Rev. Elev. Méd. vét. Pays trop., 1985, **38** (3) : 284-294.

Disease constraints on village goat production in southwest Nigeria

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RÉSUMÉ

OPASINA (B. A.). — Obstacles pathologiques à la production caprine villageoise au Nigeria du Sud-Ouest. *Rev. Elev. Méd. vét. Pays trop.*, 1985, **38** (3) : 284-294.

Les chèvres constituent une source essentielle de protéines au Nigeria. Elles sont élevées par un nombre important de familles dans le Sud-Ouest. L'obstacle majeur à cette spéculation a toujours été la mortalité d'origine pathologique. Les résultats d'une enquête préliminaire de 18 mois conduite dans les villages de Badeku et Eruwa ont montré l'importance de la peste des petits ruminants (PPR) et de la gale à *Sarcoptes scabiei*. Une enquête complémentaire détaillée de 12 mois a mis en évidence l'importance de la PPR, des helminthoses, de la trypanosomose et de l'infestation ectoparasitaire par les poux. Elle comprenait un volet de suivi sanitaire mis en place ultérieurement à titre d'essai dans la région de Fasola.

Une étude sérologique dans la même région a montré l'importance des virus suivants : ecthyma contagieux, bluetongue, adenovirus type 5, PPR, para-influenza type 3, bronchorhinite. Mais seuls la PPR et l'ecthyma contagieux se sont révélés importants au plan clinique.

La peste des petits ruminants et la gale ont eu pour corollaire une mortalité et une morbidité élevées sur les chèvres villageoises du Sud-Ouest.

Une campagne de 12 mois contre la PPR pour ces animaux a eu pour résultat de réduire la mortalité de 75 p. 100 dans les groupes de sujets vaccinés. Par contre, les bains contre la gale n'ont eu aucun effet sur ce facteur.

Mots clés : Chèvre - Pathologie - Contrôle sanitaire - Helminthose - Trypanosomose - Virose - Productivité - Nigeria.

SUMMARY

OPASINA (B. A.). — Disease constraints on village goat production in southwest Nigeria. *Rev. Elev. Méd. vét. Pays trop.*, 1985, **38** (3) : 284-294.

Goats are a major source of animal protein in Nigeria and are kept by a large number of rural households in the southwest. The major constraint to production has been high mortality from disease. The results of an 18 month preliminary investigation at Badeku and Eruwa villages showed the importance of *peste des petits ruminants* (PPR) and mange caused by *Sarcoptes scabiei*. A further detailed 12 month investigation, that included a disease control trial component subsequently performed in the Fasola area, highlighted the importance of PPR, helminthiasis, trypanosomiasis and ectoparasitic infestation from lice. A serological study in the same area showed the prevalence of contagious ecthyma (orf), bluetongue, adenovirus type 5, PPR para-influenza type 3, and infectious bronchorhinitis virus. Of these, only PPR and orf were of clinical importance.

Peste des petits ruminants (PPR) and mange have been associated with high mortality and morbidity among village goats in southwest Nigeria. Twelve months of PPR control for village goats resulted in 75 p. 100 reduction in mortality among the groups vaccinated. Dipping against mange had no direct effect on mortality.

Key words : Goat - Pathology - Disease control - Helminthiasis - Trypanosomiasis - Viral diseases - Productivity - Nigeria.

INTRODUCTION

Small ruminants, especially goats, are a major source of protein in the humid tropics of West Africa. The zone has varying levels of tsetse challenge. As reported by ILCA (8), approximately 6.6 million goats, mainly trypanotolerant dwarf breeds, are in Nigeria's humid zone, of which the Southwest is a part. Goats are kept in the Southwest by a large number of households in free-roaming village flocks, usually with an ownership pattern of

an average 2 goats per individual and 4 goats per household, as observed by OPASINA (13). These animals, in addition to being a source of protein, are a source of ready cash for small scale farmers in the area.

Under the traditional production system, animals are left to scavenge, graze, and browse around compounds. They are given little or no supplementary feed and veterinary attention. Mating is uncontrolled and special housing is not provided. Although the production potential of village goats appears to be high, they experience high morbidity and mortality from disease, as reported by AKEREJOLA, SCHILLHORN VAN VEEN and NJOKU (3), and ILCA (8). Most information on diseases of goats in Nigeria is limited to research institutions and universities, and little is known of the situation at the village level. Also, little is known of the interaction of disease control with productivity of village goats. This paper reveals the major disease prevalent among goats in some selected villages in southwest Nigeria. It also reveals the effects of disease control intervention on the productivity of the animals.

MATERIALS AND METHODS

The study area (see map)

The investigation was carried out in 2 ecological areas of southwest Nigeria, Badeku in the forest, and Eruwa in the derived savannah zone. The derived savannah zone is considered to be the fire subclimax of the lowland forest as reported by CROWDER and CHEDDA (6). Two major seasons exist in the study areas : the rainy season, which begins around March-April, and ends around October, and the dry season, which begins around November and ends around March. Rainfall is usually bimodal, with peaks in July and from September to October. The heaviest rains fall around May, July, September and October. Daily mean temperature in the area ranges from 26 °C to 36 °C, and relative humidities are high, usually around 80 p. 100.

Disease screening

There are 2 phases of the disease study. The preliminary investigation (Phase I) was carried out in Badeku and Eruwa from October 1978 to March 1980, and the detailed investigation (Phase II) was carried out in Fasola from May 1982 to April 1983.

In the preliminary study, neck tags were used to identify male and female goats of all ages, 314 at Badeku and 531 at Eruwa. During the weekly veterinary visit, all goats reported sick were examined clinically. When animals were weighed at the end of each month, any that were observed to be sick were identified and examined. Post-mortem examinations were performed on carcasses whenever possible, emergency slaughter and consumption of moribund goats being common.

The detailed investigation was carried out in 9 villages near Fasola. Approximately 500 male and female goats of all ages were identified by ear tags.

Since the preliminary investigation showed PPR and mange to be particular problems, an attempt was made to control these diseases. Thus, 4 groups of villages with approximately equal numbers of goats were identified with different treatments :

— village group 1 : PPR vaccination and monthly dipping against mange ;
— village group 2 : PPR vaccination only ;
— village group 3 : monthly dipping against mange only ;
— village group 4 : control.

The methodology of disease investigation involved routine clinical examination. Clinical examination involved checking all body systems for malfunctioning and, when possible, collecting appropriate samples for identification. Blood and faeces were screened to confirm diagnosis of endoparasites. The clinical examination was based on the goats among the households to make data collection easier, and a new random sample was selected each month. In each of these samples, 50 p. 100 of goats among households were selected. In effect, this meant that approximately 50 p. 100 of the total sample population of goats was examined clinically each month. Serum samples were also collected and sent to the Laboratoire de l'Elevage et de Recherches Veterinaires in Dakar, Senegal, to determine the prevalence of viral diseases among the village goats.

Disease control interventions

All goats in the first and second groups of villages were vaccinated against PPR using tissue culture rinderpest vaccine (TCRV). One

vial of the vaccine, containing 100 doses and frozen for preservation, was dissolved in 200 ml of ice cold sterile normal saline. Each goat was inoculated with 2 ml of the reconstituted vaccine through the subcutaneous route behind the shoulder. Vaccination was done once *per annum* for goats 3 months and older.

Dipping was done monthly in the 1st and 3rd groups of villages in Fasola. Through the communal efforts of farmers in each of the 2 village groups, a dip tank (1 × 1 × 0.8 m) was built from laterite mud, and plastered with cement. The dipping was done every four weeks with Gamma benzene hexachloride acaricide. Dips were used twice and topped each time before being discarded and refilled with fresh acaricide.

Ideally, within village comparison would have been preferable, but this proved impossible to implement in practice.

Productivity data collection

Data on monthly weights, deaths and births within whole village flocks were also collected. Effects of PPR vaccination and dipping were assessed from birthweights, growth rates, kidding rates, and mortality rates.

RESULTS

1. Disease prevalence

Table n° I shows the diseases prevalent during the preliminary investigation. Of the average population of 275 goats monitored during 18 months at Badeku, 22.2 p. 100 contracted PPR, 2.9 p. 100 orf, 6.5 p. 100 pneumonia, 2.9 p. 100 gastro-enteritis, 2.2 p. 100 helminthiasis (mainly from *Haemonchus contortus*), 7.3 p. 100 ectoparasitic infestation from ticks (*Rhipicephalus spp.* and *Amblyomma variegatum*), lice (*Lignonathus spp.*), and fleas from *Ctenocephalides spp.*, 32.4 p. 100 mange infestation caused by *Sarcoptes scabiei* and 12 p. 100 had accidents from traps.

In the Eruwa area, of the average population of 382 goats during the survey period, 19.6 p. 100 contracted PPR, 0.3 p. 100 orf, 4.7 p. 100 pneumonia, 1 p. 100 gastro-enteritis, 1.6 p. 100 helminthiasis (*H. contortus* and *Œsophagostomum columbianum*), 2.1 p. 100 ectoparasitic infestation, and 56.8 p. 100 mange caused by *S. scabiei.*

Other diseases or health problems observed were abscesses and lymphadenitis, keratoconjunctivitis, foot-rot, orchitis, mastitis, vulvovaginitis, dystocia, trypanosomiasis, and starvation.

Table n° II shows the monthly prevalence of diseases during the detailed investigation. Most diseases occurred during the rainy season, from July to October. Ectoparasitic infestation from lice (*Lignonathus spp.*), brown ear ticks (*Rhipicephalus spp.*) and fleas (*Ctenocephalides spp.*), trypanosomiasis (*Trypanosoma vivax*), clinical helminthiasis and pneumonia had the highest prevalence. Pneumonia (5.8 p. 100), helminthiasis (7.8 p. 100) and louse infestation (14.9 p. 100) all showed the highest prevalence in October, whereas trypanosomiasis (15.4 p. 100) showed its peak prevalence in September. However, both trypanosomiasis and louse infestation occurred throughout the year. Some diseases, although not significant in terms of the total diseases picture, did have a marked seasonal distribution. A PPR outbreak occurred in one village around July (rainy season). Orf appeared mainly in the rainy season, March to October. Abscesses and lymphadenitis were also observed mostly in the rainy season, from May to September. Babesiosis occurred in the rainy season between July and October, following relatively high tick infestation between March and July. Mange infestation was observed in the rainy and dry seasons, but the highest prevalence was seen in the late dry season, February to March. Accidents, mainly from traps, occurred predominantly in the rainy season (April to September), particularly during planting (April to June) when farmers set traps to prevent animals from grazing the new crops, especially maize.

Table n° I - Disease attack rates among monitored goats in the forest (Badeku) and derived savanna (Eruwa), October 1978 - March 1980.

DISEASE	Forest		Derived savanna	
	Nb.	Percentage	Nb.	Percentage
Peste des petits ruminants (PPR)	61	22.2	75	19.6
Orf	8	2.9	1	0.3
Pneumonia	18	6.5	18	4.7
Gastro-enteritis	8	2.9	4	1.0
Helminthiasis	6	2.2	6	1.6
Ectoparasitic infestation (ticks, fleas, lice)	20	7.3	8	2.1
Ectoparasitic infestation (Sarcoptic mange)	89	32.4	217	56.8
Accidents	33	12.0	17	4.4
Others	38	13.8	24	6.3
Average number of goats	275		382	

Table n° II - Prevalence by month of disease in sampled goat population of Fasola villages (percentage)

DISEASE	M	J	J	A	S	O	N	D	J	F	M	A
PPR	-	-	11.9	-	-	-	-	-	-	-	-	-
Orf	-	1.1	2.3	2.2	0.5	1.3	-	-	-	-	0.7	1.7
Pneumonia	5.2	1.1	0.6	2.2	1.0	5.8	1.3	-	3.9	-	4.7	1.7
Abscesses/lymphadenitis	0.5	1.1	0.6	1.1	1.5	-	0.6	-	-	-	-	-
Keratoconjunctivitis	-	0.6	0.6	-	0.5	0.6	-	-	-	-	-	-
Helminthiasis	4.2	4.5	6.2	7.7	5.6	7.8	7.0	7.0	0.6	-	2.0	1.7
Trypanosomiasis	0.5	1.1	2.8	7.2	15.4	11.7	5.1	8.9	5.8	1.6	8.8	5.8
Babesiosis	-	-	3.4	2.8	4.6	0.6	1.3	-	-	-	-	-
Mange	2.1	1.7	1.7	1.1	-	0.6	2.5	1.9	-	5.6	3.4	1.7
Fleas	1.6	-	2.3	-	6.7	1.3	-	-	-	-	-	-
Lice	9.9	5.7	6.2	9.4	9.7	14.9	7.6	1.9	5.8	1.6	4.0	3.5
Ticks	6.8	4.0	5.1	1.1	0.5	0.6	-	-	-	-	-	-
Accidents	3.6	2.8	1.7	1.1	1.0	-	-	-	-	1.6	-	2.3
Other	2.6	3.4	0.6	1.7	1.0	-	0.6	1.9	1.3	0.8	1.3	0.6
Total animals sampled	192	176	177	181	195	154	158	157	155	124	148	171

Table n° III - Distribution of disease within and over age groups
Percentage of total sample

DISEASE	Age group in months				
	0-3	4-6	7-12	13-24	25+
PPR	1.4	2.9	0.3	0.5	0.8
Orf	3.6	1.7	0	0	0
Pneumonia	4.1	5.9	4.1	0.8	0.3
Abscesses/lymphadenitis	0.8	2.1	0	0	0.3
Keratoconjunctivitis	0	0.4	0	0.5	0.1
Helminthiasis	2.2	14.7	9.0	3.2	1.9
Trypanosomiasis	0	0	1.0	5.0	14.3
Babesiosis	0	0.4	0.4	1.3	2.2
Mange	1.4	1.3	2.4	0.8	2.1
Fleas	1.9	3.4	1.0	0.8	0.1
Lice	12.7	13.9	8.3	4.2	2.5
Ticks	1.1	0.4	1.7	2.4	1.9
Accidents	0.3	1.7	2.1	1.0	1.4
Other	2.2	0.4	0.7	0.3	1.9
Cumulative sample size	363	238	289	379	719

Table n° III shows the distribution of diseases within and over different age groups. In the pre-weaning age, 0 to 3 months, orf, pneumonia, and ectoparasites appeared in great numbers, accounting for 24.8 p. 100 of the total sample in that age group. In the 4 to 6 months age group, pneumonia (5.9 p. 100), clinical helminthiasis (14.7 p. 100), and ectoparasitic infestation (19.0 p. 100) showed importance. Amongst the 7 to 12 months group, pneumonia (4.1 p. 100), helminthiasis (9.0 p. 100) and ectoparasitic infestation (13.4 p. 100) were most apparent. Trypanosomiasis (5 p. 100) and ectoparasitic infestation (8.2 p. 100) were important among the adults, 13 to 24 months old. In the adult group of animals above 25 months of age, trypanosomiasis appeared to be the most outstanding disease, accounting for 14.3 p. 100 of the total sample. PPR affected all age groups, but was observed most among pre- and post-weaning kids, 0 to 3 and 4 to 12 months. Abscesses and lymphadenitis were mainly observed in young goats, especially those at post-weaning (4 to 6 months). Keratoconjunctivitis also affected goats at post-weaning, as well as adults above 13 months of age. Clinical cases of helminthiasis occurred in all age groups, but post-weaning kids were most affected. Trypanosomiasis and babesiosis affected mainly adult goats over 25 months old. Mange infestation was encountered in all age groups, but mainly in the 7 to 12 months group. Ectoparasitic infestation from lice, ticks and fleas affected all goats, but kids at pre- and post-weaning showed the highest infestation. Accidents occurred among animals of all ages, but most commonly among adolescent (7-12 months) goats.

Table n° IV shows diseases prevalent within village group 1 (vaccination and dipping). Although PPR and mange and other ectoparasites were controlled in this group of villages, other diseases occurred. Among these, clinical helminthiasis and typanosomiasis were important. Clinical helminthiasis occurred mainly in the rainy season from April to October, with peaks of infection in August (12.2 p. 100) and October (14.7 p. 100). Trypanosomiasis appeared throughout the year, but its prevalence was highest in the rainy season, especially September (14 p. 100) and October (12.2 p. 100). Orf occurred in the rainy season, whereas pneumonia was found in both the rainy and dry seasons. Abscesses/lymphadenitis were found mainly in the rainy season (August to September). Keratoconjunctivitis appeared only in September, whilst babesiosis was found mostly between July and September. Ectoparasites, mange, fleas, lice and ticks were found at the start of the survey, before dipping commenced. Accidents occurred in the planting season, mainly in May.

Table n° V shows diseases prevalent within

Table n° IV - Monthly prevalence of disease in sampled goats in village group 1 (percentage)

DISEASE	M	J	J	A	S	O	N	D	J	F	M	A
PPR	-	-	-	-	-	-	-	-	-	-	-	-
Orf	-	-	4.4	-	-	2.4	-	-	-	-	-	-
Pneumonia	5.4	-	-	8.2	-	-	1.8	-	7.8	-	7.7	-
Abscesses/lymphadenitis	-	-	-	4.1	1.7	-	1.8	-	-	-	-	-
Keratoconjunctivitis	-	-	-	-	1.7	-	-	-	-	-	-	-
Helminthiasis	1.8	-	6.7	12.2	7.0	14.6	9.1	7.4	-	-	-	2.2
Trypanosomiasis	-	2.1	2.2	6.1	14.0	12.2	7.3	7.4	7.8	-	7.7	10.7
Babesiosis	-	-	11.1	2.0	0.7	-	-	3.7	-	-	-	-
Mange	5.4	4.2	2.2	-	-	-	-	-	-	-	-	-
Fleas	-	-	-	-	-	-	-	-	-	-	-	-
Lice	8.9	12.8	-	-	-	-	-	-	-	-	-	-
Ticks	12.5	2.1	-	-	-	-	-	-	-	-	-	-
Accidents	5.3	2.1	2.2	2.0	-	-	-	-	-	-	-	-
Other	1.7	6.4	6.7	-	-	-	1.8	1.8	2.0	-	-	4.3
Total animals sampled	56	47	45	49	57	41	55	54	51	32	39	46

Table n° V - Monthly prevalence of disease in sampled goats in village group 2 (percentage)

DISEASE	M	J	J	A	S	O	N	D	J	F	M	A
PPR	-	-	-	-	-	-	-	-	-	-	-	-
Orf	-	-	-	-	-	2.6	-	-	-	-	-	-
Pneumonia	-	-	2.2	-	-	10.3	4.6	-	4.5	-	-	-
Abscesses/lymphadenitis	2.2	2.2	2.2	-	3.6	-	-	-	-	-	-	-
Keratoconjunctivitis	-	-	-	-	-	-	-	-	-	-	-	-
Helminthiasis	-	2.2	2.2	8.5	-	-	4.6	-	-	-	-	-
Trypanosomiasis	2.2	-	2.2	12.8	14.5	15.4	4.6	8.3	-	3.1	11.5	7.1
Babesiosis	-	-	2.2	2.1	7.3	2.6	-	-	-	-	-	-
Mange	-	-	2.2	2.1	-	-	-	-	-	18.7	19.2	10.7
Fleas	-	-	6.7	-	10.9	5.1	-	-	-	-	-	-
Lice	11.1	4.4	13.3	12.8	21.8	25.6	33.3	4.6	22.7	6.2	3.8	17.9
Ticks	6.7	4.4	11.1	-	-	-	-	-	-	-	-	-
Accidents	4.4	6.7	2.2	21.0	1.8	-	-	-	-	3.1	-	7.1
Other	-	-	-	-	-	-	-	-	-	-	-	-
Total animals sampled	45	45	45	47	55	39	24	24	22	32	26	28

village group 2 (vaccination only). The disease picture in this group resembled that of village group 1. In this group, goats were vaccinated against PPR only, and the most important disease problems were trypanosomiasis and ectoparasitic infestation from lice. Like village group 1, village group 2 experienced peaks of infection from trypanosomiasis in September (14.5 p. 100) and October (15.4 p. 100), but trypanosomiasis appeared to occur throughout the year. Orf was present in the rainy season, and pneumonia was recorded in all seasons. Abscesses/lymphadenitis were found in the early rains, May to July, and in the late rains of September. Clinical helminthiasis seemed insignificant in this group. Most cases were recorded in the rainy season, July through August. Babesiosis occurred in the rainy season between July and October. Mange infestation was noticed mainly in the late dry season, February to March, whereas fleas were found in the rainy season (July, September

Table n° VI - Monthly prevalence of disease in sampled goats in village group 3 (percentage)

DISEASE	M	J	J	A	S	O	N	D	J	F	M	A
PPR	-	-	44.7	-	-	-	-	-	-	-	-	-
Orf	-	5.0	-	8.7	-	-	-	-	-	-	-	-
Pneumonia	2.4	5.0	-	-	2.6	12.8	-	-	1.9	-	6.0	1.7
Abscesses/lymphadenitis	-	-	-	-	-	-	-	-	-	-	-	-
Keratoconjunctivitis	-	2.5	-	-	-	2.6	-	-	-	-	-	-
Helminthiasis	2.4	2.5	4.2	6.5	5.2	7.7	6.8	8.9	1.9	-	6.0	3.5
Trypanosomiasis	-	2.5	6.4	4.3	21.0	12.8	2.3	13.3	5.7	-	8.0	1.7
Babesiosis	-	-	-	2.2	2.6	-	-	-	-	-	-	-
Mange	2.4	25.0	-	2.2	-	-	-	-	-	-	-	-
Fleas	7.3	-	-	-	-	-	-	-	-	-	-	-
Lice	12.2	-	-	23.9	-	-	-	-	-	-	-	-
Ticks	4.9	7.5	-	4.3	-	-	-	-	-	-	-	-
Accidents	-	2.5	-	-	2.6	-	-	-	-	2.9	-	3.5
Other	4.9	-	4.2	2.2	2.6	-	-	2.2	1.9	2.9	4.0	-
Total animals sampled	41	40	47	46	38	39	44	45	53	34	50	57

and october). Ticks occurred in the early and mid rains (May to July). Most accidents took place during the April to June planting season.

Table n° VI shows diseases prevalent in village group 3 (dipping only). Apart from control of ectoparasites in this group, the total disease picture and trends resembled those of village groups 1 and 2, although there was an outbreak of PPR around July, giving a prevalence rate of 44.7 p. 100 in the animals sampled. Helminthiasis and trypanosomiasis were prominent. Clinical helminthiasis occurred practically throughout the year with peaks of prevalence in October (7.7 p. 100) and December (8.9 p. 100). Trypanosomiasis appeared throughout the year as well, with highest prevalence in September (21 p. 100) and December (13.3 p. 100).

Orf occurred in the rainy months of July and August, whereas pneumonia was found throughout the rains, between April and October ; in October it reached its peak prevalence of 12.8 p. 100. Unlike the two preceding village groups, in village group 3 abscesses and lymphadenitis were not observed. Keratoconjunctivitis occurred in the rainy season (June and October), whilst babesiosis was seen in August and September. Ectoparasitic infestation appeared before dipping commenced in August and disappeared completely from the sampled population after 2 months. Accidents again occurred mainly in the rainy season, during planting (April to June, and September).

Table n° VII shows diseases prevalent in village group 4 (control). In this group, PPR and mange mites were not controlled. The disease pattern nevertheless resembled those of village groups 1, 2 and 3, with the exception of the absence of a PPR ourbreak. The most important diseases were helminthiasis, trypanosomiasis, and ectoparasitic infestation from lice. Clinical helminthiasis occurred mainly in the rainy season with peak prevalence in June (13.6 p. 100) and September (11.1 p. 100). Trypanosomiasis was found at all seasons, but showed the highest prevalence in the late rains, September (13.3 p. 100). Ectoparasitic infestation from lice occurred throughout the year with peaks of prevalence in October (37.1 p. 100), January (13.8 p. 100) and March (15.1 p. 100). Orf was found in the rainy months (March, April and September) ; pneumonia peaked in May. Abscessess/lymphadenitis appeared in July, and babesiosis in August. Mange infestation occurred mainly in the dry season (November, December and February, whilst flea infestation occurred mainly in July and September. Tick infestation was observed in the early rains (May to July) and late rains (September to october), with the highest peak in July (10 p. 100). Accidents happened in the planting season, with the highest peak in May (4 p. 100). Other recorded diseases were coccidiosis, mastitis, abortion, dermatitis and malnutrition. However, in terms of the whole disease picture, they appeared very insignificant.

Table n° VII - Monthly prevalence of disease in sampled goats in village group 4 (percentage)

DISEASE	M	J	J	A	S	O	N	D	J	F	M	A
PPR	-	-	-	-	-	-	-	-	-	-	-	-
Orf	-	-	-	-	2.2	-	-	-	-	-	3.0	7.5
Pneumonia	12.0	-	-	-	2.2	-	-	-	-	-	3.0	2.5
Abscesses/lymphadenitis	-	2.3	-	-	-	-	-	-	-	-	-	-
Keratoconjunctivitis	-	-	2.5	-	-	-	-	-	-	-	-	-
Helminthiasis	12.0	13.6	12.5	2.6	11.1	8.6	5.7	6.8	-	-	-	-
Trypanosomiasis	-	-	-	5.1	13.3	5.7	5.7	5.9	6.9	3.8	9.1	5.0
Babesiosis	-	-	-	5.1	-	-	-	-	-	-	-	-
Mange	-	-	2.5	-	-	2.9	5.7	6.8	-	3.8	-	-
Fleas	-	-	2.5	-	15.6	-	-	-	-	-	-	-
Lice	8.0	4.5	12.5	-	15.6	37.1	11.4	5.9	13.8	-	15.1	2.5
Ticks	2.0	2.3	10.0	-	2.2	2.9	-	-	-	-	-	-
Accidents	4.0	-	2.5	-	-	-	-	-	-	-	-	-
Other	-	-	2.5	5.1	2.2	-	-	2.9	-	-	-	-
Total animals sampled	50	44	40	39	45	35	35	34	29	26	33	40

Table n° VIII shows the prevalence among village goats of infectious rhinotracheitis (IBR), *peste des petits ruminants* (PPR), adenovirus type 5 (AD), bluetongue (BT), contagious ecthyma (CE), and para-influenza type 3 (PI). Of these, contagious ecthyma showed the highest prevalence rate (77 p. 100), followed by bluetongue (68 p. 100), adenovirus type 5 (59 p. 100), *Peste des petits ruminants* (30 p. 100), para-influenza type 3 (28 p. 100) and infectious rhinotracheitis (26 p. 100).

Table n° VIII - Prevalence of viral diseases in the village goats

Viral disease	Nb. Sampled	Nb. Positive	Percentage Positive
Infectious rhinotracheitis (IBR)	108	28	26
Peste des petits ruminants (PPR)	107	32	30
Adenovirus Type 5 (AD)	106	63	59
Bluetongue (BT)	104	71	68
Orf (Contagious ecthyma, CE)	99	76	77
Parainfluenza Type 3 (PI)	92	26	28

2. Effects of disease control on productivity

Table n° IX shows the mean birthweight in the 4 groups of villages. Mean birthweight in the 4 groups of villages was 1.52 ± 0.34 kg. The highest birthweight, 1.65 ± 0.47 kg, was observed in village group 3 (dipping), whilst the lowest occurred in the control villages (group 4).

Table n° X shows the daily liveweight gain (DLWG). Among kids at pre-weaning age (0-3 months), the mean DLWG was 30.6 gm, and it was only in the vaccination village groups (1 and 2) that the value exceeded this mean. The same trend was observed among goats at post-weaning, 4-12 months. Weight losses were observed among does nursing 0-3 month-old kids, the highest losses being observed in the control group.

Table n° X - Liveweight gain per day in goats in four village groups

Age group	Village 1	2	3	4	DLWG (gm)
0-3 months	39.2	35	18.6	29.1	30.6
4-12 months	17.9	23.4	13.7	15.7	17.7
Does in last 2 months of gestation	25.6	46.4	36.6	66.1	43.7
Does nursing kids					
0-3 months	-20.4	-33.6	-36.7	-44.5	-33.8
13+ months	18.7	13.6	12.4	20	16.1

Table n° XI shows the kidding rate. The overall kidding rate was 142.2 p. 100, with the highest rate recorded for goats that were vaccinated and dipped. However, significant differences were observed between village groups 1 and 2 ($P < 0.001$), village groups 1 and 3 ($P < 0.05$), village groups 1 and 4 ($P < 0.01$), village groups 2 and 3 ($P < 0.001$) and village groups 2 and 4 ($P < 0.05$) using the standard test for comparing two proportions.

Table n° XI - Kidding rate in goats by village groups

Village group	Nb. of dams	Nb. of parturition	Nb. of kids	Kidding rate (p.100)	Nb. of kids per parturition
1	54	65	95	175.9	1.46
2	54	41	59	109.3	1.43
3	48	44	70	145.8	1.59
4	29	25	39	134.5	1.56
TOTAL	185	175	263	142.2	1.50

Table n° XII shows the monthly mortality pattern. The highest mortality occurred in village group 3 (dipping only, 28.4 p. 100), whilst the lowest occurred in village group 2 (vaccination, 6.2 p. 100). The highest mortality rates occurred in September, especially for village groups 3 and 4 (dipping and control). In addition, another peak was observed in village group 3 in July, following an outbreak of PPR.

Table n° IX - Village group and birthweights (mean ± SD) in kg

Type of birth	Village group 1		Village group 2		Village group 3		Village group 4		Total Nb. of births	All villages mean ± SD
	Nb.	Weight	Nb.	Weight	Nb.	Weight	Nb.	Weight		
Multiple	37	1.35±0.14	24	1.51±0.07	18	1.58±0.46	12	1.36±0.15	91	1.44±0.28
Single	52	1.54±0.42	32	1.53±0.28	52	1.72±0.48	24	1.46±0.08	160	1.57±0.37
All births	6	1.42±0.35	3	1.52±0.20	-	1.65±0.47	3	1.52±0.13	12	1.52±0.34
Total births	95		59		70		39		263	

Table n° XII - Mortality rate by village group

Village group	M	J	J	A	S	O	N	D	J	F	M	A	Monthly mean (p.100)	Annual mean (p.100)
1	2.8	0	0	0.9	0.8	0	0	1.5	0.7	1.9	0.6	0.6	0.8	9.6
2	0	1.0	0.9	0.8	0.8	0	0.8	0	0	0	1.1	0	0.4	6.2
3	0	1.7	8.4	2.0	17.2	0	1.2	0	1.1	1.1	0	0	2.7	28.4
4	2.1	2.2	4.9	2.6	9.5	0	4.2	0	2.0	1.9	0	0	2.4	20.8
Mean	1.2	1.2	3.5	1.6	7.1	0	1.5	0.4	0.9	1.2	0.4	0.1	1.6	

Seasonal variations were noticed in the pattern of mortality, with higher rates from July to September, especially in village groups 3 and 6 where PPR was not controlled. Mortalities appeared to be lower in the mid and late dry season (December to March). In village groups 1 and 2, where animals were vaccinated against PPR, mortalities appeared to be evenly distributed over the year.

DISCUSSION AND CONCLUSION

The results have shown the importance of PPR, mange and ectoparasitic infestation, helminthiasis and trypanosomiasis among village goats. PPR, observed during the preliminary and detailed investigations, occurred as outbreaks. Outbreaks during the preliminary investigation took place in the dry season, but the only outbreak during the detailed investigation happened in the rainy reason. PPR is known to be common in the rainy season, but now it is clear that an outbreak of PPR may occur during either one. PPR is a disease of economic importance among the goat population of West Africa, as observed by NDUAKA and IHEMELANDU (12), BOURDIN and DOUTRE (5), ABEGUNDE, NAWATHE, OKEKE and OPASINA (1), and is probably the major cause of caprine death in Nigeria, as reported by AKEREJOLA, SCHILLHORN VAN VEEN and NJOKU (3).

BEATON (4) observed mange among goats in Nigeria nearly 4 decades ago. During the course of this study, there appeared to be locality differences in the prevalence of sarcoptic mange in the southwest. Mange of the high degree of severity observed at Badeku and Eruwa during the preliminary investigation was not seen at Fasola during the detailed investigation.

Trypanosomiasis, caused by *Trypanosoma vivax,* was observed among goats at Fasola. As with mange, locality differences in the incidence of trypanosomiasis existed, despite the fact that the entire region is presumed to be tsetse infected. Among village goats examined in the preliminary investigation at Badeku and Eruwa, there was only one case of the disease. The differences in incidence might be associated with the presence or absence of cattle in the vicinity of the villages. KRAMER (9) found 13.8 p. 100 of the goats he investigated showing clinical signs of trypanosomiasis. The animals were kept in compounds in villages surrounding the University of Nigeria, Nsukka, in eartern Nigeria where there were also cattle. Around the Fasola villages, there were sedentary cattle as well as cattle trade routes.

Helminthiasis, in the form of parasitic gastroenteritis, has been ranked along with PPR and pneumonia as a major constraint to goat production, but, as reported by ILCA (8), this ranking is based on experience with institutional flocks. In all the areas studied, clinical helminthiasis occurred throughout the year, but was mainly observed in the rainy season in the case of Fasola. SCHILLHORN VAN VEEN (14) and FABIYI (7) observed that in the wet period, pasture conditions are favourable for development of the infective stages of helminthiasis, so that a high challenge could be expected. However, under the existing traditional production systems, goats scavenge and graze only on the periphery of villages, and are little exposed to the third infective larval stage of helminths, as reported by ILCA (8).

Although a serological study has shown that bluetongue, infectious rhinotracheitis, para-

influenza type 3, and adenovirus type 5 are prevalent among indigenous goats, they have not been observed clinically as disease entities. Of all the viruses shown by serology to be prevalent, only PPR and orf have been observed clinically among village goats.

PPR and mange control among village goats have no significant effect on birthweight, growth and kidding rates. The same observation has been made by MACK (10) in the same area. Differences in kidding rates among village groups might be associated with differences of locality. Among village groups in which goats were dipped monthly, kidding rates appeared to be higher, perhaps because of the greater ease of mating brought about when animals were enclosed in restraining yards prior to dipping.

In village groups in which goats were vaccinated against PPR, mortality was reduced to about 75 p. 100. The effect of mange control was not as clear, and it would therefore appear that PPR was responsible for high mortalities among village goats. ADEOYE (2) observed a similar trend among the village goats around Ikire and Badeku. MOSI, OPASINA, HEYWARD, CAREW and VELEZ (11), and MACK (10) observed in a similar survey performed at Badeku and Eruwa that the introduction of PPR and mange control was encouraging for goats because not only did productivity increase, but overall flock mortality felt and offtakes increased.

In conclusion, much more research is required with regard to PPR, and a considerable increase in the monitored sample size is needed before the economic effect of PPR vaccination can be assessed more precisely. Dipping, as it has been tested in the villages, does not appear viable when one considers the logistics involved. Water supply is always a problem in rural areas during the dry season, and aside from that, trained personnel are required to perform the dipping.

ACKNOWLEDGEMENTS

The author is grateful to the ILCA Small Ruminant Team at Ibadan for making it possible to publish this paper.

I thank the Nigerian National Veterinary Research Institute at Vom, the Laboratoire de l'Elevage et de Recherches Vétérinaires in Dakar, Senegal, and the Faculty of Veterinary Medicine of the University of Ibadan, Nigeria, for various diagnostic works. I also thank Ms Kelly CASSADAY for the initial editorial work.

RESUMEN

OPASINA (B. A.). — Obstáculos patológicos en la producción aldeana de ganado cabrío en sudoeste de Nigeria. *Rev. Elev. Méd. vét. Pays trop.*, 1985, **38** (3) : 284-294.

Las cabras son una fuente esencial de proteínas en Nigeria y son criadas por un número importante de familias en el sudoeste. Siempre fué la mortalidad de origen patológica el obstáculo importante para dicha producción.

Los resultados de una encuesta preliminar durante 18 meses, efectuada en las aldeanás de Badeku y Eruwa, mostraron la importancia de la peste de los pequeños rumiantes (PPR) y de la sarna con *Sarcoptes scabiei*. Una encuesta complementaria detallada durante 12 meses evidenció la importancia de la PPR, de las helmíntiasis, de la tripanosomiasis y de la infestación ectoparasitaria por los piojos. Incluía un control sanitario experimentado en la región de Fasola.

Un estudio serológico en la misma región mostró la importancia de los virus siguientes : ectima contagioso, lengua azul, adenovirus tipo 5, PPR, parainfluenza tipo 3, broncorinitis.

Pero, solos la PPR y el ectima contagioso se mostraron importantes desde el punto de vista clínico.

La PPR y la sarna fueron asociadas con una mortalidad y una morbidez elevadas de las cabras aldeanas del sudoeste. Una lucha de 12 meses contra la PPR redució de 75 p. 100 la mortalidad de los animales vacunados. En cambio, los baños contra la sarna no tuvieron ningún resultado.

Palabras claves : Cabra - Patologia - Control sanitario - Helmíntiasis - Tripanosomiasis - Virosis - Productividad - Nigeria.

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