Evaluating the contribution of livestock to household livelihoods in the communal rangelands of the north Eastern Cape Province, South Africa

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Abstract

This article evaluates the contribution of livestock to rural households in communal areas of the north Eastern Cape in South Africa, using surveys from 120 households. Structured questionnaire surveys were conducted from both livestock and non-livestock-owning households to gather information on livestock composition and their associated contribution to household livelihoods. The results revealed that livestock composition was dominated by sheep (72%), cattle (19%) and goats (9%). The mean livestock holding of 6 cattle, 15 sheep and 2 goats was reported by the female-headed households, while the mean livestock holding of 6 cattle, 29 sheep and 4 goats was reported by the male-headed household. Different livestock beneficial outputs such as offtake, manure, milk and draft power were reported by both livestock (74%) and non-livestock (26%) owning households. On the other hand, the mean annual income from livestock sales was reported to be R24 999,00 for cattle, R7 995,00 for sheep and R1 599,00 for goats. These results suggest, that livestock contributes significantly to rural households regardless of the state of ownership, and suggests that agricultural policies that seek to change agrarian and communal rangeland systems should focus on livestock commercialization that favours rural context to improve the rural economy.

Keywords: Beneficial outputs: Cattle; Household-head; Sheep
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Introduction

South Africa has about 82% of land that is suitable for agriculture of which 69% is suitable for livestock production and wildlife while 13% is suitable for dryland cultivation (DAFF, 2017). Of the agricultural land, 17% is occupied by communal livestock production, which accounts for an estimated 40% of the national livestock herd, with over 90% of livestock owners owning about 75% of the national herd (Gwiriri *et al.*, 2019). While the increased human population coupled with unemployment shows significant potential for livestock to continue contributing to the livelihoods of poor rural households Vetter, (2013), a wide range of reasons for rural people to keep certain types of livestock (Shackleton *et al.*, 2000), over time is subject to change. Schmidt, (1992) suggests that these reasons vary widely and include a form of employment, cash from sales, household consumption, funeral purposes, a form of investment, bride-wealth, sales of skin and wool, transport and draft power. Smaller livestock such as sheep and goats are mainly kept for traditional ceremonies, short-term monetary returns from sales and household consumption, while cattle are mainly kept for socio-cultural reasons, and returns such as manure production and traction for crop cultivation (Twine, 2013).

Several studies such as Shackleton *et al.*, (2001), Dovie *et al.*, (2006) and Maura *et al.*, (2003) have been conducted to investigate the benefits of livestock to rural communities because of the perception that communal rangelands are unproductive and make little contribution towards the national welfare economy. This is due to the relatively small amounts of livestock products entering the formal markets from communal areas (Shackleton *et al.*, 2001). Communal livestock production is also characterised by poor livestock condition (Mapiye *et al.*, 2009) and poor production efficiency (Meissner *et al.*, 2013), which are a result of poorly managed rangelands (Bennett *et al.*, 2013). There are also several challenges that communal farmers face such as poor marketing infrastructure and access to formal markets as a result of high transport costs (Sikhweni & Hassan, 2014), lack of market information and the pricing structure (Meissner *et al.*, 2013).

In South Africa, the Eastern Cape Province is the only Province that has all seven biomes (Rutherford & Westfall, 1986), twenty-nine Acock's veld types (Acocks, 1988) and ecological zones within its boundaries. Livestock-based livelihoods in the communal areas of Eastern Cape Province, have the potential to drive inclusive, climatic-resilient development (Gwiriri *et al.*, 2019). This allows for a range of various agricultural activities, because of the tremendous diversity of climates within the province. There have always been high livestock numbers reported in these areas, which is why the province is stated as being the region of premier livestock (Musemwa *et al., 2010)* and it holds excellent opportunities for wool processing and meat production. However, low-input livestock production remains a primary land-use option (Shackleton *et al.*, 2002), with a low offtake rate estimated at less than 10% (Musemwa *et al.*, 2010).

This study has therefore taken the opportunity to assess the contribution of livestock to rural households in the north-Eastern Cape with a focus on all the beneficial goods and services livestock provide to both livestock and non-livestock owners. This was necessary as interventions regarding livestock production mostly focus on wealthy, older livestock owners with little attention to poor and non-livestock owners who still derive benefits from livestock. It is important for rural development policies to not only focus on commercializing livestock production in communal areas but also focus on interventions that build livelihood resilience while providing different ways for households to reduce poverty and improve livestock outputs and adding value to rangeland resources for livestock.

Materials and methods

Study site description

The study was conducted in two villages of the north Eastern Cape Province in South Africa near Cala town. These two villages are Mahlungulu and Mgwalana and fall under quaternary river catchments T12A and S50E centered around (31°32'13.80"S, 27°46'42.87"E), (31°42'22.69"S, 27°41'03.80"E) respectively (Figure 1). Both villages lie on communal land that is traditionally administered by local chiefs and are within the Sakhisizwe Local Municipality. The vegetation is described as *Drakensburg foothill moist grassland* in the mountainous area and is incised by river gorges of dry forest (Mucina & Rutherford, 2006). Dominant and common species in the study site are *Sporobolus africanus, Heteropogon contortus, Eragrostis plana* and *Aristida congesta*, which form grass swards (Mucina & Rutherford, 2006). The long-term mean annual rainfall distribution of 654–786 mm reported for the study site (Schulze & Maharaj, 2007), characterises the wet and dry seasons and the coefficient of variation is 25% (Mucina & Rutherford, 2006). The mean annual potential evaporation and mean annual soil moisture stress is 1638 mm and 68% respectively (Schulze & Maharaj, 2007). The geology is mostly mudstone and sandstone of the Tarkastad Subgroup and the Molteno Formation, as well as Jurassic Age dolerites. Dominating soils are well drained with more than 800 mm of depth, with sedimentary parent material of 15-55% clay content representing soils from Clovelly, Griffin and Oak Dale (Mucina & Rutherford, 2006).

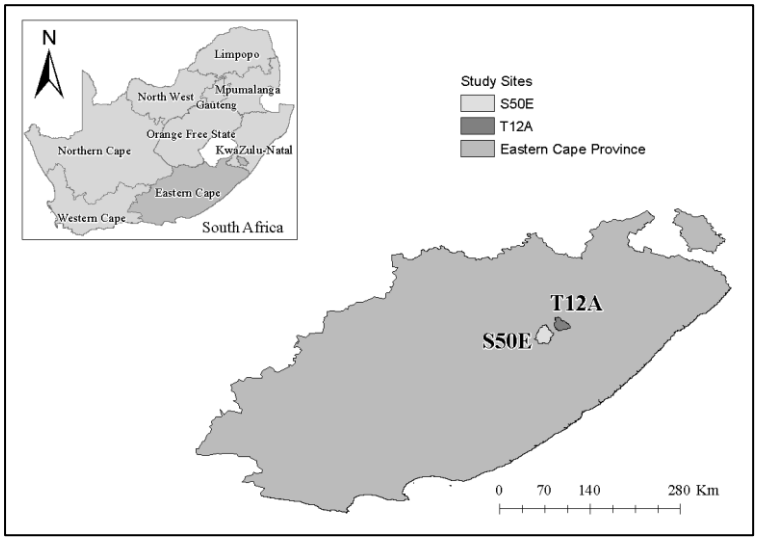

Figure 1 Location of the study site in quaternary river catchments T12A and S50E

Sampling approach

Prior to data collection, an introductory workshop with the village leaders and members was held to provide clarity on the questionnaire survey and schedule appointments for household interviews. The villages where the study was conducted were selected on the basis of the presence of a significant population of invasive alien plants (IAPs), and evidence of clearing of these plants to restore the cleared area to grasslands, thus understanding livestock-based livelihoods. In each of the selected villages, a total number of households was obtained from the Census (2011), with Mgwalana village having 123 households, while Mahlungulu village had a total of 79 households. A total of 120 households were then randomly selected from the two villages, which shared similar characteristics and farming practices. Both female and male-headed households who own livestock and those who do not own livestock participated in the interviews. In each of the two villages, only sixty households were randomly selected to understand the contribution of livestock in their households. The participation of respondents in the research was based on their availability and willingness to participate and a consent form was administered from each household to ask for their permission prior to the interviews. The household head was interviewed, and in cases where the household head was absent, the most senior person was interviewed.

Data collection

A qualitative data collection approach was employed in this study. A structured questionnaire was designed to gather information from 120 households. Information gathered included household demographics, household livestock holdings, livestock inputs, livestock composition and generated livestock goods and services from both livestock and non-livestock-owning households to understand the contribution of livestock regardless of the status of livestock ownership. Livestock beneficial goods and services included livestock offtake, milk, manure, wool/hides and traction. A structured questionnaire was administered through face-to-face interviews with randomly selected households by the researcher, with the help of a local research assistant. The questions were administered by the researcher in the local language (isiXhosa), which is the language best understood by the respondents, and later translated into English for the purposes of writing. During the interviews, data was captured on a Kobo Collect app, which is an Android abled app and were later downloaded to an Excel spreadsheet for further analysis.

Data analysis

Descriptive means of livestock holdings and numbers in different-headed households were computed. Livestock practices and household characterises were also described. Livestock-beneficial goods and services were estimated based on the local price rate. As there were population and household level data from the census, this study scaled up these household-level results to the village as follows:

Livestock population = Mean livestock holding X number of households

Results

Socio-economic characteristics of households

The results revealed that 65% and 35% of the respondents were females and males, respectively. The respondent's age ranged from 28 to 75 years of age with the highest number of respondents (39 %) falling under the age of 31-40 years. The results revealed that 82% of the respondents used hired labour to look after their livestock *"I employ someone to look after my livestock to keep them safe from theft and predators, because kids are now going to school"*.

On the other hand, 18% of the respondents reported that they do not use hired labour, but look after the animals themselves.

"I don't have money to employ a herder because I only live on old age grant, which I use to feed my family". The results showed that 57% of the respondents provide additional feed during the dry season, but the number of days on which different respondents provide feed for their livestock differs, with 43% of the respondents relying solely on rangelands for livestock grazing and feeding. *"I only feed cows that have calves in winter so that they can produce milk for the calves".* The results also showed that 90% of the respondents kraal their animals at night, while only 10% leave their animals in the fields (Table 1).

Table 1 Socio-economic characteristics of the households that were interviewed

Description	Frequency (n=120)	Percentage (%)
Gender		
Females	78	65
Males	42	35
Age		
≤ 30	5	4
31-40	47	39
41-50	17	14
51-60	24	20
≥ 61	27	23
Hired labour		
Yes	98	82
No	22	18
Additional feed		
Yes	68	57
No	52	43
Kraaling		
Yes	108	90
No	12	10

Household livestock composition

There were about 74% of households that owned livestock, while 26% of the households did not own livestock. Of the recorded livestock types in the interviewed households, livestock composition was dominated by sheep (72%), cattle (19%) and goats (9%) (Figure 2). In the interviewed households, the total livestock that was reported were sheep (2487), cattle (694) and goats (311). The average livestock numbers owned by each household were around 21 sheep, six cattle and three goats. Following Stats SA (2010) on population upscaling, the villages together comprised 202 households, suggesting an estimated livestock population of 4242 sheep, 1212 cattle and 606 goats. Furthermore, the maximum number of livestock owned by different households ranged from 1 cattle to 42 cattle, while sheep ranged between 2 and 163 and lastly, goats ranged between 1 and 35.

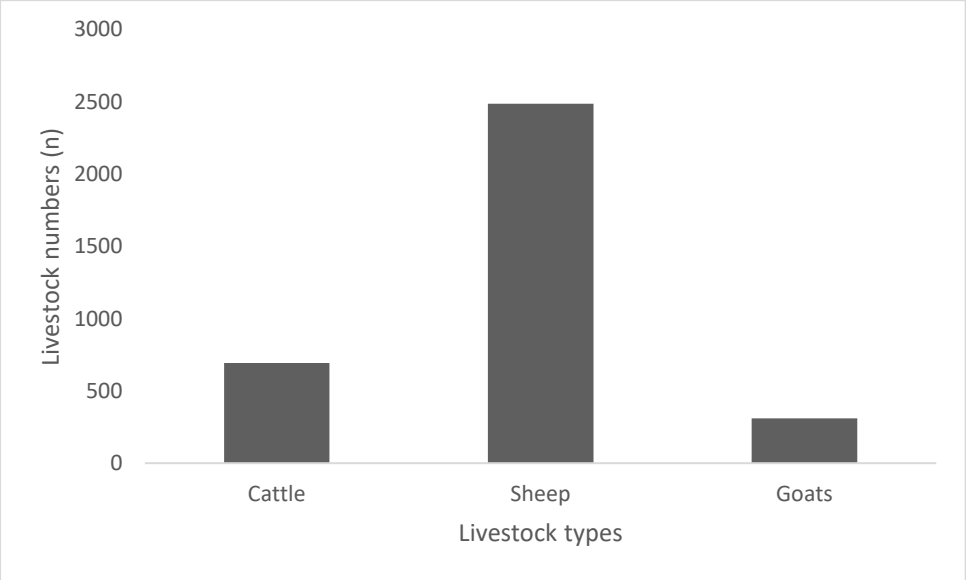

Figure 2 Number of different livestock composition in the interviewed households.

Household livestock holding by gender of the household head

The study revealed that 62% of the respondents were from female-headed households, while 38% of the respondents were from male-headed households. A mean livestock holding of 6 cattle, 15 sheep and 2 goats was reported by the female-headed households, while a mean livestock holding of 6 cattle, 29 sheep and 4 goats was reported by the male-headed households. The livestock holding type from female-headed- households ranged from 1 to 42 cattle, 2 to 89 sheep and 2 to 18 goats, while the male-headed households ranged from 1 to 29 cattle, 2 to 163 sheep and 1 to 35 goats.

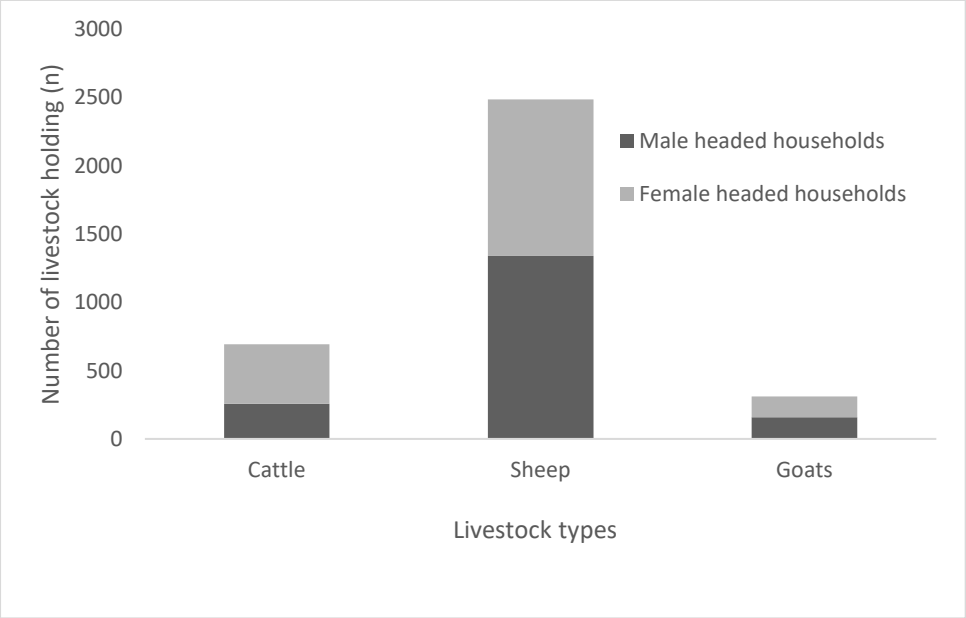

Figure 3 Livestock holding by gender of the household head in the interviewed households

Contribution of livestock goods and services to livestock-owning households

The results revealed that households benefit significantly from livestock goods and services (Table 2). On average, 38% of the households who owned livestock used milk as part of their household nutrition. The results indicated that households benefits from livestock through selling hides, wool and mohair for household income. The results also showed that 73% of the households used manure. Only 25% of the households reported that they used their animals for traction services. For the purposes of economic analysis, traction was estimated at R300,00 per day. The respondents gave this quote as the average value for hired oxen. Manure was estimated at R50,00 per wheelbarrow, while the price of milk was estimated at R6,00 per litre at the farm gate (Farmers Weekly, 2016). On average, the livestock goods and services were reported to be contributing a mean of R3 208,01 per annum in each household, this value exclude livestock sales.

Table 2 Annual contribution of livestock beneficial goods and services to livestock owning households

Beneficial goods and services	Mean household outputs (R)	Minimum outputs (R)	Maximum outputs (R)	Percentage of households (%)
Milk	1 021,80	731,90	5 939,96	38
Hides	505,57	499,98	499,98	74
Wool	1 016,99	499,98	1 499,94	74
Mohair	502,84	499,98	499,98	74
Traction	117,65	149,89	599,95	25
Manure	963,04	49,92	3499,99	73

Contribution of livestock beneficial goods and services to non-livestock owners

The results revealed that 26% of the interviewed households did not own livestock but benefitted from livestock goods and services. About 3% of households reported that they benefitted milk from livestock.

"I normally collect milk from my neighbours and in exchange, I milk for them".

About 26% of the households benefit from hides, mohair and wool.

" When a household had slaughtered a livestock and don't want to use the skin, I take it and use it to make ropes and sell them, or I would assist during sheep shearing and some households would give me some portion from the wool so that I can sell it to the wool processors".

Traction (13%) and manure (23%) were also reported to contribute to the livelihoods of non-livestock owners (Table 3). *"My neighbours normally get plenty of manure, and would give up some few wheel borrows when they have enough for their gardens, because they mix it with the commercial fertilizer".*

The contribution of livestock products to non-livestock owners was through other households paying lower price for livestock products, through exchange of labour or kind. The average annual net of livestock contribution to non-livestock owning households was reported at R2 678,00 annually.

Table 3 Contribution of livestock beneficial goods and services to non-livestock owners per annum

Beneficial outputs	Average household outputs (R)	Minimum outputs (R)	Maximum outputs (R)	Percentage of households (%)
Milk	205,79	722,93	3 659,89	3
Hides	554,58	499,98	1 499,94	26
Wool	648,44	499,98	1 499,94	26
Mohair	499,98	499,98	499,98	26
Traction	164,06	149,89	449,93	13
Manure	617,11	99,97	3 099,98	23

Annual average livestock sales from livestock owning households

The average number of livestock sold as reported by livestock owning households was 5 cattle, 10 sheep and 2 goats (Table 4). The mean annual income reported from livestock sale was R24 999,00 for cattle, R7 995,00 for sheep and R1 599,00 for goats.

Table 4 Average annual contribution of livestock offtake to livestock owners (ZAR)

Livestock type	Average number of livestock sold per year (n)	Average price of a livestock type (R)	Average income per household for livestock type sold (R)
Cattle	5	5000,00	25 000,00
Sheep	10	3466,70	8000,00
Goats	2	3466,70	1600,00

Discussion

Socio characteristics of the households

According to a study conducted by Yisehak, (2008) in Ethiopia, gender is an important component in the labour share of livestock production systems. Both males and females have different responsibilities related to animal production, with some level of variation in involvement from household to household. In smallholder livestock production, males are mostly responsible for decision-making and general herd management, while females contribute more to labour and feed inputs and manage sick animals and calves (Yisehak, 2008). The respondents reported that they provide labour for livestock handling and household members provide most of it. Some of the households use their children to look after cattle when they come from school. This arrangement, according to Kepe, (2002) also helps an individual to gain livestock ownership because of the experience of animal husbandry he/she gains at a young age.

However, mandatory schooling has reduced the number of children who are available to work as herders, so it is mostly elderly people who look after livestock during school hours.

Age was an important criterion with many individuals ranging from 51–60 (20%) to more than 61 (23%) years of age (Table 1) in interviewed households. This suggests that although older people have more knowledge and interest in livestock keeping, they struggle with the physical responsibilities that come with livestock farming. They also do not easily adapt to innovations and technology. On the other hand, there is the likelihood that they have younger people, often grandchildren in their households who can care for livestock. These results were almost the same as those found by Kunene, (2010) in Northern KwaZulu-Natal, and Masuku & Sihlongonyane, (2015) among smallholding farmers in Swaziland, who recorded that most farmers fell into the age group of 50–60 years. Almost every household (90%) kraals/corral their livestock at night. Kraaling and herding are very important in keeping animals away from predation and theft.

Livestock composition and ownership

The study revealed that livestock production is diverse; sheep production was the major product followed by cattle and very little goat production. However, with regard to animal husbandry practice, differences are known to exist, such as the type of animals kept and the rate of offtake of an animal in each household. Maura *et al.*, (2003) argue that the type of animals kept in a household is influenced by the composition of the household, gender roles, the use of cattle for traction, and the degree of traditional transfer such as bride-wealth. High numbers of sheep dominate the livestock production in this study, possibly because of the Xhosa approach that leads to cattle ownership being dominated by men (Gwelo, 2012) and sheep production has the advantage of ease of husbandry over cattle and they have no cultural importance. Although goats hold some level of traditional significance through slaughter for ritual ceremonies, very few goats are found in the study site. People complained of high rates of theft, which may explain the low goat numbers reported.

The ratios of cattle to sheep in the study area are probably related to terrain and the agro-ecology, which is better suited to sheep. The farming system in both villages is composed of multi-species, which Abate *et al.*, (2010) point out as a way to supplement people's livelihood with different livestock functions. This study did not focus on the micro-livestock component of rural households, even though most rural people in South Africa keep at least some type of micro-livestock such as pigs, chickens, ducks, geese, turkeys and pigeons, which constitute a frequently overlooked rural household economy component.

The study recorded a high number of female-headed households, with higher livestock numbers recorded in the female-headed households than male-headed households. These numbers may rather be connected to cultural constraints to women owning goats, sheep and particularly cattle in the first place as these are seen as male livestock. However, Salomon, (2015) states that livestock husbandry and ownership follow a largely gendered division of labour which can cause people to ignore the normative roles: women generally keep livestock close to home, such as pigs and chickens, which were not included in this study. Furthermore, Maura *et al.*, (2003) argue that female-headed households or widows may be nominal owners of sheep, goats and cattle, a role which is commonly seen as stewardship, and one in which the elder son will formally takes over the livestock when the mother dies.

Contribution of livestock to rural households

The study revealed that households owning cattle and sheep comprised a greater proportion of livestock ownership than households owning goats, which is due to most households owning more sheep and cattle than goats in the study area. The average net annual value of livestock goods and services, excluding offtake, was R3 207,88 in livestock-owning households and R2 687,88 in households without livestock. Besides livestock sales, milk production formed the highest average net annual output in livestock-owning households. However, other households had stopped milking their animals due to drought and because the animals did not get enough feed in the rangelands (Mkhabile, Y, 06/06/2016). Another reason for not milking their cattle may be the fact that people struggle to buy supplements throughout the year and, when they happen to buy them, the feed is only available for a short period. The estimated annual economic livestock production value in South African Development Trust communal areas was R1 196,00 ($92,30) per household (Adams *et al.*, 1999).

However, Kepe, (2002) argues that the invisible capital makes a significant contribution to rural livelihoods, which is mostly the livestock value as a wealth store and which observers underestimate. Livestock also provides meat for household consumption and cash from live animal sales. The animals provide socioeconomic status to their owner; they are considered a means of demonstrating wealth and are used for traditional rituals, such as bride-wealth payment. Maura et *al.*, (2003), believe that this livestock contribution component is underestimated and undervalued and very little has been written about it. However, there is a lack of evidence suggesting a decrease in the significance of livestock to rural people, although there are challenges in their livestock ownership. Kepe, (2002) further argues that the decrease in the economic fortunes is fuelled by ever-greater need for livestock in rural households, which can act as a safety net and supplement cash earned in the urban sector. Wealthier households tend to rely less on the wide range of benefits derived from livestock than poorer households do (Shackleton *et al.*, 2001). Furthermore, the majority of poorer owners derive more direct livestock benefits such as milk, meat and wool Shackleton *et al.*, (2005), than general cash from livestock sales (Mapiye *et al.*, 2009).

The survey revealed that traction is the least beneficial output derived from livestock by some communal people, regardless of cattle ownership. The respondents reported that the use of tractors has led to the decreased use of cattle for traction (Tom, M, 15/ 10/2016). Households who only use animals for traction are those headed by males and those who have only oxen to do the job. Animal traction is reportedly charged at R300,00 per day, regardless of hours spent on traction. Animal traction may assist households in increasing the total production of their crops by increasing the cultivated areas. According to Thornton, (2010), animals that are used for traction increase their weight because of their work, which results in significant meat production, which is further influenced by the forage quality and quantity available. du Plessis & Hoffman, (2004), further state that oxen used for traction reduce the practice of slaughtering young male animals, which leads to larger carcass weights. Castration of the ploughing oxen leads them to add weight/muscle, but the market preferentially wants 18-22-month-old steers, so heavy 8-year-old oxen don't fetch a particularly good price, for all their size.

Lastly, the results reveal that the average annual value of manure is R1 579,89 regardless of livestock ownership, with some households reporting that they use animal dung for fuel. Animal manure supplies the soil with organic matter which improves the soil structure, reduces soil erosion, and increases water-holding capacity; it also has a beneficial effect on soil microorganisms (Makinde & Ayoola, 2012). According to Makinde & Ayoola, (2012), animal manure is an important source of nitrogen for crop production as it helps reduce input costs and results in increased production and profit. Animal manure contains nutrients that are slowly released into the soil and have a long residual effect because they can be stored for a longer time in the soil. Dovie *et al.*, (2002) also reported that animal manure is one of the beneficial outputs derived from livestock in communal areas.

Benefits of livestock to non-livestock owners

Livestock production in rural areas plays a multi-purpose role where both large and small stocks provide several goods and services to households regardless of the status of ownership (Shackleton *et al.*, 2005). The inclusion of non-livestock owners in this study was to understand and value the benefit that livestock provides in a broader community. This is because evidence from previous studies has shown that livestock contribution through cash or kind to non-livestock-owning households is lacking. Livestock husbandry also contributes to job creation through the employment of livestock herders, livestock handling and kraal maintenance. Most rural people have a huge interest in livestock production, even if they do not own any livestock. Similar to Ouma *et al.*, (2003) the value was calculated based on the amount of livestock products non-livestock owners get from livestock-owning households through cash or kind. Shackleton *et al.*, (2000) states that livestock allow for a high degree of sharing of scarce resources with the community members that do not own livestock. This is evident as households who do not own livestock are reported to benefit from livestock goods and services. Shackleton *et al.*, (2000) estimated that 7% of the net annual value of all beneficial outputs is derived by non-livestock owning households, which make a greater use of livestock products. This is because, better-off households use more alternatives such as tractors, and pasteurised milk instead of fresh milk.

Vetter (2013) mentions that, some households benefit from livestock for example, through access to ploughing stock or products such as meat, milk and manure, which all extend beyond owners.

This contribution of livestock to the different livelihoods of people who do not own livestock has not received much attention, especially in policy-making spaces (Shackleton *et al.*, 2005). This is because, a cost of not owning livestock in households exists in communal areas such as payment for damage of crops by livestock as compensation (Shackleton *et al.*, 2005). Alternatively, payment from herding livestock by non-livestock owners also plays a role as a source of income and employment for non-livestock owners.

Conclusion and recommendations

It is evident from the study that uneven distribution of livestock among households remains a critical component of the rural livelihoods in the north-Eastern Cape communal rangelands. This is particularly the case for communal areas where severely limited livelihood options prevail, and livestock production will most likely remain the only livelihood option for some households. The study shows that there are numerically more sheep than cattle and goats in the villages, suggesting that wool production is a possible livelihood strategy that most households are likely to benefit from. So, interventions from the National Wool Growers Association may be beneficial in making sure that high-quality wool is produced. The results also showed that, even people who do not own livestock benefit from livestock products. Additionally, these results provide an important driver to government policies, which seek to change agrarian and land production systems to focus on livestock commercialisation, which might likely concentrate to livestock-owning households to become established livestock farmers and provide jobs and livestock products to non-livestock-owning households. Thus, continues to support the vulnerable livelihoods of the poor households and builds livelihood resilience.

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Declaration of interest statement

There are no potential conflict of interest associated with this article.

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