Small Ruminant Production and Management Systems in Urban Area of Southern Guinea Savanna of Nigeria

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ABSTRACT— *A total of one hundred small ruminant farmers randomly selected from three Local Government Areas of Ilorin metropolis were surveyed to examine small ruminant production and management systems in the southern Guinea Savanna of Nigeria. About 90%, 83%, 43% and 55% of the respondents were male, married, in the age bracket of 40-49 years and had secondary education, respectively. West African dwarf goats (45.2%) and Yankasa sheep (58.4%) were the most preferred and dominant breeds of goats and sheep in the study area. The method of feeding commonly adopted (96.3%) by the farmers was a combination of scavenging and supplementation, while cassava peels was the main feed supplement. Most (56.20%) of the farmers got their animals through purchase only. Majority (56.3%) practised semi-intensive system of husbandry, and a greater proportion (38.8%) reared the animals for consumption purpose. Tick-borne disease (37.82%), diarrhoea (23.18%), mange (17.08%) and helminthosis (14.64%) were the most prevalent diseases. Higher proportions of the farmers (38.5%) and (32.3%) employed self medication and local herbs, respectively, in treating their animals. Routine inspection of animals, as an improved practice, was introduced to 96.4% of the farmers while 68% adopted the practice making it the highest in terms of awareness and adoption among farmers. Farmers identified scarcity of fodders, lack of training and knowledge, shortage of veterinary services and limited capital as the most serious constraints facing small ruminant production in the study area. Chi-square analysis revealed that sources of animals and years of experience in production were significantly (P < 0.05) associated with the total number of animals reared by respondents. Correlation analysis showed that age of farmers, number of children and years in livestock farming were positively (r = 0.057, 0.194 and 0.087) but not significantly (p > 0.05) correlated to the number of stock reared. Small ruminant farming in the study area is a smallholder affair managed semi-intensively and requires improved feeding, provision of veterinary services, financial assistance and extension services to encourage and enhance production.*

Keywords— Constraints, herd size and composition, management practices, sheep and goats, socio-economic characteristics

1. INTRODUCTION

The importance of small ruminants (ie sheep and goats) to the socio-economic well being of people in developing countries in the tropics in terms of nutrition, income and intangible benefits (eg savings, insurance against emergencies, cultural and ceremonial purposes) cannot be overemphasized (Kosgey, 2004). Sheep and goats are important livestock species in developing countries because of their ability to convert forages, and crop and household residues into meat, fibre, skin and milk. The economic importance of each of the products varies between regions, especially in the developing countries. In terms of total output, sheep and goat products are the most important in developing countries where 45% of all mutton, 54% of all sheep milk, 93% of all chevon, and 73% of all goat milk are produced (FAO, 1981). Sheep and goat meat enjoys wide acceptability amongst different several cultural groups because there is no taboo against them (Peacock, 1998). Goat reproduce very fast with tropical breeds producing twins and some triplets hence, a small flock can quickly expand until it forms major part of the family capital asset (Peacock, 1998).

The developing countries of the world have a daily animal protein intake that is below the Food and Agriculture Organization standard of 35 g/caput/day (FAO, 1990) a problem occasioned by low production of livestock as population increases. For an improved animal protein intake, there is need for improvement in the production of meat and other protein sources from the livestock industry. Sheep and goats offer a great potential in this respect due to their relative ease of breeding, management, ability to subsist on forages, hardiness, adaptation to a wide range of ecological zones and distribution among others. In recent times, sheep and goats production is becoming popular even among urban dwellers as result of the aforementioned merits. Urban livestock production which is an aspect of urban agriculture has the benefit

of providing food; according to Smith (1996), it has become one of the major food producing activities. There is, however, the need for more concrete and empirical information on production and management systems of sheep and goats in the urban centres. The information will assist policy makers in the development of small ruminant production and management in order to increase production among urban famers. This will ultimately result in increased consumption of protein of animal origin and better health condition of the populace. This study examined the socio-economic characteristics, production pattern and management systems of smallholder small ruminant farmers in urban area of Guinea Savanna of Nigeria.

2. MATERIALS AND METHODS

The study area was Ilorin metropolis in Kwara State, southern Guinea Savanna of Nigeria. It consists of three Local Government Areas, Ilorin East, Ilorin West and Ilorin South Local Government Areas, and has a land area of approximately 90,000 km^2. Ilorin metropolis is located between latitude $8^0\,30'$ N and longitude $4^0\,33'$ E.

2.1 Sampling procedure

There are 12 administrative wards in Ilorin West and 9 administrative wards in Ilorin East. Five wards were randomly selected from each of the two selected local government areas making a total of 10 wards for the study. Ten ruminant farmers were randomly selected from each of the 10 selected wards to give a total of 100 farmers, the sample size of the study.

2.2 Data collection

The instruments for data collection were observations and formal survey with the farmers. Primary data were collected by administration of both open and close ended structured pre-tested questionnaires administered on the sampled farmers in the study area. The questionnaires administered on the farmers centred on five main issues mainly: socio-economic characteristics, herd inventory, mode of feeding and management practices, animal health and health management and constraints to production.

2.3 Data analysis

Data were analyzed using descriptive statistics such as percentage, range, frequency distribution and means; chi-square and correlation analyses were done for selected variables.

3. RESULTS AND DISCUSSION

The socio-economic variables of the ruminant farmers are presented in Table 1. A larger proportion of the respondents (42.7%) were within the age range of 40 to 49 years with mean age of 41 years, which indicates that a high proportion of middle age respondents were involved in goats and sheep production. Thus, small ruminant production is an adult business in the area. The result agrees with the previous findings on age of pig producers (Ajala et al., 2006), poultry farmers (Fakoya and Umunna, 2008) and cattle farmers (Amimo et al., 2011) but was lower than the age reported by Adesehinwa et al. (2004) for ruminant livestock farmers in rural setting. In consonance with earlier reports (Adesehinwa et al., 2004; Amimo et al., 2011), most of the farmers (90.2%) were males indicating that small ruminant production is a male affair in the study area. Most of the respondents (82.9%) were married with 1-5 children. Well above half of the respondents (89%) have at least basic educations, with 19.5 % having primary school education, 54.9% had secondary school education and 23% had tertiary education, while only 9.8% had no formal education. It could be inferred, therefore, that the respondents were literate and the level of education standard in this study area was substantially higher. For the purpose of adopting new technologies, education is an important factor which if lacking can have adverse impact on future small ruminant production improvement. The high level of literacy can provide scope for an information interface between farmers, extensionists, researchers and development agents. The level of the academic standard reported in this study is comparable to those obtained by Ajala et al. (2006), Ndebele et al. (2007) and Amimo et al. (2011) among livestock farmers. A larger percentage of the farmers (79.3%) did not belong to any farmers' association. Ekong (2003) asserted that farmers belonged to a number of formal and informal organizations and a positive correlation exists between level of participation in community life and adoption of agricultural innovations.

Table 1. Socio-economic and personal characteristics of small ruminant farmers

Variable	Frequency	Percentage
Age (years)		
20-29	3	3.7
30-39	24	29.3
40-49	35	42.7
Above 50	16	19.5
No response	4	4.9
Gender		
Male	74	90.2
Female	8	9.8
Marital status		
Single	4	4.9
Married	68	82.9
Separated	3	3.7
Divorced	1	1.2
Widowed	6	7.3
Number of children		
1-5	33	40.2
6-10	14	17.1
Above 10	3	3.7
No response	32	39.0
Educational level		
No formal education	8	9.8
Primary education	16	19.5
Secondary education	45	54.9
Tertiary	12	14.6
No response	1	1.2
Membership of farmers' association		
Yes	17	20.7
No	65	79.3

Table 2. Herd size and breed composition of sheep and goats population of the farmers

Item	No of farmers	% of farmers	Total no of animals	Mean of animals	% of animals
Goats					
Red Sokoto	11	13.41	31	0.38 ± 0.12	6.78
WAD	37	45.12	72	2.02 ± 0.29	15.29
Sahel	8	9.76	29	0.35 ± 0.14	6.16
Sheep					
Yankasa	48	58.54	257	2.89 ± 0.40	54.57
Balami	1	1.22	1	0.1 ± 0.01	0.21
Ouda	22	26.83	51	0.62 ± 0.13	10.83
WAD	14	17.07	30	0.37 ± 0.10	6.37

Table 2 shows that 13.41%, 45.12% and 9.76% of the respondents were rearing Red Sokoto goats, West African dwarf goats (WAD) and Sahel goats, respectively, and these three breeds accounted for 6.78%, 15.39% and 6.16% of the goat population, respectively. WAD goats had the highest mean number of 2.02 ± 0.29 per respondent while the mean number of the two other breeds was less than one. The preponderance of WAD goats over other breeds may be as result of the tolerance of the breed to trypanosomosis, which is relatively prevalent in the studied ecological zone. Only four breeds of sheep, Yankasa, Balami, Ouda and WAD, were kept by the farmers; majority (58.54%) of the respondents were rearing Yankasa, followed by Ouda (26.83%), then WAD sheep (17.07%) and the least Balami breed (1.22%). When each breed was expressed as the percentage of the total sheep population, Yankasa, Ouda, WAD and Balami accounted for 54.57%, 10.83%, 6.37 and 0.21% in that order. Mean number of sheep per respondent was highest for Yankasa (2.89 ± 0.4) and very low for each of the other breeds (< less than one sheep per respondent). The small herd size typifies a smallholder production system. WAD goats and Yankasa breed of sheep were the most preferred breeds by respondents because they are well adapted to the studied ecological zone. The total number of goats reared was 124 while that of sheep was 318. Sheep were more predominant in the stock possibly because of their relative bigger size and the ease of

management when compared with goats which are hardier to handle. These results are in tandem with that of Kosgey et al. (2008) and Olafadehan and Adewumi (2010).

Table 3: Mode of feeding animals and management practices by small ruminant farmers

Variable	Frequency	Percentage
Methods of feeding		
Scavenging only	3	3.7
Scavenging + supplementation	79	96.3
Supplements used		
Cassava peels only	35	47.9
Grains only	4	5.5
Household wastes only	16	21.9
Cassava peels + household wastes	8	10.9
Cassava peels + grains + household wastes	6	8.2
Cassava peels + grains	4	5.4
Sources of animals		
Inheritance only	4	5.0
Purchase only	45	56.2
Gift only	8	10.0
Caretaking only	3	3.8
Inheritance + gift	4	5.0
Purchase + gift + caretaking	1	1.3
Gift + caretaking	1	1.3
Purchase + gift	6	7.5
Inheritance + purchase	4	5.0
Purchase + caretaking	4	5.0
Experience in Livestock Farming (years)		
1-5	18	50.1
6-10	8	22.3
Above 10	10	27.6
Management systems		
Semi extensive	45	56.3
Extensive	35	43.7
Intensive	0	0.00
Reasons for keeping animals		
Prestige	10	12.5
Consumption	31	38.8
Source of income	20	25.0
Consumption + Income	16	20.0
Consumption + Prestige	3	3.7

Table 3 reveals that majority (96.3%) of the respondents used a combination of scavenging and supplementation for feeding their animals as against the very few (3.7%) allowing scavenging only. It could be that lack of grazing land in urban centres promotes the practice of supplementation contrary to the reports of Olafadehan and Adewumi (2010), who observed that the agropastoralists, with access to vast rangeland, rarely supplement their stock but depend almost entirely on range pasture. The result, however, concurs with previous findings (Kosgey et al., 2008). Cassava peel was major feed supplement used unlike grains which were the least patronized feed supplement. The use of cassava peels by most of the respondents may be due to its relative affordability and availability unlike grains which are very expensive due to competition between humans and animals. Ajala (2004) opined that left over feeds on the farm and home are cheap feed sources which are readily available to ruminant farmers. More than half (56.2%) of the respondents got their animals through purchase only. Parallel observations were made by Ajala et al. (2003). This, however, has an implication on the number of animals the farmers can acquire. The volume of farmer's capital will determine the number of animals he is able to purchase and keep. Majority (50.1%) of the farmers had 1-5 years of experience in livestock farming. It appears that economic hardship currently experienced in the country is making many urban dwellers to engage in small ruminant production either to boost their animal protein intake or to augment their income. In term of purpose of rearing animals, the rank order is: consumption (38.8%) > income (25.0%) > consumption and income (20.0%). This indicates that small ruminant animals were reared in the study area mostly for the purpose of consumption. This may be the reason while the herd size of respondents was small. While a greater proportion of the farmers (56.3%) used semi-intensive management

system of rearing animals, 43.7% depended on extensive management system and no farmer practised intensive management system. The result is not unexpected considering low mean number of stock per respondent, high cost of intensive system coupled with the major purpose of keeping the animals (consumption not commercial). Generally, intensive system of livestock production is associated with keeping large number of livestock, which is impracticable in urban setting, and is commercial. It has been reported that smallholder farmers tend to keep animals for family needs, rather than purely as an economic enterprise (Kosgey et al., 2008).

Prevalent diseases of sheep and goats in the study area, as shown in Table 4, are tick-borne disease, diarrhoea, mange and helminthosis (worm infestation), bloat, soil eating (geophagy). However, tick infestation was the most prevalent disease. Tick-borne diseases, diarrhoea and helminthosis have been indicated as prevalent diseases of small ruminants among smallholder farmers (Kosgey et al., 2008). Chinogaramombe et al. (2008) also reported tick-borne disease as the most prevalent disease in the semiarid areas of Zimbabwe.

Table 4: Prevalent diseases of small ruminant in the study area

Diseases	Farmers reporting diseases		
	Frequency	% of farmers	Ranking
Soil eating	4	4.9	6th
Diarrhoea	19	23.18	2nd
Bloat	6	7.32	5th
Helminthosis	12	14.64	4th
Loss of hair (Alopecia)	3	3.66	7th
Mange	14	17.08	3rd
Ticks	31	37.82	1st

Table 5 shows that that majority (38.5%) and (32%) of the small ruminant farmers depended on the use of self medication and local herbs, respectively, to treat their animals as against 25% engaging the services of the veterinarians or animal health personnel. The practice of quarantine, especially when new stocks are acquired by the small ruminant farmers, is very low (3.8%). This may be as a result of inadequate knowledge of its importance among the farmer and could have as well been responsible for introduction of diseases from new stock to the study area since majority of the respondents acquired their animals through purchase. Low usage of veterinary services among farmers may be due to shortage of veterinary clinics and high cost of engaging veterinary services in the area. These findings are in consonance with that of Iyayi et al. (2003) and Olafadehan and Adewumi (2010) but disagree with that of (Kosgey et al., 2008), who reported high patronage of veterinary services provided by the government, private veterinarians and drug suppliers.

Table 5: Disease prevention and control methods of respondents

Treatment	Frequency	Percentage
Veterinary services	13	25.0
Observance of quarantine period	2	3.8
Local herbs	17	32.7
Self medication	20	38.5
Total	52	100

Table 6 shows that routine inspection of the animals and hygienic practices ranked the highest in terms of the introduced improved practices and adoption by the respondents. The reason for this may be due to the low or no cost attached to the adoption of these innovations. Low ranking of use of concentrates, veterinary drugs and semi-covered housing structure in terms of adoption among farmers may due to high cost of adopting these innovations.

Table 6: Improved practices introduced to the respondents and adopted by the respondents

Improved practices	Introduced innovation		Adoption rate	
	Frequency	Percentage	Frequency	Percentage
Feeding of concentrates	21	25.5	12	14.4
Hygienic practices	77	93.9	55	66.0
Use of drugs	34	40.8	12	14.0
Routine inspection	79	96.4	57	68.4
Thatched roofing	30	36.8	18	21.6
Semi-covered structure	28	33.6	2	2.4

As shown in Table 7, scarcity of forages was ranked first (89%) of all the constraints to small ruminant production. This so because lands in urban areas are generally used for buildings, industrial purpose, road construction, provision of basic and infrastructural amenities, etc since urban centres are not meant for livestock farming. This corroborates the previous findings (Kosgey, 2004) that land for forage production in the smallholder systems is a limiting factor. However, quality and timely availability of the feed has been reported to affect the productivity and growth of animals (Adesehinwa et al., 2003). Inadequate training and knowledge in goats and sheep rearing was ranked the second constraint to small ruminants' production. This implies that there is need for provision of efficient extension services for the farmers. Shortage of veterinary service was ranked the third constraint and limited capital was ranked the fourth while pests and diseases were ranked the fifth constraint. Other constraints which were not considered to be serious were neighbours' complaints, costly feed, housing problem and marketing problems. According to Ajala et al. (2003), major constraints associated with ruminant production include lack of finance, high incidence of pest and disease, high cost of feeding and lack of information on improved small ruminant management practices.

Table 7: Constraints to small ruminant production in the study area

Constraints	Frequency	Percentage	Rank
Limited capital	52	63.4	4th
Veterinary shortage	53	54.6	3rd
Costly feed	30	36.6	7th
Scarcity of forages	73	89.0	1st
Pest and diseases	38	46.3	5th
Housing problem	28	34.1	8th
Neighbours' complaints	34	41.5	6th
Marketing problem	1	1.2	9th
Lack of training and knowledge	55	67.1	2nd

As shown in Table 8, the degree of association between selected variables and number of ruminant animals reared reveals that sources of animals ($\chi^2 = 42.904$, $p < 0.05$) and sources of information on livestock production ($\chi^2 = 46.939$, $p < 0.05$) had significant relationship with the total number of animals reared by respondents, whereas sex ($\chi^2 = 3.239$, $p = 0.19$), marital status ($\chi^2 = 11.077$, $p = 0.19$), education ($\chi^2 = 14.082$, $p = 0.08$), membership of farmers association ($\chi^2 = 8.455$, $p = 0.21$), use of supplements ($\chi^2 = 147.93$, $p = 0.21$), constraints to production ($\chi^2 = 0.239$, $p = 0.89$) and adoption of improved practices ($\chi^2 = 0.476$, $p = 0.79$) did not have significant ($p > 0.05$) association with the number of animals kept. This implies that sources of animals and sources of information on ruminant animal production are likely to affect the number of animals reared by the farmers. The more appropriate sources of information available to the farmers on ruminant production, the more they were able to utilize this information for increased production. This result further stresses the importance of relevant information in livestock production.

Table 8: Chi-square relationship between selected variables and number of animals reared

Variables	χ^2	P-value	Decision
Sex	3.329	p = 0.19	Not significant
Marital status	11.077	p = 0.19	Not significant
Education	14.082	p = 0.08	Not significant
Membership of farmers' association	8.455	p = 0.21	Not significant
Supplements used	6.251	p = 0.21	Not significant
Sources of animals	42.904	p < 0.05	Significant
Source of information	46.939	p < 0.05	Significant
Constraints to production	0.239	p = 0.89	Not significant
Adoption of improved technologies	0.476	p = 0.79	Not significant

Correlation analysis reveals that age ($r = 0.057$, $p = 0.61$), number of children ($r = 0.194$, $p = 0.08$) and farmers' experience in livestock production ($r = 0.087$, $p = 0.44$) (Table 9) did not have significant ($p > 0.05$) relationship with the number of animals reared implying that none of the variables is likely to affect the numbers of animals reared by the farmers.

Table 9. Correlation relationship between selected variables and number of animals reared

Variable	R value	P-value	Decision
Age	0.057	p = 0.61	Not significant
Number of children	0.194	p = 0.08	Not significant
Experience in livestock farming	0.087	p = 0.44	Not significant

4. CONCLUSION

Urban small ruminant farming is a smallholder sheep and goat production semi-intensively managed. The major constraints faced by smallholder sheep and goats farmers in the urban areas were scarcity of grasses, inadequate training and knowledge, shortage of veterinary services and limited capital. Establishment of fodder or provision of subsidized supplementary feeds, defined and properly planned extension service and veterinary services are needed in the study area. Farmers should be encouraged to form themselves into cooperative society to enable them access loan from financial institution. This will enable them increase the number of animals they rear and consequently household income and animal protein intake.

5. REFERENCES

[1]   Adesehinwa AOK, Aribido SO, Oyediji GO, Obiniyi AA, Production strategies for coping with the demand and supply of pork in some peri-urban areas of southwestern Nigeria. Livestock Research for Rural Development, 15 (10), 2003.

[2]   Adesehinwa AOK, Okunola JO, Adewumi MK, Socio-economic characteristics of ruminant livestock farmers and their production constraints in some parts of South-western Nigeria. Livestock Research for Rural Development, 16 (8), 2004.

[3]   Ajala MK, Household decision making in the production of small ruminants in Giwa Local Government Area of Kaduna State of Nigeria. In: Proceedings of the 29th Annual Conference of Nigeria Society of Animal Production, Sokoto, Nigeria, March 2004, pp. 399-402, 2004.

[4]   Ajala MK, Adesehinwa AOK, Bawa GS, Socio-economic factors influencing swine management practices among women in Jama'a Local Government Area of Kaduna State, Nigeria, Tropical and Subtropical Agroecosystems, 6, 43–48, 2006.

[5]   Ajala MK, Gefu JO, Okaiyeto PO, Socio-economic factors influencing small ruminant management practices in Giwa Local Government Area of Kaduna State, Nigeria. Proceeding of the 28th Annual Conference of Nigeria Society of Animal Production, March 2003, pp. 432-435.

[6]   Baker RL, Rege JEO, Genetic resistance to diseases and other stresses in improvement of ruminant livestock in the tropics, In: Proceedings of the Fifth World Congress on Genetics Applied to Livestock Production, vol. 20, University of Guelph, Canada, August 1994, pp. 405–412, 1994.

[7]   Amimo JO, Thumbi S, Inyangala BO, Junga JO, Mosi RO, Socio-economic characteristics and perceptions of cattle keepers and constraints to cattle production in western Kenya, Livestock Research for Rural Development, 23 (6), 2011.

[8]   Chinogaramombe GNC, Muchenje V, Mapiye C, Ndlovu T, Chimonyo M, Musemwa L, Challenges for improving smallholder dairy production in the semiarid areas of Zimbabwe, Livestock Research for Rural Development, 20 (3), 2008.

[9]   Ekong EE, Introduction to Rural Sociology, (Dove Publishers), Uyo, Nigeria, p. 36, 2003.

[10]   Fakoya EO, Umunna MO, Socio-economic characteristics of poultry farmers in Abeokuta South Local Government Area of Ogun State, Nigeria, In: Proceedings of 33rd Annual Conference of Nigeria Society of Animal Production, pp. 278-281, 2008.

[11]   FAO, Production Yearbook, Food and Agriculture Organization, Rome, Italy. Vol. 34, 1981.

[12]   FAO, Technical papers. Animal genetic resources – a global programme for sustainable development, Food and Agriculture Organization, Rome, Italy, 1990.

[13]   Iyayi EA, Okoruwa VO, Babayemi OJ, Peters OF, Livestock production pattern of agropastoralists in peri-urban centres of south-west Nigeria, Nigerian Journal of Animal Production, 30(1), 87-92, 2003

[14]   Kosgey IS, Breeding objectives and breeding strategies for small ruminants in the tropics. PhD Thesis, Wageningen University, The Netherlands, p. 272, 2004.

[15]   Kosgey IS, Rowlands GJ, van Arendonk JAM, Baker RL, Small ruminant production in smallholder and pastoral/extensive farming systems in Kenya, Small Ruminant Research, 77, 11-24, 2008.

[16]   Olafadehan OA, Adewumi MK,. Livestock management and production system of agropastoralists in the derived savanna of South-west Nigeria, Tropical and Subtropical Agroecosystems, 12, 685–691, 2010.

[17]   Ndebele JJ, Muchenje V, Mapiye C, Chimonyo M, Musemwa L, Ndlovu T, Cattle breeding management practices in the Gwayi smallholder farming area of South-western Zimbabwe, Livestock Research for Rural Development, 19 (11), 2007.

[18]   Peacock C, Improving goats' production in the tropics: A manual for development of workers, Oxfarm/Farm-Africa publication, pp. 1-7, 1998

[19]   Smith J, Cities feeding people: Report of 18 urban agriculture, progress and prospect: 1975-2005, Ottawa, International Development Research Centre, 1996.