INTRODUCTION

The life history of digestive-tract strongyle nematodes in ruminants involves a free-living phase, whose success depends on climatic conditions, and a parasitic development phase during which female nematodes pass eggs in the feces. The number of eggs recovered from feces (eggs per gram) is a gross indicator of intensity of infection in goats (2) and sheep and goats (3). It is well documented that EPG strongly depends on the ruminant species (6), climate (10), and breeding management (2).

The island of São Tomé, which is located in the gulf of Guinea, has several interesting features regarding ruminant species (introduced recently or not), breeding management (more or less extensive), and climate (variable on a local scale). Cattle were reintroduced in recent years from Europe and were disseminated in 1992 from one state farm to individual farmers in various sites on the island. They remained in limited numbers (fewer than 500), crossed with remnant zebu cattle, and they are now regularly treated with anthelmintics. Sheep and goats are distributed in different sites on the island, but their breeding management is different: sheep (fewer than 800) are better cared for than goats (several thousands) which live freely in most cases. The majority of sheep are imported from several European countries. Goats are of southern Europe breeds (their importation ceased about twenty years ago) and local West African Dwarf. The prevailing parasites are helminths. Goat necropsies performed in this study revealed Haemonchus contortus and Oesophagostomum columbianum as the dominant species. According to Brito-Gutteres, cattle carry Haemonchus santomei (1). The climate, although of equatorial type corresponding to the tropical rain forest zone, is variable due to altitude: from under 1500 mm to over 3000 mm rainfall is recorded per year in areas where domestic ruminants are bred. Very few publications are available on the digestive-tract strongyle infection of adult ruminants in the tropical rain forest zone. Moreover, the data were never treated as standard epidemiological data, and the relative importance of risk factors has not been evaluated accurately. The aim of the present work was to relate strongyle infection (assessed by fecal egg counts) in adult domestic ruminants to local climate, season and breeding management in the island of São Tomé.

MATERIALS AND METHODS

Sampled animals and sites

The studied animals were all adults. As breeding occurred throughout the year in all the sites, the influence of periparturient rise on fecal egg counts (6) was not taken into account. Twenty-two sites distributed in the island were investigated (figure 1). Climatic divisions, based on rainfall per year, were as follows: subarid (< 1500 mm), subhumid (1500-2000 mm), humid (2000-3000 mm), and very humid (over 3000 mm).
Strongyles in ruminants of São Tomé

(2000-3000 mm), and very humid (> 3000 mm). Sample characteristics are presented in table I. In the extensive system, ruminants were grazed permanently on pastures, whereas in the so-called intensive breeding management they were kept indoors at night. Goats were also in some farms grazed individually (tethered with a rope) and moved regularly to new grazing areas, which might be considered as the most intensive management type.

Parasitological techniques

Fecal samples of three to five small ruminants were pooled per farm. Cattle samples were individual, so that for each farm cattle EPGs were estimated on several individual values in order to increase the accuracy of estimation, which is low in low infection. Feces were examined using the classical McMaster technique with sodium chloride as floatation liquid; fecal egg counts (FEC) were assessed (1 egg seen corresponded to 100 eggs per gram of feces). H. santomei was identified as H. placei based on data presented by Brito-Gutteres (1).

Statistical analyses

FEC means and confidence intervals (CI; P = 0.95) were calculated using bootstrap resampling (2000 repeats) with the Simstat program (13) as their distribution did not follow a normal distribution. The epidemiological study was of the cross-sectional type as ruminants were sampled without beforehand considering parasite infection or exposure to environmental factors (mostly breeding management). In this type of study, only the odds ratio (OR) can be calculated as follows: a*d/b*c (a: infected and exposed to the factor; b: not infected but exposed to the factor; c: infected and not exposed to the factor; d: not infected and not infected).
exposed to the factor). OR increases when factor influence on infection prevalence is high. OR calculation, significance (Mantel-Haenzel test) and confidence interval (Cornfield limits) (P = 0.95) were performed according to Kleinbaum et al. (11). Logistic regression (9) was also used when EPG was coded into binary values (lower vs. higher than median); the Wald chi-square test was used to select significant environmental variables.

**RESULTS**

**Prevalence of infection and fecal egg counts**

The prevalence was 43 ± 11%, 86 ± 10% and 90 ± 8% in cattle, sheep and goats, respectively. Goats (EPG = 1207; CI 95% = 691-1820) had a higher EPG than sheep (EPG = 785; CI 95% = 501-987), mainly because a few goats were exceptionally highly infected. EPG was low in cattle (EPG = 95; bootstrap CI 95% = 67-125) (table I).

**Univariate analysis of parasitic risk**

The climate in the area did not seem to influence the infection intensity as assessed from EPGs (table II). Fluctuations recorded in table I did not lead to clear conclusions either. The highest cattle EPG was recorded during the dry season (table I). Extensive breeding management was associated with low EPG in cattle and high EPG in goats. No significant associations were found regarding sheep EPGs.

**Multivariate analysis of parasitic risk**

Logistic regression analysis was performed to determine which factors were independently associated with an increased or a reduced risk of digestive-tract strongyle high EPG (table III). The conclusions were substantially the same as those drawn from univariate analysis, except that local climate was found to modify the risk in cattle.

**DISCUSSION**

Factors influencing transmission and incidence of digestive-tract strongyle infection are well known. In areas with a short dry season, herbage infectivity occurs all the year round (12) and a very similar situation occurs probably in São Tomé. This could account for the limited differences recorded between seasons in small ruminants. The higher EPG of cattle during the dry season accounts for the limited differences recorded between seasons in goats (12) and a very similar situation occurs probably in São Tomé. This could account for the observed differences between small ruminant and cattle infections.

Husbandry practices may profoundly modify the patterns of worm infection as shown in Nigeria (6). Intensively managed herds with high stocking rates and limited grazing areas are expected to be more infected than those grazing larger areas of pastures, which is the case in cattle (8). Conversely, intensive grazing results in lower infection in goats, which had been previously recorded under temperate climate (2). This is only an apparent contradiction with cattle data. Intensively grazed goats are the best cared for: they are moved to uninfected areas regularly (where they are tethered with a rope), whereas extensively bred goats are rather feral compared to domesticated goats. No conclusion could be drawn on sheep management and infection, as the sheep investigated were nearly all managed extensively.

Host species and age play a role in infection with digestive-tract strongyles. In Uganda cattle, infection is much higher in one-year-old calves than in over three-year-old cattle (14). Adult...
animals, which were furthermore submitted to anthelmintic treatments, were sampled, which could explain the low infection recorded in the cattle of São Tomé. Infection prevalence in small ruminants was not much different from that recorded in similar zones (5, 6). Goats were slightly more infected than sheep as previously observed in Mozambique (15), but in contrast with findings in Zaire (5); breeding management could explain these discrepancies.

In the future, it would be interesting to identify the species of discrepancies.

findings in Zaire (5); breeding management could explain these previously observed in Mozambique (15), but in contrast with ruminants was not much different from that recorded in similar animals, which were furthermore submitted to anthelmintic larvae on pasture in Calabar, Nigeria. Trop. Anim. Health Prod. Africa, 28: 155-158.


Résumé

Neto-Padre L., Afonso-Roque M.M., Fazendeiro I., Refega S., Cabaret J. Excrétion des œufs de strongles de l’appareil digestif chez les bovins, les ovins et les chèvres de l’île de São Tomé en fonction du climat local, de la saison et du mode d’élevage


References


Retour au menu