



Small Ruminant Production: Contributions, Management Practices and Challenges at Traditional Level in Rural Areas of Sierra Leone

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Abstract: Small ruminant production is an important animal husbandry practices practiced in developing countries including Sierra Leone. This current study was conducted in the Southern Part of Sierra Leone (Moyamba District) to investigate Small Ruminant Production (SRP) at the free-range management system concerning household contributions, practices, and challenges. Data were collected from 192 respondents using a well-structured pretested questionnaire. This was administered randomly to 6 selected chiefdoms in the Moyamba District. Data were analyzed using simple descriptive statistics for mean, frequencies, and percentages. The results of the study showed that 60.4% of the respondents were male whilst 39.6% were females. 80.7% were married, 49.0% were illiterate and 74.0% were unemployed. Household demands were reported as the main purpose for keeping goat and sheep followed by traditional practices, income generation, religious ceremonies, and manure for vegetable production. 67.7% and 89.1% provided supplementary feed and water for their animals respectively. The majority of the respondents (81.8%) built separate shelters whilst the remaining farmers either shared dwelling houses with their animals (25.7%) or did not confine them (18.2%). Disease outbreaks such as [mange, Peste des Petit Ruminant (PPR), diarrhea, respiratory infections, foot rot, and bloat]; uncontrolled theft; poor market facility; damage; and inadequate animal healthcare services among others were the major constraints reported by farmers. It was concluded that production management practices were mainly done at the traditional level using traditional knowledge and skills with little or no modern input hence low-output. The study therefore recommended that government and non-governmental organizations should implement multi-sectorial interventions to provide the pre-requisite assistant to the farmers which can help to combat the multiple challenges affecting small production in the study area.

Keywords: Challenge, Disease, Livelihood, Marketing, Mortality, Small Ruminant

1. Introduction

Small ruminant production (SRP) is an important agricultural activity that contributes to poverty reduction, economic dependency, and promotes socio-cultural beliefs and practices, especially in resource-limited settings. Small ruminants (SRs) including Goats and Sheep perform well even when poorly managed and cared for because of their

unique adaptive natural characteristics which greatly contribute to their geographical distribution. Over the years SRP has gained a greater and wider attention particularly in developing countries due to the continuous increase in demand, social, traditional, and religious functions it performs. Animal production accounts for about 30% of the total land areas which support 600 million livelihoods by creating jobs for 1.3 billion people [1]. Studies have revealed

that nearly 59.7% and 33.8% of the goat population (861.9 million) and 42.0% and 26.7% of the sheep population (1078.2 million) are found in Asia and Africa respectively [2]. In some poorer communities, livestock production plays an important function in meeting the basic daily requirements (food) of the people especially women, disabled and the less privilege that in most societies are being neglected. In recent years livestock rearing particularly SRs, has become a gender-sensitive issue more so in the developing world. It is widely acknowledged that goats and sheep contribute to poverty alleviation and food security which is an important pillar in attaining the Millennium Development Goals but their support towards gender equality and promotion has even broadened the upsurge interest of women towards livestock production [3, 4]. Regardless of the immense functions goats and sheep accomplish they are being suppressed by management, climatic, environmental, technical, non-technical, and production constraints [5, 6].

Sierra Leone is located along the Atlantic Ocean (6° 55' N and 10° N and 10° 14' W and 13° 17') with a population of 7,092,113 [7]. Agriculture is the key component contributing to the survival of many Sierra Leoneans and an important source of revenue generation for most of its people. It is the largest employing sector providing jobs for about 75 percent of its population with a national GDP of 46% [8, 9]. However, the livestock sector is still underdeveloped and thus cannot meet the demand of the growing population. In narrowing this gap, importation of poultry, cattle, and pig meat and their products has been an alternative measure. Although the 11 years' civil war destroyed a large portion of the livestock population, approximately 95% of the country's population is still engaged in livestock production [10]. Livestock rearing in Sierra Leone remains a matter of choice that is most times driven by household burden/demand and unequal distribution of local resources, especially in rural areas. In Sierra Leone, SRs constitutes mainly of goats and sheep to which goats account for the largest (21.3%) followed by sheep (8.7%). Despite different breeds of goat and sheep are reportedly reared in many parts of the world including Africa, the West African Dwarf (WAD) goats and the Djallonke sheep are the main breeds reared in Sierra Leone although the Sahelian goats and cross-breed of the WAD and Sahelian have been reported [11]. They are unevenly distributed and are kept mainly by the poor under different agro-ecological conditions due to their unique socio-cultural values in promoting traditional and religious practices. SRs fulfill undeniable but neglectable economic, nutritional, and social functions in all corners of Sierra Leone, especially in the rural areas. Despite the aforementioned benefits accomplished by SRs, sufficient information on the management practices, potential contributions, and constraints are scarcely documented due to limited research. However, other studies [8, 12, 13] have been conducted on the general functions livestock accomplish to farmers and the challenges associated with their management practices. Therefore, the objectives of this study were to investigate and document base-line information on SRP at the traditional level, contributions to the household

level, and the constraints faced by farmers in the Moyamba District.

2. Methods and Materials

Moyamba District is located in the Southern part of Sierra Leone with an estimated population of 318,002 [7]. It is the largest district in the south with a total land area of 6,902 Km² along latitude 8° 09' 32.33" N and longitude 12° 25' 54.05" W. In the west, the district is bordered by the Atlantic Ocean; Bo in the east; Bothe in the south; and Tonkolili and Port Loko districts in the north. The main geographical features include savannah grassland, secondary forest, inland valley swamps, mangroves, hills, mountains, rivers, and other water bodies. Compared to the rest of the country, the district experiences a wet semi-equatorial climate with two main seasons which normally last for six months each. The mean annual rainfall ranges between 125 to 250 mm and relative humidity of 71 to 80 percent. The major source of livelihood is agriculture followed by business, fishing, mining, and former job. 87.5% of the households are engaged in crop farming mainly rice cultivation which is the staple food including cassava, groundnut, beans, ginger, pineapple, and maize. Livestock rearing is another key component in the lifestyles of most people with 77.9% of households involved in it. The goat and sheep population in the Southern province are 108,896 and 48,642 where 42,286 and 15,206 were found in the studied district [7] respectively. Other livestock species rear includes poultry, cattle, and pig. The district has different ethnic groups (Mendes, Sherbro, Temne, and Loko) with strong socio-cultural practices that are strongly connected to small ruminants.

A total of one hundred and ninety-two (192) semi-structured questionnaires were administered to 192 respondents (32 goats and sheep rearers per town/villages) in six randomly selected chiefdoms (Kori, Dasse, Kowa, Kamajei, Fakunya, and Kaiyamba). The most populated small ruminant towns in the six chiefdoms i.e., Kori (Taiama), Dasse (Mano), Kowa (Njama), Kamajei (Senehun), Fakunya (Moyamba Junction), and Kaiyamba (Moyamba) were selected. The questionnaires were purposively structured for household head and were administered face to face through a house to house visit. In cases where the head of the house was unavailable, a member in the family with experience in rearing SRs was interviewed. The questionnaires were pre-tested in Kori and Dasse chiefdoms and the outcome was used to do further modification on the questionnaire. Side comments, personal observation, and related works (journal articles, books, and publications) were additional sources of data that served as complementary materials.

Data obtained were entered into an excel spreadsheet and analyzed using SPSS version 23.0 to obtain frequencies, averages, and percentages. Results from the analyzed data were presented using tables and figures. Qualitative information gathered was translated and presented as case study statements.

3. Results and Discussion

Table 1 presented the demographic attributes of goats and sheep farmers in the studied areas. Base on the results of the study, 60.4% of the respondents interviewed rearing SRs were men's compared to 39.6% who were women. As tradition demands, men are the breadwinners and therefore, it is obligatory for them to attend to the needs of their family members.

Table 1. Socio-economic attributes of goats and sheep owners.

Variable	Valid percent
Gender of respondents	
Male	60.4
Female	39.6
Average age of respondents	43.1
Education level	
Primary/secondary	25
Tertiary	19.3
Islamic	6.8
Illiterate	49
Marital status	
Single	5.2
Married	80.7
Single parent	14.1
Year of rearing experience	
1-5	16.7
6-10	30.7
10 and above	52.6
Employment status	
Employed	26.0
Unemployed	74.0
Different livestock species reared by farmers	
Goats	31.2
Sheep	16.1
Poultry	43.7
Cattle	1.9
Pig	7.1

In addressing these needs with limited resources, they consider goats and sheep rearing at the household level as the most appropriate measure. Men are also engaged in different traditional practices that most times demand the need to keep goats and sheep. The average age of the respondents were within the working-age group (43.1) and therefore if empowered with the required skills and resources will perform better. Approximately, half of the respondents (49.0%) were without formal education which is crucial for the adoption of modern ideas and technology in their management practices whereas a few others have acquired basic primary and secondary (25.0%), tertiary (19.3%), and Islamic (6.8%) education. The marital status of the farmers revealed that 80.7% were married, 14.1% were single parents, whilst 5.2% have never married before. 52.6% of the respondents have long years of rearing experience (10 years and above) whilst the remaining 30.7% and 16.7% have 6-10 and 1-5 years of experience in rearing SRs respectively. Majority of the respondents (74.0%) were not formally employed whilst 26.0% were formally employed. The main livestock rear in the study areas includes chicken, goats, sheep, pig, duck, and cattle. Among the different species rear, indigenous poultry accounted for the largest species reared

followed by goats, sheep, cattle, and pigs [7]. These animals are kept for multiple functions ranging from household to commercial purposes. However, SRP is not the main source of livelihood for the majority of the respondents (95.3%) but to supplement crop production, especially during crop failure which is in line with [9] report. Out of the 192 interviewees, only 4.7% (9) of them depend entirely on SRs for their livelihoods of which the majority were single parents and retirees.

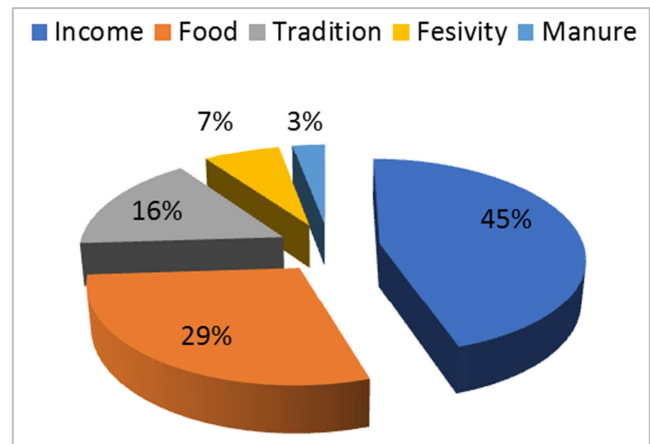


Figure 1. Reasons for keeping ICs.

During the study, important contributions of goats and sheep as presented in figure 1 were listed by SRFs which are in agreement with [15, 16] reports who also stated income, food, the fulfillment of traditional rights, religious practices, and manure for crop production as key contributions to SRFs. The main contribution of SRs according to the respondents in the studied area was food (49%) for household consumption. SRs particularly goats are the most palatable animal prefer by the majority of Sierra Leoneans due to high nutritive values and good attractive aroma. Goat meat is a delicacy with little or no taboo consume widely by all class of citizens (poor or rich). Among other reasons for which goats and sheep are reared includes traditional purposes (secret societies, marriage, and naming ceremonies), cash for solving household problems, and fertilizer for vegetable production similar to the study conducted by [14] where SRs were important in ceremonial feasting and payment of social dues. SRs especially sheep are used in many religious rites. In the Islamic tradition, sheep are sacrificed in honor of certain rights (naming ceremony, Eid-ul-Adh). Goats, on the other hand, play a key role in Christian celebrations. In Sierra Leone and many other African countries, Christians used goats to celebrate Easter and Christmas, gift to their members or heads as well as to organize important occasions such as baptize their members [17]. Added to these contributions, SRs are again used to establish large ruminant production where goats and sheep were reportedly sold to start or expand cattle rearing.

Figure 2 below presents the flock compositions for goats and sheep during the study and how were they acquired.

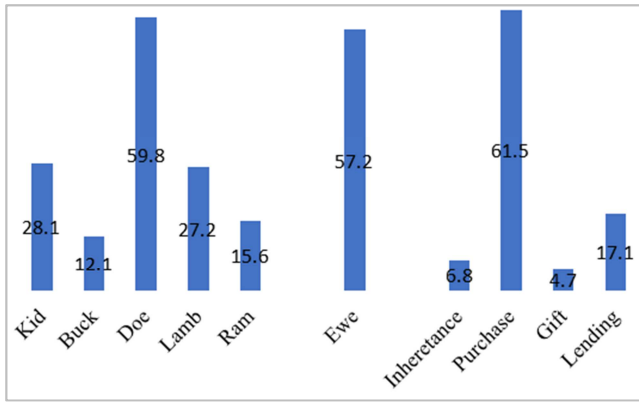


Figure 2. Flock composition and means of acquiring breeding stock.

Out of 1,508 goats recorded during the study, doe constituted 59.8% followed by goat kids (28.1%) and buck (12.1%). Female goats with good productive features were most times maintained as breeding stock unlike aged and deformed or stunted goats which were normally culled and sold or consumed. A similar flock structured was also observed for sheep where 57.2% of the 778 total populations of sheep were ewe seconded by lamb (27.1%) and ram (15.6%). The reason for the low number of flock composition for the two species as mentioned by the respondents compared to many other studies was due to the multiple challenges (mortality rate caused by inadequate management practices, continuous disease outbreaks, theft, cruelty, and poor education) which they normally encounter. The male population among both species was recorded as the least which was due to their high economic and domestic demands. The average male to female ratio recorded for both goats and sheep was 1:2.7 and 1:2.5 respectively. It was further noticed that some respondents lack male animals as a breeding stock which implies that the reproductive performance of their female animals greatly depends on other farmers. These conditions could promote uncontrolled mating, unselective breeding, long lambing/kinging interval, and low performance.

In figure 2, 61.5% of the respondents got their breeding animals through purchasing whilst 17.1%, 9.8%, 6.8%, and 4.7% acquired through lending, exchange, inheritance, and gift respectively which supports the findings of [18]. 84.9% of the respondents practiced the traditional system of management considering its low input, which is in agreement with the report of [19] who reported 72.5% of the farmers keeping their animals in the extensive management system. The traditional or free-range system is virtually cheap considering the low economic status of the farmers, unlike the intensive and semi-intensive systems which are highly capital-intensive although 15.1% of the respondents practiced semi-intensive system. Although the traditional management system was considered the best system among others because of the availability of free local feed resources; it is also the most unsafe system of rearing livestock. It is evidenced that animals' rear under the free-range system are prone to disease outbreak, theft, high mortality, predators, accident,

unfavorable weather condition, and low production.

Table 2. Ratio of male to female goat and sheep and the different management type practiced (%).

Male to female ration	
Goat	1:2.7
Sheep	1:2.5
Management type	
Traditional/extensive system	84.9
Semi-intensive	15.1

Figure 3 below illustrates the various types of challenges reported by the respondents during the study. These challenges range from technical to production to economic and attitudes of the community. Lack of support (28.4%), continuous disease outbreak (21.4%), and rampant theft (18.0%) ranked top among all the constraints listed. Marketing, inferior breed quality, crop damage, poor treatment, feed scarcity, accident [poison (plant, chemical), vehicle, motorbike], animal cruelty were moderate challenges whilst housing forms the least challenge.

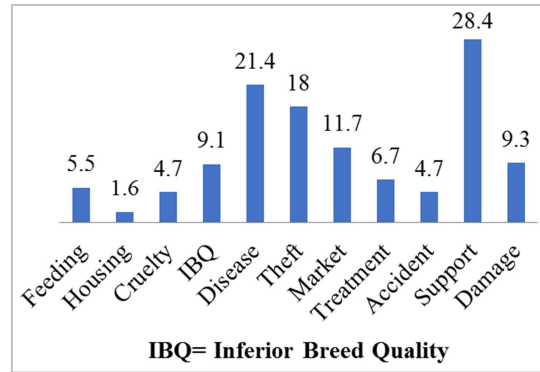


Figure 3. Challenges associated with SRP.

Similar challenges from related studies in different countries have been reported [20, 16]. Additional challenge mentioned that is a true feature for traditional livestock production was the lack of record-keeping. Among those interviewed, only 6.8% (13) of them keep a record of their livestock which agrees with a previous study in Rwanda which reported that only 4% of the farmers interviewed kept a record [21]. Also, livestock extension service was considered very poor in the studied area, as only 2.1% (4) of the respondents have had access to extension agents or services.

Table 3 below provides information on the provision of feeds and water in the studied areas. Despite SRs depend mainly on natural pastures; farmers occasionally supplement their animals with tree forages, tuber (cassava, potato), leftover, kitchen wastes and peels in periods of feed scarcity. More than two-thirds of the respondents (67.7%) agreed to have provided additional feeds to supplement feed shortage during the dry season whilst 32.3% did not supplement. In our discussions, some respondents believed that the prolonged reproductive interval and the delayed maturity period for young animals, as well as the poor immune status of animals against certain diseases, were sometimes due to

inadequate feeding. 90.7% of the farmers faced feed scarcities in the dry season since most of the animals were tethered to minimize conflict with crop growers and rampant theft whilst 6.2% and 3.1% either encountered feed shortages in the raining season or throughout the year respectively. A similar result has been obtained in Ethiopia, where goat and sheep herders experienced feed scarcity in both seasons [22]. Provision of drinking water by farmers was inadequate due to poor awareness. The majority of the respondents provided drinking water only in the dry season because water is inaccessible by most animals. 89.1% gave water to their animals from different sources whilst 10.9% allowed their animals to source drinking water. 16.4% and 6.4% provided water twice and trice per day respectively whilst the majority (74.3%) put water in permanent containers and placed in shades where goats and sheep come to drink. Water containers reachable by both domestic and pets including wild animals were normally cleaned when emptied. The consequence of such practice may be devastating (disease transmission) and therefore, farmers need to be educated. Water with different tastes and colors from various sources were provided for drinking. The main sources of water available in the study areas were well, pump, tap, swamp and river.

Table 3. Feed and water provision (%).

Supplementation		Provision of water	
Yes	67.7	Yes	89.1
No	32.3	No	10.9
Feed supplementation		Frequency	
Forages/vegetables	23.6	Permanent	74.3
Leftover	20.2	Twice	16.4
Tuber	29.8	Trice	6.4
Peels	26.4	Water source	
Period of feed shortage		Well	50.9
Dry season	90.7	Pump/tap	37.6
Raining season	3.1	River	5.2
Both season	6.2	Swamp	6.4

Adequate shelter plays vital roles in protecting (from theft and predator) and providing comfort for the animals especially during unfavorable weather conditions (hot, cold, or rain). 81.8% of the respondents provided separate and different forms of shelters for their animals whilst 18.2% were without separate shelter. The shelters were built with local materials including stick and zinc (72.6%), stick and thatch (15.7%) and brick and zinc (12.1%), and sometimes tapeline or scrap-metals. 93.0% of the respondents separated shelter from dwelling houses whilst 7.0% joined their pens to their dwelling houses. The main reason why farmers joined pens with their dwelling houses, had no separate shelters, shared dwelling houses with animals, or unconfined them was to protect their animals from being stolen. 86.6% of the shelters were raised off the ground to prevent or minimize the incidence of diseases and parasites whilst 13.4% of the pens were positioned on the ground which was a possible source of infection and easy access by predators. Due to the lack of adequate shelters, the majority of the farmers kept their animals in a single pen (61.1%)

which facilitated the rapid transfer of diseases and sometimes resulted in fighting among animals and trampling of the young animals. However, 38.9% of the respondents provided separate pens for lactating and advanced stage of pregnant animals. In a few of the communities visited, pigs and SRs were kept in the same shelters which the study considered as poor animal husbandry management practices because pigs are known to host different disease pathogens resulting in cross infection.

Table 4. Housing and its management system (%).

Constructed shelter	Floor-type	
Yes	81.8	Cemented 15.9
No	18.2	Mud/dust 84.1
Housing composition	Separate pen for each category of animal	
Stick and thatch	15.3	Yes 38.9
Stick and zinc	72.6	No 61.1
Brick and zinc	12.1	Cleaning
Housing location	Yes 94.5	
Attached to human dwelling	7.0	No 5.5
Separated	93.0	Frequency of cleaning
Housing position	Daily 26.3	
Raised	86.6	Weekly 64.7
Ground	13.3	Monthly 9.0
Pen for sick animals	Animals without shelter	
Yes	13.4	Dwell with human 25.7
No	86.6	Others 74.3

The result of the analysis also revealed that 94.5% of the respondents cleaned their pens but the frequency at which it was done differed among farmers. 64.7% cleaned on weekly bases, 26.3% and 9.0% cleaned on daily and monthly bases respectively whilst 5.5% did not clean. The study further revealed that the condition of shelter influenced cleaning frequencies in the study areas. Farmers with mud/dust floors (84.1%) often cleaned with difficulty and therefore, hardly cleaned but those with cemented floors (15.9%) took less time to clean and it was frequently done. Animals without any form of shelter dwell in either kitchen, abandon structures, neighboring pens, or in open places (74.3%) which expose them to frequent stealing, predators, infections, and hostile environment.

Disease has been reported among SRFs as the major constraint causing high mortality and serious economic loss to farmers, especially in developing countries [22, 14] like Sierra Leone. In the studied areas where conventional treatment is poor; livestock extension services are inadequate, and SRs are traditionally managed, the problem of diseases intensifies every year which posed a severe threat to farmers' livelihoods, social and economic status, cultural and religious practices. In this study, 77.1% of SRFs reported disease outbreaks whilst 22.9% had not experienced any disease occurrence in their flock (table 5). Based on the prevalence of diseases encountered by the respondents, mange was the most frequent disease observed followed by Pests des Petits Ruminant (PPR), diarrhea, respiratory infection, foot rot, and bloat which are in agreement with a previous study outside Sierra Leone [23]. Goats were reported to be less affected by foot rot as most of the cases reported for foot rot were from sheep rearers but mange was frequently seen and more severe among the goat

population. The seasonal pattern of diseases and the factors responsible for their occurrences were not understood among farmers as outbreaks do occur at any time within the year. The majority of the respondents recognized the end of the dry and start of the raining seasons as the most prevalence period for certain diseases like PPR, bloat, and diarrhea whereas 28.6% and 29.9% experienced more diseases in the dry and both seasons respectively. Most of the sources of diseases were unknown by the majority of the farmers (50.3%) but 29.2%, 18.6%, and 1.9% considered free-range, introduction of new animals in communities, and the frequent mingling of both wild and domestic animals as possible means by which animals' contract diseases respectively. The most common mode of disease transmission was through direct contact due to interaction with different herds. Other means of transmission including indirect contact and poor management of infected carcass were further listed whilst 29.1% have no idea of how their animals contract diseases. In the event of an outbreak, respondents take different measures in mitigating its effect. 34.7% treated animals presenting symptoms using traditional veterinary medicine as well as human drugs (pills, antibiotics), 19.5% isolated sick animals although there was no designated pen for isolated sick animals and therefore continue to interact and share the disease with other animals, 18.6% either ate or sold, 13.1% reported and 14.0% offered no solution.

Table 5. Disease conditions of small ruminants (%).

Disease	Disease source	
Yes	77.1	Strange animal 18.6
No	22.9	Free-range 29.2
Prevalence season		Wild 1.9
Dry	29.9	No idea 50.3
Raining	41.5	Mode of transmission
Both	28.6	Direct contact 52
Main diseases		Indirect contact 15.6
Mange	31.8	Poor carcass 3.3
Foot rut	14.8	No idea 29.1
Diarrhea	23.8	Response to outbreak
PPR	24.9	Eat/sell 18.6
Bloat	4.7	Report 13.1
		Self-treatment 34.7
Respiratory infection	15.2	Isolate 19.5
		Nothing 14

Eating and sharing of dead animals among livestock keepers and other neighbors were mentioned among farmers whilst a few either burry or throw them because of religious prohibition and sometimes the condition of the dead animal (if seriously sick).

SRP in Sierra Leone is an important commercial activity that links livestock farmers with the modern economic world. Marketing plays a crucial role in the lives of the farmers by providing them with frequent cash. 54.7% of the respondents sold part of their animals during the studied year whilst 45.3% did not (table 6). The ratio of sheep to goats sold in the study year was 1:2.6 (sheep=80, goats=206). Income earned from sales was used for household affairs including medication, education, and others like purchasing of farm input (seeds, farm tool, hiring of labor), repairing of dwelling houses, paying local

tax, protect businesses from collapsing, buying dress for children and household utensils which is in agreement with [17] findings. Money earned from the marketing of goats and sheep was also used to pay school charges and buy school materials (34.8%), and sometimes to hire the services of animal healthcare personnel (15.4%) which strongly agreed with the results obtained by [24] in Nigeria. The majority of the respondents (50.3%) sold their animals during festive seasons when the demand and price were high. Others also sold at the start of the school year, farming season whilst 30.6% sold when the need arises. The main customer named was the middleman who buys at low cost and sells at a higher price thus making more profit compared to the producers which are in agreement with the findings reported by [19] in Nigeria. Religious individuals and town/village people were also other customers identified. 71.3% of the farmers sold at the farm-gate whilst 28.7% sold at different points. The selling of animals was mainly determined by men as household heads, 12.4% of the respondents agreed to have consulted their partners before selling whilst 21.9% of the decision to sell was taken by women. The livestock market in Sierra Leone is faced with a series of challenges that require the attention of the stakeholders for profitable production. Findings from this study revealed that price fluctuation was the most serious problem which farmers encountered in the studied areas. Livestock marketing is mainly influenced by seasonal activities that are driven by demand. For instant, in the dry season when most activities take place, demand was said to be high which results in higher prices causing farmers to earn more money compared to the rainy season with low demand and low price. Another major challenge listed was periodic marketing (27.5%). The marketing of SR in the studied areas was irregular and therefore remained stagnated at certain periods in the year. Lack of market information, poor road network, the high transportation cost of animals, lack of established and functioning livestock market in the studied areas were part of the challenges.

Table 6. Goats and sheep marketing system and its challenges (%).

Sold goat/sheep	Sales authorizer	
Yes	54.7	Man 65.7
No	45.3	Woman 21.9
Ratio of goat: sheep sold per year	1:2.6	Both 12.4
Reason for selling SRs		Marketing times
Food	36.8	Festive season 50.3
Health	15.4	Start of the school year 13.6
Education	34.8	Start of the farming season 5.4
Others	13	Others 30.6
Buyers		Marketing challenge
Middleman	56.3	Price variation 37.6
Religious members	21.9	Lack of information 15.7
Neighbour	18.8	Transportation 9.6
Marketing points		No livestock market 3.9
Farm-gate	71.3	Periodic market 27.5
Other sales points	28.7	

4. Conclusion

- 1) Small ruminant population in the study areas constitute mainly of indigenous breeds with low-input and low-output levels under the free-range or traditional management system
- 2) Small ruminant production occupies a unique position in farmers' daily life by contributing to household food security, income, socio-cultural and religious practices, and agricultural activities.
- 3) Regardless of their primary contributions, small ruminant production is faced with numerous challenges that have remained unaddressed. Among the different challenges highlighted, continuous disease outbreaks and rampant theft were the most serious challenges in the studied areas.
- 4) Animal healthcare service was inadequate causing scaring flock mortality and therefore, traditional practices in disease management were key.
- 5) High illiteracy rate, lack of awareness, and management skills among farmers due to lack of livestock extension service were key concerns.

5. Recommendations

- 1) To reduce the prevailing constraints, there is a need for appropriate technical and institutional interventions from concerned bodies to improve productivity.
- 2) To alleviate SR diseases in the study areas, strengthening community animal healthcare services is of topmost concern.
- 3) For a healthy production, SR farmers and livestock extension agents should be given training focusing on good management practices (feeding, housing, improved biosecurity, and provision of drinking water).
- 4) Robust measures are required by the government as well as the community to reduce/eliminate animal theft.
- 5) A shift from the traditional method of SRP to a market-oriented production system is needed by improving management practices, marketing systems, and creating loan/credit opportunities for farmers.

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