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Peri-Urban Small Ruminant Production in Northern Guinea Savanna, Nigeria

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Abstract: A survey to assess the production pattern of peri-urban small ruminants' production in Northern Guinea Savanna zone of Nigeria was conducted by means of structured questionnaires. A total of 120 respondents were randomly selected for the study. Statistical analyses were accomplished by means of descriptive statistics. Findings of the study indicated that a high proportion of the respondents involved in small ruminants production were in their middle age, mostly illiterate but are highly experienced in small ruminant production. Most of the respondents (92%) kept the indigenous breed of small ruminants. Management system was mostly extensive. Analysis revealed that in small ruminant flocks, females constituted more than 70% of the flock. Litter sizes for sheep and goats were 1.23 and 1.47, parturition intervals were 246 and 234 days, respectively. The average age at first oestrus was 248 days in sheep and 224 days in goats. Mortality, management system, oestrus detection, timeliness of mating contributed to low reproductive performance. Small ruminants production would be enhanced if adequate attention is paid to the removal of identified constraints to production.

Key words: Peri-urban, small ruminant, production system, reproductive performance, constraints, Nigeria

INTRODUCTION

There is a disturbing and noticeable shortage of animal protein in the diet of the average Nigerian. Balogun *et al.* (1995) indicated that solution to the present meat shortage rests on the promotion and sustenance of increased and more efficient production of all classes of meat animals.

In Nigeria, small ruminants which represent about 63.7% of total grazing domestic livestock are widely distributed in rural, urban and peri-urban areas. There are estimated national population of 22.1 million sheep and 34.5 million goats (FDLPCS, 1992a). The indigenous breeds of sheep in order of importance are Yankasa (60%), West African Dwarf (20%), Uda (10%) and Balami (10%), while for the goat breeds, the order is Red Sokoto (50%), West African Dwarf (45%) and Sahel (5%). The vast majority of these small ruminants (about 70%) are found in the Northern part of the country (RIMS, 1992b). Even now things have not changed significantly. This suggests the relative importance of small ruminants within the livestock economy of Nigeria. This figure also suggests that small ruminants are a source of meat products which if improved upon would augment the existing supply of meat. Sheep are estimated to contribute 11% of the meat supplied from slaughter houses in the nation and that the contribution of sheep is greater if rural unregistered slaughters are considered. Similarly, goats contribute about 24% of Nigerian meat supply (Oni, 2002). Small ruminants play significant roles in the nutrition, social and economic life of Nigerians. In most cases, the small ruminants are not kept strictly to provide meat for the household, or as a regular source of cash income. The importance of scavenging sheep and goats is rather as a savings account or

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insurance policy, that is, they are sold when extra cash is needed. They also play a specific role in social life, when at weddings and other festivities they are presented as gifts or slaughtered as ceremonial meat.

In Nigeria, the systems of management of small ruminants are dictated by climate, cropping and population density. The small ruminant management system in the traditional sector can be broadly grouped into three; namely extensive, semi-intensive and intensive systems.

Small ruminant rearing is an age long traditional production system in the Northern Guinea Savanna where animals are managed under the extensive system but a system that started to evolve in the last decade in which keepers combine small ruminant production with cultivation. As a result of this metamorphosis, new opportunities for growth are opening up and also new challenges are being faced. Horst (1976) blames the poor performance of the Nigerian sheep and goats on the predominance of the existing system of management and argues further that this poor performance of the Nigerian small ruminants can be limited or entirely circumvented via an improvement in the management. Survey of their management practices and their problems is a way of fashioning a development programme that will enhance their production. Under the unified extension services, extension packages are to be developed for the small scale farmers. To do this, on-farm studies of their problems and prospects must be carried out. This survey was therefore designed to study the background of small ruminant farmers and provide information on the small ruminant production system with a view to recommending appropriate extension packages by researchers and extension agents.

MATERIALS AND METHODS

The Study Area

The study area was in Giwa Local Government Area of Kaduna State, Nigeria. The state was chosen for the study primarily because it contributes significantly to the national livestock resources. For instance about 7% of national cattle herd and 28% of the national small ruminant flock is produced in the state. Thus it ranks among the small ruminant population area in Nigeria.

The state is situated between latitude 09° 30'N and longitude 08° 30'E in the Northern Guinea Savanna. The rainy days last between 190-200 days with distinctive dry and rainy seasons. The study location has two distinctive seasons; a dry season (November-April) and a rainy season (May-October).

The soil is rich and suitable for the cultivation of a wide range of crops. Most of the ethnic groups are farmers that keep a good number of small ruminants and poultry in addition to arable cropping.

Data Collection

The instruments for data collection, which spanned a period of 12 months (April 2002-March 2003), were observations and a combination of informal and formal questionnaires. Primary data was collected by the administration of both open-ended and close-ended structured questionnaires to the respondents in the study area. A multi-stage sampling procedure was adopted in selecting the small ruminant farmers in the following ways: (i) four wards (Shika, Fatika, Yakawada and Gugar-gari) were randomly selected from Giwa LGA, (ii) four villages were purposively selected based on high concentration of small ruminants in these areas and (iii) thirty households involved in both sheep and goat production were selected from each village using simple random sampling techniques, giving a total of 120 respondents for the study. Data collected include demographic information on the respondents, management practice, flock size, breed types, diseases and medications, marketing of small ruminants, reproductive performance and problems. The data collected were analyzed using simple descriptive statistics such as percentages, means, ranges and standard deviation.

RESULTS AND DISCUSSION

Biodata of Respondents

The biodata of the respondents presented in Table 1 showed that majority (65%) of the stock owners were within the age range of 36-49 years. The mean age of the stock owners was 41 years indicating that a high proportion of the middle age respondents were involved in small ruminant production. Thus small ruminant production is an adult business in the area. Again the age range 36-49 years is indicative of the potential that exists for improved production practices since people within this age range would be expected to be more receptive to new innovations, even though majority of the respondents had no formal education. It could be inferred, therefore, that the stock owners are predominantly illiterate. Although education enables individuals to gain knowledge and skill and thus increases their power of understanding, it appears that experience rather than education, helps the stock owners in their managerial ability. However, for the purpose of adopting new technologies, education is an important factor which if lacking can impact adversely on future small ruminant production.

Motivation for Keeping Small Ruminants, Ownership Patterns and Flock Sizes

Most of the respondents (75%) keep small ruminants as a secondary source of income (Table 2). Those keeping them for consumption and hobby were 16.7 and 2.5%, respectively. Most of the respondents (91.7%) keep indigenous breed which studies have shown are characterized by poor growth, poor feed conversion efficiency and high mortality. Only 8.3% of the respondents kept exotic breeds, mostly the West African Dwarf goats and sheep. The breeds of animals kept are the local

Table 1: Biodata of respondents

Respondent characteristics	Frequency	(%)
Age (years)		
Young (35 years and less)	26	21.7
Middle (36-49 years)	78	65.0
Old (50 years and above)	16	13.3
Total	120	100.0
Mean age = 41 years		
Level of education		
No formal education	78	65.0
Primary education	38	31.7
Secondary education	4	3.3
Total	120	100.0
Household size		
Small (1-5 persons)	37	30.8
Fairly large (6-10 persons)	51	42.5
Large (11-15 persons)	14	11.7
Very large (16-20 persons)	18	15.0
Total	120	100.0
Occupation		
Traders	22	18.3
Civil servants	18	15.0
Farmers	68	56.7
Students	7	5.8
Others	5	4.2
Total	120	100.0
Small ruminant keeping experience (years)		
Less than 10 years	17	14.2
10-19 years	28	23.3
20 years and above	75	62.5
Total	120	100.0
Mean keeping experience = 22 years		

Table 2: Motivation for keeping small ruminant, breed and flock size

Parameters	Frequency	(%)	Reasons
Motivation for keeping small ruminant			
As source of supplementary income	90	75.0	
For domestic meat supply	20	16.7	
Hobby	3	2.5	
Others	7	5.8	
Type of breed kept			
Indigenous	110	91.7	Commonly available and cheaper.
Exotic	10	8.3	Grow faster and produce more offspring.

Table 3: Pattern of ownership and holding sizes in the study area

Parameters	No. of respondents	Percentage of total respondents	Mean flock size ¹
Owned sheep only	32	26.7	8.4 (2-18)
Owned goats only	23	19.2	10.1 (2-22)
Owned sheep and goats	65	54.1	14.6 (5-37)
Total	120	100.0	

¹: Values in parentheses indicate ranges of holding size; Source: Fieldwork (2003)

brown goats, a strain of the Red Sokoto goat and the sheep are predominantly the Yankasa breed. The fact that the indigenous sheep and goats were more readily available and cheaper might account for their predominance.

Holding sizes were larger for respondents who owned mixed flocks (Table 3). In the study area, sheep were more widely owned than goats. Sheep were owned by 26.7% of the households and goats by 19.2%. Mixed flocks of sheep and goats were found in 54% of the households. The ratio of goats to sheep kept by the respondents was 1:1.4. Observations revealed that most males left the flocks before they reached the age of 15-17 months, leading to a shortage of males of breeding age. Analysis revealed that in the sheep flocks, females constituted 78.6% while in the case of goats it was 74.2%. The results of this study are however, at variance with study reported by Adu *et al.* (1979) in Red Sokoto goats. Table 3 also shows that respondents are smallholders. This indicates that small ruminants are not kept in commercial sizes. This is typical of the peasant's farming culture where a few animals are kept to augment family income. This confirms Kaufman and Francis (1990) and Ajala and Gefu (2003) assertion that small ruminants are kept as an adjunct to the main business of cropping. Lack of ownership to land and inadequate training in modern small ruminant farming are some of the factors that have affected the expansion of small ruminant production. Perhaps one other reason why sheep and goats were not kept in commercial sizes is lack of awareness of existing credit facilities (Agricultural loans from banks) by the respondents that could assist them in expanding their farms.

Management, Housing and Feeding

Majority of the respondents (72.5%) kept their animals under the extensive system of management. This was in agreement with the findings of Oladele and Adenegan (1998) and Adeshinwa and Okunlola (2000) who reported the extensive system as the most common system of production in south western Nigeria. Ajala and Gefu (2003) also reported that small ruminants are mostly managed under the extensive systems in Northern Nigeria. Although this system of management is cheap and less labour intensive, it is characterized by low productivity and high losses due to accidents, diseases and theft. About 26% of the respondents adopted the semi-intensive system while only 1.7% practiced the intensive system of management (Table 4).

Supplementary feed was rarely provided. Animals scavenge and subsist on household and farm wastes. None of the respondents used commercial feeds because such feeds are not available. Apart from the genetic limitations of the indigenous goats and sheep, heavy reliance in scavenging for food is responsible for the poor performance of the small ruminants because they are unable to meet up their

Table 4: Management system, feeding, veterinary service

Parameters	Frequency	(%)	Reasons
Management system			
Extensive (free-range)	87	72.5	Economical and practicable.
Semi-intensive	31	25.8	Not too expensive and for safety.
Intensive	2	1.7	Too expensive but ensures the safety and better performance of the animals.
Type of feed used			
Household/Kitchen waste	120	100.0	Cheap and available.
Commercial small ruminant feed	-	-	Unaware of commercial feed for small ruminants.
No. of veterinary contacts			
1-3 contacts	20	16.7	
4-6 contacts	7	5.8	
Over 6 contacts	3	2.5	
No visits	90	75.0	
Mean No. of contacts = 1			

Table 5: Reproduction performance characteristics of small ruminants under the traditional management system

Production traits	Sheep	Goats
Age at 1st oestrus (days)	248 (242-271)	224
Liveweight at 1st oestrus (kg)	13.2	-
Age at 1st lambing/kidding (days)	513 (417-598)	430 (418-439)
Lambing rate/kidding rate (%)	92 (68-87)	-
Litter size	1.23 (1.12-1.48)	1.47 (1.16-1.53)
Weaning rate (%)	81	72 (64-78)
Lambing interval/kidding interval (days)	256 (219-268)	234 (186-241)
Gestation length (days)	152 (149-158)	148 (144-150)

nutrients requirements through scavenging. Feed millers should be encouraged to explore the potential market for small ruminant feeds in the study area using alternative feed ingredients, not consumed by man in order to lower costs of production. Veterinary services were available but only 25% of the respondents reported utilizing the services of the veterinary officers. There were no specialized feeding and breeding programmes.

Reproductive Performance in Small Ruminant

Small ruminants production has been characterized by low productivity in Nigeria. Several factors have been adduced to this. Among them is the low reproductive characteristics of the small ruminant found in the different parts of the country. Others include the management system practiced as well as high morbidity and mortality especially during the rainy season.

Table 5 showed that litter size in sheep 1.23 (1.12-1.48) is lower than in goats 1.47 (1.16-1.53). Goat appears to be more prolific with an average litter size of 1.47. This result agrees with Adu *et al.* (1987) with an average litter size of 1.58 in the West African Dwarf goats. Parturition intervals were 256 (219-268) and 234 (186-241) days for sheep and goats respectively. The age at first oestrus was 248 (242-271) days in sheep and 224 days in goats. These values are relatively higher than 157±5.9 days reported in the Red Sokoto breed by Adu and Lakpini (1989). The values obtained in this study agreed with those reported by Hans-Joachin and Horst (1989), which showed that attainment of puberty by small ruminants depended on body weight, breed and breeding intensity. This finding also is in conformity with study by Fasanya *et al.* (1992), who reported that dietary supplementation enhances effect on attainment of puberty in does.

Table 6: Marketing of small ruminants and product by respondents

Parameters	Frequency	(%)
Age at which small ruminants are sold		
3 months	36	30.0
6 months	11	9.2
1 year	34	28.3
1½ years	39	32.5
Mode of sale of animals		
Live	117	97.5
Dressed	3	2.5
Market channels		
Sales to middlemen	114	95.0
Sales to butchers	6	5.0
Is small ruminant rearing profitable		
Yes	118	98.3
No	2	1.7
Profit range per animal at slaughter weight		
₦600 and less	10	8.3
₦601-1,000	38	31.7
₦1001-2,000	4	3.3
Over ₦2000	68	56.7

The average age at first lambing of 513 days and age at first kidding of 430 days fell within the range value of 301-431 days reported from studies in the traditional management of goats in sub-Saharan African (Lebbie and Manzini, 1989). However these values were lower than the range value of 636-984 days reported from studies carried out at research station on small East African goats (Belay *et al.*, 1994). The younger age at first kidding observed in this study also conform with studies carried out under traditional setting by Adu and Lakpini (1989). This may be attributed to the fact that selection methods are completely lacking at the village level of production. No proper breeding. Goats and sheep roam about and get bred by any male of any age, size or unknown breeding or health records. Some of the female goats or sheep are bred too early than schedule due to constant contact with the males.

The reason for poor reproductive performance as observed in Table 5 may be due to problems with estrus detection, timeliness of mating and inadvertent slaughter of pregnant animals. Another contribution to low reproductive efficiency was high mortality as observed in the flocks. This high mortality rate could be as a result of the extensive system of management where animals are allowed to graze to find for themselves. This results into higher parasite loads being observed in the grazing animals.

Marketing of Small Ruminants

Most of the respondents (32.5%) sold their animals at incredible market age of 1½ years while 30% of the respondents sold theirs as weaners (Table 6). Majority of the respondents (95%) sold their animals to middlemen who offered better prices and only 5% of them sold theirs to butchers. Sales of live animals were based on visual appraisal of the animals. It is common to sell animals before attaining normal market age. The major consideration being the urgent financial needs of the family. The fact that 2.5% of the respondents sold their animals dressed is an indication that slaughtering of animals in the area of study is very much a backyard affair. Most respondents prefer to sell their animals live. Lack of refrigerators or deep freezers may account for why the animals were sold unprocessed. Most respondents made substantial profits from their animals.

Diseases and Mortality

Majority (66.7%) of the respondents carried out medications on their animals mainly against helminthoses. This is not surprising as the scavenging animals easily pick-up worms particularly

Table 7: Medication and mortality in flock reported by respondents

Parameters	Frequency	(%)
Carry out medication		
Yes	80	66.7
No	40	33.3
Diseases treated		
Helminthoses	24	20.0
Ectoparasites	12	10.0
Pneumonia-enteritis complex (PPR)	14	11.7
Foot rot	18	15.0
Polythene bag induced rumen impaction	12	10.0
No treatment	40	33.3
Age at which mortality occur		
1-12 weeks old	80	66.7
1-3 years old	32	26.7
Over 3 years	8	6.7
Causes of mortality		
Diseases	54	45.0
Poisons	5	4.2
Accidents	4	3.3
Poor management	49	40.8
Unknown	8	6.7

during the rainy season. The remaining (33.3%) respondents did not provide any medications for their animals (Table 7). This category of respondents prefers to sell their sick animals than to spend their money on the treatment of the animals.

The problem of disease is reported to be more prevalent during the rainy season. The diseases reported by respondents to be major cause of death of sheep and goats are helminthoses, ectoparasites, pneumonia-enteritis complex (PPR), foot rot and polythene bag induced rumen impaction. Mortality of animals was attributed mainly to diseases (45%) and poor systems of management (40.8%). Other causes of mortality reported by respondents were poisons and accidental killings by motorists.

General Problems Encountered in Small Ruminant Rearing

Some of the constraints highlighted by the respondents that affect small ruminant rearing are difficulty in procuring feeds, high incidence of diseases, lack of information on improved small ruminants management practices while other minor constraints include credit, housing and hostility of other members of the community. Respondents generally regarded nutrition, especially in the late dry season, as one of the biggest problem causing stress to the small ruminants and possibly limiting productivity.

CONCLUSIONS AND RECOMMENDATIONS

Great potentials exist for small ruminant production in Northern Guinea Savanna of Nigeria. For optimum growth and reproductive performance and for the industry to develop, however, certain changes in small ruminant husbandry are necessary which can only be brought about through sound extension education.

The most likely motivation for small ruminant farmers to improve the productivity of their animals, is economic: the opportunity to increase cash income. For farmers to reorientate their enterprise toward the cash market, risks must be minimized. This not only means maintaining stable market conditions but also assuring that new technology is cost-effective.

The reproductive performance of small ruminants can be improved upon by increasing prolificacy or reducing mortality (or both), since they could thus reduce the maintenance cost (for housing and feeding of adult females) per offspring.

Identified constraints to small ruminant production must be addressed by all stakeholders, that is farmers themselves, government, livestock scientists and veterinarians.

The challenge for animal scientists is to find a way of packaging small ruminant feeds in such a way that they can be easily available and in bulk to enable producers increase their flock size-as the poultry nutritionists have done.

The issue of credit facilities should be the responsibility of the government. Government policies should favour access to finance, from the available financial institutions, by livestock producers.

Finally, farmers should be educated as to the existence and usefulness of agencies concerned with animal health and production. This can best be achieved through an effective and well co-ordinated extension education.

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