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Stomach fluke infection in sahelian and West African dwarf small ruminants in Benin

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Abstract
A cross-sectional study was carried out between December 2010 and November 2011 in order to determine the prevalence and the variation factors of the stomach fluke infection in small ruminants of Benin. The paunch and the honeycomb (rumen-reticulum) of 366 sheep and 390 goats of West African Dwarf (WAD) or Sahelian breeds were selected from the two major agro-climatic areas of the country (Northern area and Southern area) and examined. The results showed an overall prevalence of 14.3% (108 infected subjects out of 756 examined) with 9 to 315 flukes per infected animal. Frequency and intensity of infections have been significantly ($p < 0.001$) higher in wet seasons (27.35%) than in dries (3.61%). Three other associated factors (species, breed and origin) influenced notably ($p<0.01$) the infection rates. Then, the highest rate (26.06%) was recorded with Sahelian sheep followed by Sahelian goats (16.29%), WAD sheep (9.09%) and WAD goats (6.54%). Northern areas appeared as a favourable environment for the infection.

Keywords: Paramphistomum, Epidemiology, Sheep, Goats, Benin.

INTRODUCTION

In Saharan Africa, as elsewhere in the tropics, gastrointestinal parasites are a major constraint to small ruminant production [8 and 10]. They are the main cause of anaemia, digestive disorders and decreased production [14]. Salifou [13] reported that these diseases are a real problem in Benin. This author indicated a strong poly parasitism in goats and sheep in some agro-ecological zones in southern Benin. Respiratory and digestive strongyles are more extensively studied but paramphistomosis doesn't arouse much interest in parasite control research. Although adults of Paramphistomidae Fischoeder, 1901 rarely produce clinical symptom [7], heavy infestations can seriously affect the livestock causing major disruption of rumen function. In Mexico, for instance, Rangel-Ruiz et al. [11] have attributed poor nutritional absorption followed by weight loss to stomach fluke. The larvae of some species, in migratory phase in the duodenal mucosa, also cause significant tissue damage and acute morbid evolution with anorexia, anaemia, diarrhoea and even death [5, 6 and 12]. This gives to the parasite relative importance depending on the environment. According to Assogba and Youssao [2], *Paramphistomum sp*. is part of the parasitic spectrum raging on ruminants in Benin. The study, described in the following, was undertaken to determine the prevalence of paramphistomosis in sheep and goat.

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MATERIAL AND METHODS

Study design and parasitological method

The study was undertaken from December 2010 to November 2011. It enrolled 756 sheep and goats of two breeds (WAD and Sahelian) and of two age groups (under or upper one year old). The animals have been randomly selected from all agro-ecological zones (AEZ) of the country but they were classified in to two origin groups corresponding to the main agro-climatic areas (Table 1).

Table 1. Study areas and sampling

Study areas	Seasons and covered months	Rainfall (mm/year)	Selected animals
Northern Area: AEZ 1-5	A dry season (September to March) A rainy season (April to August)	700 – 1300	137 goats and 257 sheep
Southern Area : AEZ 6-8	Two rainy seasons (April to July September to November) Two dry seasons (August to September December to March)	800 – 1400	253 goats and 109 sheep

The selected animals were bought and transferred to the abattoir of Cotonou where they have been slaughtered and autopsied after an ante mortem examination. Their gastrointestinal tracts were then, carefully, isolated for paunch and honeycomb examination. The presence of flukes fixed inside the organs was

recorded. The worms were collected in normal saline into a labelled container and transferred to the Animal Health and Production Research Unity (UERSPA / EPAC / University of Abomey-Calavi) for diagnosis confirmation and for worm burden determination. The identification of the flukes has followed the standard diagnosis criteria given by Yamaguti [16] and Urquhart et al. [15]. On average, 60 subjects were monthly concerned by that parasitological test. Animal belonging at least one stomach fluke were considered positive.

Data analysis

The prevalence (P) of stomach fluke infections was calculated with the following formula:

P (%) = 100 x Number of positive subjects / Number of examined animals

The statistical analysis was performed using logistic regression model under STATA 11 in order to evaluate association between the prevalence and some possible risk factors like the season and host's species, breed, age, sex, and origin.

RESULTS AND DISCUSSION

Table 2 shows the rates of stomach fluke infection relative to animal species, breed, age and origin. Figure 1 shows the seasonal trend of paramphistomosis in relation with species and origin. Globally, 14.3% of the examined animals were infected. Statistically ($p<0.001$), sheep were more infected (21.3%) than goats (7.69%). These infection rates are lower than those reported by Achi et al. [1] in Ivory Coast (37% in sheep and 10% in goats) or by Melaku and Addis [9] in Ethiopia (28.9% in sheep and 16.7% in goats). Belem et al. [4] also reported a prevalence of 20% in goats in Burkina Faso. But in Togo, a neighbouring country, the reported rates, 15.25% and 10.45% respectively in sheep and goats [3] are quite similar to this result. But, the specie effect on prevalence seems similar throughout reports [1, 3 and 4]. Season and animal's origin and breed have also been strongly ($p<0.001$) correlated with the infection rates. The prevalence was higher in wet seasons and especially for northern sheep than in dries seasons. The influence of these associated factors is understandable since intermediate host of *Paramphistomum* (Planorbid snails) is more frequent in the northern area where many rivers (Okpara, Mekrou, Alibori, Sota, Niger) constitute suitable biotype. Otherwise, that environment (around waterways) becomes preferred grazing area for ruminants in dry season, where they infest themselves eating Cercaria settled on pasture. Then, the infecting probability is higher in these areas than elsewhere. Southern areas are also watered enough but breeding system does not allow animals to graze so much around rivers (animals live around homes). Concerning the breed, Sahelian animals, belonging notably in the northern, were more infected (Fig. 1) than WAD animals (accommodated breed in the southern area). The worm burden was moderate or severe (9 to 315 flukes) and the highest intensity (upper 100 flukes) were recorded with upper one year olds subjects. No other variation factor was noted.

Table 2. *Paramphistomum spp*. infection rates in animals relative to specie, breed, age and origin

Specie	Breed	Age	Origin	Examined subjects	Infected Subjects	Rate (%)	
Goats	***Djallonké***	> 1 year	Northern area	32	5	15,63	
			Southern area	105	3	2,86	
		< 1 year	Northern area	10	3	30,00	
			Southern area	67	3	4,48	
	Sahelian	> 1 year	Northern area	62	5	8,06	
			Southern area	67	3	4,48	***9,09****
		< 1 year	Northern area	33	5	15,15	
			Southern area	14	3	21,43	
Total				**390**	**30**	**7,69***	
Sheep	***Djallonké***	> 1 year	Northern area	61	13	21,31	
			Southern area	55	4	7,27	
		< 1 year	Northern area	22	9	40,91	
			Southern area	40	3	7,50	
	Sahelian	> 1 year	Northern area	112	26	23,21	
			Southern area	10	5	50,00	**26,06***
		< 1 year	Northern area	62	15	24,19	
			Southern area	4	3	75,00	
			Total	**366**	**78**	**21,31***	

*Significant difference between rates

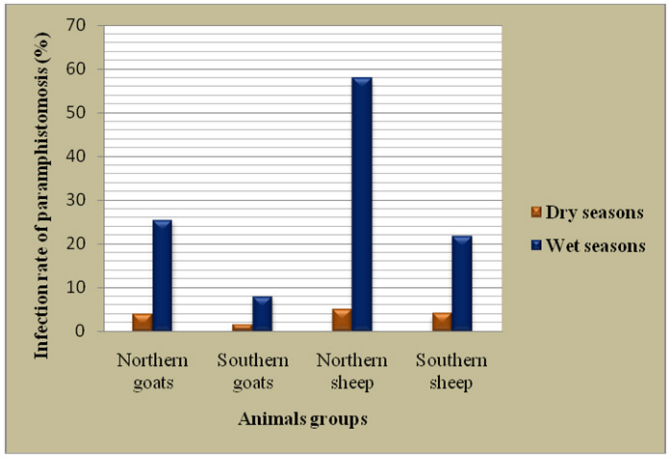

Fig 1. Seasonal trend of paramphistomosis in relation with the animal's specie and origin

CONCLUSION

Stomach fluke infection is disclosed as an important helminthiasis in sheep and goats of Benin. Sahelian breeds were found to be more infected than the WAD. Paramphistomosis must be considered and integrated into the general parasitic control programme in the Northern agro-ecological areas of Benin.

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