International Journal of Food Science and Agriculture, 2022, 6(3), 309-319
https://www.hillpublisher.com/journals/jsfa/
ISSN Online: 2578-3475
ISSN Print: 2578-3467

# Farmers' Perceptions of Livestock Husbandry and Rangeland Management Practices in Two Communal Coastal Areas of the Eastern Cape Province, South Africa

**Matshawule Sinethemba*, S. T. Beyene**

Department of livestock and Pasture, Faculty of Science and Agriculture University of Fort Hare, P.O. Box 1314, Alice, Eastern Cape, Republic of South Africa.

**How to cite this paper:** Matshawule Sinethemba, S. T. Beyene. (2022) Farmers' Perceptions of Livestock Husbandry and Rangeland Management Practices in Two Communal Coastal Areas of the Eastern Cape Province, South Africa. *International Journal of Food Science and Agriculture*, 6(3), 309-319.
DOI: 10.26855/ijfsa.2022.09.011

**Received:** June 16, 2022
**Accepted:** July 15, 2022
**Published:** August 30, 2022

***Corresponding author:** Matshawule Sinethemba, Department of livestock and Pasture, Faculty of Science and Agriculture University of Fort Hare, P.O. Box 1314, Alice, Eastern Cape, Republic of South Africa.
**Email:**
matshawule.sinethemba@yahoo.com

## Abstract

This study assessed indigenous knowledge and farmer perceptions of livestock performance, rangeland condition and indigenous feed resource management in two communal coastal areas of the Eastern Cape Province, South Africa. A total of 50 farmers from each communal area (Dyamdyam and Machibi) were interviewed using a structured questionnaire to determine farmer's perceptions. The respondent included both female and male farmers who owned livestock. About 82% and 74% of households at Machibi and Dyamdyam, respectively, were male-headed. The average population of livestock species at Dyamdyam was cattle (6.0), goats (3.1) and sheep (1.2), whereas at Machibi it was cattle (8.9), goats (5.8) and sheep (1.0). Cattle and sheep are primarily raised for sale and food, while goats are primarily raised for traditional purposes such as circumcision. The primary challenges faced by farmers to raise their livestock include stock theft followed by feed shortage and animal diseases. All the respondents reported that they practice continuous grazing due to the absence of fence on their rangelands. In both villages rangelands are primarily used for grazing followed by the collection of wood and grass for building, fire and medicines. About 30% and 32% of the respondents at Dyamdyam and Machibi respectively, perceived that their rangelands were in poor conditions. Communal farmers do not control their livestock movements due to vandalised fences in their rangelands. Therefore, it can be concluded communal rangelands are continuous grazed due to the absence of fence.

## Keywords

Grazing, fencing, household respondents, livelihood, poor conditions, villages

## 1. Introduction

In South Africa, rural areas are mainly populated by small scale farmers who raise livestock on common land and practice crop farming for consumption and sale on local markets [1]. Communal rangelands provide natural resources that support the multiple livelihood strategies of the resource poor rural people [2]. Several communal farmers in Africa use their indigenous knowledge and perceptions to make decisions on livestock farming and grazing land management. This local knowledge has allowed them to keep livestock under challenging biophysical environments, which are highly variable in space and time, and with little support as well as modern farming technologies [3]. Local knowledge and perceptions of communal farmers may vary from place to place and also from individual to individual within the same location.

Many scientists worldwide have recently recognised the indigenous knowledge and perceptions of communal farmers regarding their livestock husbandry and rangeland management [4], [5], [6] while others have ignored and disapproved [7]. As a result, many development projects in Africa that are trying to improve the communal rangeland condition and livestock production have failed [7]. The combination of indigenous and scientific knowledge can bring more useful evaluation of environmental changes and its implication for local land users. Some South African communal herders have indigenous knowledge and skills that can be used in developing the livestock production by sustainably using and managing the rangeland resources [8]. It is an advantage to acquire the perceptions of communal farmers related to rangeland conditions and livestock management because many communal farmers are able to classify the grass species that are more palatable and less palatable to livestock [9, 10].

In an attempt to improve livestock production and achieve ecological stability in communal rangelands, an investigation of famers' indigenous knowledge and perceptions about their livestock husbandry and rangelands management practices is significant [11]. Therefore, the objective of this study was to evaluate the farmers' perceptions of livestock husbandry and rangeland management practices in two communal coastal areas (Dyamdyam and Machibi) of the Eastern Cape Province, South Africa.

## 2. Materials and methods

### 2.1. Description of study areas

The study was conducted in two communal grazing lands namely Dyamdyam and Machibi located in the coastal areas of the Eastern Cape, South Africa. These communities are beneficiaries of the Nguni Cattle project. In 2004, the University of Fort Hare in collaboration with Industrial Development Corporation (IDC) and the Eastern Cape Department of Agriculture Agencies initiated the Nguni cattle development project [12].

Machibi is located at the coordinates of 33° 00.088‘‘‘‘S and 027° 27.605‘‘‘‘E and an elevation ranging from 362-364 m above sea level. It has a semi-arid climate and receives average annual rainfall of 700-800 mm, with most rainfall occurring during summer (November to January).

Temperature ranges from 20°C-26°C in summer and in winter it ranges from 9°C-12°C [13]. The soil is fine textured and dominated by sandy soil that has low moisture holding capacity and high tendency of getting waterlogged after heavy rainfall. Machibi falls under the Thorn-veld savanna biome. The dominant grass species are *Thermeda Triandra, Sborobolus Africanus, Cynodol dactylon* and *Eragrostis plana*. The common woody species are *Acacia Karoo* and *Scutia Myrtina* [14].

Dyamdyam is located at the coordinates of 33° 12.611’S and 027° 13.918’E and an altitude that range from 62-64 m above sea level. It has a humid climate and receives mean annually rainfall of 800-1,000 mm, with most rainfall occurring during summer (November to January). The temperature ranges from 20°C-24°C in summer and in winter 8°C-10°C [15]. The soil is fine texture and predominated by sandy soil with low moisture retention capacity. The common grass species are *Themeda Triendra, Sporobolus Africunus, Erograstis Plana, Tristachya leacothrix* and *Elulia vilosa*. The dominated woody species are *Diospyros Cyciodis* and *Acacia Karoo* [15].

### 2.2. Selection of Farmers

A total of 50 households who kept the livestock species were randomly selected from each communal area. These included both female and male farmers. Prior to the selection of households, a meeting was held with the Chairman of each community to introduce the purposes of the study. These two villages were selected because they are the beneficiaries of the Nguni. Cattle Project and communal farmers complained about poor performance of Nguni Cattle.

### 2.3. Data collection

Household respondents were interviewed using structured questionnaires consisting of open-ended and closed questions. Closed questions in the current study were defined as a multiple response questions where the household respondents could make more than one choice. Open-ended questions were added in this study to inspire free and spontaneous answers from interviewees. Therefore, when the respondents answering such questions were not limited to choices encoded by the designer of questionnaire and they explained their own facts and opinions. Each farmer was interviewed individually in the homestead. The questionnaire was structured into three sections: (1) Demography, (2) Livestock role and husbandry and (3) Rangeland condition and management. Interviews were conducted in Xhosa language by trained enumerator. The study protocols were approved by Govan Mbeki Research and Development Centre (GMRDC) in accordance with University of Fort Hare and Ethical Committee.

### 2.4. Statistical analyses

The data pertaining to farmer's perceptions and demographics were analysed using the SPSS statistical software pro-

gram [16]. For ranked data Friedman's Chi-square test was employed. When Friedman's test showed significant variation, a set of sign test for multiple comparisons of means were made. For other data, descriptive statistics such as frequencies, means, standard deviations and percentage were used where applicable.

## 3. Results

### 3.1. Demographic information

About 82% and 74% of the households at Machibi and Dyamdyam, respectively were male headed. The majority of the respondents at Dyamdyam (56%) and Machibi (68%) were married. Most of the interviewed communal farmers at Dyamdyam (66%) and Machibi (70%) were above 50 years of age (Table 1). Mean households size at Dyamdyam was (2.1), whereas at Machibi it was (3). About 50% and 42% of household respondents at Dyamdyam and Machibi respectively were not employed (Figure 1). They mainly relied on social grants followed by pension and small businesses (Figure 1). Most of the respondents at Dyamdyam (74%) and Machibi (64%) attended the primary education and only 6 % of farmers at Dyamdyam and 2% at Machibi attended tertiary education (Figure 1).

**Table 1. Age distribution (%) of respondents at Dyamdyam and Machibi communal areas (respondents, n= 50 per village)**

| | Dyamdyam | Machibi |
|---|---|---|
| *Age distribution (years)* | | |
| <30 | 6 | 4 |
| 30-40 | 8 | 12 |
| 40-50 | 20 | 14 |
| >50 | 66 | 70 |

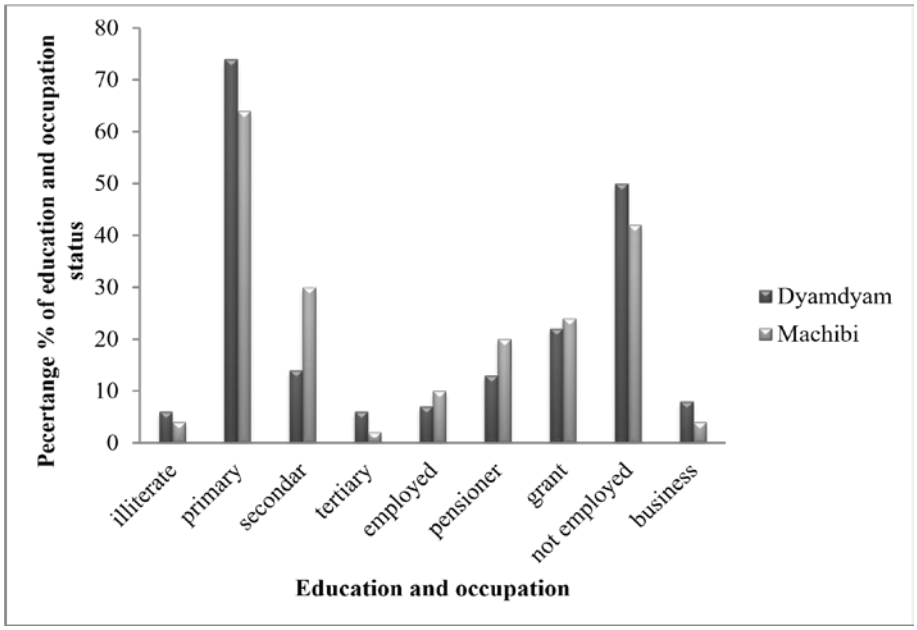


**Figure 1. Education and occupation status of communal farmers at Dyamdyam and Machibi areas.**

### 3.2. Livestock population and trend

The mean population of livestock species at Dyamdyam was cattle (6.0), goats (3.1) and sheep (1.2), whereas at Machibi it was cattle (8.9), goats (5.8) and sheep (1.0) (Table 2). There was a significant ($P < 0.05$) difference in mean numbers of cattle and goats kept between the study areas, being higher at Machibi than Dyamdyam. Most household respondents at Dyamdyam (64%) and Machibi (70%) kept non-descript cattle breed, while 24% and 16% kept Nguni cattle, respectively. About 78% and 86% of respondents at Dyamdyam and Machibi respectively perceived a declining trend of cattle population over the past ten years. Similarly, household respondents at Machibi (82%) and Dyamdyam (52%) observed the decreasing trend of sheep population over the past ten years. However, about 38% and 37% of respondents at Dyamdyam and Machibi respectively, perceived an increasing trend of goats population over the past ten years.

**Table 2. Livestock population (mean ± SE) at Dyamdyam and Machibi (respondents, n= 50 per village)**

| | Dyamdyam | Machibi |
|---|---|---|
| *Cattle population* | | |
| Bulls | 0.3a ± 0.1 | 0.2a ± 0.1 |
| Heifers | 2.2a ± 0.5 | 1.3b ± 0.3 |
| Cows | 1.9b ± 0.4 | 3.7a ± 0.9 |
| Calves | 0.8b ± 0.3 | 1.7a ± 0.4 |
| Oxen | 0.8b ± 0.4 | 1.5a ± 0.3 |
| Total | 6.0b ± 1.6 | 8.6a ± 1.6 |
| *Sheep population* | | |
| Rams | 0.2a ± 0.1 | 0.3a ± 0.2 |
| Ewes | 0.6a ± 0.3 | 0.6a ± 0.2 |
| Castrated rams | 0.3a ± 0.1 | 0.2a ± 0.1 |
| Lambs | 0.2a ± 0.1 | 0.1a ± 0.1 |
| Total | 1.2a ± 0.6 | 1.1a ± 0.5 |
| *Goats population* | | |
| Does | 1.6b ± 0.7 | 3.1a ± 0.6 |
| Bucks | 0.2a ± 0.1 | 0.3a ± 0.1 |
| Kids | 0.6b ± 0.2 | 1.8a ± 0.4 |
| Castrated Bucks | 0.6b ± 0.2 | 0.8a ± 0.2 |
| Total | 3.1b± 1.1 | 5.8a ± 1.1 |

[ab]Means with different superscript within the same row are significantly different (P< 0.05)

### 3.3. Purposes of keeping livestock

As ranked by the interviewed farmers in both communities, cattle are primarily raise for sale, traditional purposes (circumcision and wedding) and *lobola*. Secondly, they raise their cattle for food and traction (Table 3). Interviewed communal famers at Dyamdyam and Machibi keep goats primarily for traditional ceremonies such as circumcision followed by sale, food and *lobola* (Table 3). In both communities the principal reason for raising sheep is for sale followed by food, *lobola* and traditional ceremonies (circumcision and wedding).

### 3.4. Challenges faced by communal farmers in rearing their livestock

Communal farmers are faced with various challenges in rearing their livestock. Household respondents at Dyamdyam reported that, the primary challenges faced by farmers in raising their cattle and sheep are feed shortage and stock theft followed by animal diseases. Drought is ranked third while predators and water scarcity were ranked the least (Table 4). In the same village, their view of challenges in raising goats is differently ranked with animal diseases and stock theft ranked as the primary challenges (Table 4). The respondents at Machibi reported that the primary challenges faced in raising their sheep are stock theft, feed shortage and animal diseases followed by predators, water scarcity and drought. For raising goats, stock theft is still the major challenge followed by animal diseases and predators. For raising cattle, stock theft, feed shortage and animal diseases were regarded as the primary challenges (Table 4). About 62% of respondents at Dyamdyam and 68% at Machibi reported that their livestock have poor performance in terms of production and reproduction with only 12% and 16% indicated that, their livestock have a good performance, respectively.

**Table 3. Relative importance (mean rank ± SE) for keeping livestock in Dyamdyam and Machibi (respondents, n= 50 per village)**

| | Dyamdyam | | | Machibi | | |
|---|---|---|---|---|---|---|
| *Purposes* | Sheep | Goats | Cattle | Sheep | Goats | Cattle |
| Sale | $1.5^{a} \pm 0.1$ | $1.7^{a} \pm 0.2$ | $1.4^{a} \pm 0.1$ | $1.7^{a} \pm 0.1$ | $1.9^{a} \pm 0.2$ | $1.3^{a} \pm 0.2$ |
| Food | $2.2^{b} \pm 0.2$ | $3.3^{c} \pm 0.3$ | $3.8^{c} \pm 0.5$ | $2.3^{b} \pm 0.3$ | $3.5^{c} \pm 0.3$ | $3.8^{c} \pm 0.6$ |
| *Lobola* | $3.1^{c} \pm 0.4$ | $2.4^{b} \pm 0.3$ | $2.7^{b} \pm 0.8$ | $2.4^{b} \pm 0.3$ | $2.5^{b} \pm 0.3$ | $3.0^{c} \pm 0.4$ |
| Traditional ceremonies | $3.2^{c} \pm 0.3$ | $2.6^{b} \pm 0.3$ | $3.7^{c} \pm 0.6$ | $3.5^{c} \pm 0.3$ | $2.1^{b} \pm 0.3$ | $2.4^{b} \pm 0.4$ |
| Traction | | | $4.7^{d} \pm 0.8$ | | | $5.7^{d} \pm 0.5$ |

$^{abc}$Means with different superscript within the same column are significantly different ($P < 0.05$). Purpose that has low mean value is more important and is given the first letter.(1= most important, 5= least important).

**Table 4. Challenges of raising livestock (mean rank ± SE) as perceived by communal farmers at Dyamdyam and Machibi (respondents, n= 50 per village)**

| | Dyamdyam | | | Machibi | | |
|---|---|---|---|---|---|---|
| *Challenges* | Sheep | Goats | Cattle | Sheep | Goats | Cattle |
| Feed shortage | $2.5^{a} \pm 0.5$ | $3.4^{a} \pm 0.9$ | $1.9^{a} \pm 0.3$ | $3.1^{b} \pm 0.8$ | $4.1^{c} \pm 1.1$ | $3.1^{c} \pm 0.8$ |
| Water scarcity | $4.5^{d} \pm 0.7$ | $4.4^{b} \pm 0.8$ | $4.7^{c} \pm 0.7$ | $4.2^{c} \pm 0.5$ | $4.3^{c} \pm 0.5$ | $4.2^{d} \pm 0.5$ |
| Drought | $3.9^{c} \pm 0.7$ | $3.7^{a} \pm 0.7$ | $3.8^{b} \pm 0.7$ | $4.9^{c} \pm 0.6$ | $4.1^{c} \pm 0.6$ | $4.3^{d} \pm 0.6$ |
| Predators | $4.1^{d} \pm 0.8$ | $3.2^{a} \pm 0.6$ | $4.1^{c} \pm 0.8$ | $4.2^{c} \pm 0.8$ | $3.2^{b} \pm 0.7$ | $4.2^{d} \pm 0.8$ |
| Animal diseases | $3.2^{b} \pm 0.7$ | $3.1^{a} \pm 0.7$ | $3.3^{b} \pm 0.8$ | $3.0^{b} \pm 0.8$ | $3.1^{b} \pm 0.7$ | $2.2^{a} \pm 0.8$ |
| Stock theft | $2.6^{a} \pm 0.5$ | $4.1^{b} \pm 0.8$ | $3.2^{b} \pm 0.7$ | $2.1^{a} \pm 0.4$ | $2.3^{a} \pm 0.4$ | $2.1^{a} \pm 0.4$ |

$^{abc}$Means with different superscript within the same column are significantly different ($P < 0.05$). The lower the rank of a challenge, the greater is its importance and is given the first letter. (1= most important, 6= least important).

## 3.5. Feed supplementation

About 14% of the respondents at Dyamdyam and 28% at Machibi reported that they offer supplementary feed to their livestock, whereas 86% and 74% respectively did not offer their livestock with supplementary feed. All the farmers at Dyamdyam and Machibi indicated that they give feed supplements to their livestock in the winter season (May to July). Household respondents at Dyamdyam (8%) and Machibi (12%) used lucerne and lick to supplement their livestock, whereas only 2% and 3% use maize stalk respectively. All the respondents at Dyamdyam and Machibi indicated that their livestock obtained water from dams and rivers.

## 3.6. Uses of communal rangelands

Respondents from both villages showed slight differences in terms of their perceptions of the uses of rangeland. At Dyamdyam respondents reported that rangelands are used primary for grazing and collection of woods and grass for building and fire, whereas at Machibi, the respondents considered grazing as the most important use (Table 5). The majority of respondents at Dyamdyam (62%) and Machibi (66%) indicated that their livestock start grazing near the homesteads. About 54% of household respondents at Dyamdyam and 64% at Machibi reported that their livestock spend most of the time grazing near to the homesteads. They agreed that the reason livestock spend most of time grazing near the homestead is because it is easily reached by the animals and distribution of drinking areas. The majority of respondents in both villages reported that water drinking areas are mostly found near the homestead. Most household respondents at Dyamdyam (98%) and Machibi (96%) reported that, their livestock spend about 9 hours on rangelands. In addition, they further stated that, they keep mixed livestock species on their grazing lands.

**Table 5. Uses of communal rangelands (mean ranked ± SE) at Dyamdyam and Machibi (respondents, n= 50 per village)**

| | Dyamdyam | Machibi |
|---|---|---|
| *Uses of rangelands* | | |
| Grazing | $2.2^{a} \pm 0.1$ | $1.4^{a} \pm 0.1$ |
| Fire wood | $3.2^{b} \pm 0.1$ | $2.1^{b} \pm 0.1$ |
| Building | $2.4^{a} \pm 0.1$ | $2.9^{b} \pm 0.1$ |
| Medicine | $3.1^{b} \pm 0.1$ | $3.2^{c} \pm 0.1$ |

[abc]Means with different superscript within the same column are significantly different (P< 0.05). (1= most important, 4= least important).

### 3.7. Farmers' perceptions of rangeland condition and rangeland management

About 54% of household respondents at Dyamdyam and 30% at Machibi indicated that they do not know the current condition of the rangelands. About 30% of the interviewed farmers at Dyamdyam and 32% at Machibi reported that their rangelands are in poor condition whereas 0% and 2% reported that their rangelands are in good condition respectively (Figure 2). All respondents from both villages indicated that they practice continuous grazing system. They explained that they used continuous grazing due to the absence of fence and camping system on their rangelands. Household respondents at Dyamdyam (20%) and Machibi (14%) perceived that the current state of their rangelands is caused by overgrazing followed by the lack of rainfall, whereas the rest do not know the driving factors to current state of rangeland condition.

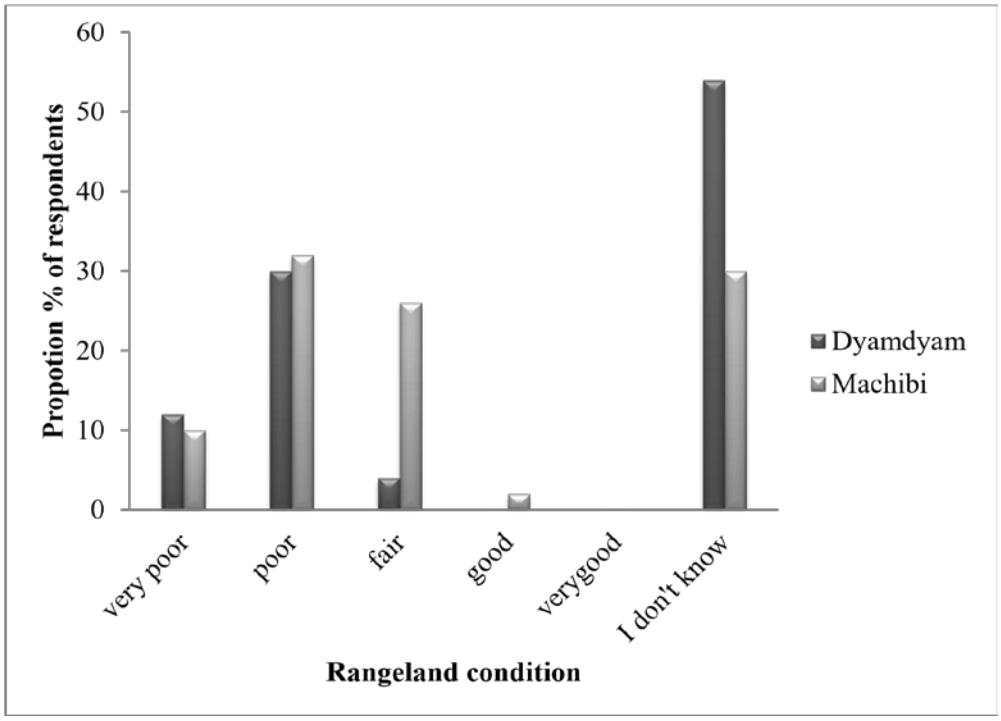


**Figure 2. Proportion (%) of household respondents who perceived different state of the current rangeland condition at Machibi and Dyamdyam.**

## 4. Discussion

### 4.1. Household demography

The current study revealed that the majority of household respondents were above 50 years of age. Similar results were reported in communal areas of the Eastern Cape Province of South Africa [17]. This indicates a lack of commitment and interest in agriculture among the youth in communal areas of the Eastern Cape Province of South Africa. This also showed that farming in communal areas is mostly practiced by elderly people. Youth in communal areas of the Eastern Cape showed a lack of interest and participation in livestock farming [18, 19, 20]. Indeed, from the different point of the involvement of youth in farming may result in an increase in food insecurity because of limited farming

experience [20]. Involvement in agriculture by rural youth is associated to the failure of the transfer of indigenous knowledge from the elders to the youth [18]. On the other hand, it was reported that the age of the household head is a vital driving factor in agricultural productivity as it determines farming experience [21, 47]. The higher the age of the farmer, the more the productivity because of more experience developed from farming [22].

The majority of respondents participated in this study were married. Married communal farmers are able to reduce food insecurity in their families because they can work together to expand crop and livestock farming [23]. The mean household size reported in this study was small and slightly similar to other studies reported in the same province but in different communal areas [24, 25]. However, it was relatively low compared to the mean household size reported in Ethiopia [4]. Large household size tends to put pressure on the consumption of livestock products within the household [26]. However it was suggested that large household size could provide enough farm labour to expand household livestock and crop farming [27]. In addition, availability of labour within a household plays a vital role in determining the number of livestock to be held per household [28]

The educational status of household respondents showed that most communal farmers did not go beyond primary education. The poor status of education in communal areas could be attributed to the shortage of schools in rural areas of South Africa. This is a common occurrence in many rural areas of South Africa for historical reasons. The poor level of education may negatively affect agricultural productivity in communal areas, because access to information with regard to good management skills for livestock, rangelands and crop farming depend on the level of literacy [28]. It was reported that well-educated communal farmers have a better opportunity to manage their livestock and crops [29]. They can acquire information for livestock, crops and rangeland management from new technologies rather than the poor educated communal farmers. Adoption of new technology to improve agricultural practices in rural areas depends on the educational status of the farmers. In addition, communal farmers need to combine indigenous skills and educational skills and approaches in order to improve their rangelands and livestock production. The combination of indigenous and educational knowledge can bring more useful evaluation of environmental changes and its implication in rangelands and livestock production. In summary, improved educational level of communal farmers can speed up the adoption of new skills and proven and recommended farming practices to increase livestock and crop production in communal areas [30].

This study also showed that many household respondents at Dyamdyam and Machibi were not employed, they mainly relied on social grants followed by pensions, livestock sale and small businesses for their livelihood. Many studies conducted in rural areas of South Africa reported similar results [31, 32]. The Eastern Cape has the highest level of unemployment in the whole country [16]. Therefore, expanding livestock production and crop farming could reduce food insecurity a point from creating employment opportunities in communal areas of the Eastern Cape Province, South Africa.

### 4.2. Livestock population trend and its importance

Respondents perceived a declining trend in cattle and sheep population over the past ten decades and increasing trend in goats population over the past ten years. This declining trend may be due to an increase of feed shortage and animal diseases, whereas the increase of goats is associated with the increase of woody plants on communal rangelands [33]. The total mean population of cattle and sheep reported in this study was higher than the results reported in the same province but in different villages [20]. However, the total mean cattle population recorded in this study was lower than the values reported in the same province [17, 34]. In addition, the total mean population of goats found in this study was relatively lower than the total mean population reported in the Eastern Cape Province of South Africa [17, 20]. The majority of household respondents in this study raise non-descript cattle breeds. The reason for raising non-descript breeds might be due to a lack of breeding practices in communal areas. In most cases, this is due to a lack of knowledge and existing conditions such as infrastructure and land tenure rights within the communal farming system [35].

In terms of livestock structure, heifers and cows have the largest mean population at Dyamdyam and Machibi, respectively. Higher mean population of heifers and cows in study areas may be due to the fact that communal farmers prefer to hold cows and heifers for milk production and breeding purposes. The mean population of cows and heifers reported in this study was relatively higher than the mean population reported in the same province but in different villages [20]. The mean population of bulls reported in the current study was very low. This could be attributed to the fact that communal farmers castrate their male animals, slaughter for traditional ceremonies such as wedding and circumcision, and make them docile for traction [33]. In addition, communal farmers prefer selling the oxen to generate income. In the present study, ewes and does have the largest mean population. This may be due to the fact that communal farmers slaughter the castrated rams and bucks for meat consumption, sale and traditional ceremonies [36]. The mean population of ewes and does found in this study was slightly higher than the values reported in the same province [20].

Communal farmers at Dyamdyam and Machibi raise livestock for different purposes. They raise cattle primarily for sale, food (meat and milk) and traditional ceremonies (circumcision, wedding and pacification of ancestors) and *lobola*.

In this study traction was regarded as the least important reason for raising cattle [35]. Interviewees in this study reported that sheep and goats were primarily raised for cash generation, food, and traditional purposes (circumcision and wedding) and *lobola* [36].

### 4.3. Challenges faced by communal farmers in raising their livestock

Communal farmers were faced with various challenges in raising their livestock. Feed shortage, stock theft, animal disease and predators in this study were cited as the main challenges faced by communal farmers to raise their livestock. These findings agree with many studies conducted in communal production system of Africa [4, 35, 20]. However, communal farmers regarded feed shortage as the least challenge faced in raising their goats. This may be due to the fact that communal rangelands have a relatively high density of woody species, therefore the browser species such as goats may not be affected by feed shortage [36]. Drought and water scarcity were regarded as the least challenges faced by communal farmers in raising their livestock. This might be due to the fact that both study areas are found in coastal areas where the rainfall is high and there is less risk associated to drought and water scarcity [38].

Furthermore, household respondents at both villages perceived that feed shortage is worsened by reduction of available grazing land areas and rangelands degradation. These findings strongly agree with the findings reported in the same province [35]. Other reasons comprise of population pressure, increase in livestock numbers and bush encroachment [4]. The lack of adequate skill for livestock and rangelands management results in feed shortage, stock theft and animal health problems [17]. In the current study, poor performance of livestock in terms production and reproduction due to lack of adequate feed is reported. These results are corresponding with the study conducted in Ethiopia [37]. In addition, household respondents further suggested that the provision of management skills for rangelands and livestock, supplementary feed, kraals and fencing the rangelands would assist to reduce feed shortage, animal diseases, predators and stock theft. These plans pointed out by the household respondents to reduce these challenges are similar with plans used by communal farmers in Ethiopia [39].

### 4.4. Feed supplementation and rangeland condition

In the current study, many communal farmers at Dyamdyam and Machibi did not provide supplemental feed to their livestock and they depend on natural rangeland in order to feed their animals during the year round [4]. Communal farmers who offered supplements to their livestock indicated that they supplement during the dry season (May to July) due to the lack of feed during this season and they use lucerne, licks and maize stalk. In addition, all the respondents in this study indicated that, they experience shortage of feed during the dry season (winter). The shortage of feed during the dry season might be due to the lack of rainfall and cold temperatures. It is rare to have enough feed and meets the entire minerals required by the livestock during the dry season (winter) due to the weather conditions [40].

The majority of respondents in this study do not know their rangeland condition. This might be due to a lack of adequate training and educating skills in communal farmers about their rangeland management and conditions. The minority of interviewed communal farmers reported that their rangelands are in poor condition and this is caused by overgrazing, the lack of rainfall and human activities [48]. Many studies reported that some communal famers in rural areas of Africa believe that the condition of their rangeland is poor whereas others rate their rangelands to be in good condition [41, 42]. All the interviewees in the present study reported that they practice continuous grazing system due to the absence of fence and camping system in their rangelands. In addition, it was further stated that grazing areas in several communal rangelands of Namibia are not sub-divided into camps for effective utilization of rangeland [41]. This does not permit for recovery of vegetation after grazing because the control of animals is not easy [43].

### 4.5. Uses of communal rangelands

In the present study, communal rangelands are primarily used for grazing followed by the collection of wood and grass for building, fire and medicine. This is because extensive natural rangelands are the primary source of forage for poor resource livestock farmers in communal areas [4]. It was further stated that over 90 % of resource poor rural households in the Southern Africa depend on the natural rangeland resources for food, income and other services [44]. Communal rangeland provides services such as timber, pharmaceuticals, human food, animal feed and fresh water [45]. Communal farmers in this study reported that their livestock spend most of time grazing near the homestead since it is easily reached by the animals and the distribution of drinking areas [46].

## 5. Conclusion

The present study revealed that livestock plays a vital role in the livelihood of poor resource farmers at Dyamdyam and Machibi by generating income and provision of food. However, it is constrained primarily by feed shortage, stock thefts and animal disease. Many communal farmers did not offer their livestock with supplementary feed and they depended on natural rangelands for feed throughout the year. Therefore, there is a need for intervention to identify other

sources of fodder that can be used by resource limited farmers during the dry seasons. In addition, all the household respondents indicated that, they practice continuous grazing system due to vandalised fence on their rangelands. Thus in turn leads to over utilisation of communal rangelands. Therefore, fencing and application of appropriate grazing system in communal grazing area is highly recommended.

## Acknowledgment

I would like to express my sincere thanks and appreciations to my supervisors Prof. S.T. Beyene for his valued advice, encouragement and strong motivations. I would also like to thank National Research Foundation (NRF), Govan Mbeki Research and Development Centre (GMRDC) for funding this research. Many thanks go to technicians of the Department of Livestock and Pasture Science for their patience and assistance in data collection.

## References

[1] Wessels, K. J., Prince, S. D., Frost, P. E. and Van zyl, D. **(**2004). Associating the effects of human-induced land degradation in the former homelands of northern South Africa with a 1 km AVHRR NDVI time series. *Remote Sensing of Environment*, 91(1): 47-67.

[2] Peden, M. I. (2005). Tackling the most avoided issue: Communal rangeland management in Kwazulu-Natal, South Africa. *African Journal of Range and forage Science*, 22(3): 167-175.

[3] Angasa, A. and Oba, G. (2010). Effects of grazing pressure, age of enclosures and seasonality on bush cover dynamics and vegetation composition in southern Ethiopia. *Journal of Arid Environments*, 74: 111-120.

[4] Solomon, T. B., Snyman, H. A., and Smit, G. N. (2007). Cattle-rangeland management practices and perceptions of pastoralists towards rangelands degradation in the Boran zone of Southern Ethiopia. *Journal of Environmental Management*, 82: 481-494.

[5] Kgosikoma, O., Mojeremane, W., and Harvie, B. (2012). Pastoralists' perception and ecological knowledge on savanna ecosystem dynamics in semi-arid Botswana. *Ecology and Society*, 17: 27-38.

[6] Ghorbani, M. H., Azarnivand, A., Mehrabi, M., Jafari, H., Nayebiand Seeland, K. (2013). The role of Indigenous ecological knowledge in managing rangelands sustainably in northern Iran. *Ecology and Society*, 18: 1-15.

[7] Abate, T., Ebro, A., and Nigatu, L. (2010). Traditional rangeland resource utilisation practices and pastoralists perceptions on land degradation in South-east Ethiopia. *Tropical Grasslands*, 44: 202-212.

[8] Allsopp, N., Laurent, C., Debeaudoin, L. M. C., and Samuels, M. I. (2007). Environmental perceptions and practices of livestock keepers on the Namaqualand commons challenge conventional rangeland management. *Journal of Arid Environment*, 70: 740-754.

[9] Gemedo-Dalle, Maass, B. L., and Isseetein, J. (2006). Rangeland condition trend in the semi-arid Boran lowlands, southern Oromia, Ethiopia. *African Journal of Range and Forage Science*, 23(1): 49-58.

[10] Brown, J. R. and Havstad, K. M. (2004). Monitoring to detect change on rangeland: Physical Social and Economic/ Policy drivers. *African Journal of Rangeland and Forage Science*, 21(2): 115-121.

[11] Musemwa, L., Mushunje, A., Chimonyo, M., Fraser, G., Mapiye, C., and Muchenje, V. (2008) Nguni cattle marketing constraints and opportunities in the communal areas of South Africa. *Review Journal of Agriculture Research*, 3(40): 239-245.

[12] Buffalo City Metropolitan Municipality (BCMM). **(**2007). Mount Coke-Dimbaza Local Spatila Development Framework, Motivation Report. Pp. 11-12.

[13] Mucina, L. and Rutherford, M. C. (2006). The vegetation of South Africa, Lesotho and Swaziland, Strelitzia 19, South Africa National Biodiversity Institute, Pretoria.

[14] World Atlas. (2012). Dyamdyam populated place. Chinci http://www.chine.com/travel/pax/q/985100/ZA/South+Afica/0/. (Accessed 01 March 2012).

[15] Buffalo City Metropolitan Municipality (BCMM). (2011). Buffalo City GIS. http://gis.bcmm.gov.za/bcmmgis/. (Accessed 10 March 2012).

[16] Statistical Package for the Social Sciences (SPSS). (2011). Space Time Research Pty Lrd. Bisho.

[17] Mapiye, C., Chimonyo, M. Dzama K., Raats, J. G., and Mapekula, M. (2009). Opportunity for improving Nguni cattle production in smallholder farming system of South Africa. *Livestock Science*, 124: 196-204.

[18] Rumosa-Gwaza, F. (2009). Communal Production System of Goats Raised by Resource Poor Farners in Eastern Cape Province South Africa. PhD Theses, University of Fort Hare, Alice, South Africa.

[19] Lesoli, M. S. (2011). Characterization of communal rangeland degradation and valuation of vegetation restoration in the Eastern Cape, South Africa. PhD. Thesis, University of Fort Hare, Alice South Africa.

[20] Gwelo, F. A. (2012). Farmers' Perceptions. Nguni cattle Feeding Behaviour and Vegetation Nutrients Dynamics in Two Communal Rangeland. Eastern Cape. M.Sc Dissertation, Unpublished. South Africa: University of Fort Hare.

[21] Mbata, T. N. (2001). Determinants of animal traction adoption in traditional agriculture: An application of the multivariate probity procedure of Lesotho. *Development Southern Africa*, 18(3): 34-41.

[22] Hofferth, S. L. (2003). Persistence and change in the food security of families with children, 1997-1999. Department of family studies, University of Maryland [Online]. Available from: http://www.findarticles.com/p/articles/mi_ m1309/is_3_40/ai_11102115.[Accessed 10/06/2010].

[23] Joubert, B. and Simalanga, T. E. (2004) Mechanizing agriculture using animal traction and small scale irrigation. In: Empowering farmers with animal traction (eds Kaumbutho, P., Pearson, A. and Sinalinga, T). Proceedings of a workshop of the Animal Traction Network for Eastern and Southern Africa (ATNESA) held at Mpumalanga, South Africa, 249-252.

[24] Mphale, M., Makoae, G. M., and Rwambali, E. G. (2002). An analysis of population growth and land use in Palaneng Bokong: *Implications for Resources Management and Sustainable Agriculture*, ISAS 2000, Maseru, Lesotho.

[25] Chimonyo, M., Kusina, N. T., Hamudikuwanda, H., and Nyoni, O. (1999). A survey on land usage of cattle for draught in a smallholder farming area of Zimbabwe. *Journal of Applied Sciences for Southern Africa*, 5(2): 111-121.

[26] Mapiye, C., Chimonyo, M., Muchenje, V., Dzama, K., Marufu, M. C., and Raats, J. G. (2007). Potential for value-addition of Nguni cattle products in the communal areas of South Africa: a review. *African Journal of Agricultural Research*, 2(10): 488-495.

[27] Paddy, F. (2003). Gender differentials in land ownership and their impacts on household food security: A case study of Masaka district. Master Thesis Uganda [Online]. Available from: www.troz.uni-hohenheim.de/research/Thesis/MscAES/Paddy.pdf Accessed [19July 2010].

[28] Hayes, J., Roth, M., and Zepeda, L. (1997). Tenure security investment and productivity in Gambian Agriculture: A generalized probit analysis. *Journal of Agriculture Economics*, 79(2): 369-382.

[29] Snyman, H. A., Kassahun, A., and Smit, G. N. (2008). Impact of rangeland degradation on the pastoral production system, livestock and perceptions of the Somali pastoralists in Eastern Ethiopia. *Journal of Arid Environments*, 72: 1265-1281.

[30] Kabirizi, J., Turinawe, A., Ebiyau, G., Kigongo, J., Akwanga, D., and Nangooti, N. **(**2009). Impact of improved forage technologies on profitability of dairy enterprise and factors affecting utilisation of technologies. *African Crop Science Conference Proceedings*, 9: 745-749.

[31] King, P. G. and Bembridge, T. J. (1988). An extension approach for the national grazing strategy based on famer characteristics in the Eastern Cape. *Journal of the Grassland Society of Southern Africa*, 5**:** 8-14.

[32] Condill, G. (2005). Institutional change and ecosystem dynamics in the communal areas around Mt coke State forest, Eastern Cape, South Africa, M.Sc, Rhodes University.

[33] Dovie, D. B. K., Shackleton, C. M., and Witkowski, E. T. F. (2006). Valuation of communal area livestock benefits, rural livelihoods and related policy issues. *Land Use Policy*, 23: 260-271.

[34] Smit, G. N. (2004). An approach to tree thinning to Southern African savannas for long term restoration from bush encroachment. *Journal of Environmental Management*, 71: 179-191.

[35] Mngomezulu, S. (2010). Formal marketing of Cattle by Communal farmers in the Eastern Cape Province of South Africa. Can they take part? MSc Dissertation. The Netherlands: Wegeningen University.

[36] Montshwe, D. B. (2006). Factors affects participation in mainstream cattle markets by small-scale cattle farmer in South Africa, MSc thesis, University of Free State, RSA.

[37] Katjiua, M. and Ward, D. (2007). Pastoralists‟ perception and realities of vegetation change and browse consumption in the northern Kalahari. Namibia. *Journal of Arid Environment*, 69: 716-730.

[38] Mengistu, A. (2018). Feed resources in Ethiopia. Animal and fisheries Resources Development Ethiopia. http://www.fao.org/Wairdocs/ILRI/x5548e03.htm.

[39] Abule, E. (2003). Rangeland evaluation in relation to pastoralists perception in the Middle Awash Valley of Ethiopia. A PhD thesis Presented to the University of the Free State, Bloemfontein, South Africa. P. 297.

[40] Macdowell, L. R. (1992). Mineral in Animal and Human nutrition. Academic press. San Diego, CA, p. 524.

[41] Ward, D., Ngairorue, B. T., Apollus, A., and Tjiveze, H. (2000). Perceptions and realities of land degradation in arid Otjimbingwe, Namibia. *Journal of Arid Environment*, 45: 337-357.

[42] Abule, E., Snyman, H. A., and Smit, G. N**.** (2016). Comparison of pastoralists‟ perceptions about rangeland resource utilization in the Middle Awash Valley of Ethiopia. *Journal of Environmental Management*, 75(1): 21-35.

[43] Arnalds, O. and Backarson, B. H. (2003). Soil erosion and land use policy in Iceland in relation to sheep grazing and Government subsidies. *Environmental Science and Policy*, 2: 115-121.

[44] Dovie, D. B. K., Shackleton, C. M., and Witkowski, E. T. F. (2007). Conceptualizing the human use of wild edible herbs for conservation in South Africa communal areas. *Journal of Environmental Management*, 84: 146-156.

[45] De Oliveira, Duraiappah, A. K., and Shepherd, G. (2003). Increase capability through an ecosystem approach for the dry lands. *The Global Dry Lands Imperative UNEP*: 116.

[46] Lesoli, M. S. (2008). Vegetation and soil status, and human perception on the condition of communal rangeland of the Eastern Cape, South Africa. MSc. Thesis, University of Fort Hare, South Africa.

[47] Tokozwayo, S. (2016). Evaluating farmers' perceptions and the impact of tree encroachment on herbaceous vegetation and soil nutrients in Sheshegu communal rangelands of the Eastern Cape, South Africa. MSc, thesis, Faculty of Science and Agriculture, University of Fort Hare, South Africa.

[48] Ndandani, A. (2016). Range condition assessment to document the extent of degradation on selected semi-arid rangelands of the Eastern Cape, South Africa. M.Sc, thesis, Faculty of Science and Agriculture, University of Fort Hare, South Africa.