Some aspects of sheep and goat management in southeast Nigeria*

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SUMMARY

A SURVEY *of small ruminant owners was conducted in Bendel, Anambra, Imo and Rivers states of southeast Nigeria. Sheep were found in 28% of households and goats in 92%. The mean flock size for sheep was 3.2 for all households and 11.4 for owners only; the corresponding figures for goats were 6.9 and 7.5. However, the distribution of animals was skewed, with most households owning only a few animals. Primary problems experienced by farmers related to feeding, disease control and housing. Three modes of management were distinguished according to the degree of animal confinement. Management was related to climatic zone, human population density, farming system, animal disease incidence and mortality. Confinement was found to be associated with a higher incidence of disease and higher mortality.*

INTRODUCTION

Southeast Nigeria is one of the most densely populated parts of Africa. In some areas, rural population density exceeds 1000 km^{-2}. Pressure on land resulting from the increasing population and expanded production of cash crops (in particular oil palm) has led to intensified land use. However, with the exception of Lagemann's (1977) study of three communities in present-day Imo state, little information is available on the consequences of agricultural intensification. In particular, little data exist on the distribution and management of livestock in southeast Nigeria.

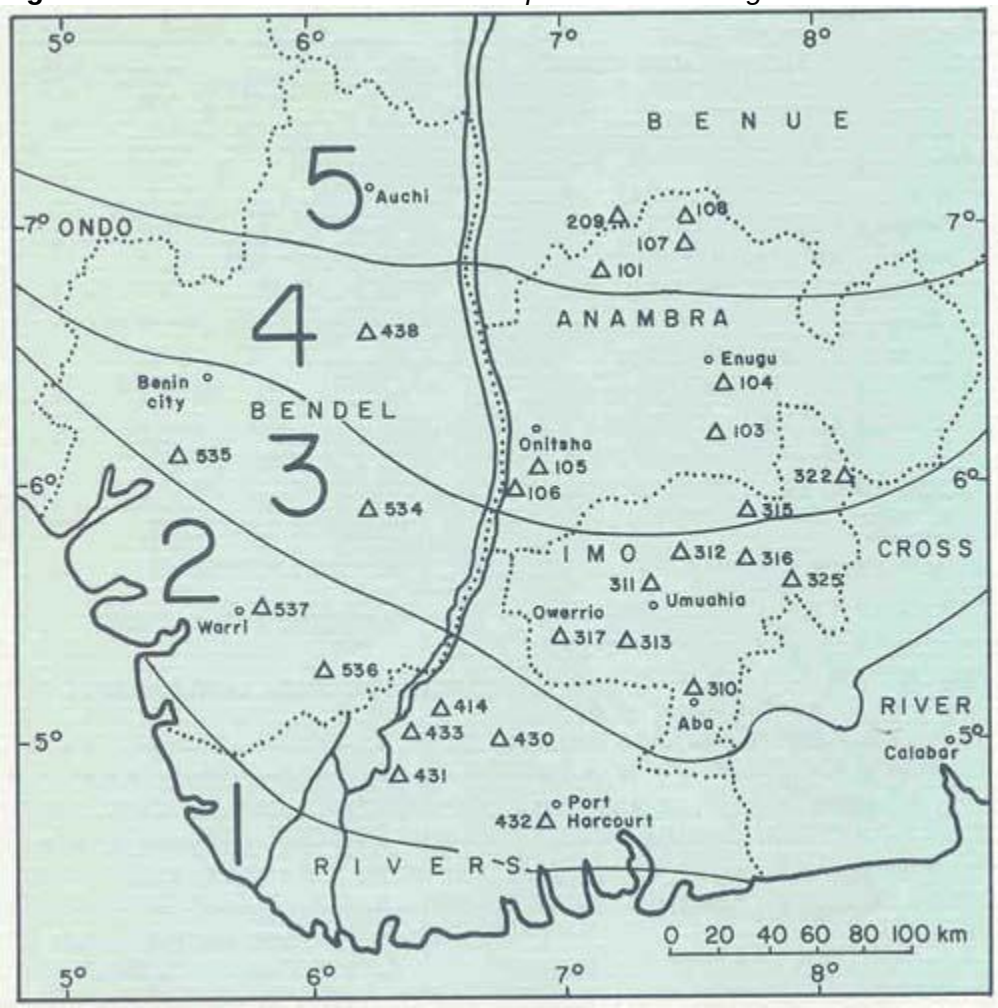
This study attempts to relate livestock management systems to characteristic problems facing small ruminant producers in the physical and economic environment of four states in southeast Nigeria. Although more extreme in this area, increasing population pressure on land is general to the humid zone of West Africa. The survey thus not only provides information on southeast Nigeria, but also suggests the implications of increasing population density and intensified agriculture for smallholder livestock production systems throughout the zone.

THE STUDY AREA

The study area was in the Bendel, Anambra, Imo and Rivers states in southeast Nigeria (see Figure 1). The area is ecologically diverse, although tropical forest and derived savanna predominate. Annual rainfall ranges from less than 1500 mm in the north of Anambra state to over 4000 mm in the southwestern extremity of the study area. The most common soils are acidic Ultisols with pH ranging from 4 in the highest-rainfall areas in the south to around 5.5

further north. These soils have low natural fertility, but are intensively farmed. In many areas, pressure on land has led to shorter fallow periods and declining soil fertility.

Figure 1. *Administrative and climatic map of southeast Nigeria.*



Cassava and yam are the main crops cultivated in southeast Nigeria; other crops of importance are maize, cocoyam and plantain, and, in some locations, rice. Oil palm has historically been an important cash crop in the area. Land holdings are small (generally less than 1ha), and often fragmented, comprising different types of land which are managed in different ways. Around the compound may be a continuously cultivated area, the ‘compound farm’, where a complex variety of trees and food crops are grown, and which benefits from animal manure and household wastes. Outlying plots are cultivated less intensively. Farms are worked by hand. Men are generally responsible for land clearing and yam cultivation, while women are responsible for most other operations and crops.

Livestock production in southeast Nigeria is limited by trypanosomiasis: the trypanotolerant West African dwarf breeds of sheep and goats are the most important livestock species, both economically and, after poultry, numerically. They are valued as a source of meat (although they are usually slaughtered only on the occasion of festivals or ceremonies), cash and manure. Nevertheless, livestock remain a minor farm enterprise. Upton's (1966) figures indicate that livestock contribute less than 4% of farm income, while according to Lagemann (1977), their

contribution is 10–20% of gross farm income (about two-thirds of the livestock produced are consumed within the household).

Management and other inputs are minimal. While small ruminants may be confined, special housing is the exception rather than the rule. Animals are fed household scraps, tree foliage (commonly palm fronds), and the by-products of food processing. Veterinary inputs are minimal or nil.

METHODS

Twenty-seven local government areas (LGAs) were selected in the four states surveyed by applying randomly generated coordinates to a grid imposed on a set of maps with a scale of 1:250 000 (Figure 1). Within each of these LGAs, two communities were selected which appeared from the maps to have contrasting proximity to main roads and urban centres. A random sample of about 30 households was selected at each sample point.

Only members of households which owned sheep or goats were interviewed. Based on figures of the 1965/68 agricultural census, small ruminant owning households—the population represented by this survey—are estimated to be approximately half of all rural households in the area (Federal Office of Statistics, 1972). The data for this study were collected between January and March 1983.

For the purposes of analysis, the study area was divided into five climatic zones on the basis of the annual rainfall pattern (Figure 1). In zone 1, there is 60mm of rain in the driest month. (This zone, in which livestock are of minor importance, is not represented in the study). In the second zone, 1–2 months are dry (<60mm of rainfall). The third zone has 3 dry months in which total rainfall is <60mm, while the annual total is 1875 to >2500mm. The fourth zone has 4 months in which precipitation is <60mm; the driest month has <30mm. Most parts of this zone have a total annual rainfall of >1750mm, but the overall range is 1600 to >2000mm. The fifth climatic zone has 4 dry months in which rainfall is <48.5mm. Annual total rainfall in this region is 1500–1830mm (Ofomata, 1975).

FINDINGS

Household size and farming system

The mean household size was 9.9 persons, consisting of 1.8 adult males, 2.1 adult females and 6.1 children. Disaggregation of these data by state and by climatic zone shows that households in the southern, higher-rainfall zones and states tended to be larger than those in the more northerly areas. In addition, the ratio of resident adult males to adult females was greater in climatic zone 2 (1:1) than in the other zones (0.84:1). This reflects a higher level of male outmigration in the drier zones. Farming was the predominant occupation for adults in all zones, and was given by 72% of males and 81% of females as their primary occupation.

Land zoning is a characteristic feature of the farming system in many parts of southeast Nigeria. Compound farms are often found around the homestead, where both tree and arable crops are cultivated intensively, and manure and household waste are applied. Outside this area ‘near’ and ‘distant’ farmlands are distinguished, each with its own crop rotation practices and tenure rules.

Compound farms were seen in almost half (47%) of the sample: they were markedly more common in the Anambra, Imo and Rivers states than in Bendel, and in the northern, drier climatic zones (Table 1). Compound farms were also associated with higher levels of human population density. The rank correlation coefficient between population density and the proportion of households with compound farms in the 27 surveyed LGAs was 0.50 ($P<0.01$).

Table 1. *Presence of compound farms by state and climatic zone, southeast Nigeria, January–March 1983.*

	Sample size	Households with compound farm (%)
State		
Rivers	242	43
Bendel	235	18
Imo	321	47
Anambra	281	75
Climatic zone		
2	277	39
3	406	39
4	174	50
5	162	77
All households	1079	47

Cassava and yam were the most important crops; cassava predominated in the southern zones 2 and 3, and yam in the northerly zones. However, a variety of other annual and tree crops was also found.

Small ruminant ownership

Goats were more widely owned than sheep. Sheep were found in 28% of households and goats in 92%. Mixed flocks of sheep and goats were found in only 20% of households. The frequency distribution of animals of both species, but especially that of sheep, was highly skewed. Modes, medians and means were therefore used as measures of central tendency, as well as ranges and interquartile ranges (Table 2).

Table 2. *Small ruminant ownership, southeast Nigeria, January–March 1983.*

	Small ruminant ownership		
	Sheep	Goats	All
Number of owning households	300	996	1079
Percentage of owning households	28	92	100
Mean flock size	11.4 (16.7)[a]	7.5 (11.3)	10.1 (17.6)
Mode	1	3	2
Median	6	5	5
Range	1–120	1–183	1–244
Interquartile range	3–12	3–8	3–10
Number of animals of the species	Percent households with that number of animals		
0	72	8	n.a.[b]
1–5	14	54	52
5–10	6	11	24
10–20	4	2	15
>20	4	5	9

a. Figures in brackets are standard deviations.
b. n.a. = not applicable.

The mean number of sheep owned across all households was 3.2 head (± 10.2 SD), compared with 6.9 (± 11.0 SD) for goats. However, where present, the average sheep flock (11.4 head) was larger than that of goats (7.5 head). Ownership of the two species was associated. The correlation coefficient between the numbers of sheep and goats owned in any household was 0.38 ($P<0.001$).

Flock size was related to household size. The correlation coefficients between total household size and the number of sheep, goats. and total small ruminant holdings were 0.35, 0.35, and 0.42 respectively (all significant at the 0.1% level). This reflects both household labour supply and household consumption requirements.

The proportion of households owning sheep and the mean flock size were strikingly higher in Rivers than in the other three states (Table 3). The mean size of goat herds was also higher in Rivers than in the other states, although the ownership level, at 84% of households, was somewhat lower (Table 4). Both ownership and flock size of sheep were highest in climatic zone 2. Goat herd size was also highest in this zone.

Table 3. *Sheep ownership by state and climatic zone, southeast Nigeria, January–March 1983.*

	Households (%)	Mean flock size[a]	Median flock size
State			
Rivers	52	15.2 (19.1)[b]	8
Bendel	21	9.7 (14.1)	5
Imo	18	10.1 (17.9)	4
Anambra	23	6.7 (9.1)	4
Climatic zone			
2	49	15.0 (18.9)	8
3	16	7.8 (16.6)	4
4	30	10.7 (13.8)	5
5	18	5.1 (4.5)	4
All households	28	11.4 (16.7)	6

a. Owners only.
b. Figures in brackets are standard deviations**.**

Table 4. *Goat ownership by state and climatic zone, southeast Nigeria, January–March 1983.*

	Households (%)	Mean herd size[a]	Median herd size
State			
Rivers	84	12.3 (15.4)[b]	8
Bendel	96	7.2 (9.0)	5
Imo	94	6.3 (11.7)	4
Anambra	95	5.4 (6.9)	4
Climatic zone			
2	84	11.9 (15.9)	8
3	97	5.9 (10.3)	4
4	91	7.3 (9.7)	4
5	96	5.3 (4.9)	4
All households	92	7.5 (11.3)	5

a. Owners only.
b. Figures in brackets are standard deviations.

The majority of animals (79% of sheep and 71% of goats) were born from owners' stock, while 17% of sheep and 20% of goats had been purchased. The remaining 4% of sheep and 7% of goats were from other sources (for example, gifts and loans).

Small ruminant management

Three types of livestock management were distinguished on the basis of animal confinement: free-roaming all year, confined or tethered only during the cropping season, and confined throughout the year. Goats were more likely to be confined than sheep (in 36% vs 24% of owning households).

Confinement of both sheep and goats is more common in the more densely populated states of Imo and Anambra (Table 5) and in the drier climatic zones (Table 6). Seasonal confinement of small ruminants is particularly associated with Anambra state and with climatic zone 4, which is related to the practice of compound farming in these areas. Year-round confinement of goats was noted in 57% of households where compound farms were found, as compared to 18% where they were not (the corresponding figures for sheep-owning households were 32% and 14%). The rank correlation coefficient between the proportion of households where goats were confined and the proportion where compound farms were observed in the 27 LGAs was 0.69 (P = 0.001). The equivalent coefficient for sheep was –0.36 (P = 0.06).

Table 5. *Management of sheep and goats by state, southeast Nigeria, January–March 1983.*

Animal species and state	Sample size	Management systems[1]			Total (%)
		Free roaming (%)	Seasonally confined (%)	Confined all year (%)	
Sheep					
Rivers	127	84	0	16	100
Bendel	49	82	0	18	100
Imo	59	73	2	25	100
Anambra	65	32	25	43	100
All states	300	70	6	24	100
Goats					
Rivers	204	89	0	11	100
Bendel	225	88	0	12	100
Imo	301	51	3	46	100
Anambra	266	20	15	65	100
All states	996	59	5	36	100

[1] Owners only.

Table 6. *Management of sheep and goats by climatic zone, southeast Nigeria, January–March 1983.*

Animal species and climatic zone	Sample size	Management system[1]			Total (%)
		Free roaming (%)	Seasonally confined (%)	Confined all year (%)	
Sheep					
2	135	85	0	15	100
3	66	71	2	27	100
4	69	48	22	30	100
5	30	54	3	43	100
All zones	300	70	6	24	100
Goats					
2	234	88	0	12	100
3	395	60	1	39	100
4	212	51	15	34	100
5	155	23	6	71	100
All zones	996	59	5	36	100

1. Owners only.

Goat confinement was more closely associated with higher human population densities than was that of sheep. The rank correlation coefficient between population densities and the proportion of households confining their goats in the 27 LGAs was 0.64 ($P<0.001$). The corresponding statistics for sheep management were $r = –0.16$, $P = 0.47$. (LGA population densities used were those given in Idachaba, 1985).

The size of small-ruminant holdings was related to management system. The necessity for confinement appeared to limit flock size: where animals were free roaming, the mean flock size was 13.2 for sheep and 8.4 for goats, whereas for confined animals the mean flock sizes were 7.4 sheep and 6.2 goats (owners only). Labour to collect and carry feed and the availability of housing seem to be the main constraints on animal numbers.

Only in 27% of cases of year-round confinement were goats seen to be kept in a separate construction or enclosure. This was usually constructed of wood (48%), corrugated iron sheeting (21%) or mud (18%).Otherwise the animals were simply confined in the house or compound. Where goats were confined seasonally, special constructions for the animals were observed only rarely (4% of cases). Where sheep were confined, however, they were more likely to be provided with special purpose housing, which was noted in 60% of cases of year-round and 12% of seasonal confinement.

Feed was seen to be offered to animals in 58% of households in the sample. Its provision was related to the animal management system. Where confinement was permanent, feed was offered in almost all cases; however, collected feed had also been provided in many cases where animals were free roaming (49% for sheep, 32% for goats).

Browse was the most commonly observed feed type, given either alone or in combination with other feeds in 81% of cases where feed was provided. Household refuse was offered by 48% of households and farm products or food-processing byproducts (e.g. cassava or yam peelings) by 15% of the households that provided feed. Browse was particularly important in climatic zone 4, where it was observed in 98% of cases where feed was offered, compared with an average of 74% in the other zones.

Perceived problems

Feed, disease and housing problems totaled 54% of responses when farmers were asked about difficulties encountered when keeping livestock. Lack of veterinary care, crop destruction and theft were the next most frequently cited problems.

There was some variation between climatic zones in the types of problem cited. Feed was apparently a less serious problem in climatic zone 2 than in the drier zones, while housing, surprisingly, was less often cited as a problem in zone 5, where confinement is most widespread. Disease was considered the major problem in this zone.

The problems reported were related to the mode of management. As might be expected, where animals were confined, farmers cited feed as their greatest problem, particularly where confinement was seasonal. Housing as a problem was also associated with seasonal confinement. Where animals were free roaming, concern over health predominated.

Specific reasons for not keeping sheep were given by 62% of informants (of whom 72% were non-owners). The difficulty of controlling sheep was the most common reason (although a lower proportion of households confined sheep than confined goats). This is clearly related to two other reasons mentioned-problems of crop destruction and housing.

Relatively few farmers housed their sheep, so presumably lack of housing is also related to the difficulty of providing feed for the confined animals, which was cited as the major problem in households where animals were confined. Traditional ritual prohibition against sheep were given as a reason in four LGAs in which such prohibitions appeared to affect a substantial proportion of the population. Only 5% of informants (8% were non-owners) gave reasons for not keeping goats: crop destruction and susceptibility to disease were the most important.

Diseases observed

The pneumo-gastro-enteritis complex (PGEC), probably most often due to the viral infection *peste des petits ruminants* (PPR), was overwhelmingly considered the major health problem. PGEC symptoms were observed by 96% of the farmers citing specific diseases. Other health problems were foot rot, abortion, mange and tick infestation, although only 5% of sheep owners and 10% of goat owners mentioned such problems.

Thirty percent of informants reported that there had been a PGEC outbreak in their flocks during the 12 months prior to the interview. About 66% reported never having observed symptoms of the disease in their flocks, while the remaining 4% recalled an outbreak that had occurred between 2 and 6 years previously.

A higher proportion of sheep owners than of goat owners reported PGEC outbreaks. The incidence of PGEC among both sheep and goats increased from the higher- to the lower-rainfall zones (Table 7). Disease levels were related to the animal management system (Table 8): seasonally confined animals appeared to be particularly susceptible to PPR. Chi-squared tests showed that the differences in PGEC incidence between zones were significant at the 5% level for both species, while those between management systems were significant at this level for goats.

Table 7. *Pneumo-gastro-enteritis complex (PGEC) incidence and mortality index for sheep and goats by climatic zone, southeast Nigeria, 1982/83.*

Animal species and climatic zone	Sample size	PGEC incidence in last 12 months (%)	Mortality index (%)
Sheep			
2	135	33	17
3	66	27	19
4	69	39	26
5	30	53	24
All zones	300	35	21
Goats			
2	234	25	21
3	395	23	21
4	212	36	28
5	155	43	32
All zones	996	29	24

Table 8. *Pneumo-gastro-enteritis complex (PGEC) incidence and mortality index for sheep and goats by management system, southeast Nigeria, 1982/83.*.

Species and management system	Sample size	PGEC incidence in last 12 months (%)	Mortality index (%)
Sheep			
Free roaming	211	34	21
Seasonally confined	17	53	32
Confined all year	72	33	17
All systems	300	35	21
Goats			
Free roaming	585	29	23
Seasonally confined	47	34	28
Confined all year	364	29	24
All systems	996	29	24

Mortality

Mortality indices for each species were calculated from farmers' recollection of the number of deaths over the preceding year. The mean mortality index for goats, at 24%, was somewhat higher than that for sheep (21%). However, 35 households had lost all of their sheep and 12 households all of their goats during that year. If the mortality indices for households no longer owning the particular species are included in the respective sub-samples, the mean indices rise to 29% for sheep and 25% for goats. This suggests that epidemics which kill all animals of a species in a household are more common among sheep than among goats.

Higher mortalities were associated with lower-rainfall environments (Table 7) and seasonal confinement of animals (Table 8). These findings were consistent with those relating to the incidence of PPR. Mack et al (1985) also reported a higher mortality among confined goats in two sites in the Imo and Anambra states, compared with that among free-roaming goats in southwest Nigeria (4.5% vs 2.7% month^{-1}).

CONCLUSIONS

The distribution of animals was skewed, with most households in the sample owning only a few animals. The modal values were one sheep and three goats per household, while only 14% of households has more than five sheep and only 38% had more than five goats. However, substantial flocks were found in a minority of households, with 9% owning more than 20 small ruminants. Further research needs to be undertaken on the management and productivity of such medium-scale enterprises. Ownership patterns differed between states and between climatic zones. The mean flock sizes of both species were highest in Rivers state and in climatic zone 2.

Management practices differed by state, climatic zone and farming system. Animal confinement was most common in the drier climatic zones and in Anambra state. Higher human population densities and agricultural intensification (of which compound farming was taken as an indicator) were associated with the confinement of livestock, in particular goats.

In general, mortalities were high, and PPR was reported as the most important disease. There was evidence that disease problems in both sheep and goats were greater in the lower-rainfall areas: PPR was observed both more commonly and more recently in the northerly than in the southerly climatic zones. Higher levels of mortality for both species were also observed in these zones. The drier environment of the northerly zones would thus appear to be associated with more severe disease problems.

Disease and mortality patterns were related to management system; seasonally confined animals seem especially vulnerable to disease. This reflects a failure to adjust management to this transitional phase of confinement because associated management strategies (of housing, feeding, watering, breeding) have apparently not been fully developed. Furthermore, since the confinement period is during the growing season, the requirement to provide feed for the animals coincides with the peak period of labour demand for cropping.

Increasing human population densities and agricultural intensification are likely to lead to increasing animal confinement both in southeast Nigeria and throughout the humid zone of

West Africa. New management strategies, in particular relating to feed and disease, will be required under these circumstances.

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