



GTAC/CBPEP/ EU project on employment-intensive rural land reform in South Africa:
policies, programmes and capacities

Commodity study
Livestock production

Rauri Alcock and Marisia Geraci
Mdukatshani Rural Development Programme
Heifer Project South Africa

31 March 2020



FUNDED BY THE
EUROPEAN UNION

Acknowledgements

Dr Trevor Dugmore helped with the compilation and literature review of this paper.

Abbreviations and acronyms

AU	Animal unit
ARC	Agricultural Research Council
DAFF	Department of Agriculture, Forestry and Fisheries
LSU	Large stock unit
NWGA	National Wool Growers Association
RMRD-SA	Red Meat Research and Development South Africa
SAMIC	South African Meat Industry Company
SSU	Small stock Unit

Contents

Acknowledgements.....	ii
Abbreviations and acronyms	ii
List of figures.....	iv
List of tables	iv
Executive Summary.....	1
1 Objectives.....	2
1.1 The project	2
1.2 Specific objectives of this study	2
2 Livestock farming and farmers.....	3
2.1 Livestock farming	3
2.2 Livestock farmers	3
3 Key features of livestock production by black smallholder and small-scale commercial farmers in South Africa.....	7
3.1 Agro-ecological conditions affecting livestock production.....	7
3.2 Animal units	10
3.3 Global warming and climate change.....	11
3.3.1 Breed and environment	14
3.4 The scale of livestock production by black smallholders and small-scale commercial farmers.....	18
3.5 Production, income and employment by black smallholder and small-scale commercial livestock producers	23
3.5.1 Cattle Production	23
3.5.2 Goat production.....	27
3.5.3 Sheep.....	31
3.6 Constraints to livestock production	32
3.7 Employment in livestock production	33
3.7.1 Relationship with other livelihoods sources	36
3.8 Markets for livestock produced by black smallholder and small-scale commercial livestock producers	37
3.9 Socio-cultural aspects of livestock production by black smallholder and small-scale commercial livestock	44
3.9.1 The ceremonial economy.....	44
3.9.2 Gender relations	45
3.10 Support services for livestock production	46
3.10.1 Primary animal health care (PAHC).....	48

3.10.2	Pharmaceutical Companies.....	49
3.11	Farmer organisations	49
4	Conclusions on the potential for expanding small-scale livestock production through land reform and associated policy	50
4.1	Livestock value chains	51
4.2	Breeding for the future	52
5	Conclusions for land reform.....	52
6	Recommendations for livestock as a commodity	53
	References	55

List of figures

Figure 1:	Distribution of agricultural households farming livestock and poultry only within each province	5
Figure 2:	Farming regions in South Africa.....	7
Figure 3:	Nine biomes of South Africa	8
Figure 4:	Rainfall distribution for South Africa	8
Figure 5:	Growth response of veld grasses to rainfall	9
Figure 6a and 5b:	The effect of environmental temperature on the digestibility of herbage and on the intake of feed by livestock.....	11
Figure 7:	Feed intake relative to cow size.....	13
Figure 8:	Weaner production per ha for cows of different weights.....	14
Figure 9:	Productivity relative to environment, or survival vs production.....	15
Figure 10:	The cost of rehabilitating bush encroached veld.....	16
Figure 11:	Distribution of agricultural household heads by age group and sex (percentage)	34
Figure 12:	Livestock value chain	38
Figure 13:	Number of livestock slaughtered in South Africa over a year from October to November	42

List of tables

Table 1:	Number of agricultural households by type of activity.....	4
Table 3:	Predicted carrying capacities of various veld types according to average rainfall	10
Table 4:	Effect of tree density on grass production (Smith, 2006)	10
Table 5:	Grazing capacities of different vegetation types in South Africa.....	11
Table 6:	Effective ha required to run 100 AU or SSU over the year in the various rainfall areas.....	11
Table 7:	Effect of cow size on weaner output per 100 kg of cow weight (Lepen, 1996).....	13
Table 8:	Communal vs commercial trial on Dohne	16
Table 9:	Estimated livestock numbers (thousands) in South Africa (with figures estimated for communal areas)	18
Table 10:	Number of agricultural households by population group of household head	19
Table 11:	Number of livestock and poultry by type at household level on 07 March 2016.....	20
Table 12:	Number of agricultural households grouped by number of livestock farmed.	21
Table 13:	Number of agricultural households involved in a specific agricultural activity.	22
Table 14:	average cattle herd sizes by provinces	23
Table 15:	Number of agricultural households by education level of household head.....	24
Table 16:	The reasons given for keeping livestock in the communal/traditional areas	25

Table 17: Herd sizes recorded in surveys per region	25
Table 18: Reasons given for keeping goats in the communal/traditional areas	28
Table 19: Employees, their estimated wages (R million/year) and employee dependants in the commercial livestock sector.....	33
Table 20: Descriptive analyses of communal farming in the selected provinces	35
Table 21: South African meat imports and exports.....	41

Executive Summary

This paper is a thematic study for livestock production by smallholders and small-scale black commercial farmers in South Africa. Its aim is to identify the potential for successful expansion of the number of such farmers producing livestock through redistributive land reform, and to examine the possible outcomes of such expansion, with a particular focus on aggregate levels of production, farmer income and employment. It forms part of a larger series of thematic studies carried out for the CBPEP/GTAC Project on Employment intensive land reform in South Africa.

Section 1 Objectives outlines the overall objectives and aims of the project.

Section 2 Livestock farming and farmers defines the types of livestock farmers who are further described in the document describes the farmers as communal, commercial and communal market orientated farmers as an emerging class. This section also looks at the reasons why farmers keep livestock.

Section 3 Key features of livestock production by black smallholder and small-scale commercial farmers in South Africa describes key factors around production, both limitation and potential as well as the numbers of livestock, what the market for this livestock is and what employment potential these numbers suggest. Finally, the roles of gender in livestock and who the current role players are in the sector are explained.

Section 4 outlines **Conclusions on the potential for expanding small-scale livestock production through land reform**. This section details steps that could be taken to support commercialisation of these industries to support small scale farmers. It also looks at value chains and the value chain that could be built upon.

Section 5 Conclusions for land reform looks at how land reform could support small scale farmers and livestock commercialisation with an emphasis on job creation.

Section 6 Recommendations for livestock as a commodity highlights key intervention points that the state would need to consider to support employment intensive livestock farming.

1 Objectives

1.1 *The project*

This project aims to formulate a set of options for rural land reform in South Africa aimed at generating a large number of employment, self-employment and livelihood-enhancing opportunities through the promotion of small-scale agriculture. This will include formulating national policy guidelines, designing programmes to be implemented by national and provincial departments in conjunction with non-governmental partners, and costing such programmes. Implementation will include the provision of relevant support services to beneficiaries, such as extension advice and support for marketing of produce. Proposals will address many of the key weaknesses underlying the failure of redistributive land reform in South Africa to date.

Formulating appropriate land reform policies and designing programmes for implementation and provision of support services requires the prior specification of the key characteristics of successful smallholders and small-scale black commercial farmers in contemporary South Africa. It will identify existing constraints on success and opportunities to relieve those constraints through effective land reform. The agro-ecological, socio-economic and institutional conditions that enable success and the feasibility of creating such conditions more widely must also be identified. A number of case studies of specific commodities produced by smallholders and small-scale black commercial farmers will be undertaken. In addition, several thematic studies will analyse the strengths and weaknesses of existing land tenure and land administration systems; the capacities required for local-level planning and extension services; formal and informal agricultural value chains and their accessibility to small-scale producers; the financing of small-scale agriculture; and social and cultural aspects of small-scale agricultural systems (including gender relations).

In trying to provide for an extension support system for future land reform beneficiaries, this study looks at the status quo of current commercial and communal farmers to establish what the possible production and employment potential that could be created by supporting livestock farmers.

This study has chosen to look at cattle, sheep and goats only and has not looked at the many other types of livestock that are in the communal areas and are available for emerging farmers. These other livestock types are fragmented in distribution and in the case of chickens are seen as low value animals that are not always worth investing in.

The focus of this study is on smallholders and small-scale black commercial farmers (SHSC) as this is the largest group of future farmers who may be recipients of land reform. They are also provide the best chance for adding jobs to the rural agricultural economy.

1.2 *Specific objectives of this study*

The overall aims of this study of livestock production by smallholders and small-scale black commercial farmers in South Africa are to identify the potential for successful expansion of the number of such farmers producing livestock through redistributive land reform, and to examine the possible outcomes of such expansion, with a particular focus on aggregate levels of production, farmer income and employment.

The specific objectives of the study are:

1. To quantify the current scale of livestock production by smallholder and small-scale black commercial farmers in South Africa, and to characterize the key features of their production and livelihood systems;
2. To describe and assess the effectiveness of the support services offered to such farmers;

3. To describe and assess the character of the value chains in which these farmers participate;
4. To quantify and assess the outcomes of both current and potentially expanded systems of livestock production by such farmers, in relation to income, employment and social differentiation;
5. To explore the implications of research findings for land reform policies and implementation frameworks, with an emphasis on land redistribution.

2 Livestock farming and farmers

2.1 *Livestock farming*

Livestock farming takes place throughout South Africa with the numbers and species being dependent on production potential, climatic conditions, the concentration of population, the availability and accessibility of inputs and the location of markets. The livestock industry which accounts for more than 40% of the total value of agricultural output is a very important component of the agricultural sector and the national economy. Due to livestock farming being largely natural resource based it occupies approximately 80% of the land available for agriculture, as only 12% of SA is deemed suitable or arable production. Animal husbandry is the primary income generator in the majority of the rural areas in the country.

According to studies conducted by the Department of Agriculture, the agricultural sector creates the second largest employment multiplier per Rand invested and that an investment of R1 million in the agricultural sector creates twice the number of jobs than in the manufacturing sector.

Nine of the top ten employment generators in the economy are within the agro-processing sector. Meat products represent one of the top ten employment generators in the economy. The livestock sector is a major employer and employment generator with approximately 425,000 direct and indirect employees and a further 2,125,000 people dependent on the livestock industry for their livelihood. Approximately 36,000 commercial farmers employing about 108,000 farm workers farm with cattle and approximately 60,950 workers are employed in sheep farming.

The industry has high investment potential, with the current total investment in the industry amounting to more than R20 billion (IDC, 2010: iv)

2.2 *Livestock farmers*

Livestock production is often linked with a social and cultural way of life for many farmers in South Africa, and this includes members of rural homesteads that are livestock keepers and not seen by the policy makers as farmers. This strong link to the lifestyle choice of rural homesteads then needs one to further describe the aspirations of these kinds of producers, so as to better model policies to support this large group of livestock farmers.

As can be seen from the table below there are more livestock farmers than crop farmers in South Africa. This table refers to all farmers who self-identified in the census of 2016. This would include small scale and commercial farmers.

Table 1: Number of agricultural households by type of activity

Province	Animals only		Crops only		Mixed farming	
	2011	2016	2011	2016	2011	2016
Western Cape	21 997	16 957	29 542	35 805	19 685	6 285
Eastern Cape	294 384	214 964	107 394	85 042	183 149	178 801
Northern Cape	34 826	35 338	9 713	7 271	8 166	4 458
Free State	53 248	46 596	114 314	76 586	26 675	22 252
KwaZulu-Natal	300 563	241 991	217 277	144 144	176 604	124 583
North West	134 091	109 674	36 834	35 698	32 719	16 794
Gauteng	46 235	40 743	136 245	160 676	57 267	16 786
Mpumalanga	119 150	83 943	84 822	79 070	48 498	46 772
Limpopo	215 333	160 184	161 068	141 059	75 741	67 602
South Africa	1 219 831	950 389	897 212	765 352	628 520	484 333

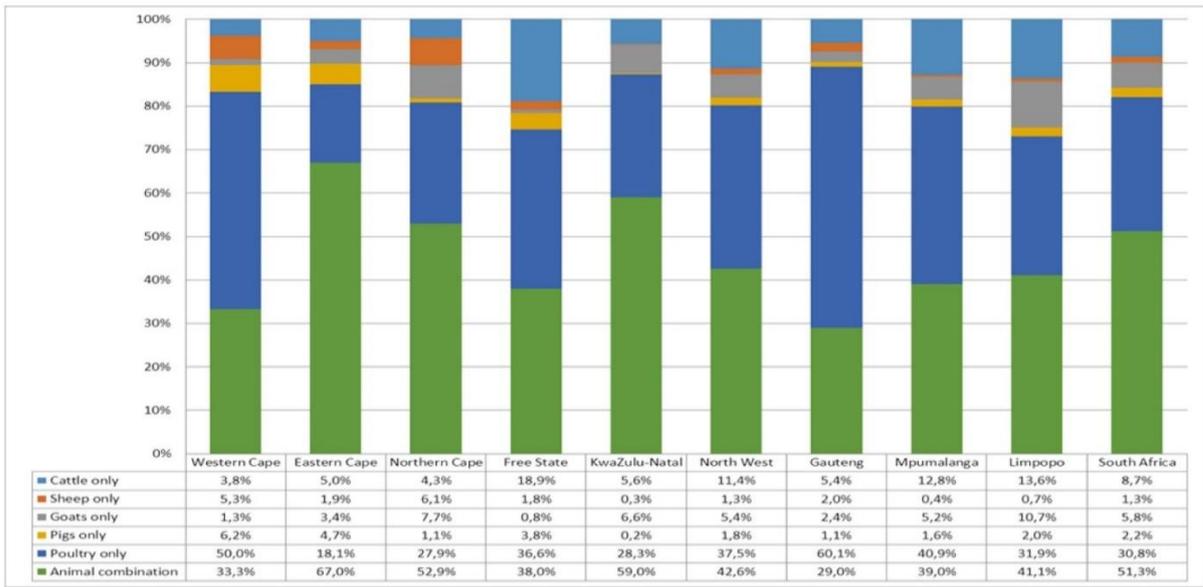
Source: (StatsSA 2016)

Livestock production systems can be grouped into three categories. Although these can be oversimplifications, they are useful as a tool to understand the investments and decisions that farmers make.

1. **‘Commercial’ livestock farming** is a description used in South Africa to describe traditional, white-owned ranching businesses on farms privately owned by single owners of the farms. Simply put, ‘a farmer, a farm and a fence’. In recent decades this has moved rapidly into farming companies and multinationals replacing these individual farmers. Many African businessmen have also invested in these farms. The term ‘commercial farmer’ is often used to separate these large-scale farmers from those who are not commercial/communal farmers.
2. **‘Communal farmer’** is a much-contested term but for this document we use the term to describe a rural family living on communal land (be this state-owned land, land handed over through land reform or a former Bantustan). The main identifier is that it is owned or managed or used in a communal manner, with no individual having large tracts of land separated out by fencing for their exclusive use. These farmers have herds and flocks valued from between a few hundred Rands to hundreds of thousands of Rands. And the livestock involved often combine cattle, goats, sheep and chickens in the same home (see Table 2 below, which suggests that in the two largest farming provinces of Eastern Cape and KwaZulu-Natal, around 60 percent of farmers have combined herds. These combined herds are used to provide social and economic security, and functionally are traded for cash or goods and used to pay social obligations linked to marriage and traditional fines. Generally speaking, only in dire circumstances are they eaten purely as meat that is not linked to a ceremony. They are also owned by different family members in large homesteads of many families, and this makes it more difficult for them to sold out-of-hand.
3. The **‘communal market-oriented farmer’** is a third class of farmer that has started coming to the fore in recent years. These farmers live on land belonging either to the state or groups (or ‘communities’, but have decided to commercialise parts of their herds, either by making their farming system more intensive or finding additional land and thus allow productivity to

grow. They also have varying herd sizes, mostly comprising mixed herds and flocks, but the main reason for investing in production is so that the farmer can sell the livestock. A partial driver of this is farmers having access to land reform farms which often have extensive grazing areas. Another driver combines a mix of joblessness and education, with young people coming home and wanting to make a living from the family wealth.

Figure 1: Distribution of agricultural households farming livestock and poultry only within each province



Source: StatsSA (2016)

Most smallholders currently live in the old homelands which are a mixture of new and old tenure arrangements. Although these from the outside seem like African homelands of some type, the underlying tenure is very mixed often undefined. This is as a result of the old Transkei, Bophuthatswana, Venda, and Ciskei (TBCV) states which are nominally state land but in some form of transition towards privatisation. The Ingonyama Trust is an anomaly to these. Although it has the same history, it is a para-statal controlled by private individuals, and numerous patches of state land that has not been integrated, as well as many land reform farms bordering on these areas. The balance lives on land reform farms, often with little or no control over the entry and exit of people or livestock. There is often not a perceivable difference between land reform farms and the surrounding communal areas. Many livestock farmers are bound by tribal or traditional boundaries.

Livestock are also owned by poor urban households, even in large cities (Randolph et al., 2007). Similarly, in South Africa rural and urban societies own livestock within a communal dispensation, the urban dwellers often having access to grazing at the commonage made available by town municipalities.

Much of what used to be municipal commonage has become peri-urban sprawl where livestock is kept, but in smaller fragmented herds and flocks

These smallholder farmers can be broadly divided into three groups, namely:

1. Small-scale, family-run, homestead livestock. These are generally small herds of 4 to 14 goats, around 10 to 20 chickens, and sometimes a few cattle. There is very little herding as

the value returned as a result of this activity is minimal. These animals are largely kept as a form of savings and have often come into the homestead through bartering or being paid as fines. These homesteads have few investments to contribute to livestock production They herd on the commonage.

2. Medium-scale black smallholders generally own 40 to 100 goats, 20 to 50 cattle and many chickens that the women take care of. They still live in a geographically bound home where they move the cattle from every day. They employ herders and so-called helpers, usually young and poorer children of the neighbourhood. They actively herd their animals in order to move their livestock away from homesteads and closer to good grazing.
3. A third class of large farmer, who buys a farm away from other rural homes and pays people to manage his cattle for him year-round. This is usually someone who has come into wealth (e.g a taxi owner). This kind of 'gentlemen farming' is common and is often seen as the much-vaunted creation of a commercial black farmer.

Sheep and goats generally do not tend to overlap, as sheep are grazers and compete with cattle for grass. Goats are predominantly browsers, so competition is limited. Sheep can tolerate extreme cold, whereas goats prefer dryer and warmer areas. In terms of stock theft, sheep are also much more vulnerable.

On the reasons that black farmers keep livestock Randolph et al (2000) have proposed the following reasons and relative importance:

- **Producing food:** A regular supply of nutrient-rich, livestock-based supplements to plant-based staple foods is critical for homestead food security. In most systems the lower-value livestock like chicken and sheep are slaughtered out-of-hand and consumed by the larger farmer's extended families. In some systems, slaughtering livestock for meat is, and only when required for cultural ceremonies and hospitality. It's also generally undertaken only when animals are sick or old. (Meissner et al., 2013. S. Afr. J. Anim. Sci. vol. 43).
- **Generating income:** Owners may produce for the market, but in practice sales are occasional to meet urgent needs for cash. This 'reactive market' is slowly changing as sellers begin to plan and breed for sale.
- **Providing manure:** Livestock waste is used mainly to maintain soil fertility and therefore contributes to better crop production.
- **Traction and transport:** Cattle and donkeys are often used to plough and transport commodities.
- **Serving as financial aids:** The poor do not generally have access to credit and banking facilities. Livestock offer an alternative to their savings or accumulated capital, and as a hedge against inflation. They can sell their livestock for urgent cash or use them as a form of insurance, which can be sold to provide for the family when the owner dies.
- **Enhancing social status:** Cultural norms in many poor rural societies place considerable value on livestock as an indicator of social importance in the community. Livestock are also exchanged as dowry and the price of the bride is linked to the social status of the family. Even more common are social fines and interactions around this justice system that involves livestock as settlement. A quarter or even half a herd can be used in a year on these sorts of interactions.

South Africa has changed and is changing incredibly fast, however. At this time the authors would argue that the following ranking for keeping livestock is more likely:

- Serving as financial aids
- Generating income
- Enhancing social status
- Producing food

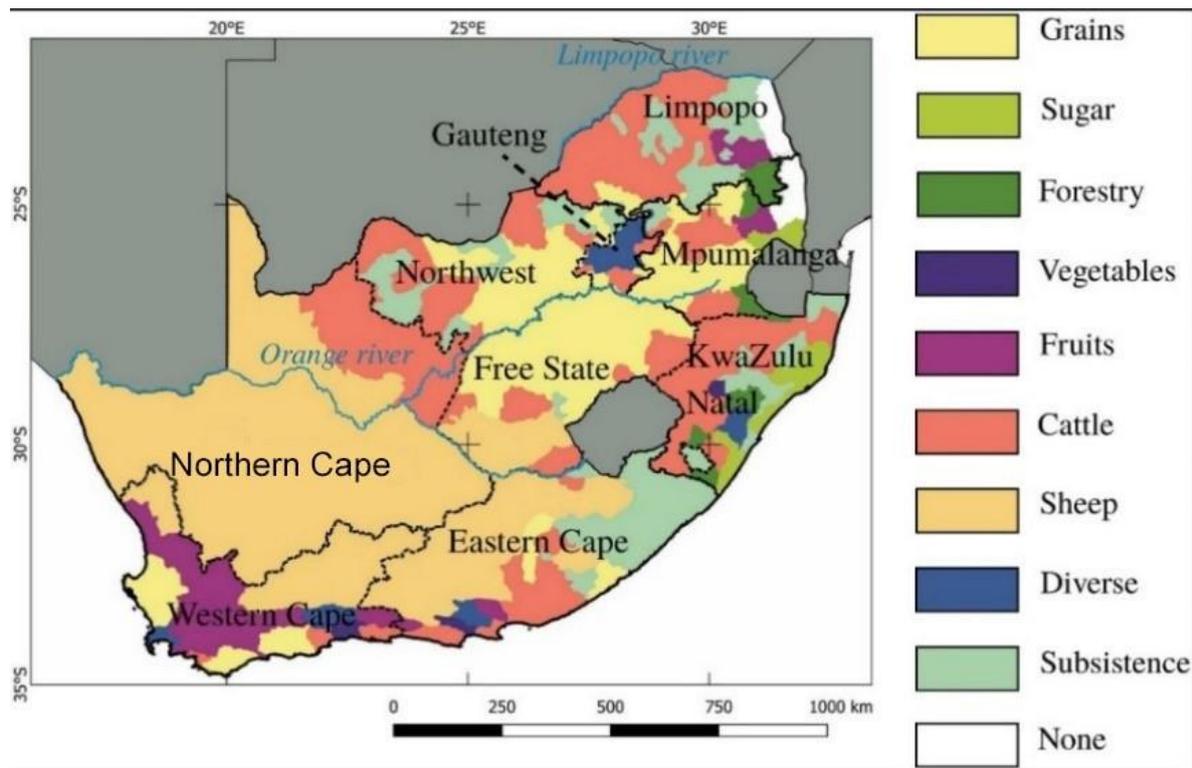
Manure is no longer a commodity, but rather a problem to try remove from kraals and animal traction and transport are no longer practiced on any scale.

3 Key features of livestock production by black smallholder and small-scale commercial farmers in South Africa

3.1 *Agro-ecological conditions affecting livestock production*

There are many different map systems describing the ecology, rainfall, and grazing potential of different parts of South Africa. In the drier Karoo areas, it is easier to both describe and make recommendations, but the east of the country has more complex patterns of vegetation cover, and urbanisation encroaches on agricultural land to a greater degree. The following three maps broadly outline the major parts of South Africa in sufficient detail to make recommendations around livestock.

Figure 2: Farming regions in South Africa

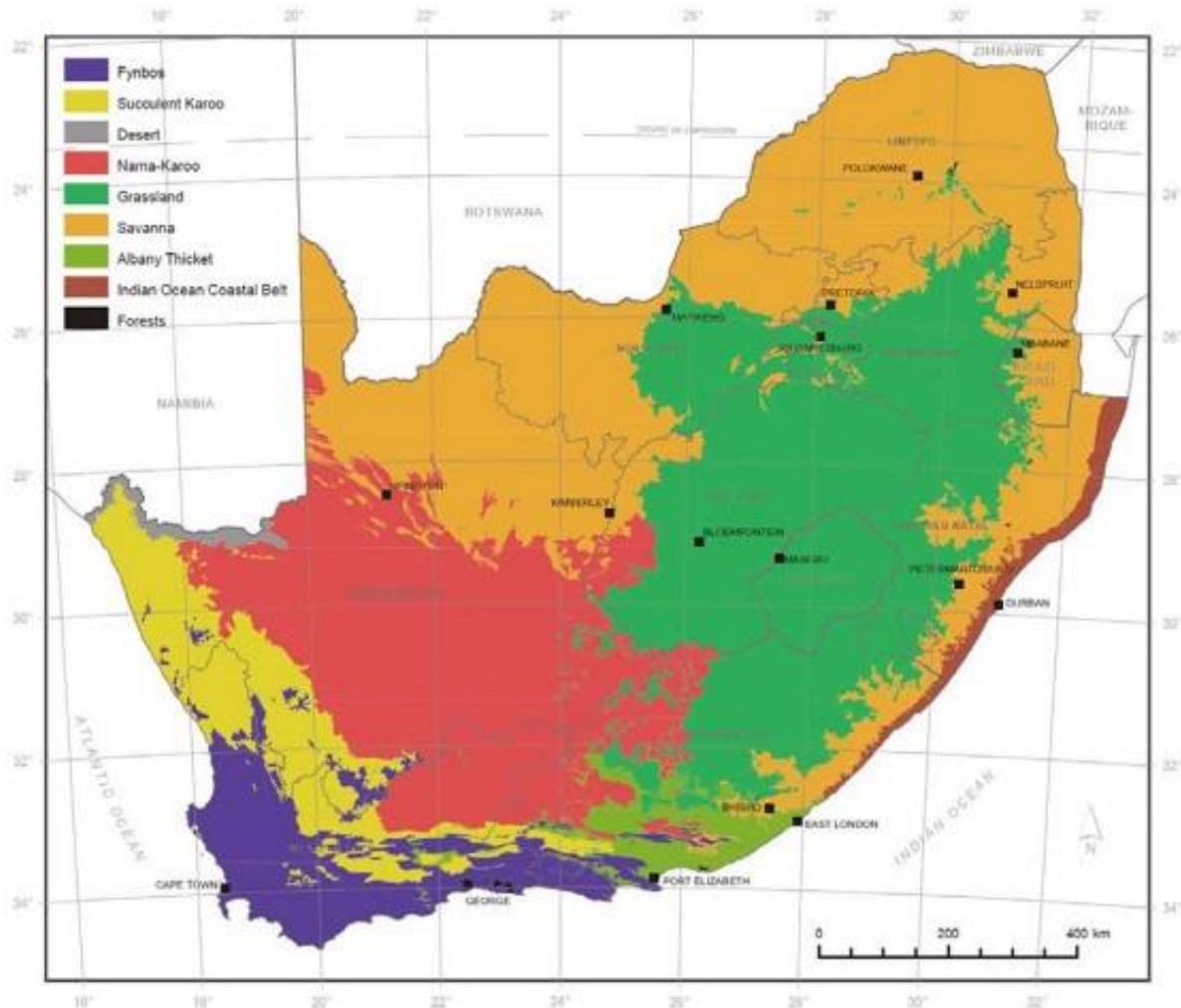


Source: Waldner, François; C. Hansen, Matthew; Potapov, Peter V.; Löw, Fabian; Newby, Terence; Ferreira, Stefanus; et al. (2017)

The land use map in Figure 1 above indicates suggested farming activities per area. These maps are based on Western agricultural models and do not necessarily reflect what farmers may actually be doing in these areas. Most of all though, the maps do not take into account vegetation change

brought on by climate change which has created huge bush encroachment problems in large parts of the eastern part of the country and spheres of grasses invading the Karoo.

Figure 3: Nine biomes of South Africa

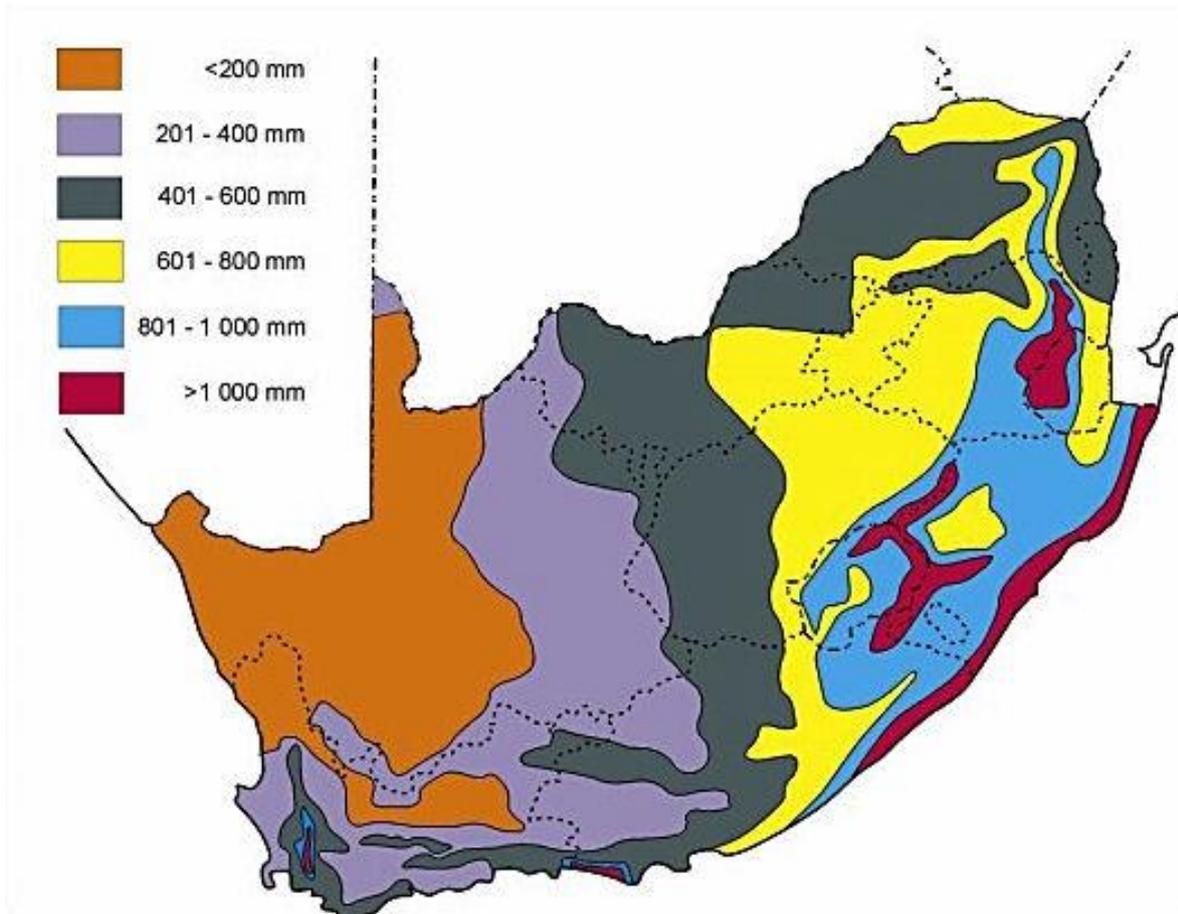


Source: Mucina and Rutherford (2006)

<https://www.arcgis.com/apps/MapJournal/index.html?appid=e686017d45f142d59b9971c8a8125e90>

Figure 2 above shows the biomes of the country. These coarse-grained representations do not differentiate the grassland and savannah biomes into high, medium or low rainfall sub-biomes. Some of these areas that are one colour on the map may receive between 400 mm to 1400 mm of rain/annum.

Figure 4: Rainfall distribution for South Africa



Source: Mabhaudi et al (2017)

Figure 3 above is a better indicator of where land would have higher carrying capacity for livestock. Note though that the maps have very little overlay of patterns or shapes which makes it difficult to describe potential in broad brushstrokes.

Animal production from veld is dependent upon the amount of herbage available per hectare, with rainfall the principle factor determining the amount of biomass produced. Factors such as a lack of vegetative cover reduce the effectiveness of the rainfall due to runoff from bare hard soils.

Figure 5: Growth response of veld grasses to rainfall

Vegetation type	Semi-arid grassland	Bushveld /Matopos	KZN Grasslands
Veld Condition	Yield (kg DM/mm rainfall)		
Poor	0.93		2
Average	1.58	3	3
Good	2.68		4
Reference	Snyman, 1989.	Cited by Smith, 1994. (Cedara Report No. N/A/94/44)	Smith, 2006

The dominant effect of rainfall on animal production was confirmed by Hatch, et al., (1997) where rainfall in the growing season was the most important factor determining animal productivity for the season, followed by stocking rate.

3.2 Animal units

Animal units are standardised units to enable comparison between small animals or breeds with larger animals or breeds on the same scale. Animal units are also linked to a standardised feed intake or nutrient requirement. An AU is essentially a measure of [forage](#) demand by a theoretical animal unit that can then be converted according to the relative demands of different animal classes based primarily on metabolic bodyweight.

The large stock unit (LSU) was defined as the equivalent of one head of cattle with a body weight of 450 kg and gaining 500 g per day (Meissner et al., 1983). The energy requirement of such an animal is c. 75 MJ ME/day. However, for sheep and goat (small stock) producers, the LSU remains an uncomfortable concept. The small stock unit (SSU), defined as 15% of a LSU (1 SSU = 0.15 LSU ≈ 11.25 MJ ME/day ≈ 1.5 kg Lucerne hay/day ≈ 50 kg ewe), will be used to express the grazing capacity of the land for small stock (Herselman & Olivier, 2009).

Feed requirements are correlated to animal size, measured in standard units, namely per AU or SSU. The feed requirement of an animal unit is expressed as 10% of its metabolic weight, which amounts to 10 kg DM/day or an annual requirement of 3650 kg/yr. The equivalent for an SSU of 50 kg is 1.5 kg DM/d, or 548 kg DM/yr.

Estimating the amount of herbage production from rainfall and knowing the amount of feed required to sustain an animal over the year, assuming that 50% of the herbage is available to the animal (Smith, 2006), the carrying capacity of the veld can be predicted. Although in reality each site needs to be visited to determine veld condition and basal cover as this impacts the effectiveness of the rainfall. The predicted herbage production and consequent carrying capacity for various veld types is shown in Table 4.

Table 2: Predicted carrying capacities of various veld types according to average rainfall

Rainfall (mm/yr)	150	300	500	700	900
	Kg DM production/ha /yr				
Semi – arid grasslands	237	474	790	-	-
Bushveld	-	-	1500	2100	2700
Moist grasslands	-	-	1500	2100	2700
Carrying capacity (AU/ha/yr –assuming 50 % utilisation)					
Semi - arid grasslands	30.8 ha/au 4.6 ha/ssu	15.4 ha/au 2.3 ha/ssu	9.2 ha/au 1.1 ha/ssu	-	-
Bushveld*	-	-	4.8 ha/au	3.5 ha/au	2.7 ha/au
Moist grasslands	-	-	4.8 ha/au 0.61 ha/ssu	3.5 ha/au 0.44 ha/ssu	2.7 ha/au 0.34 ha/ssu

In terms of bushveld, tree density impacts on grass growth through shading. and this needs to be factored in when predicting grass yield, as indicated in Table 5 below:

Table 3: Effect of tree density on grass production (Smith, 2006)

Tree density (tree equivalent/ ha)	Proportion of grass yield in relation to the absence of trees (%)
900	90
1200	80
1500	70
1800	50
2100	30

For comparative purposes, Tainton (1981) cites the carrying capacities of the various biomes as shown in Table 6.

Table 4: Grazing capacities of different vegetation types in South Africa

Vegetation type	Grazing capacity (ha/AU/annum)
Grassland	1.75 – 5
Savanna (bushveld)	4.0 – 35
Nama Karoo	7.0 – 35
Succulent Karoo	12.0 – 25
Thicket	6.0 – 30
Fynbos	4.0 – 20

Utilising the predicted carrying capacities from Table 4, the effective area required to run a farming unit of either 100 AU or 100 SSU in the various grassland areas based on annual rainfall is given in Table 7. Using 100 as a production unit makes it simple to scale the area up or down for the actual units farmed. It also gives the relative scales of land areas required to farm in the various agro-ecological areas in South Africa.

Table 5: Effective ha required to run 100 AU or SSU over the year in the various rainfall areas

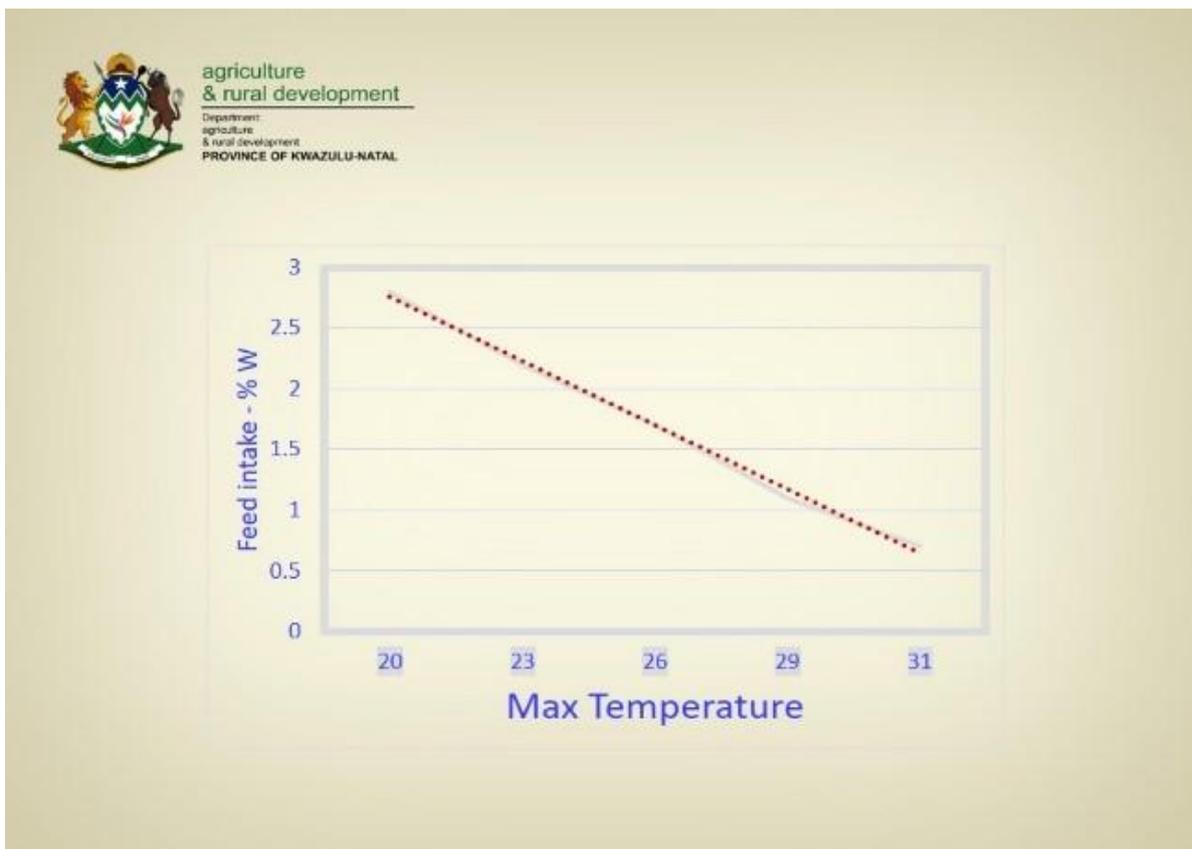
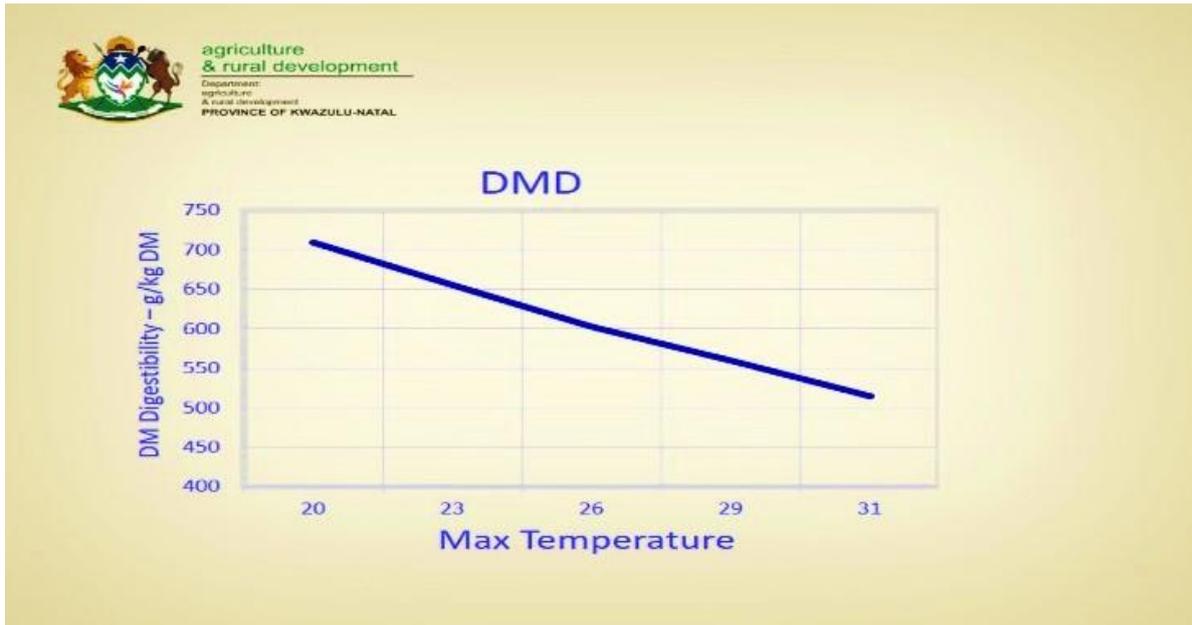
Vegetation	Semi-arid grassland			Moist grasslands		Bushveld	
Rainfall (mm/yr)	150	300	500	700	900	700	700 high tree density – 1500/ha
Ha/ 100 AU	-	1540	920	350	270	350	500
Ha/ 100 SSU	460	230	110	44	34		

However, these stocking rates assume veld in average to good condition with a sufficient basal cover to intercept the rainfall. Other factors such as climate change and warming are making an ever-increasing impact on livestock production, and cognisance needs to be taken of these effects and the negative impact they will exert on livestock production in warmer climates.

3.3 Global warming and climate change

Higher environmental temperatures have a negative impact on the digestibility of herbage. Furthermore, high temperatures reduce feed intake by livestock, a mechanism to reduce the heat load, a by-product of rumen fermentation, on the animal. In effect this means animals eat less of a poorer quality feed, a double blow. These effects are illustrated in Fig 5a and b below.

Figure 6a and 5b: The effect of environmental temperature on the digestibility of herbage and on the intake of feed by livestock.

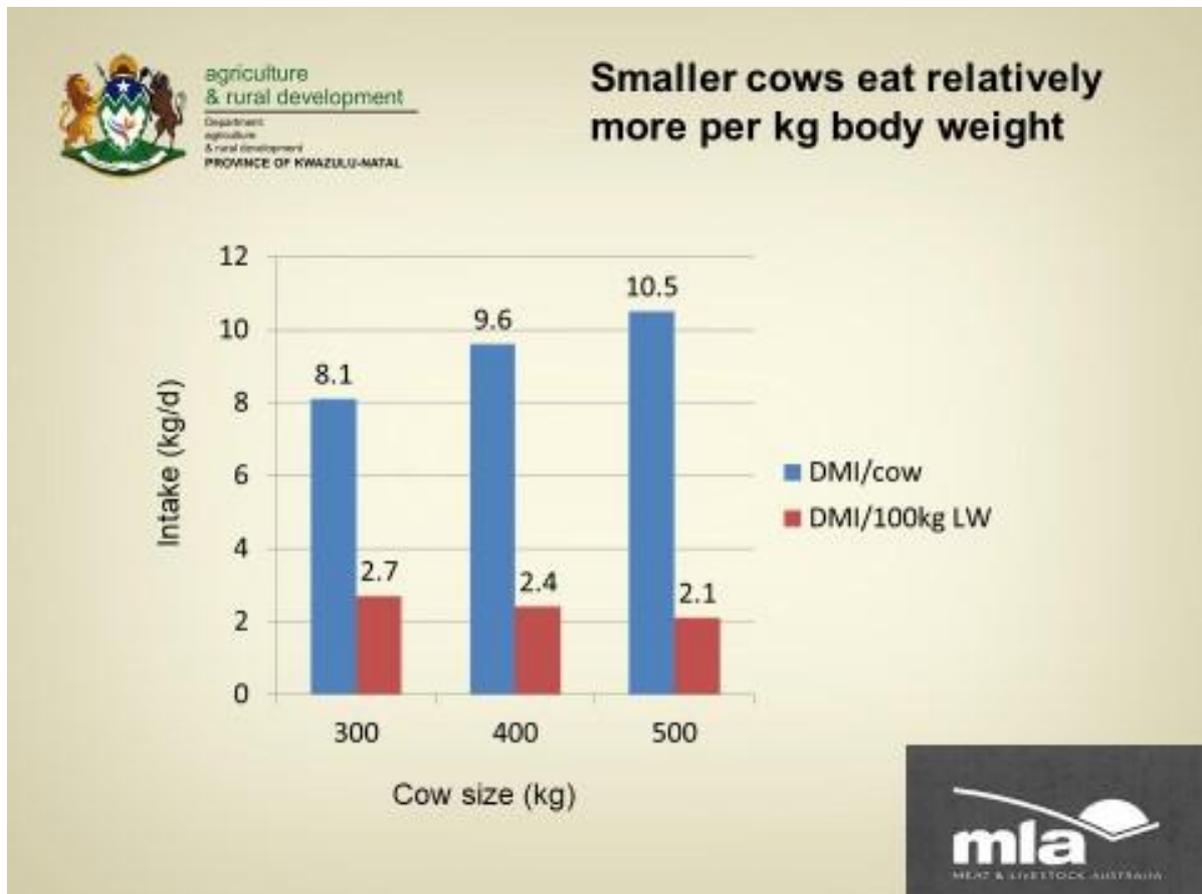


Source: Department of Agriculture and Rural Development – KwaZulu-Natal n.d.

Animals adapt to hotter climates by developing a smaller body size. Smaller animals have a larger surface area (skin surface area) in proportion to body weight, allowing for a greater surface area for heat loss. Limbs, tails, ears and dewlaps are longer in hotter environments (McManus, 2016). Smaller body size requires less energy for maintenance (keep it alive), a further adaptation favouring these animals in a hotter environment characterised by feeds with low nutritive value.

Smaller animals/breeds have been shown to be more biologically efficient, requiring less feed to survive due to their lower maintenance requirements and their ability to consume more feed in relation to their size, i.e., consume more feed per kg body weight as indicated in Fig 5, and may be more appropriate and efficient in surviving increased environmental temperatures in the future.

Figure 7: Feed intake relative to cow size



Source: Meat and Livestock, Australia in Department of Agriculture and Rural Development, KwaZulu-Natal.

Productivity per cow is greater in smaller cows, as shown below, due to the greater efficiency of heat loss and relatively higher feed intake.

In Namibia, Lepen (1996) showed that kg weaner mass produced/100 kg cow mated was greater in smaller breed animals and similarly for smaller animals with a breed.

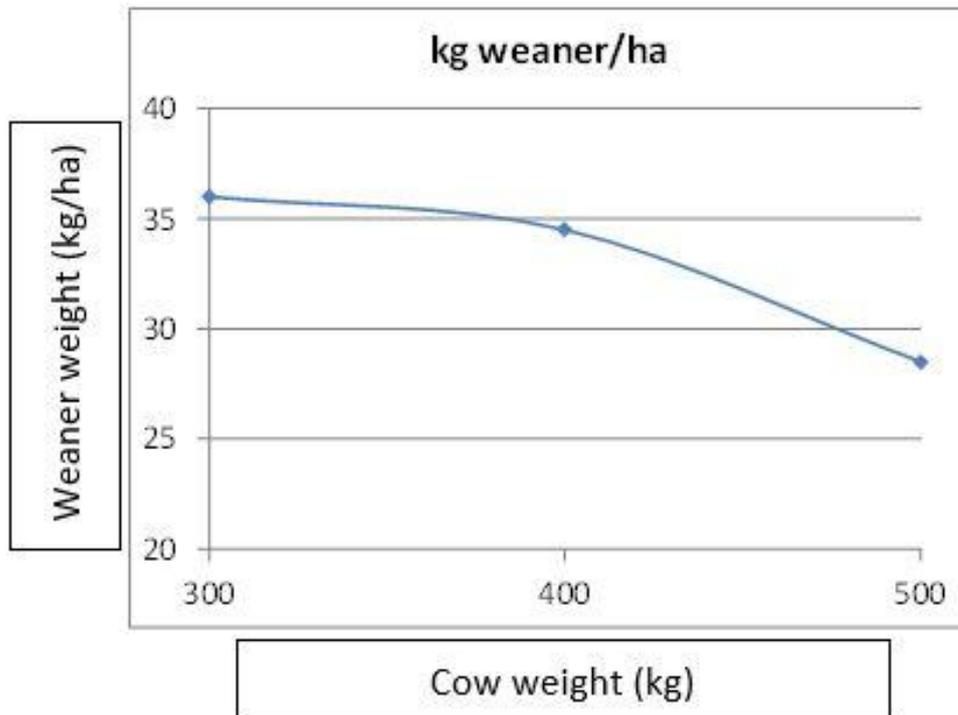
Table 6: Effect of cow size on weaner output per 100 kg of cow weight (Lepen, 1996)

Breed	Nguni	Hereford	Santa	Simmentaler
kg weaner weight/100kg cow	37.4	33.9	34.9	31.5
Dam weight	400	517	556	590

Similarly, Els, (2002) found that the influence of frame size on productivity, when stocked at the same biological weight per ha, small framed animals had a higher production per ha than large framed animals. Similar results were found within a breed.

The increased productivity of the smaller animals in terms of output per kg of cow is also translated in improved output per ha is illustrated in Fig 6.

Figure 8: Weaner production per ha for cows of different weights.

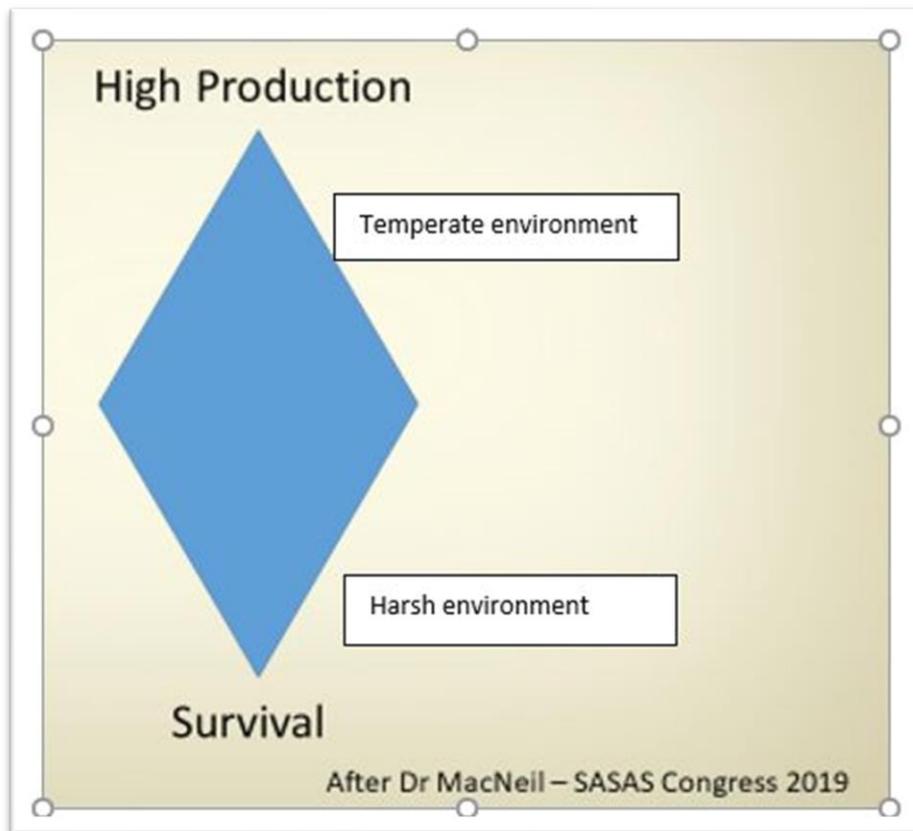


A study by Visagie (2017) on the effect of frame size on cow performance and profitability in two Bonsmara herds from two production areas, utilising the model developed by Prof Nesor of the Free State University, confirmed the conclusion drawn above that smaller framed cows were more efficient than medium framed cows with large framed cows the least efficient per ha, albeit with small differences between body sizes, with small framed cows with lots of milk the most profitable animals.

3.3.1 Breed and environment

The interaction between environment and productivity is illustrated in Fig 7. As the environment gets harsher, the animals change from production to survival mode. The optimum level of production and survival fall somewhere between the extremes and will depend on the severity of the environment. As conditions becoming harsher due to the impact of global warming going forward animals will have to expend more of their demising resources (feed intake and feed quality) on survival and consequently less on production, thereby reducing overall productivity. Consequently, areas presently marginal for livestock production may become unsuitable for livestock production in the future.

Figure 9: Productivity relative to environment, or survival vs production.



Although there is general agreement that the indigenous animals of Africa are well adapted, there is increasing pressure to increase the productivity of these animals. It is important to establish that one-sided genetic selection for individual performance characteristics without a corresponding improvement in environmental nutrient supply has always produced negative side effects. In communal land tenure systems where animal numbers are unrestricted, and nutritional resources are consequently depleted, there is little scope for improvement of animal productivity by genetic means. If indigenous animals are to be used as the basis for selection for improved performance characteristics, the challenge is to produce an animal capable of high performance, but which is still adapted to its environment. Those with settings which are too high for the environment will misdirect endogenous resources and typically exhibit problems with reproduction (Cronje, 1998).

“The tragedy of breed improvement” is a phrase used by de Lange (1991) to describe the adverse effects of well-intentioned but ill-advised breed improvement programmes that have been with us for a long time (Donkin, 2005). Ill-conceived crossbreeding programmes merely reduce the hardiness of locally adapted breeds. This is due to a certain mindset that believes that the main problem is genetic, and that the introduction of improved breeds will solve the problem. While a new breed of animal could be more productive than the existing breeds, unless health and nutritional programmes are introduced to support the higher nutritional requirements of these animals, the results will be disastrous. A crossbreeding programme may become so widespread that the existence of valuable genetic diversity in the indigenous and adapted animals may be threatened.

Ledger (1960) stated that feed and not breed was critical in animal production. Much is made of the low offtake from communal herds, although this is only considering sales through the formal market. Nowers (2013) conducted research in the Eastern Cape where animals were sourced from co-

operators in communal (58 cattle selected from 9 communal farmers - Randomly allocated to commercial or communal management group) and compared with commercial Bonsmara animals from the research station. The animals sourced from communal farmers run on the Dohne Research Station increased their productivity to that of the other animals on the Research Station, while the cattle managed under communal conditions reduced their productivity to that of the other animals on the communal area, indicating that it was environment and management and not breed responsible for the lower output from communal herds. This data is presented in Table 9.

Table 7: Communal vs commercial trial on Dohne

	Treatment Herds		Döhne Herds	
	Communal	Commercial	Nguni	Bonsmara
Calving (%)	35	82	85	74
Re-conception (%)	25	84		
Weaning weight (205d)	107	176	153	192
Cow efficiency (%)	29	49	44	41
Cow Mortalities (%)	13	1		
Calf Mortalities (%)	27	2		

Source: Nowers (2013)

To conclude, climate change is going to have a severe impact on livestock production in hotter environments and in future the hot harsh marginal production areas may not be able to sustain effective livestock production due to the increased incidences of drought and disease. Other activities such as wildlife and tourism may become more appropriate in marginal areas going forward. As noted by MacNeil (2019), the rules are changing – while change is inevitable, adaptability and survival are optional. Going forward we need to match the breed/animal to the environment. Don't put a Ferrari breed in a low resource environment. We need to build strong foundations to succeed.

The physical and economic consequence of bush encroachment, which will increase with higher environmental temperatures higher atmospheric carbon levels is indicated below. Further cost of dealing with the results of this encroachment also increases the longer it is left. Water and grass will diminish faster the longer it takes to deal with the effects.

Figure 10: The cost of rehabilitating bush encroached veld



Source: Stafford, W. H., G. P. Von Maltitz and H. K. Watson (2018).

3.4 *The scale of livestock production by black smallholders and small-scale commercial farmers*

The estimated livestock numbers (thousands) in South Africa are presented in Table 10 and data for Agricultural households in Tables 11 to 13.

Table 8: Estimated livestock numbers (thousands) in South Africa (with figures estimated for communal areas)

	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape	Total
Cattle1 – 2002	3 197	2 320	276	2 805	1 181	1 375	1 816	493	501	13 964
Sheep1	8 625	6 013	82	858	196	1 663	734	7 890	2 901	28 952
Goats1	3 201	86	8	952	1 087	106	771	513	253	6 977
Cattle2 – 2017	3 126	2 178	246	2 444	922	1 266	1561	441	503	12 639
Sheep2	6 593	4 486	88	664	209	1 559	606	5 402	2 651	22 258
Goats2	2 061	215	25	693	927	80	668	468	209	5 346
Beef cattle – 3 commercials	1 531	1 232	321	1 409	650	868	1 035	603	219	7 868
Beef cattle – 3 Communal	1 272	911	245	1 116	433	603	713	208	232	5 733
Sheep – 3 commercial	6 410	4 271	91	676	226	1 534	612	5 361	2 380	21 561
Sheep – 3 communal	906	604	13	95	31	217	86	758	336	3 046
Meat Goats 3 4 commercial	643	67	11	227	349	25	202	144	62	1 730
Meat Goats – 3 communal	1 588	165	27	561	861	61	498	355	152	4 268

1 DAFF - Directorate Agricultural Statistics, 2002

2 DAFF National Livestock Statistics: Newsletter May 2019

3 Meissner et al., 2013

4 Excludes 21000 dairy goats and 1 million Angora goats

Although the data are very disputed, the most recent data that gives an indication of trends is StatsSA's 2016 census. The data around the livestock statistics are summarised in the box below. Previously, livestock counts were done by stock inspectors in the commercial sector and diptank assistants in the former homelands. However, the stock inspectors and diptank assistants were phased out in the early 1990's, leaving the Department without ground truthing staff in the field, and now relying on cattle numbers sent in by farmers. The control boards also played a role in data collection, but as these were deregulated in the 1980's this source of information also disappeared. Commodity organizations, such as the RPO and its affiliates try to maintain data on livestock numbers, but as they are voluntary organizations with membership dues not all farmers participate. Also, there are rival commodity organisations, e.g. the Transvaal Agricultural Union. The statutory levy on livestock sales assists in the estimation of livestock numbers, but this only includes data from formal sales which are reported. According to the Red Meat Research and Development SA (www.rmrdsa.co.za) the availability of statistics, and in particular that applicable to herd size, herd composition and the number of animals slaughtered, pertaining to the large and small stock sector remains a problem since the abolishment of the Meat Board in 1997. Data published by the National Department of Agriculture is according to several experts in the red meat industry not an accurate reflection of the actual state of affairs in the industry. Estimation of livestock numbers in the communal areas is fraught with problems leading to very questionable statistics.

2016 National Census by StatsSA

Population of 55 653 654
 16 923 309 households
 Agric 2016 survey then says 2.3 million are involved in agriculture
 Livestock households 990 210 is close to 4 million people relying on livestock

Rural population (% of total population) in South Africa was reported at 34.7 % in 2016, according to the World Bank collection of development indicators, compiled from officially recognized sources. Rural population refers to people living in rural areas as defined by national statistical offices – this is 18 million people – 4 per home - thus 4.6 million rural homesteads

So every second home is involved in agriculture – 50 percent
 And every fourth is involved in livestock minus poultry – 25 percent

There are 13 934 125 cattle kept by 588 367 homesteads, thus 24 cattle per home
 There are 19 479 166 sheep kept by 240 737 homesteads, with 80 sheep per home on average
 And 7 830 644 goats kept by 514 519 homesteads, with 15 goats per home on average

Table 9: Number of agricultural households by population group of household head

Province	Black African		Coloured		Indian or Asian		White		Other
	2011	2016	2011	2016	2011	2016	2011	2016	2011
Western Cape	22 580	10 949	34 882	25 920	523	769	25 549	31 514	1 039
Eastern Cape	574 118	475 665	9 560	6 127	725	462	11 627	12 787	541
Northern Cape	30 076	27 839	17 137	13 683	190	45	7 013	7 231	732
Free State	183 830	143 287	3 409	2 048	303	50	13 504	12 125	239
KwaZulu-Natal	685 245	517 661	3 211	1 967	12 092	6 210	15 580	10 387	875
North West	196 276	153 720	2 317	1 648	417	220	14 639	12 192	397
Gauteng	221 155	194 633	5 252	4 092	4 949	4 414	46 584	39 455	1 188
Mpumalanga	252 061	213 992	838	507	533	322	9 695	10 461	263
Limpopo	460 483	378 534	469	693	469	224	6 699	7 209	372
South Africa	2 625 829	2 116 281	77 079	56 686	20 204	12 716	150 874	143 361	5 650

Table shows the farming population of South Africa broken down by race showing a decline in farmers between the years 2011 to 2016 African farmers representing more than 90 percent of the farmers in the country (STATSSA, 2016).

Overall, livestock numbers have declined over the past 17 years, with sheep and goat numbers in particular declining appreciably. Shamase (2013) indicated that livestock numbers in the Nongoma district in Zululand had declined over the previous 30 years by 24%, with diseases and drought cited by the respondents (74.1%) as the reasons for the reduction in livestock. The major diseases encountered being heart water (20.9%) red water (20.9%) tape worms (20.9%) and gall sickness (16.3%). It is noteworthy that the tick-borne diseases are dominant.

Urbanisation could also be an influence on livestock numbers. South Africa is urbanising rapidly: 63% of South Africans are already living in urban areas and the statistics will rise to 71% by 2030. By 2050, eight in 10 people will be living in urban areas and this will increase demand on basic infrastructure requirements. Given this reality, government has developed an Integrated Urban Development Framework (IUDF). (PMG 2019)

Table 10: Number of livestock and poultry by type at household level on 07 March 2016

Province	Cattle	Sheep	Goats	Pigs	Chickens	Other poultry
Western Cape	692 495	2 282 396	182 669	104 979	295 507	185 187
Eastern Cape	2 819 086	7 605 248	3 221 829	536 108	3 841 174	291 982
Northern Cape	591 607	4 279 133	554 254	13 099	314 007	120 833
Free State	1 869 583	2 509 463	131 532	148 470	1 056 509	73 197
KwaZulu-Natal	5 498 209	549 943	1 930 175	201 826	6 406 289	170 632
North West	2 207 342	840 180	538 991	127 078	2 128 239	95 856
Gauteng	509 804	217 406	202 091	140 650	1 911 589	129 978
Mpumalanga	1 508 808	945 118	337 217	194 238	1 938 282	143 835
Limpopo	1 237 493	250 279	731 888	135 369	4 056 632	164 714
South Africa	13 934 125	19 479 166	7 830 644	1 602 816	21 948 229	1 376 214

Source: STATS SA - Community Survey 2016, Agricultural households, Report No. 03-01-05

Table 11: Number of agricultural households grouped by number of livestock farmed.

Province	W Cape	E Cape	N Cape	Free State	KwaZulu-Natal	North West	Gauteng	Mpum	Limpopo	South Africa
Cattle										
1 – 10 (2011)	2 486	172 507	6 355	24 952	136 728	35 545	4 518	33 087	69 089	482 270
(2016)	1 769	139 541	5 886	19 128	118 437	28 947	5 450	32 697	57 924	409 782
11-100 (2011)	2 186	25 908	3 513	6 354	31 013	13 755	2 923	10 565	21 713	117 934
(2016)	2 059	36 664	5 573	8 294	43 423	16 660	5 638	17 867	24 585	160 783
100 + (2011)	1 259	2 122	977	2 283	1 792	2 397	789	1 074	759	13 457
(2016)	1 011	3 517	1 248	3 379	1 839	2 903	874	1 920	1 132	17 822
Total (2011)	5 932	200 538	10 846	30 590	169 534	51 699	8 231	44 727	91 502	613 662
(2016)	4 839	179 721	12 709	30 801	163 699	48 510	11 962	52 484	83 640	588 367
Sheep										
1 – 11 (2011)	1 676	62 595	5 040	3 528	15 887	10 736	2 224	3 327	10 030	115 046
(2016)	1 448	53 308	5 234	3 904	14 804	10 846	3 642	3 993	9 399	106 580
11-100 (2011)	1 737	55 971	4 530	3 031	5 608	6 440	1 661	1 591	3 531	84 103
(2016)	1 874	73 588	6 176	4 125	6 159	8 577	4 222	2 994	4 398	112 114
100 + (2011)	2 845	4 535	3 287	2 155	890	930	465	475	299	15 884
(2016)	2 662	7 850	4 359	3 510	792	1 074	255	1 263	279	22 043
Total (2011)	6 259	123 102	12 858	8 715	22 385	18 107	4 350	5 393	13 861	215 034
(2016)	5 983	134 747	15 769	11 540	21 755	20 498	8 118	8 250	14 076	240 737
Goats										
1 – 11 (2011)	1 188	109 953	7 563	2 122	101 683	19 979	2 884	15 698	64 597	325 670
(2016)	907	102 685	7 167	2 707	121 518	22 019	4 303	23 916	61 714	346 937
11-100 (2011)	738	39 011	5 809	1 164	28 219	7 186	1 408	3 117	12 739	99 396
(2016)	704	57 959	8 492	1 768	53 248	12 736	3 510	7789	17 059	163 265
100 + (2011)	460	1 176	673	202	529	317	303	99	236	3 998

(2016)	317	1 598	849	227	457	243	238	190	188	4 307
Total (2011)	2 387	150 140	14 046	3 489	130 432	27 482	4 596	18 915	77 573	429 065
(2016)	1 928	162 243	16 508	4 702	175 222	34 998	8 051	31 896	78 962	514 509

Table 12: Number of agricultural households involved in a specific agricultural activity.

Province	Livestock Production		Poultry Production		Vegetable production		Other	
	2011	2016	2011	2016	2011	2016	2011	2016
Western Cape	28 334	12 373	29 196	17 120	39 337	37 417	63 045	22 669
Eastern Cape	330 354	323 763	334 665	318 621	246 412	157 732	156 880	239 564
Northern Cape	28 040	28 000	25 853	26 319	9 334	7 722	21 257	8 426
Free State	45 207	40 874	51 414	47 296	106 809	86 097	88 110	68 932
KwaZulu-Natal	268 656	265 045	356 881	310 458	340 743	188 442	182 688	210 204
North West	88 633	78 555	117 453	92 222	36 620	35 414	54 237	35 952
Gauteng	62 047	23 277	82 403	48 979	147 870	159 326	218 664	78 340
Mpumalanga	72 896	76 307	127 759	104 713	91 214	97 330	91 919	112 225
Limpopo	172 683	151 018	173 681	154 503	105 181	103 874	206 950	253 397
South Africa	1 096 854	990 210	1 299 288	1 120 233	1 123 524	873 355	1 113 759	1029 708

3.5 Production, income and employment by black smallholder and small-scale commercial livestock producers

This section looks at the issue of hidden statistics of how much income is generated by small-scale farmers, often a complex issue for homesteads with multiple sources of income, including social welfare payments.

Further the issue of employment is clouded by a sector that has no official employment stats as most of the helpers and herds in this industry are paid below minimum wages and are not registered as employed in any database and are often paid in cash or kind. A payment system where you keep a calf or two of the herd after a season of herding is common and is seen as a useful tool for poor families to get into livestock ownership.

Currently, farmers of livestock in rural areas are older men 50-70 who have accumulated wealth in migrant labour to big towns and have come back to live at home, look after cattle and grandchildren while the next generation work in urban areas or look in urban areas for jobs. These are largely multigenerational families that were either occupiers or labour tenants in the general area that they are now living.

A review of the literature, presented below, reveals that farmers with less experience generate less income per farmer (R 61 184.21) from cattle sales than farmers with more farming experience (R 155 192.00). In terms of gender, only 12% of farmers were females, with 88% male. In this study, 83% of respondents were employing labour, while 17% were not employing any labour. The assessed farms employed 157 people, of which 80% were employed permanently and 20% temporally employed. Salaries ranged from R 500 to R 3 500 per month, with the vast majority (22) earning between R 1001 and R 1 500 per month. Most of the farmers (85%) sold livestock, while 15% did not sell. Marketing channels used by most farmers in the study area were private buyers (53%), auctions (30%) and speculators (20%), with the least used were butcheries (5%) and feedlots (5%). Cattle production and sales contributed 43% of the annual income of the farmers, while all other farm sales summed up to 27.6%. Fuel accounted for the highest expense (28%), workers' salaries (21.1%) and supplements (licks & feeds, 16.5%) (Aphiwe, 2017).

3.5.1 Cattle Production

A national livestock survey, FAO/UNDP/SADC Project RAF/97/032 was initiated in the SADC region in 2003 (Scholtz et al., 2008). Of the farms sampled, 81% belonged to the communal sector, 12% the emerging sector and 7% to large scale commercial farmers. Extensive cattle farming accounted for 75% of the production systems, with backyard production at 18%. With the exception of the Northern Cape and Western Cape Provinces, beef production was the major livestock production enterprise in the emerging sector, with 86% of livestock producers farming with cattle. Herd sizes per province in the communal and emerging sectors were:

Table 13: average cattle herd sizes by provinces

	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape
Herd size	28	14	40	12	13	24	22	231	21

Source: Scholtz et al., (2008)

Ownership

In terms of beef cattle, 5.69 million beef cattle were owned by 3 million subsistence farmers, 240 thousand emerging (smallholder) and 87 87 thousand farmers with the potential to commercialise. In terms of commercial farmers, 22 thousand farmers owned 6.67 million beef cattle (Scholtz et al., 2008). In the communal sector the heads of households were mainly male, with over 60% older than 50 years.

In a survey of livestock producers in Gwaba Village, Buffalo City Metropolitan Municipality, Eastern Cape, Rust et al. (2019) found that cattle owners were older and in the 65 to 75-year age range. Female farmers represented only 17.6% of the livestock owners and were in the 55 to 65 age group. Most cattle owners indicated they could read and write and 41.2% had completed a tertiary education. However, the level of education reduced as the age of the livestock owners increased. This is in agreement with the findings of Marandure (2015) and Molefi (2015) but much higher than the 10% reported by Ainslie (2002) for the Pedie district. This is a usual finding and would suggest gentleman farming where retired state officials obtain land post retirement to live on and utilise it. Farming was the main source of income (65.5%) in the community followed by pensions (31%). This differs with the findings of Molefi (2015) in Mpumalanga, who recorded that approximately 48% of respondents relied on pension income, while 28.5% reported that the main source of income in their households came from a combination of beef cattle production and pensions.

The high tertiary level education of respondents does not reflect the education levels in the country which suggests that the group interviewed were part of a governmental supported project or indeed retired or active civil servants benefiting from cattle farming as a form of retirement investment. The education level of farmers is illustrated below with data from Statsa showing the majority of farmers having no or education levels below grade 11. Less than 10 percent have tertiary qualifications.

Table 14: Number of agricultural households by education level of household head

Province	No schooling		Grade 1 to Grade 11/Std 9		Grade 12/Std 10		Completed tertiary	
	2011	2016	2011	2016	2011	2016	2011	2016
Western Cape	4 542	2 460	44 858	27 103	18 476	15 590	16 162	21 694
Eastern Cape	130 547	84 334	388 383	322 672	45 964	51 941	30 774	31 041
Northern Cape	11 013	8 137	32 589	26 953	7 479	7 958	3 927	4 256
Free State	25 868	16 507	129 508	97 594	32 616	28 621	12 857	11 681
KwaZulu-Natal	194 458	120 439	398 910	293 304	87 644	81 386	34 860	34 602
North West	46 583	27 379	126 955	98 555	27 799	26 012	12 321	10 842
Gauteng	20 398	17 898	143 703	118 377	66 263	56 083	47 322	42 217
Mpumalanga	83 028	57 714	129 193	108 663	36 422	38 078	14 268	13 854
Limpopo	142 904	91 361	235 885	197 136	57 193	61 725	31 665	28 539
South Africa	659 344	426 229	1 629 995	1 290 357	379 860	367 394	204 160	198 727

Source: StatsSA (2016)

The average age of cattle farmer in the Amathole and Chris Hani Districts of the Eastern Cape were 52.6 and 57.6 years with average herd sizes of 115 and 85.95 animals respectively (Aphiwe, 2017). The age of the farmers indicates a lack of youth participation in farming, particularly cattle farming. The farming experience of these cattle farmers was 12.27 and 11.53 years for the Amathole and Chris Hani Districts respectively. In terms of gender, only 12% of farmers were females, with 88% male.

A study was conducted to identify the constraints faced and the opportunities available to develop communal livestock production in the Nyandeni Local Municipality in the Eastern Cape Province, South Africa by Ngqulana (2017). The mean age of the respondents was 55, with females (n=23) averaging 49.78 years and males (n=43) 57.72 years of age. Of the respondents surveyed 50% of the 68 respondents were unable to read and write and of those able to read and write only 7% had acquired a matric education. Only 27% of the respondents knew how much land was available for grazing, comprising a mean area of 11.33ha.

Table 16 below highlights the importance of the cultural and ceremonial importance of livestock ownership in KwaZulu-Natal and Eastern Cape, although it highlights significant regional variations in this regard. It also highlights the importance of livestock sales.

Table 15: The reasons given for keeping livestock in the communal/traditional areas

Reason/Reference	Scholtz et al, 2008	Shamase, 2013	Tapson & Rose, 1984	Goni et al., 2018	Shackleton et al., 2005
Cash – sales	25.7%	11.1%	22%	42.2%	23.7
Meat	21.6%	3.7%	17%	3.1%	9.1
Investment	15.4%		0.36%		17.0
Milk	10.2%	85.2 %	83%		7.3
Ceremony	8.2%		22%		11.2
Cultural	5.1%		44%	21.9%	3.5
Dowry/lobola	5.1%		30.5%		2.7
Work	4.1%		19%	3.1%	11.8
Other	4.5%				
Family support				29.7%	
Region	SA	Nongoma, Zululand	Zululand, KZN	Eastern Cape	Limpopo Lowveld

Herd size and structure

The herd structure observed in Mpumalanga was not optimal for profitable beef farming with females on average only making up 64% of the adult herd with only 29% of females represented in the herd in the 5 to 10-year age range. This is very low and detrimental when taking into account that the females only started producing at or after 4 years of age Molefi (2015). In the Sand River catchment, Limpopo, the mean number of cattle per household was 10.1 with a total of 556 animals in the area, of which cows constituted 58.8%, followed by calves (19.6%) and then bulls (18.2%) (Shackleton et al., 2005).

Table 16: Herd sizes recorded in surveys per region

Region	Cattle	Sheep	Goats	Reference
Sand River catchment, Limpopo	10.1		7.3	Shackleton et al., 2005
Amathole District, Eastern Cape	115			Aphiwe, 2017
Chris Hani District, Eastern Cape	85.95			Aphiwe, 2017

Region	Cattle	Sheep	Goats	Reference
Schoonoord - Sekhukhune district, Limpopo			40.1	Braker et al., 2002
Bolahlakgomo – Limpopo			16.2	Braker et al., 2002
Jericho – NW Province			7.7	Braker et al., 2002
Nongoma District, Zululand	54	79#	49	Shamase, 2013
Nyadeni District - Eastern Cape - Mean herd size	6.8	35	16.6	Ngqulana, 2017
of which Females owned herd size	6.4	26	13.6	
and male owned herd size	7.1	41	17.9	

- only 22% of respondents owned sheep – indigenous Nguni sheep

Labour

In this study, 83% of respondents were employing labour, while 17% were not employing any labour. The assessed farms employed 157 people, of which 80% were employed permanently and 20% temporally employed. Salaries ranged from R 500 to R 3 500 per month, with the vast majority (22) earning between R 1001 and R 1 500 per month (Aphiwe, 2017).

Productivity

The offtake of livestock from the communal areas is low relative to those in commercial areas at 8% for beef, 36% for sheep and 10% for goats (relative to 23, 29 & 33% for beef, sheep and goats in the commercial sector). This has been attributed to livestock being kept for other reasons, such as status symbols to ritual purposes, diluting the benefits of income generation (Livestock Development Strategy for South Africa 2006-2015). However, the calving percentages calculated from the National Survey of 61% for commercial, 48% for emerging and 27% for the communal sector (Scholtz et al., 2008) may explain much of the poor offtake from communal systems. These figures are similar to those by Tapson and Rose (1984) who found in herds, cows assumed capable of breeding constitute approximately 40% of the herd with an average calving percentage of 32%. Also, Nqeno et al. (2010) stated that in communal areas malnutrition resulting in poor body condition of the dam and consequently in a failure to conceive, calving rates are usually low as compared to the commercial sector.

Tapson and Rose (1984), Poland et al. (2003), as well as Shamase (2013) highlight the role of the herd in providing milk for the household, traditionally due to “ the mainstay of the Zulu diet is amasi or curds of milk, and most of their dishes are a mixture of this amasi with different vegetables (Krige, 1936). Tapson and Rose (1984) considered the high mortality rate of calves under one year of age probably being due to malnutrition as a result of milk being used by the owner, and to other malnutrition related diseases.

A study was conducted in the Nyandeni Local Municipality in the Eastern Cape Province, South Africa by Ngqulana (2017) indicated that mean age of livestock sold was 7.5 for steers and 4 years for wethers, indicating a large percentage of unproductive stock in the herds. According to the respondents the mean lambing percentage was 38.98% for sheep, 31.89% for goats and 21.19 for cattle. Munyai (2012) recorded a low offtake of 9% in the Limpopo Province, which is comparable with other values reported for southern Africa. Many respondents did not want to sell cattle as they believed in maximising the number of cattle owned. Others felt that owning many cattle safeguards against losses during drought.

Kadzere (1996) indicated that the quality and productivity of the animals is not a priority in communal areas in South Africa and that farmers are only concerned about the number of cattle they own as a reflection of their wealth as an African. The proportion of young cows and heifers in cattle herds and the percentage of farmers with young cows and heifers in their herds are both however very low and are limiting factors which affect both the productivity and reproduction rate of the herds. Kadzere (1996) reported that, despite inherently ideal climatic and vegetational conditions, the productivity of the smallholder systems is low. At the same time, the multiplicity of livestock functions in smallholder systems distorts any direct comparison with privately owned, large-scale, commercial properties. "Survival" is the smallholder's prime objective, which in turn means that smallholder agriculture is usually mixed, thus maximising the spread of risk. In addition, smallholder communal farmers tend to see their livestock in terms of numbers and not quality and, under communal land tenure, this practice leads to overgrazing and land degradation

Marketing and income

Cattle owners in Mpumalanga indicated that they marketed livestock mostly through the informal market and only 17% of livestock owners indicated that they marketed livestock through formal markets Molefi (2015).

In a survey by Aphiwe (2017) most of the farmers (85%) sold livestock, while 15% did not sell. Marketing channels used by most farmers in the study area were private buyers (53%), auctions (30%) and speculators (20%), with the least used were butcheries (5%) and feedlots (5%). Cattle production and sales contributed 43% of the annual income of the farmers, while all other farm sales summed up to 27.6%. Fuel accounted for the highest expense (28%), workers' salaries (21.1%) and supplements (licks & feeds, 16.5%).

Of the farmers surveyed by Ngqulana (2017) in the Nyandeni Local Municipality in the Eastern Cape Province, South Africa, 64.6% sold sheep, 25% sold goats and 10.4% sold cattle for meat production. A total of 47% of the respondents who sold (36%) their livestock for meat production used informal markets.

According to the survey by Shamase (2013) in the Nongoma district (Mduda, Kombuza, Sgodiphola and Skhuthwaneni wards/izigodi) only 7.5% of livestock owners sold cattle for income, with 14.8% not selling at all. The majority of respondents (48.1%) were reluctant to sell and only sold if they needed money, with 29.6% selling to pay school fees for their children and to buy food. The majority of respondents (55.6%) bought beef even if it was expensive. They did not slaughter for meat, to do isishebo, but they slaughtered for other functions and got that meat as their sishebo. The least number of respondents (18.5%) did not slaughter at all and completely relied on buying meat, whereas other respondents (25.9%) slaughtered and also bought beef.

In the Sand River catchment, Limpopo, the mean removal of animals per year was 19.3%, comprising 8.6% slaughtered, 7.2% deaths or theft, and 3.6% net exports out of the system (Shackleton et al., 2005). None of the off-take mechanisms were correlated with cattle numbers, indicating off-take was not density dependent. However, the number of calves born (as a proportion of total cattle numbers and not cows only) was strongly density related, ranging from over 30% when total cattle numbers were low to approximately 7% at peak numbers.

3.5.2 Goat production

The results of the national livestock survey, FAO/UNDP/SADC Project RAF/97/032 indicated that the overriding proportion of goat farmers sampled were from the communal and emerging sectors (Bester et al., 2009). Of the goat farmers sampled, in the communal sector 474 were primary

farmers (63.1%) and 277 (36.9%) secondary. In the emerging sector 14 (10.9%) were primary goat farmers and 114 (89.1%) secondary. Also, 86% of the emerging goat farmers were found in the Eastern Cape.

Table 17: Reasons given for keeping goats in the communal/traditional areas

Reason/ Reference	Bester et al., 2009	Bester et al., 2009	Mahanjana et al., 2000	Braker et al., 2002	Braker et al., 2002	Braker et al., 2002	Shackleton et al., 2005
Cash – sales / Investment	34.4%	43.9%	23%	15%	5%		10.8 cash 10.5 savings
Meat	24.1%	26.7%	15%	30%	38%	10%	21.5
Milk			2%	3%		10%	0.33
Ceremonial / Cultural	24.8%	18.7%	35%	15%	38%	29%	3.7
Status			5%				
Companionship					10%	8%	
Emergencies/ security			16%	27%	8%	15%	
Manure						25%	
Region	SA – Emerging farmers	SA – Communal famers	Mgwalana district. E Cape	Jericho, NW Province	Bolahlakgomo Limpopo	Seckhukhune district, Limpopo	Limpopo Lowveld

Amongst domestic livestock, goats are unique in that they are browsers rather than grazers. In this way they are suited to wooded and bushy areas where they complement other domestic livestock by utilising the browse not utilized by the grazers, thereby increasing the utilization of the resource base.

A study, by du Plessis (1998) on the selection by goats at the Mara Research Station in Limpopo showed that goats selected 6.4% grasses, 46.6% trees and shrubs and 47% forbs in summer. In winter the goats selected 30.6% grasses, 54.4% trees and shrubs and 15% forbs in winter. In contrast, Pedi sheep selected 62% grasses, 10.6% trees and shrubs and 37.4% forbs in summer, while in winter the sheep selected 65.6% grasses, 22.9% trees and shrubs and 11.5% forbs in winter. Selection preferences by indigenous goats was investigated at the Delftzyl Research Farm, situated near Roetan in the Limpopo Province by Robinson et al. (undated). Due to theft, the goats were penned at night and taken out at 08:00 and returned at 15:00. The indigenous goats selected 52% browse, 44% grass and 4% forbs on average throughout the year. However, in winter more grass than browse was selected.

Ownership

Sebei et al. (2004a), working in the North West Province, found that the majority of the farmers were pensioners of fairly advanced age (mean = 68.9 yrs.) who were also performing household chores indicating a shortage of labour.

Braker et al. (2002) surveyed goat production in Jericho (NW Province), Bolahlakgomo (Limpopo) and Schoonoord (Sekhukhune district, Limpopo). In Jericho, close to large cities, goat production was characterised as a commercially oriented production system because the sale of live animals was an important reason for keeping goats. In Bolahlakgomo, goat production was characterised as a social system, while in Schoonoord goat production was characterised as supportive system because the

production of manure for crop production was important. In Jericho, households spent on average only one hour a day on the management of goats, in Bolahlakgomo about 4 hours a day and in and Schoonoord 5.5 hours per day. The elderly head of the household or a young boy (son or grandson), usually looked after the goats. Labour was hired in 2 households. Only households in Schoonoord sold milk and meat, the other communities did not sell produce, only live goats. The household incomes were mainly from off-farm activities or pensions. Farming activities contributed only a small proportion to the household income.

In the Mgalwana district, surveyed by Mahanjana et al. (2000) the socio-economic status of the community was best illustrated by the fact that most of those interviewed indicated that their source of household income was from government pensions and money sent to them by non-resident parents of children in their care (57%). Only 38% indicated that they ate meat more frequently than once monthly. Only 15% of the respondents kept goats for home meat consumption, with almost all the respondents (85%) indicating that they only slaughtered goats on special occasions such as family festivities (birth of a child, marriage and birthdays of dead relatives). The goats were also used to accumulate wealth and store wealth as a hedge against emergencies.

Herd/flock structure

Flock size in the communal sector varied from 9.4 for unimproved veld goats, 13.6 for Boer goats and 29.1 for Angora goats, while in the emerging sector, flock size varied from 17.5 for unimproved veld goats, 90.6 for Boer goats and 39.7 for Angora goats. The unimproved veld goat dominated the communal sector (53.3%), followed by the Angora goat (28.4%). The number of Angora goats in the emerging sector was higher (62.8%) and the balance Boer goats (36.1%). Angora goats were found almost exclusively in the Eastern Cape, where the Angora flock size was considerably higher than the indigenous veld goat in the communal sector indicating increasing production of mohair (Bester et al, 2009).

In the Mgalwana district, surveyed by Mahanjana et al. (2000), the majority of households kept goats (86%) with a mean flock size of 16 head, of which 76.7% consisted of does, 15.8% castrates and 20.7% bucks, indicating that does were preferentially retained within the system. The mean number of goats per household (n=39) was 7.3 including kids, with a total of 285 animals. In the Sand River catchment, Limpopo, of the goats kept; 17.9% were rams, 63.9% ewes and 18.2% kids. Goat off-take from the system were 39.2% deaths from disease, 26.1% slaughtered, 13.0% eaten by dogs, 13.0% stolen or 8.7% sold for cash (Shackleton et al., 2005). In the NW Province, flock sizes were 16.2, 7.7 and 40.1 in Jericho, Bolahlakgomo and Schoonoord respectively, with does comprising 57.1%, 57.9% and 46.9% (Braker et al. 2002).

Productivity

Sebei et al. (2004b) worked with a selection of goat herds on communal grazing around Jericho, in the Odi district of North West Province, South Africa. Thirteen farmers remained in the trial for the duration and farms were visited once a month to assess goat-farming practices that influenced the survival of kids to weaning age. For the purpose of this study, the number of offspring weaned as a proportion of does owned, was selected as the output for economic analysis. Economic considerations may be more important in communal goat farming systems than is the case with cattle, which also have a high social status (Sebei et al., 2004b). In the North West Province, where it is estimated that there are approximately 700 000 goats, only 315 were slaughtered at abattoirs in 1997. This indicates that the great majority of goats are slaughtered in the informal sector (Sebei et al., 2004b). The farmers sold or consumed approximately 20% of the herd. The number of kids that

survived to weaning (n = 83) as a percentage of adult does (n = 155) was calculated as 53.3%. It was observed during the study that communal small-scale goat farmers spent approximately 1 hour per day letting the goats out of the kraal and putting them in again. Although cattle were herded, goats were not.

An economic analysis of the data by Sebei (2004b) was used to estimate the economic impact of extension to increase production, assuming that survival to weaning increases from 0.535 per doe (for the actual survey data) to 0.883 per doe if a recommended extension message was applied. Income increased from R 80.25 per doe to R 132.45 per doe for the commercialised model with an output of 0.883 per doe. Considering that for indigenous goats, Donkin (1998) recorded 150% prolificacy and a kidding percentage of 123% with a survival to weaning of 88.3% (113 kids from 128 does) on-station. The survival to weaning rate of 0.883 per indigenous doe used in the economic model in this study was therefore taken as the achievable output for this breed of goat under optimum conditions (Sebei (2004b).

However, while the communal farmers spent R 38.73 on their does, the commercialised model predicted a variable production cost of R 361.48 per doe resulting in a production loss of R 229.03 per doe relative to a profit of R 41.52 per doe in the traditional system (Sebei et al., 2004b). Sebei et al., (2004b) concluded these results emphasised the necessity for pre-evaluation of the economic impact of adoption of extension messages on small-scale goat farmers. The negative economic implications of standardised extension messages that improve production rather than productivity are clearly demonstrated in this study and that it is very important that extension should be adapted to meet the actual conditions. For example, economic calculations in traditionally managed goat keeping systems should be based on the fact, as previously emphasised, that the sale price of goats is not linked to body mass but rather to the requirements for a live goat at a particular time, usually for cultural reasons rather than consumption.

Utilisation and marketing

When asked their preference for the type of meat, respondents indicated a preference for mutton, poultry, beef pork, goat and least of all fish (Mahanjana et al., 2000). The reasons given for discrimination against goat meat was attributed to taste and smell by 76% of the respondents.

The fact that goat meat ranked lowest on the scale of eating preferences (Mahanjana et al., 2000) is in conflict with a study by Pophiwa et al, (2017) that the dressing percentage all of the quality characteristics of Boer and Indigenous goats did not differ and concluded that there is potential to market goat meat as a product of acceptable eating quality, if proper slaughter procedures are practised. Simela et al. (2011) considered the indigenous goats of South Africa to have a high potential for chevon production.

In the Mgalwana district, castrates accounted for 89% of goats slaughtered and 94% of those sold. The motivation for selling goats was mainly to pay debts or save money (45%) and to buy other foodstuffs (27%) with the majority of sales (91%) taking place during the summer months. The buyers (considered to be migrant workers returning home for the Christmas holidays) with the goats used mainly for traditional ceremonies, funerals and weddings (Mahanjana et al., 2000). Goat skins were either sold for cash (76%) or retained for personal use (24%), such as making house mats or cattle whips. The goat sales all took place on an informal basis.

The utilisation of the Cashmere production from indigenous goats, many of which possess the ability to produce a double coated fleece provides a way of diversifying the productivity of the indigenous goat flock in South Africa. The establishment of small agro-industries which convert the fibre into

final products, with specific emphasis on tourist textiles, provide an opportunity for creating employment in rural areas (Braun, 1998).

Herd health

The level of health management was low in the communal and emerging sectors, both of which relied heavily on a combination of extension services (54.6 and 63.2% respectively) together with the services of state vets, with a lack of management and inadequate nutrition in the communal sector resulted in high mortalities, particularly in kids (97.7%) and females (38.1%) (Bester et al, 2009).

Sebei et al. (2004a), working in the North West Province the causes of kid mortality determined from necropsy of kids found dead (n= 6) were; heartwater (1) acute septicaemia (probably pasteurellosis, 1) haemonchosis (2), severe verminosis (mixed infection, 1) and undernutrition (starvation, 1). Coetzee (1998) indicated that heartwater was a major constraint to goat farming in the Limpopo Province, with many goat improvement schemes collapsing because of heartwater. Bester et al. (2009) indicated that heartwater was the predominant disease in goats in the communal sector, possibly due to a lack of dipping as only 30.5% of farmers dipped their animals. Also, in terms of flock health, vaccinations were low in both the communal and emerging sector (11% and 33% respectively.) Donkin (1998) showed that indigenous goats had a genetic resistance against heartwater. The other main disease identified by Donkin (1998) was coccidiosis, accompanied by pneumonia which caused 28% mortality amongst indigenous female kids. It was believed that this problem was largely management related and worsened by overcrowding and consequent poor hygiene, but the presence of rotavirus might also have been significant. From the national livestock survey, Bester et al. (2009) found losses in the communal sector due to mortalities was 97.7% for kids, 15.7% for weaners, 9% for males and 38.1% for females. However, in the emerging sector the mortalities were much lower at 12.5%.

3.5.3 Sheep

Sheep farming was the most preferred livestock enterprise in the Mgalwana community, followed by dairy and beef. The preference to sheep farming was attributed to the fact that sheep are more docile than goats and can be herded together with cattle. Goats were perceived as being hard to manage and were characterised as “naughty, wild, greedy and unmanageable” (Mahanjana et al., 2000). It was considered probable that the preference for livestock that are less troublesome to herd was related to labour constraints, as 44% of goat owners herded their flocks themselves and 37% relied on school-going children for this purpose. Only 19% of respondents indicated they hired labour to herd their flocks (Mahanjana et al., 2000). In contrast, in Zululand farmers indicated that they were interested in increasing their goat numbers as they perceive that goats increase faster, make more money and they survive in during dry seasons and they are used for home consumption more than cattle. Goats increase faster and are sold more often than cattle and are a source of income that plays an essential role in poverty alleviation in rural communities. The farmers indicated that goats are easy to sell due to the ongoing demand with a ready market as they are less expensive than cattle, with goats being used for ancestral functions, weddings, funerals and for paying fines to the Tribal Authority (Shamase, 2013).

In the Eastern Cape, sheep farmers in communal areas have become commercial wool producers following an initiative by the National Wool Growers Association of South Africa (Bester et al., 2009). Remarkable success has been achieved in communal areas where communal farmers marketed 222 610 kg of wool (valued at R 1.5 million) in 1997/98 which increased to 3.8 million kg wool (valued at R 137 million) in 2013/14 (De Beer & Terblanche, 2015). The main objective of the NWGA is to improve both the quality and quantity of wool produced in the communal wool sheep farming areas

of South Africa (predominantly the Eastern Cape) with 1224 Wool Grower's Associations (shearing sheds) in South Africa. A total of 900 shearing sheds deliver the wool to the formal market, with the top sheds in rural areas selling on average 2.7 kg wool per sheep, average sheds 1.7 kg per sheep and bottom sheds sold 1.4 kg per sheep. However, Ngqulana (2017) found that in terms of wool only 38% used formal markets for selling their wool 38% using formal markets for selling with 48% using informal markets.

3.6 Constraints to livestock production

According to Munyai (2012) the most important constraint in the Limpopo Province communal areas is overstocking, as high stocking rates and low effective carrying capacity is prevalent. This, in turn, leads to low reproductive rates and low growth rates as well as low take off (amount of beef produced over a certain period) as it takes a long time for the animals to become marketable. Secondly, there is winter die off as a result of the unavailability of feed. In addition, major losses may occur in the event of drought. Thirdly, there is a lack of herbage in winter. Fourthly, grazing management is conducted in an unsatisfactory manner. Fifthly, animals tend to be inbred and, sixthly, animals are lost as a result of stock theft and snares.

Forbes and Trollope (1991) carried out a study on veld management in the communal areas of Ciskei based predominantly on a communal land tenure system. They found that the stocking rates were excessively high and, consequently, that veld degradation was severe, resulting in turn in a lowered carrying capacity and low efficiency indicators such as weaning percentages. They recommended that any solution to the continued degradation of the veld would depend on the commitment of the government to a development strategy which would address factors such as freehold tenure, education, and the provision of incentives for profitable production.

Sebei (2004b) concluded the extension messages used by field staff, which are based on the commercial model, could be counterproductive. The negative economic impact of these extension messages to improve production rather than productivity, is the probable reason why communal farmers are not accepting extension advice and that although perceived as 'poor managers' these small-scale communal farmers are still achieving a good return of interest on their capital and thus the traditional use of goats as 'savings' is justified. Also, stock management strategies are perceived as being 'poor', amongst others reasons because communal farmers do not use technological advances or implement extension messages, with Tawah (1998) suggesting that the reasons why communal farmers in Africa seldom implement the advice given by extension workers is that this advice usually implies full exploitation of biological capacity under ideal production conditions. Such ideal conditions do not exist in communal systems, which are characterised by a lack of resources such as land, labour and capital.

Munyai (2012) in a study in the Muduluni Village, Limpopo Province found that sixty-two percent (62%) of farmers never see an extension officer, while forty-two percent (42%) never see a veterinary officer) and 86.4% of the farmers who responded indicated that veterinarians are not easily available in the study area.

A study was conducted to identify the constraints faced and the opportunities available to develop communal livestock production in the Nyandeni Local Municipality in the Eastern Cape Province, South Africa by Ngqulana (2017). In terms of information, 22% of the respondents indicated that the members of the Agricultural Extension Services provided them with support, with only 13% indicating that the extension services provide them with farming advice and 7% said they provided information on available markets.

Furthermore, land size (risk aversion) land appears to have an effect on the adoption of technology by small scale farmers, with farmers on small farms land tending not to adopt new technologies (Diale, 2011), possibly due to risk aversion.

Potentially, a major constraint affecting livestock production is the impact of global warming on the natural resource (grazing & bush thickening) and animal (feed intake & heat stress). The impacts of these effects will increase exponentially as the earth warms going forward rendering presently marginal areas for livestock production unsuitable for domestic livestock.

3.7 Employment in livestock production

The livestock sector has always been a major employer. Estimates for the red meat industry have been 500 000 employees and 2 125 000 dependants (SAMIC, 2002; DAFF, 2010c) and for the wool sheep industry 35 000 employees (DAFF, 2010d). However, these estimates were based on the assumption that there are 50 000 commercial livestock farmers, which have been decreasing steadily since 1994, one reason being increasing individually owned property sizes. Employment in the sector has declined for several reasons, including unfavourable economic conditions, reductions in intensive livestock management systems, conversion of large areas of rangeland to wildlife production and eco-tourism, and increased labour costs. On the other hand, the estimates did not take into consideration all of the livestock industry, notable industries excluded being poultry and game. The figures in Table 20 are based on the most recent information as obtained from industry organizations and other sources (DAFF, 2010b; Milk SA, 2011; Mohair SA, 2011; NWGA, 2011a; SAGRA, 2011; RPO, 2011; SAPA, 2011; SA Pork, 2011).

If the estimate of more than 3 million small-scale and communal farmers (DAFF, 2010c) in South Africa is reliable (some observers maintain this figure is a gross over-estimate, the numbers being of the order of 250 000 to 500 000), and conservatively at least 2 million of them own livestock, then 10 - 12 million dependants at least partially receive sustenance from livestock-based food, clothing and decorative materials.

Table 18: Employees, their estimated wages (R million/year) and employee dependants in the commercial livestock sector

Species and farm/units		Number of farms/ units	Number of employees	Wage (R millions)	Number of dependents
Sheep	Wool	6 400	32 000	540	192 000
	Mutton	3 700	14 800	235	88 000
Goats	Mohair	1 280	6 400	110	51 000
	Meat	1 180	4 750	74	28 500
Cattle farmers		12 000	48 000	750	287 000
Feedlots		56	2 500	60	15 000
Pig farmers		230	4 200	71	20 800
Abattoirs		495	12 300	265	61 500
Dairy farmers		2 700	16 200	270	98 000
Dairy distributors & buyers		290	1 200	28	6 000
Game farmers & lodges		7 500	52 600	1 590	315 600
Ostrich farmers & processing		40	490	8.5	3 000
Poultry	Broiler hatchery & rearing		7 600	365	45 600
	Broiler processing & distribution		23 700	1 140	142 000
	Egg industry		5 900	285	35 500
	Total poultry farm units	645			
Totals (max): farm/units		38 500	245 000	6 100	1 450 000

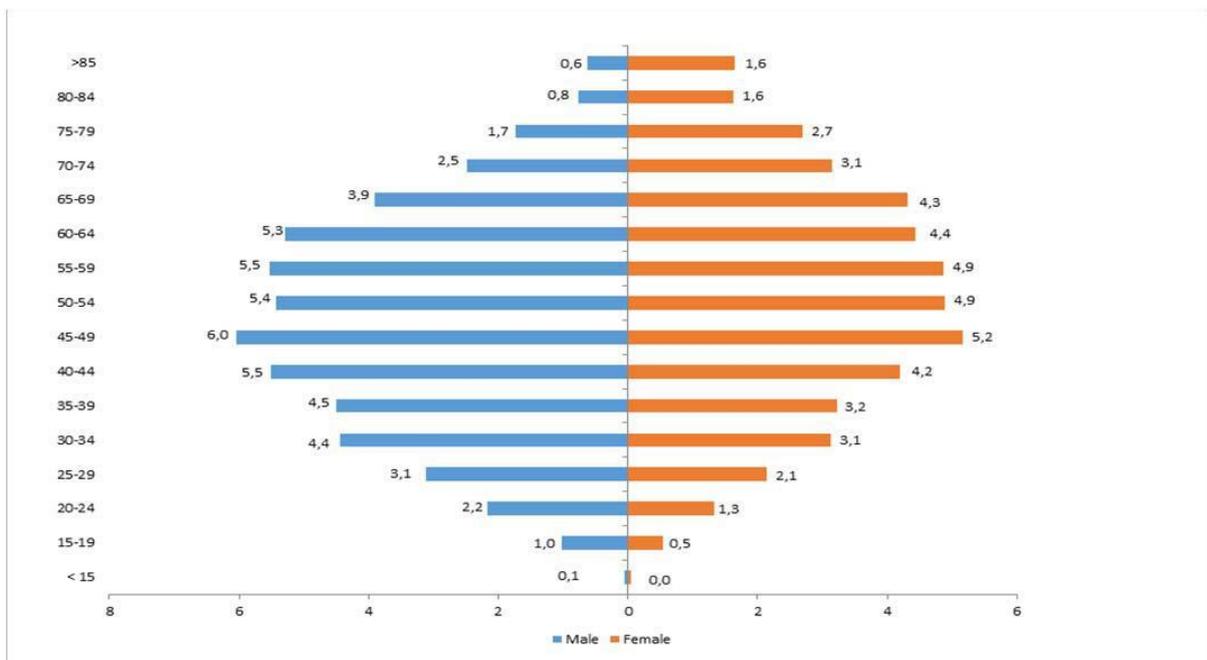
Source: Meissner et al., (2013)

The number of people employed in the smallholder and small-scale sectors is unknown and although there have been some studies that attribute numbers to farmers based on the research that there is this is very hard to scale across any size of area. This study will not try and answer this but will raise some numbers based on these estimates. The best way forward is for in-depth research to be done on this is to get firm numbers.

Molefi (2015) in Mpumalanga, who recorded that approximately 48% of respondents relied on pension income, while 28.5% reported that the main source of income in their households came from a combination of beef cattle production and pensions.

The average age of cattle farmer in the Amathole and Chris Hani Districts of the Eastern Cape were 52.6 and 57.6 years with average herd sizes of 115 and 85.95 animals respectively (Aphiwe, 2017). This study does however state that 'The number and availability of farmers was considered meaning municipalities with emerging farmers (farmers that own or lease land) were selected.' This seems to suggest that only farmers with access to private land of some form were interviewed which is likely the wealthiest in the area. Although the age of livestock farmers does seem to be representative.

Figure 11: Distribution of agricultural household heads by age group and sex (percentage)



Source: StatsSA (2016)

The study revealed that farmers with less experience generated less income per farmer (R 61 184.21) from cattle sales than farmers with more farming experience (R 155 192.00). In terms of gender, only 12% of farmers were females, with 88% male. In this study, 83% of respondents were employing labour, while 17% were not employing any labour. The assessed farms employed 157 people, of which 80% were employed permanently and 20% temporally employed. Salaries ranged from R 500 to R 3 500 per month, with the vast majority (22) earning between R 1001 and R 1 500 per month.

In a study in the Nyandeni Local Municipality in the Eastern Cape Province, South Africa by Ngqulana (2017). The mean age of the respondents was 55, with females (n=23) averaging 49.78 years and males (n=43) 57.72 years of age. Of the respondents surveyed 50% of the 68 respondents were unable to read and write and of those able to read and write only 7% had acquired a matric education. Sheep production contributed 11.35% of the average income, cattle 15% and goats only 7%. Other forms of income were 60.7% from pensions or grants, 53.7% from formal employment, 21.6% from informal employment, 18.5% from crop production and 14% from other sources. Mean herd sizes were 35 sheep, 16.6 goats and 6.7 cattle.

Braker et al. (2002) surveyed goat production in Jericho (NW Province), Bolahlakgomo (Limpopo) and Schoonoord (Sekhukhune district, Limpopo). In Jericho, households spent on average only one hour a day on the management of goats, in Bolahlakgomo about 4 hours a day and in and Schoonoord 5.5 hours per day. The elderly head of the household or a young boy, (son or grandson) usually looked after the goats. Labour was hired in 2 households. Only households in Schoonoord sold milk and meat, the other communities did not sell produce, only live goats. The household incomes were mainly from off-farm activities or pensions. Farming activities contributed only a small proportion to the household income.

In the Mgalwana district, surveyed by Mahanjana et al. (2000) the socio-economic status of the community is best illustrated by the fact that most of those interviewed indicated that their source of household income was from government pensions and money sent to them by non-resident parents of children in their care (57%).

Sheep farming was the most preferred livestock enterprise in the Mgalwana community, followed by dairy and beef. The preference to sheep farming was attributed to the fact that sheep are more docile than goats and can be herded together with cattle. Goats were perceived as being hard to manage and were and characterised as “naughty, wild, greedy and unmanageable” (Mahanjana et al., 2000). It was considered probable that the preference for livestock that are less troublesome to herd was related to labour constraints, as 44% of goat owners herded their flocks themselves and 37% relied on school-going children for this purpose. Only 19% of respondents indicated they hired labour to herd their flocks (Mahanjana et al., 2000).

Table 19: Descriptive analyses of communal farming in the selected provinces

Variables	Province	Number	Mean	Std Dev	Std Error	Min	Max
Number of employees employed to herd the cattle	E Cape	172	1.11	1.814	0.138	0	10
	N Cape	29	1.03	0.906	0.168	0	3
	KZN	15	0.47	0.639	0.165	0	2
	Limpopo	168	0.43	0.585	0.045	0	3
	Total	384	0.78	1.343	0.068	0	10
Number of cattle owned	E Cape	172	18.99	29.649	2.260	0	250
	N Cape	29	44.41	29.621	5.500	4	121
	KZN	15	16.20	15.753	4.067	2	63
	Limpopo	167	19.00	23.613	1.827	1	220

Variables	Province	Number	Mean	Std Dev	Std Error	Min	Max
	Total	383	20.81	27.482	1.404	0	250
Income from cattle sales per annum	E Cape	171	1 205.21	3 117.21	238.379	0	23 000
	N Cape	29	7 094.24	16 550.621	3 073.373	0	85 000
	KZN	15	906.67	1 288.668	332.732	0	5 000
	Limpopo	168	1 606.50	3 973.181	306.537	0	40 000
	Total	383	1 815.45	5 805.030	296.623	0	85 000

Source: Mmbengwa et al (2015)

Table 20 above attempts to give an idea of the amount of people employed informally by smallholder and small-scale farmers. It would seem to suggest that in the drier areas of the Northern Cape, more people are needed and employed to look after cattle herds and, in the wetter areas, fewer people. This suggests that for every cattle herd one could average out 0.7 person per herd. Of approximately 590,000 cattle herds, would need 413,000 people. In sheep and goats, working on the same assumptions, the 755,000 herds of sheep and goats would need 529,000 people. This means that as it stands, almost a million people are employed looking after communal livestock. Of the one million people owning livestock, they hire a further one million people. This does not look at the estimated three million subsistence farmers who own livestock as this study is not looking at these people although one must question how much overlap there is with this theoretical category of these subsistence farmer.

3.7.1 Relationship with other livelihoods sources

The productive functions of livestock ownership in communal areas are multipurpose in character, comprising a mix of stock types and a range of goods and services used. When all these multiple uses are accounted for, the cash and direct-use returns of livestock in communal areas can be comparable to commercial systems, although temporally and spatially variable. Yet previous work has generally excluded small stock from such analyses, as well as benefits and costs to non-owning households. Results indicate that cattle are used for a greater variety of goods and services than are goats. The savings value represented the most important function, followed by milk and then manure. Even if savings value was excluded, cattle ownership made a significant contribution to local livelihoods. Goats also provided a net positive benefit, represented largely by the savings value, followed by meat and cash sales. Non-owners also benefited through donations of manure, milk, draught and meat for free, or at a cheaper rate than alternatives. The majority of non-owners aspired to livestock ownership, although the risk of theft of animals was of growing concern. Averaged across the whole catchment, the net value of goods and services from livestock was just over R400 per hectare, with an annual return to capital of 36%. Cattle contributed the bulk of the value by virtue of their greater numbers and larger size, but on a per kilogramme basis goats provided higher value. Many of the goods and services obtained from livestock were not enumerated in regional or national economic statistics. (Shackleton, 2005)

Cattle and goats are owned by the more affluent and powerful people in a rural community, especially the larger herds and flocks. They are also generally free roaming and as a result are seen as a problem for gardeners and dryland croppers. Given that the men who own cattle would generally need to be on board and supportive of any farming enterprise that would exclude cattle or goats from their land, men are often necessary for any farming that isn't livestock related to be carried out. To this point, many women farmers who want to crop farm see goats as the main pests of the area. This was confirmed by interviews carried out where most non-goat farmers in almost any environment from game farming to vegetable farming speak disparagingly about goats and how disruptive they are to their farming practices.

Fencing which is seen as the only really useful control mechanism for livestock has been a controversial issue for farmers and the state from long before the current government. Fences get pulled down or cut both through vandalism to be sold at pension points or to push stock through for poach grazing. Whether this is true in all parts of the country though is unknown. As such, most state supported fencing programs have not been successful and most of these fences have disappeared. This is also true with land reform farms where the fences are quite quickly removed, and livestock start roaming freely.

In other cultures, and countries in Africa, herders would be used to control livestock in areas where there are multiple land uses. Traditional authorities would often also have rules around when livestock was allowed in the dryland cropping areas and associated fines were levied on people who broke these rules. These herders were old men and schoolchildren who shared the responsibility of where the cattle were and whether they came back at night. The fact that all rural children go to school has largely broken the system of herding and many traditional authorities report that this system of controlled grazing in dryland areas has also collapsed. (Smith 2015)

What this all means is that where there are livestock keepers, it is more and more difficult for gardeners and dryland croppers to live and practice side by side. (Blench 1998)

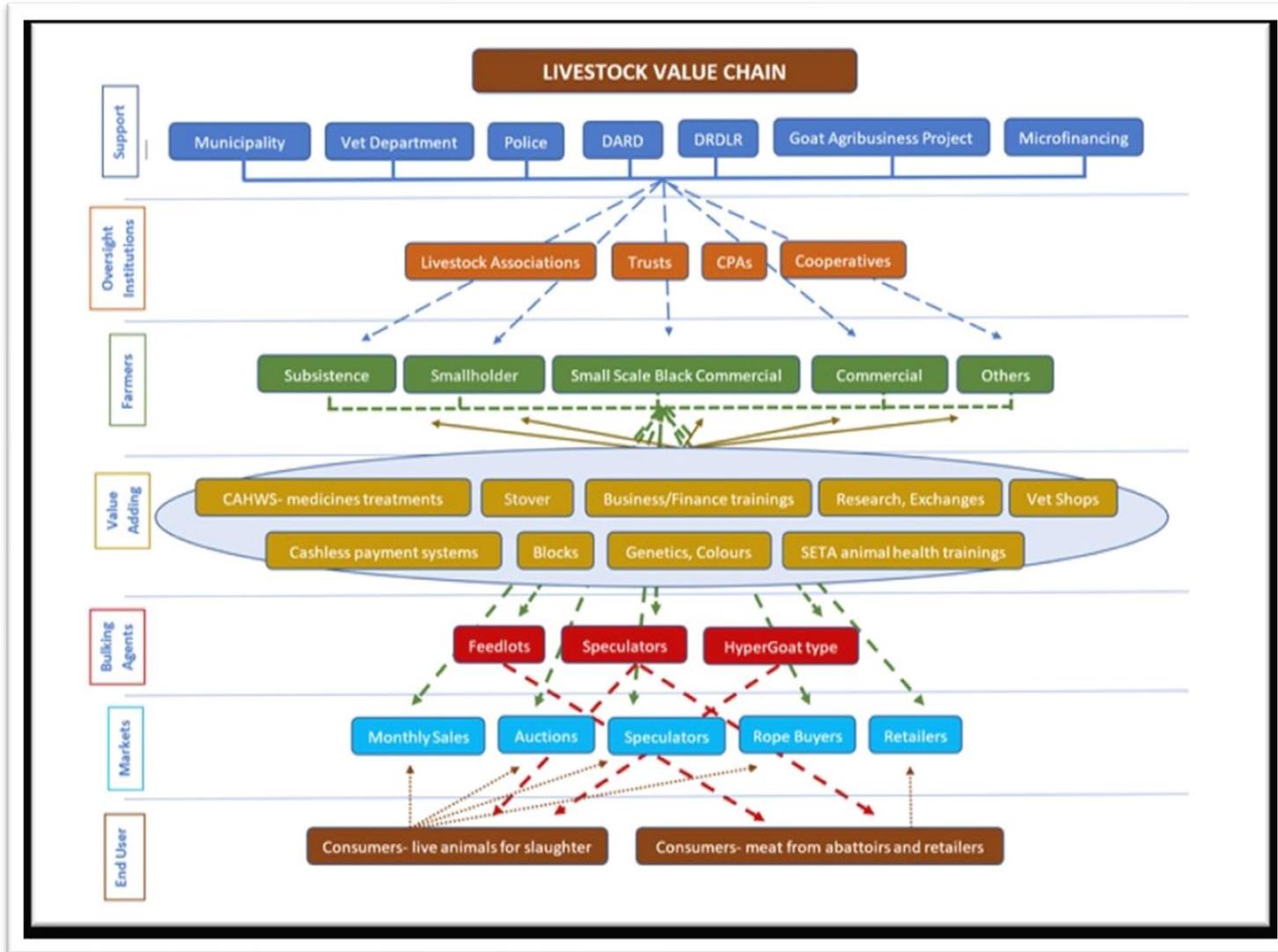
3.8 Markets for livestock produced by black smallholder and small-scale commercial livestock producers

Cousins (2008) argued that livestock in communal areas serve multi purposes and yield high economic returns per hectare when their economic functions are valued, and agreed with (Mckenzie, 1984) and (Bembridge, 1987) in arguing that livestock, especially cattle, forms a fundamental part in the lives of rural people's lifestyle and their importance to be used in paying lobola (bride-worth) and other social activities.

Cousins (2008) argued that, on the basis of multiple purposes of rearing livestock, a high stocking rate makes economic sense, with an optimal stocking rate making sense for single purpose production systems. On the government policy side, the interventions to force down stocking rates as opposed to the will of farmers stand a good chance of failing (unnecessary and unlikely to succeed) (Mckenzie, 1984). This, then, makes questionable the argument of overstocking and attempts to reduce stocking rates as an ecological or environmental cost. This fight between state regulators and farmers on stock numbers and their regulation disrupts much of the positive interactions that could be developed between farmers and state officials to build this value chain.

A further hinderance is the Animal Products Hygiene act of 1967 which governs the practices of animal slaughter and this is in direct conflict with the fate of most of the live sales of livestock in South Africa. Nearly all of these are slaughtered at homes throughout the rural areas and townships. Although this is widely known and accepted the fact that it is technically illegal means that the state takes a hands-off approach to this whole market. Lastly the compensating for bride price or other social interactions is a large part of capital traded in informal markets that the state has no means to track as its paper and tax free. This all means that government statistics on slaughter and trade need interpretation and extrapolation to make any sense.

Figure 12: Livestock value chain



The market value of animals is determined by the going auction prices at livestock auctions throughout the country. These prices fluctuate over the year depending on supply and demand. However, other factors such as disease outbreaks (Foot & Mouth, Swine Flu, etc), drought or good rains have a large influence on these prices. The going prices are published in the popular agricultural media, such as the Farmers Weekly, Landbouweekblad, Stockfarm, Red Meat (the RPO monthly publication) and on the RPO and SAMIC websites. The class of animal influences price, with beef weaners for feedlots commanding high prices and cull animals or old animals, which are penalised in the formal market by the meat grading system, realise much lower prices. However, in KZN for example, these cull cattle and other older “trade” animals may realize high prices at livestock auctions from livestock traders selling to the informal “cultural” market. In the case of the informal trade market, breed plays a role with Nguni type animals realising premium prices, on average higher than the commercial breeds.

According to the survey by Shamase (2013) in the Nongoma district (Mduda, Kombuza, Sgodiphola and Skhuthwaneni wards/izigodi) only 7.5% of livestock owners sell cattle for income, with 14.8% not selling at all. The majority of respondents (48.1%) are reluctant to sell and only sell if they need money, with 29.6% selling to pay school fees for their children and to buy food.

Molefi (2015), in Mpumalanga, reported that cattle owners indicated that they marketed livestock mostly through the informal market and only 17% of livestock owners indicated that they marketed livestock through formal markets.

In the Amathole and Chris Hani Districts of the Eastern Cape Aphiwe (2017) found that most of the farmers (85%) sold livestock, while 15% did not sell. Marketing channels used by most farmers in the study area were private buyers (53%), auctions (30%) and speculators (20%), with the least used were butcheries (5%) and feedlots (5%). Cattle production and sales contributed 43% of the annual income of the farmers, while all other farm sales summed up to 27.6%. Fuel accounted for the highest expense (28%), workers’ salaries (21.1%) and supplements (licks & feeds, 16.5%).

In the Nyandeni Local Municipality in the Eastern Cape Province, Ngqulana (2017) reported that of the farmers surveyed, 64.6% sold sheep, 25% sold goats and 10.4% sold cattle for meat production. A total of 47% of the respondents who sold (36%) their livestock for meat production used informal markets.

In the Mgalwana district, goats were also used to accumulate wealth and store wealth as a hedge against emergencies. Castrates accounted for 89% of goats slaughtered and 94% of those sold. The motivation for selling goats was mainly to pay debts or save money (45%) and to buy other foodstuffs (27%) with the majority of sales (91%) taking place during the summer months. The buyers (considered to be migrant workers returning home for the Christmas holidays) with the goats used mainly for traditional ceremonies, funerals and weddings (Mahanjana et al., 2000). The goat sales all took place on an informal basis.

The gross value of beef production is dependent on the number of cattle slaughtered and the prices received by producers from buyers. The gross value of beef production increased from R13 billion in 2006/07 to R30.6 billion in 2015/16. This is an increase of 135 % during the said period. This is due to the increased consumption of beef during this past decade. The average gross value of beef produced during this period amounted to R19 billion per annum. (Source: Statistics and Economic Analysis, DAFF) Mpumalanga accounts for the greatest share of beef production in South Africa accounting for 21% of the beef produced in 2016 followed by Free State, Gauteng, KwaZulu Natal and North West accounting for 19%, 14%, 11% and 9% respectively. (Source: Red Meat Levy Admin)

South Africa currently has approximately 430 abattoirs slaughtering cattle, pigs and sheep on an annual basis. Approximately 40% of all slaughtering's are performed by abattoirs that may slaughter an unlimited number of animals (Class A) and approximately 60% of cattle are slaughtered by highly regulated abattoirs (Class A & B). Most of these abattoirs have linkages with feedlots. The total amount of beef produced during the past ten years amounted to 9 million tons. During 2014/15 and 2015/16 production was higher than consumption and this makes South Africa self-sufficient as beef production satisfies the local demand during the said period.

Imports of beef were higher than exports from 2007 and 2013. This automatically makes South Africa a net importer of beef during the specified period. From 2012 to 2015 imports of beef has shown a decreasing trend whilst exports are increasing. From 2014 to 2016 exports exceeded imports and this was led by South Africa being declared foot and mouth disease free by the International Animal Health Organisation. Due to this declaration, there was more international markets gained. South Africa exported more beef in 2016 as compared to all years under review. There was a significant increase of 36 000 tons of export quantity and an increase of 707 tons of import quantity during 2016 compared to 2007.

South Africa was mainly exporting to Africa and Asia throughout the period under analysis. Africa commanded the highest exports of beef from South Africa from 2007 to 2014. In 2015 and 2016, Asia outstripped Africa and took a lead in the share of beef exported by South Africa to the continents. The demand for beef in Asian countries continues to grow. In total Africa commanded 118 million kilograms of beef from South Africa which accounts for 67% and Asia was the second by 30 million kilograms during the past decade. Oceania commanded the lowest South African beef exports quantity during the period under analysis. Mozambique continues to be the highest importer of South African beef within SADC countries. Beef produced in South Africa was mainly exported to Mozambique which has commanded the highest beef exports throughout the decade except in 2008 only. During this period (2008) Angola took the lead, which made it the second country to obtain the highest beef exports from South Africa. Mozambique reached a new peak of 4.8 million kilograms of beef from South Africa in 2015. Tanzania was the lowest importer of South African beef within SADC countries. In total, Mozambique commanded 25 million kilograms of South African exported beef followed by Angola with 6.8 million kilograms. Democratic Republic of Congo and Mauritius commanded just above 3 million each. South African beef is exported to Nigeria in Western Africa throughout the past decade. South African beef exports to West Africa decreased in 2015 and 2016. Nigeria reached its new peak of 217 784 kilograms during 2013 and this was followed by a drastic decrease of 20% of South African beef imports during 2014. Ghana absorbed the second highest volume of South African beef exports in 2007 and again from 2009 to 2013. In total for the period under analysis, Mali and Sierra Leone were the lowest importers of South African beef. In Middle, Northern and Eastern Africa, Egypt commanded the highest share of beef exports from South Africa from 2009 to 2016. Congo commanded the second highest share of beef exported by South Africa from 2009 to 2014. Egypt, which is from Northern Africa, experienced a sharp increase in exports and reached its peak of 949 tons in 2015. In total Kenya, Uganda and Ethiopia, which are the Eastern Africa countries, imported the lowest quantities of South African beef during the past decade.

The main destinations of South African beef in 2016 were Vietnam which commanded 13% of South African beef during 2016, followed by Mozambique, Kuwait and United Arab Emirates with 11% each, Jordan (10%), Swaziland and Lesotho with 8% and 7% respectively (DAFF, 2017).

Table 20: South African meat imports and exports

TOTAL MEAT IMPORTS	TOTAL	TOTAL MEAT EXPORTS	Total
2018/19 Year	716018	2018/19 Year	68907
2017/18 Year	717553	2017/18 Year	82215
of which chicken comprises just under half			
TOTAL Chicken IMPORTS	TOTAL		
2018/19 Year	361696		
2017/18 Year	338706		

Source: Red Meat Industry Forum (www.redmeatsa.co.za)

It is believed that total cattle numbers in South Africa ranged from 13.6 to 13.8 million head over the past 5 years. Cognisance should be taken that the cattle sub-sector is highly dualistic. According to expert opinion 35 to 40% of the total herd is owned by subsistence or emerging farmers, i.e. approximately 5.5 million animals. Research on several aspects of the emerging sector has shown that this sector has not reached its full potential. For example, it is estimated that off-take in this sector varies between 7.5 % and 10 %, which is significantly lower than the estimated 25 % in the commercial sector. If the aforementioned assumptions hold, and it is assumed that total off-take goes for slaughtering then between 2.4 and 2.6 million cattle were slaughtered in South Africa annually over the last number of years.

Sheep numbers averaged about 25 million over a number of years with an estimated 13 % of animals in the subsistence and emerging sector; this is about 3 million lower than ten years ago. The main reasons provided for the drop in sheep numbers is stock theft, problems animals and vermin, i.e. the financial implication of the latter three reasons caused farmers to invest in other agricultural enterprises. Goat numbers are believed to be around 2.5 million. If the average off take prior to deregulation is taken as a proxy for sheep and goat slaughterings then approximately 6.3 million sheep and goats were slaughtered annually over the past few years.

South Africa remains a net importer of products derived from large and small stock. Imported meat from cattle averaged around 32 000 ton per year since 2003 (this includes meat from other SACU countries). Live imports from Namibia varied significantly, but on average imports totalled 170 000 annually since 2003. Sheep meat imports into South Africa average 50 000 tons annually since 2003. Cognisance should be taken that the introduction of the Namibian Small Stock Marketing Scheme had a significant impact on the number of live animals imported, i.e. since 2004 with the introduction of the Scheme live imports from Namibia nearly halved. (Red Meat Research & Development SA, n.d.)

Figure 13: Number of livestock slaughtered in South Africa over a year from October to November



Source: Statistics accumulated by the Red Meat Levy Admin (www.levyadmin.co.za)

According to the Red Meat Research and Development SA (www.rmrdsa.co.za) the availability of statistics, and in particular that applicable to herd size, herd composition and the number of animals slaughtered, pertaining to the large and small stock sector remains a problem since the abolishment of the Meat Board in 1997. Data published by the National Department of Agriculture is according to several experts in the red meat industry not an accurate reflection of the actual state of affairs in the industry.

With the aforementioned in mind this section attempts to provide a broad overview of the sector and is based on expert opinion obtained from several industry stakeholders. Cognisance needs therefore to be taken that the statistics presented is not necessarily an exact indication of for example herd numbers or slaughtering's but provides a broader scope of what is believed to be the current state of the industry. Industry stakeholders are currently in the process to work close together with the relevant government departments in an effort to rectify the poor state of statistics pertaining to the red meat industry.

Both the consumption of large and small stock remained relatively stable, but firm over the past few years. Total beef consumption is believed to be approximately 640 000 tons and total sheep consumption approximately 160 000 tons. Per capita consumption for beef and sheep is respectively 13.5 and 3.4 kg; this is slightly up from the beginning of the century. Total beef and per capita consumption as reported by the National Department of Agriculture is significantly higher, but as indicated it is believed that this is an over estimation. An important observation is that the current figures on consumption indicates that the decline in total and per capita consumption has probably been reversed, but that much still needs to be done to ensure sustainable growth in consumption.

South Africa remains a net importer of products derived from large and small stock. Imported meat from cattle averaged around 32 000 ton per year since 2003 (this includes meat from other SACU countries). Live imports from Namibia varied significantly, but on average imports totalled 170 000 annually since 2003. Sheep meat imports into South Africa average 50 000 tons annually since 2003.

Cognisance should be taken that the introduction of the Namibian Small Stock Marketing Scheme had a significant impact on the number of live animals imported, i.e. since 2004 with the introduction of the Scheme live imports from Namibia nearly halved.

An important issue to take cognisance of within the South Africa socio-political-economic environment, is that the potential of the animals in the subsistence and emerging sub-sectors has not been unlocked.

No official statistics are quoted for goat meat slaughtering's and sales in South Africa. There is a perfunctory number but according the RPO representatives the entire goat meat industry is for traditional live sales and stud slaughter. Many reference the Muslim festival of Eid al-Adha but no official figures exist for this although farmers including the head of the Boer Goat association claim that most Northern Cape goat farmers survive of gate sales from speculators representing Indians buying exclusively castrated rams. A field visit to the Northern Cape got similar responses from commercial farmers as well as communal farmers interviewed around Askham and Kimberly. These goats are sold by the kg at auctions.

Local cultural demand for the use of goats in South Africa is currently driving (and exceeding) the supply of live goats. Goats for meat are mainly marketed in the informal sector, in the Eastern Cape and KwaZulu-Natal, which is driving the goat industry. The informal live market pays higher prices than the formal mutton and goat abattoirs can offer (e.g. R1 200 vs R700 for the same size/age animal - Nov 2018). The informal goat meat market in South Africa is mostly supplied by (live) indigenous goats as well as some older Angora goats (seasonal) commercially (Louw, 2019)

Surveys by the South African Meat Industry Company (SAMIC) have shown that goats slaughtered in the commercial sector are mainly Boer goats and surplus Angora goats which make up about 0.55 to 5% of the goats are slaughtered commercially (Ibid, 2019)

From 2018, all goat carcasses slaughtered in commercial abattoirs should be roller marked in orange and blue. The blue mark is only used for kids (young goats) while the orange mark is used for all goat carcasses, irrespective of age. The Boer Goat Breeders Association feels this new roller mark would help boost the commercial consumption of goat meat in South Africa.

During 2018 a project was launched to test the marketing and commercial sale of Angora meat products in a group of retail stores in the Eastern Cape. The project was not commercially viable due to the seasonal availability of slaughter-age Angora goats. This seasonality causes inconsistent availability. In addition, it appeared that consumers still preferred more expensive (+R10 - R20/kg) lamb or mutton than to goat meat. Yet, some producers have commented (November 2018) that meat inspectors do not always know how to classify goat carcasses. Western Cape Boer goat producer Pip Nieuwoudt states that there is a growth in the demand for goat meat due to the health benefits of the meat, but due to the good price goats fetch in the informal sector there is an undersupply to restaurants and shops commercially (Ibid, 2019).

Further development of the communal goat farming sector is needed and the Red meat Producer's Organisation (RPO), breeding associations and governmental departments of agriculture are in an ideal situation to assist with this. That was the sentiment of the meat goat working group chaired by Dr Pieter Prinsloo. Other areas of the meat goat farming industry that needs attention are the proper marketing of goat meat, consumer education as well as research and development. Most producers believe that the biggest challenge and indeed, crucial to the development of the goat meat sector, is improved governmental policy (Ibid, 2019).

In 2016, the Red Meat Research & Development SA (RMRD-SA) called together a working group to work on a development program for the meat goat industry. The working group consisted of meat goat breeding associations, provincial departments of agriculture, the SA Mohair Cluster, the Informal Goat Industry Cluster, the Agricultural Research Council (ARC) and the South African Meat Industry (South African Meat Industries Council).

In June 2018, this working group under the leadership of Dr Pieter Prinsloo made recommendations that specifically includes the marketing of goat meat, more research and consumer education. The workgroup felt that the informal sector is the main source of income for the meat goat industry, but there remains scope to further develop niche markets (Ibid, 2019)

3.9 Socio-cultural aspects of livestock production by black smallholder and small-scale commercial livestock

3.9.1 The ceremonial economy

What is important to note is that cultural practices among African people is on the rise with growing wealth and education, a fact that has surprised many. Further, people who practice these rituals do not see them as optional but generally believe if they are not done, they can create destruction of family life. (Sosibo, 2016) To this end, people will borrow money to get livestock to enact these rituals.

Generally, it is accepted that this is a market that is unknown, untaxed and unregulated. As such it is almost impossible to have any statistics on it. The KZN Goat Agribusiness Project has worked with a focus on this market for the last three years and can draw broad lessons from their work in the field and numerous livestock surveys that they have carried out. (Ballard 2009) (Hornby 2019)

Goats are the most important cultural livestock type among the Nguni people. The goats are used for almost all ceremonies from marriages, deaths, births, pregnancies, coming of age parties, etc. They are seen as the opening part of any ritual as the loud bleating during slaughter awakens the ancestors and makes them receptive to any further slaughter of cattle or the like. They are also used on their own for the same purpose. At least a million goats a year are slaughtered through the informal market in KwaZulu-Natal, and many hundreds of thousands more among the other Nguni tribes, exclusively for ceremonial purpose and thus, at people's homes, with none of this meat being sold. Goat meat is eaten as part of every ceremony but is not prepared in any way beyond boiling so it is often described as an unpalatable meat. This has stymied many goat meat initiatives.

Sheep are also used in rituals. This is more common among the Xhosa people. It is a close reflection of Zulu society so many of the same aspects are there.

Muslim and Hindu faiths also use sheep and goats in a variety of ceremonies that involve slaughter and thus a need for live animals.

Cattle have a more multifunctional role in culture. Primarily, cattle are seen as important in daily life as a representation of wealth and security, so a cattle kraal is placed centrally in African homes as the focus point of much of daily life. Men are expected to have a bull in their kraal and many ceremonies are linked to bulls and linked to milking cows. Cattle also are the main currency for a bride price system that connects families and has many related to these bride price cattle. Lastly, cattle are necessary for all ceremonies that involve death and washing of the spirits. These are very important ceremonies in that they allow families to be released of all the debts involved with the

deceased meaning that they can go on with their everyday life once they are done. This is especially important for widows.

The lack of cattle in many homesteads is creating an environment where many of these ceremonies are being monetarized and at the very least have become a financial burden on families who have to save or borrow money to buy cattle. Goats and sheep, however, can be swapped up for cattle. This means that having any of these three types of these livestock is a very useful investment for any family.

The fact that these animals are needed alive makes them much more expensive than the same animal sold to a butcher for meat. Often the difference is as much as 40-50% for the same animal depending for what you can use it for.

Women cannot generally lead sacrifice ceremonies as they are protected from killing animals. They are also restricted in terms of what they can do to animals as they have no access to the livestock enclosures. This has often got to do with beliefs around fertility and menstruation. They are also not understood to have the power to make decisions around livestock as the spiritual connection to livestock means that the livestock and its welfare is controlled by the ancestors and the woman is generally is of a different surname than the ancestors whose livestock they are.

Tapson and Rose (1984) comment that cattle have a socio-economic aspect in preserving traditional Zulu culture and that “it could be argued that the ownership of cattle has such a deep spiritual significance for the Zulu that the cattle herd has little other purpose, and action should be directed to meeting this cultural need”.

3.9.2 *Gender relations*

Gender and power issues are strong in communities that have been worked with in project areas men own the most valuable livestock and often let women own the less valuable livestock.

Cattle are often symbols of powerful men and need a kraal – herders and dipping at the very least – to handle cattle for veterinary or management interventions is difficult physically for women and ploughing is often even more unlikely – cattle are seen as having many social rules that exclude women from handling or approaching them.

Few widows are able to hold on to bigger herds for long past the husband’s death unless they can pass these on to a son of reasonable age (20 plus) as stock theft (targeting weaker homes with a dominant man) and (made up and often unjustified) family claims on the cattle deplete these herds quickly.

Few if any ceremonial sacrifices can be presided over by women or done by women or young people especially as women are representing a surname not from this kraal (maiden surname)

The issue of men often being absent in rural communities often makes this a theoretical ownership as many homes are women headed in real terms often by matriarchs who oversee the homestead and associated sub families. These homes will often phone the ‘owners’ in town for decisions but essentially run the herds in men’s absences.

The breakdown of society norms around marriage and children born from more than a single father out of wedlock has created a class of single mothers living at home who in KwaZulu are called *amashwele* or *osomaceleni* the forgiven one or those who live alongside – these new type families often don’t have cattle kraals and so tend to smaller livestock more easily.

Bride price is equally becoming a rarity and people often say it is too expensive although its mainly poorer more rural families who still pay it.

So, goats are easier to own and control than sheep. They self-herd and are relatively easy and cheap to invest in and get into. They also have gender issues around entering the kraal but are smaller and easier to handle for women.

Women are not welcomed in dip tanks or the associated management structures, but these are indeed only for cattle, so the smaller stock women generally represent is not catered for in current extension models.

3.10 Support services for livestock production

The current extension model for livestock owners is on the face of it only through veterinary control to protect commercial farmers (technically they are protecting the national herd from economically devastating diseases such as CA, foot & mouth, rinderpest, swine & bird flu, etc –these services were also offered to commercial farmers who now have to do it themselves but this has led to a lack of policing and increases in some disease such as CA in the commercial herds) from diseases and stock theft from these uncontrolled pools of animals. This is through:

- Dipping
- Vaccinations
- Primary health care
- Keeping a dip register to track ownership and movement

The other parts of extension in terms of enforcing carrying capacity, camps and auction yards are tools to protect the resource of the land from the livestock keepers and their tendency to overstock and thus face winter bottleneck problems that lead to poach grazing.

The South Africa Department of Agriculture (DoA) acknowledges the challenges faced by the extension and veterinary services. Accordingly, the DoA has profiled the state of extension and advisory services in all nine of the provinces in South Africa. The report indicated understaffing by 5490 extension officers and a need to intensify training and visibility. To this end, an Extension Recovery Plan has been adopted and approved to be rolled out in all nine provinces in order to address capacity deficiencies and create a more visible and accountable Extension Service. In addition, the Green Book will be introduced to monitor the visits of extension officers and all field officers, including the animal health technician (Department of Agriculture, 2008).

The results of the national livestock survey, FAO/UNDP/SADC Project RAF/97/032 indicated that the overriding proportion of goat farmers sampled were from the communal and emerging sectors (Bester et al., 2009). The level of health management was low in the communal and emerging sectors, both of which relied heavily on a combination of extension services (54.6 and 63.2% respectively) together with the services of state vets.

Munyai (2012) in a study in the Muduluni Village, Limpopo Province found that sixty-two percent (62%) of farmers never see an extension officer, while forty-two percent (42%) never see a veterinary officer and 86.4% of the farmers who responded indicated that veterinarians are not easily available in the study area.

A study was conducted to identify the constraints faced and the opportunities available to develop communal livestock production in the Nyandeni Local Municipality in the Eastern Cape Province, South Africa by Ngqulana (2017). In terms of information, 22% of the respondents indicated that the

members of the Agricultural Extension Services provided them with support, with only 13% indicating that the extension services provide them with farming advice and 7% said they provided information on available markets.

3.6.1 State veterinary services

The state vets in South Africa have a very formalised role in terms of livestock health. They were set up based on legislature based on controlled diseases and their oversight of these controlled diseases. State vets are not responsible for animals that don't have controlled diseases. And these controlled diseases Rabies, Anthrax and Foot and Mouth. In this situation it is obvious that farmers cannot expect formal Veterinary support at a home or village level (also with one state vet per district municipality veterinary care is an impossible task).

There are systems built around the monthly dipping at dip tanks of cattle but this does not cover any of the other livestock and does not include anything about antibiotics and nutrition or general health of any livestock.

In a briefing on the Veterinary and Para-Veterinary Professions Amendment Bill (PMG, 2012) Dr Modisane, Deputy Director General, Department of Agriculture, Forestry and Fisheries, said that of the 2 400 trained veterinarians in South Africa, only 215 were working for the State, and very few of them were operating in rural areas. In the briefing it was stated it cost the state R260 000 per annum to train a veterinarian, which was more expensive than the training required for a medical doctor.

The primary role of the state veterinary services is disease prevention through monitoring/ surveillance to prevent major disease outbreaks and the control of zoonotic diseases (diseases that can be transmitted from livestock/livestock products to humans).

Certain diseases require government control as they affect individual animal owners and also pose serious risks to other farmers or consumers of animal products. Some diseases may even, through their negative impact on trade, compromise the agricultural sector as a whole. Therefore, the following criteria are proposed for the definition of controlled animal diseases, subject to compliance with at least three of these five risk factors:

- Zoonosis: The disease is transmissible to and able to cause disease in humans.
- Rapid spread: The disease is highly transmissible and has the potential for rapid spread, independent of the actual movement of diseased animals and irrespective of farm boundaries.
- Collective control: The disease is more effectively managed by collective control strategies than by the efforts of an individual animal owner.
- Threat to industry: The disease poses a potential serious threat to the performance of the agricultural industry if the current epidemiological and geographic distribution status in South Africa changes.
- Trade sensitive: The disease can be regarded as a highly trade-sensitive issue and poses a potential serious threat to South Africa's international trading status. According to the provisions of the present legislation, "any animal disease ... which is not indigenous or native to the Republic

The list of diseases in Appendix A are Controlled and Notifiable diseases. Any occurrence or suspected occurrence of any of these diseases should be reported to the local State Veterinarian as

soon as possible. All animal owners, farmers, farm managers, veterinarians and laboratories are required to report any incidence or suspected incidence of these diseases. If the local State Veterinarian cannot be contacted, the Provincial Director of Veterinary Services must be notified.

Essentially those most relevant to livestock production are summarised below summarised below:

- Zoonotic diseases which can be transferred to humans (Notifiable diseases) which comprise brucellosis (contagious abortion - transmitted through milk), tuberculosis (meat and milk), anthrax, botulism, quarter evil and rabies. Vaccination against these diseases is compulsory.
- Economically important diseases such as foot and mouth, avian flu, swine flu, sheep scab.

Veterinary Public Health is a fundamental part of public health that safeguards human health and well-being through an integrated approach aimed at assuring a high level of prevention and control of zoonosis and food safety through coherent farm-to-table measures. Broadly, it is defined as the contributions to the physical, mental and social well-being of humans through an understanding and application of veterinary science.

State veterinarians inspect and license abattoirs and other plants processing animal products. They also conduct meat inspections on carcasses prior to sale and consumption.

State veterinary services are responsible for monitoring the food supply (only of animal origin i.e. meat, eggs, milk and honey) for chemical residues and contaminants, and determination of compliance with maximum residue limits (MRLs).

Other legislative functions of the state veterinary service are:

- Export of animals, certifying that the phytosanitary requirements of the country of receipt are met by the State Veterinarian conducting an inspection visit to determine if the establishment meets the required standard and report to national Directorate of Animal Health.
 - If the national office is satisfied and standards are met the 'ZA' number is allocated to the establishments and is listed as officially approved.
 - A ZA certificate is issued to the establishments to confirm the registration.
 - If an establishment falls short of the requirements for official approval, the state veterinarian will provide a list of points that require attention in order to qualify for registration.
- Import of animals
 - If you want to import live animals, animal products, infectious or contagious things into the Republic of South Africa, you must apply for a veterinary import permit from the Director: Animal Health. You must obtain this permit before the animal or product is shipped from the exporting country.

3.10.1 Primary animal health care (PAHC).

State veterinarians are not appointed to treat sick and diseased animals, but rather to safeguard our national herds/flocks against diseases, disease outbreaks and prevent new and emerging diseases. However, since 1994, primary animal healthcare services have been established in communal areas.

The primary animal health care programme deals with three major components:

- preventive veterinary activity (vaccinations, animal first aid, etc)
- ambulatory services (rural outreach activity & spay campaigns)
- Extension/Awareness activity.

PAHC thus provides the means to extend veterinary services to more communities especially those that are far from commercial centres

3.10.2 Pharmaceutical Companies

Hesterberg et al. (2007) indicated that for farmers surveyed in KZN, the Animal Health Technician was found to be the most frequent source of advice for 71.6% of the respondents, while local farmer's cooperative outlets retailing remedies was used by 22.% of the farmers for advice. However, there were large regional differences, ranging from 0 to 67%. Private veterinarians played a smaller role in health advice, used by 20% of the respondents.

A study was conducted to identify the constraints faced and the opportunities available to develop communal livestock production in the Nyandeni Local Municipality in the Eastern Cape Province, South Africa by Ngqulana (2017). In terms of animal health, 66% of the farmers mentioned that Veterinary Services provided assistance with the inoculation of livestock, 29% indicated receiving assistance with the treatment of livestock and 1.9% mentioned stock inspection. Pharmaceutical companies were also playing a role in providing services to farmers, with 33% indicating that they provided medicines and 10% of the farmers indicated they received health management advice from the pharmaceutical companies.

Gehring (2006) surveyed 8 pharmaceutical and one distribution company. The majority (8) of the companies used extension and the transfer of information to market their products to emerging farmers. A large proportion (7) used smaller packaging and translated the labels and product inserts. Six of the respondent companies also indicated they delivered into rural areas. The companies (5) which indicated increases in sales had two things in common, namely, they translated the labels and product inserts and had specialized training of their sales representatives.

3.11 Farmer organisations

The organisation of SHSC farmers is poorly developed in any formal sense especially in the form of livestock farmers. This is probably because they have generally underdeveloped value chains and sell out of hand when the need arises.

There is however a very strong macro organisation that has taken very different forms in each province. This is led by the national department of Agriculture through the Veterinary sub-department and exists for the control of livestock movement and other spread of livestock diseases. In the days of apartheid, it was used as a system to control of stock-theft by registering any movement of livestock in and out of rural areas.

The most typical form this takes around diptank infrastructure that is state-owned and built and where the state still provides dip for monthly, bi-monthly or quarterly dipping of all cattle. As the state needs this structure maintained and needs to control ticks and conduct vaccinations for controlled diseases there are social structures that are set up in the form of diptank committees and these are probably the primary form of livestock owner organisations. They are of course male dominated and only deal with cattle for the same reasons as above. Goats are not dipped and are not part of controlled disease vaccination campaigns. Sheep do get red mite which is a controlled disease and have in the recent past been focused on by the state through the Wool Growers Association where they have quite strong infrastructure and social organisation. The diptank

associations are structured around a livestock association that is often district municipality based. These institutions meet once a month, collect money from their members, get briefings from the Department of Agriculture and receive medicines and dip. Through them, auctions are conducted by the current auction institutions like Vleismart and BKB. There is an initiative funded by the state to support feedlots and subsequent auctioning of cattle which has had mixed success around the country.

Farmers are sometimes organised through farmers associations, although these can have political identities and have been seen to represent the more affluent farmers. This is not to say they are bad, but they don't seem to be leading any initiatives to improve productivity or value chains in rural areas among large numbers of farmers.

Women farmers are not represented on any livestock structures that these authors are aware of. Generally, because these are cattle owning structures which because of power and culture, women in rural areas struggle to hold on to and farm. The same could probably be said for the youth being represented in any social organisation around livestock.

There are also many vigilante groups that represent farmers at local and provincial levels in a quasi-state supported system of dealing with stock thieves and stock theft. They work openly and are often supported by the police although their system of torturing and killing people, the state cannot publicly support.

4 Conclusions on the potential for expanding small-scale livestock production through land reform and associated policy

The market for all types of livestock is almost open-ended if one looks at the value of imported meat, by-products and live animals into the country. At the same time, the potential for expanding small-scale livestock production through land reform is huge as much of the current land that has been transferred and its associated support has resulted in farms that are totally unproductive. Farms that are yet to be transferred are often underutilised thornveld with small intensive parts of these farms being used for vegetables or these farms being used for some form of game ranching. Many of these game ranching farms are being gentleman farmed and the game is shot by biltong hunters for very marginal returns. Research by Cousins shows that small-scale farmers use these sorts of thornveld farms much more efficiently than large scale commercial farmers.

As can be seen by the literature presented above, a majority of African farmers have livestock but the fact that it is not sold or processed through formal channels suggests that it is less productive than it could be. In field research also supports this with, in the case of goats, a 60% increase in productivity could be achieved through farmers being supported by better extension systems.

The Department of Agriculture has very outdated extension policies towards livestock. Internationally and nationally, much work has been done that could be feed into a new policy if there was political will. This could increase productivity of most African farmers in the country. A specific policy to support this emerging class of communal market orientated farmers on land reform farms would need to be added to a national extension agenda.

These farmers living in rural areas are often illiterate, the older generation and often women-headed households.

Stock theft is always mentioned as the second or third biggest problem by these farmers. State support in identification systems and local authorities (traditional and conventional) oversight on sales and transport of livestock would help reduce this if it became a policy decision at a national level.

Farmer associations have in the past been for European commercial farmers. In some provinces, community structures representing farmers have been formed to oversee cattle dipping and reduce stock theft. These structures need to be supported in both set up and activities by the state at a policy level.

Much of the policy debate around land reform mentions the access to capital by small scale farmers as a major problem restricting their ability to commercialise. Although there is a larger debate about this, the fact that small-scale livestock farmers and small-scale farming systems are not acknowledged as a legitimate form of farming means that banks cannot factor in what a reasonable credit profile would look like. The state needs to work closely with financial institutions and agree on what these future farming systems would look like and could possibly generate if they want to be serious about offering them credit.

4.1 Livestock value chains

The entire value chain that service African livestock farmers is non-existent. This is largely because they have always been seen as subsistence farmers who add nothing to the GDP of the country but also do not spend any money on their livestock unless forced to do so. This study shows that even if it were once true it is no longer true and many of the companies in the value chain are starting to invest in products for this market.

Feed for animals, especially in the winter is one of the most efficient and simplest way to increase productivity. It prevents die-offs of livestock and ensures the young survive into adulthood. A support system around feed availability and alternatives for small scale farmers by both state and private industry would make a huge difference for farmers wanting to invest in livestock and sell it. Most feed additives can be obtained locally from either other type of farming or local invasive plants, especially acacia and dichrostachys cinereal. Processing systems either through mechanisation at a small scale or at a larger scale in centralised areas needs to be considered by both the state and businesses.

It is accepted that smaller scale farming of animals is healthier and cheaper because of disease and parasite build ups so smaller farms and smaller farmers do make sense within some constraints. Basic animal health support would be the next intervention area that both the state and private business would need to re-gear themselves towards supporting. Much of the country's and the world's veterinary production is geared towards large volume, intensive factory farms. This is the very opposite of what they need to supply the average communal market-oriented farmers. Issues needing to be considered in this are state policing of medical supplies available to farmers as well as oversight of the cold chain and changes in the law around sellers being able to break up large bulk packaged medicines. Changing legislation that deals with para-vets as well as training of farmers who are given state funded medicine to ensure proper dosage and proper disposal is followed.

Markets for communal livestock owners have been tried as a way to enforce carrying capacity limitations and reduce livestock in rural areas. This has meant that the prices offered for this sort of sale has always been far below what farmers sell the livestock to each other for. These cull auctions have caused farmers to see auctions as a particularly negative process.

Markets need to be set up in peri-urban areas where both farmers and buyers can congregate with enough livestock to bring serious buyers. As each farmer sells only a few livestock, a critical mass can only be achieved by many farmers bringing their livestock probably monthly to such a central point. If the prices being asked/offered become a hindrance, then an auction type process could be carried out until all the buyers and sellers reach a point of understanding broad price points. To achieve this, though, the state would need to take part and regulate these markets with policy around marking movement, diseases and municipal regulations.

As the market for livestock has evolved to farmers selling livestock to speculators who then sell it on to individual buyers, be they butcheries or people needing to sacrifice at home, the role of the small speculator with a truck has become far more important. The state would need to support these speculators as small businesses and could benefit greatly from establishing these small businesses to service farmers. Being able to link buyers and sellers directly through speculators also allows improvement in animal welfare not having to be transported long distances but allows for niche marketing and gives preference for non-factory farmed animals.

4.2 Breeding for the future

This study does not take into account industrial feedlots or dairy farms as no small-scale farmers have access to this sort of credit and associated mechanisation.

State policy should be pro-active and support farmers looking to the future. To this point, the authors would argue that climate smart animals will be indigenous breeds that need less medical care and imported feed. They will also be smaller than current commercial breeds which indicates a trend from imported European breeds to local breeds. Smaller animals, like goats, have been proved to be more resistant to drought stress and make more efficient use of resources that are available. They also lend themselves to peri-urban type farming. To this end, the state needs to invest in research into these trends and start promoting these farming systems and livestock types, both in how they support projects financially but also in their extension models. These extension models should move away from the current versions that promote intensive feeding and farming systems.

The high value middle class market is moving towards niche, organic branded food types and this extensive system that we are proposing would make these farmers ready to be selling to this growing high value market.

5 Conclusions for land reform

Most land reform land is underutilised either by the current owner or by the community that has been settled there. Adding livestock to the current farming system would both benefit the land as well as the productivity of the farm altogether. This is especially true of small stock like chickens, sheep or goats as they utilise parts of the environment that cannot be accessed by cattle. Goats, especially, have been kept out of these areas as they are seen as problem animals and yet ongoing research shows that they are actually beneficial in most arid and semi-arid environments. Jordaan and le Roux 1992 show that a combination of fire, cattle and goats would promote red meat production from both the grass and woody component.

Future land distribution should select farmers who are wanting to commercialise as a prime activity and group these farmers onto land reform farms. These farms then need to have infrastructure and management systems supportive of extensive livestock farming. The livestock value chain issues mentioned above should be set up to support increased productivity and speculator-based sales out of these areas. There would be an increase in job creation from these farmers. We suggest a special economic zoning of these farmers to allow for below minimum wage payment for these farm

workers. In the Newcastle clothing industry, five Chinese and Taiwanese factory owners did the previously unthinkable – they won the right to pay their workers less than the national minimum wage. (Mail and Guardian, 2013)

A negotiation with the traditional authorities’ leadership to give these farmers exempt status around traditional allegiance, like white farmers enjoy, although controversial, may help allowing investment into these deep rural areas by farmers from different ethnic and tribal identities than those on these farms.

Land prices are unsustainable in terms of return almost throughout the country and counter intuitively this becomes more so in increasingly arid areas. An example is the Karoo where a farmer would need a capital investment of R10 000 to keep one goat so the investment in the land for a herd of goats is outside of any small-scale farmer’s credit worthiness. The Presidential Panel on Land Reform might answer some of these conundrums.

The capital investment of one cow is equal to 12 sheep or 8 goats. This investment in working capital is often what the state does not provide in land reform planning and so the ability to put in animals that cost less and breed faster is definite advantage. Farms would need to be divided up into economically viable units for small stock, rather than the current shape and sizes that were built on previous farming assumptions.

Livestock job creation opportunities and costs are modelled in the four local municipality studies. These vary substantially according to the ecological setting, but in optimal conditions these can create significant employment at relatively low investment cost.

6 Recommendations for livestock as a commodity

Recommendations	
Problem	Solution
It is illegal to sell livestock municipally declared towns although it happens in every single town in South Africa	Government would have to change municipal bylaws to allow livestock to be sold within city limits but at the same time build safeguards to this system to protect the animals from sitting the sun with no food or water for days.
Stock theft is the first or second on the list of problems that farmers blame for productivity losses.	At sales points, there is regular policing to check on legislative livestock marking, check that the documents are in good order and are provided by the Livestock Associations from their areas. The Livestock Association leadership also regularly visit the market and are supported by local law enforcement. All sales happen inside an agreed upon or approved marketing point.
Cash transactions will inevitably lead to armed robberies of various degrees of severity	Support a variety of pilots that incentivise banks to provide rural cashless systems that aren’t reliant on smartphones.
Farmers will often be wanting to sell livestock in small quantities as and when need be but buyers need the regularity and bulk to make the trip worthwhile.	Set up monthly sales points at pensions which are within walking distance of farmers homes and once both the buyers and sellers believe in its regularity, they will start coming. Separately and in support of this, incentivise young people to be a sub step in the value chain where they collect and prepare livestock for sale and these animals are paid for a small commission as they are both healthier and more secure. Set up a digital platform with both SMS and what’s app to advise buyers and sellers of each other’s activities and thus ensure the continuity.
There is not a well understood or developed layer of commercial African	Develop this class of farmer by working with a few self-selecting farmers from each farming area who want to upscale and

Recommendations	
Problem	Solution
farmer on land reform farms specifically for livestock.	commercialise their herd or flock. Where necessary find land to expand into. Link these farmers directly to speculators and agree on a productivity system that works within the environmental limits of carrying capacity and parasite loads.
Veterinary support for any scale of extensive livestock is currently not supported in South Africa. This extends from private vets all the way to dosage sizes and packaging.	Support a system of veterinary support steps from a Community Animal Health Worker (CAHW) treating farmers' livestock for a small fee to having a veterinary sales point in every village ensuring that cold chains of medicines and vaccines are supported and checked on by local government staff to supporting veterinary wholesalers supported by the vet companies and training materials that support farmers to understand medicines, dosages, antibiotic resistance, etc. Communal support structures that support other livestock than just cattle, e.g. goat dips, chicken vaccinations.
Winter bottlenecks and extended droughts as well as times of feed stress (weaning pregnancy)	Solution: Establish localised feed processing systems using local produce, crop residues and indigenous plants as much as possible to sell supplemental feed options to farmers.
Problem: Most African livestock is not well understood and natural bottlenecks in their productive systems are not written up and disseminated.	Incentivise research around African livestock systems in government funded program like the NRF, ARC and universities and Technikons. Set up useful experiments that answer farmers questions on currently government owned research stations that reflect the reality of farmers' systems and ways of working.
Government staff have no extension policy that talks to either livestock or land reform beneficiaries	Establish a simple curriculum that acknowledges a variety of new realities like a) small scale farmers b) land reform beneficiaries and c) communal stock farming.
Farmers can often not access things individually, but cooperatives often seem to fail.	Pilot other models of cooperative buying, selling and resource use
Farmers often want to commercialise but don't have the multiple skills needed to be effective and efficient at this.	A broad scale training of many interventions spaced out across monthly or bi-weekly morning or afternoon trainings that is incentivised by the state not supporting farmers who aren't following through on getting the list of qualification.
Women and youth are often not assumed to be the target beneficiary of agriculture support, yet the reality is that they are the present most of the time at home and make a majority of decisions around homestead herds. The youth are also literate and interested in learning and making money.	Focus extension efforts on the broad scale around other livestock than cattle. Support localised extension systems that come to the farmers. Create extension systems that rely on setting up small businesses towards self-sufficiency that would give these youth jobs in their own small businesses. If this becomes the hook that all extension is hung onto, it will resolve a lot of problems around sustainability, employment creation and skills loss in rural areas.
Traditional ceremonies are functionally illegal yet are the majority of the sales in South Africa	Need legislative changes to regulate this practice as well as this market

References

- Aphiwe, K, 2017. Assessment of production practices of emerging cattle farmers in the selected districts of the Eastern Cape Province, South Africa. M Tech: Agricultural Management thesis. Central University of Technology, Free State.
- Ballard. 2009, 'Slaughter in the suburbs': livestock slaughter and race in post-apartheid cities
- Bester, J, Ramsay, KA & Scholtz, MM, 2009. Goat farming in South Africa: Findings of a national livestock survey. *Appl. Anim. Husb, Rural Develop*, 2: 9-13.
- Blench Roger. 1998, *Resource Conflict in Semi-Arid Africa. An Essay and Annotated Bibliography*
- Braker, MJE, Udo, HMJ & Wenn, EC, 2002. Impacts of intervention objectives in goat production within subsistence farming systems in South Africa. *S Afr. J. Anim. Sci.*, 32: 185-191.
- Braun, A, 1998. The potential utilisation of South African indigenous goats for cashmere production. In: *Research and training strategies for goat production systems in South Africa*. Eds. EC Webb & PB Cronje. pp 49-53.
- Coetzee, RJ, 1998. Socio-economic aspects of goat production. In: *Research and training strategies for goat production systems in South Africa*. Eds. EC Webb & PB Cronje. pp 14-16
- Cousins B Various
- Cronje, PB, 1998. Implications of selection of goats for divergent production characteristics in environments subject to fluctuations in nutrient supply. In: *Research and training strategies for goat production systems in South Africa*. Eds. EC Webb & PB Cronje. pp 99.
- DAFF, 2017. A profile of the South African beef market value chain 2017. Directorate Marketing.
- Dialle, NR, 2011. Socio-economic indicators influencing the adoption of hybrid Sorghum: The Sekhukhune District perspective. *S Afr, J. Agric. Ext.*, 39; 75-85.
- De Beer, L & Terblanche, SE, 2015. Improving the livelihoods of wool producers in a sustainable manner by optimizing the woolled sheep production systems within the communal areas of the Eastern Caper. "A vision that is future directed". *S Afr, J. Agric. Ext.*, 43; 105-122.
- De Lange, AO, 1991. Animal production on communal grazing Paper read at a seminar, Development Bank of Southern Africa, Midrand, 12th June 1991.
- Donkin, EF, 1998. Milk production from goats for households and small-scale farmers in South Africa. In: *Research and training strategies for goat production systems in South Africa*. Eds. EC Webb & PB Cronje. pp 27-16-32.
- Donkin, EF, 2005. Sustainable livestock development in Africa: How do we help Africa to feed itself? *SA-ANIM SCI*, 6: 56-67.
- Du Plessis, I, 1998. Potential of goats in the arid sweet bushveld of the Northern Province. In: *Research and training strategies for goat production systems in South Africa*. Eds. EC Webb & PB Cronje. pp 45-48.
- Els, JF, 2002. The influence of frame size/breed and stocking rate on: 1. Reproduction and production of beef cattle. Preliminary Results. Paper read at the GSSA/SASAS joint congress, Aventura, Christiana, 16-16 May 2002.

- Forbes, R.G. & Trollope, W.S.W. 1991. Veld management in the communal areas of Ciskei. *Journal of Grassland Society of South Africa*, 8(4): 147–153.
- Kadzere, C.T., 1996. Animal Production Level: A Measure of Social Development in Southern Africa. *Journal of Social Development in Africa*, 11(1), pp.17-31.
- Gehring, Ronette, 2006. Veterinary drug supply to subsistence and emerging farming communities in the Madikwe District, North West Province, South Africa. Dissertation (MMedVet (Pharmacology)) -- University of Pretoria. URI: <http://hdl.handle.net/2263/23080>
- Goni, S, Skenjana, A & Nyangiwe, N, 2018. The status of livestock production in communal farming areas of the Eastern Cape: A case of Kajali Community, Peelton. *Appl. Anim. Husb, Rural Develop*, 11: 34-40
- Hatch, GP & Tainton, NM, 1997. The influence of stocking-rate, range condition and rainfall on seasonal beef production patterns in the semi-arid savanna of KwaZulu-Natal. *S Afr. J. Anim. Sci.*, 27: 50-54.
- Herselman, M.J. & W.J. Olivier, 2009. Description of a model for the calculation of breeding values for profitability. *Merino Focus* 2009; 80-82.
- Hesterberg, U.W, Bagnall, R, Perrett, K, Horner & R Gummow, B, 2007. A questionnaire survey of perceptions and preventive measures related to animal health amongst cattle owners of rural communities in KwaZulu-Natal, South Africa. *Journal of the South African Veterinary Association* Vol 78 (4): 205-208. DOI: <https://doi.org/10.4102/jsava.v78i4.324>
- Jordaan, JJ & le Roux, A, 1992 The short-term effect of fire, boer goats and cattle on the woody component of the Sourish Mixed Bushveld in the Northern Province of South Africa. Towoomba Agricultural Development Centre, Warmbaths, South Africa.
- Lepen, LM, 1996. Breed Characterisation studies in Namibia. *Agricola*, 21-23
- Lepen, LM, 1996. The evaluation of breeding strategies with the objective of enhancing sustainable beef production in Namibia. *Agricola*, 25-28
- Louw, M, 2019. Meat goat farming in South Africa. Available at <http://southafrica.co.za/meat-goat-farming-in-south-africa.html>
- McManus, C, 2016. Adaptations of farm animals to stressful environments, In: *The Afrikaner breed of cattle: South Africa's heritage for food security*. Eds; MM Scholtz, FWC Neser & L Tissier. Agricultural Research Council.
- Mahanjana, AM & Cronje, PB, 2000. Factors affecting goat production in a communal farming system in the Eastern Cape region of South Africa. *S Afr. J. Anim. Sci.*, 30: 149-154.
- Meissner, HH, Scholtz, MM & Palmer, AR, 2013. Sustainability of the South African Livestock Sector towards 2050. Part 1: Worth and impact of the sector. *S Afr. J. Anim. Sci.*, 43: 282-297.
- Molefi, SH, 2015. Utilization and management of beef cattle as a contributor to income of households in communal areas of Chief Albert Luthuli Local Municipality in Mpumalanga Province. Master of Science, University of South Africa.

Munyai, FR., 2012. An Evaluation of Socio-Economic and Biophysical Aspects of SmallScale Livestock Systems Based on a Case Study from Limpopo Province: Muduluni Village. PhD Thesis: University of the Free State.

Mmbengwa, Victor, Nyhodo, Bonani, Lindikaya, Myeki & Schalkwyk, Prof Herman, 2015. Communal livestock farming in South Africa: Does this farming system create jobs for poverty stricken rural areas? *SYLWAN*, 159(10): 176-192.

Nowers, CB, Nobumba, LM & Welgemoed, J. 2013. Reproduction and production potential of communal cattle on sourveld in the Eastern Cape Province, South Africa. *Appl. Anim. Husb, Rural Develop*, 6: 48-54.

Ngqulana, RC, 2017. Constraints and opportunities in communal livestock production development in Nyandeni Local Municipality, Eastern Cape Province, South Africa. MSc Agric (Extension) thesis. University of Pretoria

Nqeno, N, Chimonyo, M, Mapiye, C & Marufu, MC, 2010. Ovarian activity, conception and pregnancy patterns of cows on the semiarid communal rangelands in the Eastern Cape Province of South Africa. *Animal Reproduction Science*, 118: 140-147.

Poland, Marguerite, Hammond-Tooke, D & Voight, L, 2003. The abundant herds – a celebration of the cattle of the Zulu people. Fernwood Press. Vlaeberg, South Africa

Pophiwa, P, Webb, EC & Frylinck, L, 2017. Carcass and meat quality of Boer and indigenous goats of South Africa under delayed chilling conditions. *S Afr. J. Anim. Sci.*, 47: 794-803.

Robinson, BH, du Toit, GD, du Preez, H & Erlank, J, undated. The forage preferences of indigenous goats in the Bushveld of the Northern Province. Unpublished report.

Rust, T, Rust, JM, Nongauza, NS, de Ridder, CH, Faku, NA, Moss, S & Mpahla, M, 2019. Beef cattle production performance and farmer profile in a communal environment of the Eastern Cape Province. *Appl. Anim. Husb, Rural Develop*, 12: 1-10.

Sebei, PJ, McCrindle, CME & Webb, EC, 2004. Factors influencing weaning percentages of indigenous goats on communal grazing. *S Afr. J. Anim. Sci.*, 34: 130-133.

Scholtz, MM, Bester, J, Mamabolo, JM & Ramsay, KA, 2008. Results of a national cattle survey undertaken in South Africa, with emphasis on beef. *Appl. Anim. Husb, Rural Develop*, 1: 1-9.

Scholtz, MM & Bester, J, 2010. Off-take and production statistics in the different South African cattle sectors: Results of a structured survey. *Appl. Anim. Husb, Rural Develop*, 3: 19-23.

Shackleton, CM, Shackleton, SE, Netshiluvhi, TR & Mathabela, FR, 2005. The contribution and direct-use value of livestock to rural livelihoods in the Sand River catchment, South Africa. *Afr. J. Range Forage Sci.*, 22:127-140.

Shamase, SV, 2013. The benefits and limitations that are derived from communal grazing system in Nongoma, KwaZulu-Natal, South Africa. Masters in Sustainable Agriculture thesis, University of the Free State

Simela, L, Webb EC & Bosman, MJC, 2011. Live animal and carcass characteristics of South African indigenous goats. *S Afr. J. Anim. Sci.*, 41: 1-15.

Smith, Barry, 2006. The farming handbook. University of KwaZulu-Natal Press

- Smith TL, 2018. Agricultural-Pastoral Conflict: A Major Obstacle in the Process of Rural Development
- Snyman, HA, 1989. Evapotranspirasie en waterverbruiks-doeltreffendheid van verskillende grasspesies in die Sentrale Oranje-Vrystaat. J. Grassl. Soc. Sth. Afr, 6(3): 146-151
- Tapson, DR & Rose, CJ, 1984. An investigation into the KwaZulu cattle industry. Agriculture and Rural Development Research Institute, Fort Hare. No 2/84
- Visagie, PC, 2017. Cow performance, frame size and profitability. Stockfarm 7 (5): 42-43 (May 2017).

Appendix A: Livestock diseases

DISEASES THAT ARE CONTROLLED AND NOTIFIABLE UNDER THE ANIMAL DISEASES ACT, ACT 35 OF 1984 AND THE ANIMAL DISEASES REGULATIONS, R.2026 OF 1986:

Controlled Diseases

- Any animal disease or infectious agent that is not known to occur in South Africa
- African horse sickness (AHS)
- African Swine Fever (ASF)
- Anthrax
- Aujeszky's disease
- Bacterial Kidney Disease (in fish)
- Bovine Contagious Pleuropneumonia (CBPP)
- Bovine spongiform encephalopathy (BSE)
- Brucellosis (in all animal species)
- Classical Swine Fever (CSF)
- Contagious Equine Metritis (CEM)
- Contagious Haemopoietic Necrosis (in fish)
- Contagious Pancreatic Necrosis (in fish)
- Corridor or Buffalo disease (Theileriosis)
- Dourine
- East Coast Fever
- Equine Infectious Anaemia (EIA)
- Equine Influenza (EI)
- Equine Viral Arteritis (EVA)
- Foot-and-mouth Disease (FMD)
- Glanders
- Haemorrhagic Septicaemia (in fish)
- Johne's disease (in sheep, cattle and goats)
- Koi Herpes Virus
- Nagana (Trypanosomiasis)
- Newcastle disease

- Notifiable Avian Influenza (NAI)
- Porcine Reproductive and Respiratory Syndrome (PRRS)
- Psittacosis
- Rabies
- Rinderpest
- Salmonella Enteritidis
- Salmonella Gallinarum (Fowl typhoid)
- Salmonella Pullorum (Bacillary white diarrhoea)
- Scrapie
- Sheep scab
- Skin conditions in sheep Swine vesicular disease
- Tuberculosis

NOTIFIABLE DISEASES

- Bovine Malignant Catarrhal Fever (Snotsiekte)
- Bluetongue
- Lumpy Skin Disease
- Rift Valley Fever
- Strangles
- Swine Erysipelas