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Full Length Research

Prevalence and economic importance of parasitic lesions in small ruminant in Saaba slaughter area, Burkina Faso

F. Ouédraogo[1], M. B. Kiébré / Toé [2], H. Kaboré[2], A. Konaté[2], A. Kaboré[2*], H. H. Tamboura[2] and A. M. G. Belem[3]

[1]Ministère des Ressources Animales et Halieutiques, 03 BP 7026 Ouagadougou 03, Burkina Faso.
[2]Institut de l'Environnement et de Recherches Agricoles, 04 BP 8465 Ouagadougou 04, Burkina Faso.
[3]Institut du Développement Rural /Université Nazi Boni, 01 BP 3770 Ouagadougou 01, Burkina Faso.

*Corresponding author. Email: ade1_bf@yahoo.fr

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ABSTRACT: A cross-sectional study was conducted in the dry season from February to May 2016 to determine the prevalence of parasitic lesions and associated economic losses in small ruminants slaughtered in the slaughter area of Saaba, a rural community in the suburban area of Ouagadougou. To this end, an ante-mortem inspection (breed, age and sex) followed by a post-mortem inspection of the slaughtered small ruminants and a questionnaire survey of butchers on the selling prices of the seizures made were conducted and analyzed. The results of the post-mortem inspection indicated a total of 10,659 small ruminants inspected of which 4,598 sheep and 6,061 goats. The overall prevalence of parasitic lesions was 2.1%, of which 1.2% in sheep and 0.9% in goats. The injured organs of female small ruminants were significantly ($p < 0.0001$) more infested than those of males in all species of small ruminants. The organs affected and seized were intestines (74.3%), livers (12.8%), lungs (12.4%) and spleen (0.5%). The reasons for seizure were mainly abscesses, oesophagostomosis and parasitic nodules with a significant predominance of oesophagostomosis ($p = 0.0098$). The partial seizure of these organs by the inspecting officer was significantly more pronounced in goats than in sheep ($p = 0.0006$). The economic loss induced to butchers (in CFA francs, local currency) was estimated at 93,688.6 CFA francs, of which 78.1% was in sheep compared to 21.9% in goats. This study highlighted the importance of the economic losses caused by parasitic lesions in small ruminants during the dry season. Urgent measures should be envisaged to reduce the extent of these post-veterinary inspection losses in order to better combat malnutrition of the population and limit the spread of digestive parasitism in the country.

Keywords: Economic losses, organ seizures, parasitic lesions, small ruminants, veterinary inspection.

INTRODUCTION

In Burkina Faso, livestock production is characterized by the existence of a large number of diversified animals and a farming system with a majority of extensive livestock but adapted to the seasonal and inter-annual variability of pastoral resources (MRA, 2010). According to MRA (2015), the national livestock population is dominated by small ruminants (goats and sheep) with 23,000,000 heads, followed by poultry (hens and guinea fowl) with 42,000,000 heads. According to Barry et al. (2002), small ruminants are of great economic importance due to their fertility, fecundity, prolificity, early maturity and adaptability to a humid environment. These animals provide an important source of animal protein in the diets of rural populations and play an important social and income-generating role for rural families (Belem et al., 2000). Indeed, they are very often sold for the financial needs of livestock farmers and used in customary ceremonies. Unfortunately, pathologies constitute one of the most important obstacles to improving their zootechnical productivity at the level of African herds (Thiaucourt et al. , 2011). Tamssar (2006)

reveals that their livestock is generally confronted with problems of infectious, nutritional and parasitic diseases. Doulkom and Paré (2003) noted that in Burkina Faso, the pathology situation of small ruminants is characterized by the persistence of various infectious and parasitic diseases in all types of livestock farming. For Cabaret (2004), parasitism due to helminths often has a zootechnical impact that is difficult to assess because mortalities are rare and precise diagnosis is not often made.

The health status of animals suffering from these pathologies is better assessed during meat inspection at slaughter house level where seizures of organs or whole carcasses are carried out according to the severity of the diseases diagnosed by the veterinary services (MRA, 2009). These seizures constitute a great loss for the national economy in general and for the butcher in particular. This study therefore sought to determine the main causes of seizures related to digestive parasites in small ruminants and to assess the financial loss suffered by butchers in the peri-urban area of Ouagadougou.

MATERIALS AND METHODS

Study site

A cross-sectional survey was conducted from February to May 2016 in the rural community of Saaba located in the peri-urban area of the city of Ouagadougou (12°35' north latitude and 1°52' west longitude) in the northern Sudanian region of Burkina Faso. This site was selected because of its proximity to the city of Ouagadougou which is the capital of Burkina Faso. Its animal slaughter area is 8.9 ha. Every day, a large number of domestic animals are slaughtered to ensure the supply of meat for consumption to the resident population estimated at 1,915,102 inhabitants in 2012 (INSD, 2015).

Applied methodology

Data collection for the study was carried out in two stages: ante-mortem and post-mortem inspections (FAO/WHO, 2004).

Ante-mortem inspection

Prior to slaughter, each small ruminant was carefully inspected and information on the date of slaughter, species, breed, sex, origin or provenance, age and general appearance through body condition score was noted. Age was estimated by observing the dental table according to the procedure described by Sangaré et al. (2005). The body condition score (BCS) was made according to the lumbar palpation technique described by Thuault (2012) who considers nine rating scales by assessing the level of filling of the vertebral angle between the 2nd and 5th lumbar vertebrae.

Post-mortem inspection

Post-mortem data collection was carried out every day after the small ruminants had been dressed. It begins with the verification of the number of animals slaughtered followed by the recording of seizures, taking into account the parameters relating to the organs and carcasses seized, the reasons for seizure, the type of seizure and the economic loss incurred by the butchers as a result of the total seizure carried out by the inspecting officers. For the latter aspect, a questionnaire was submitted to butchers to obtain the prices of organs and carcasses seized by the agents throughout the period of the study.

Statistical analyses of collected data

Collected data were manually analyzed before being coded and entered in to Excel, version 2007 of Windows 2003 for possible corrections. Then, they were analyzed by $\chi 2$ test to assess the existing relationships between the measured parameters and by one-way analysis of variance to compare the means of the parameters measured by Student T test. All these analyses were performed with the statistical software StatView for Windows, version 4.57, at $p < 0.05$.

RESULTS

Prevalence and occurred seizure

A total of 10,659 animals were inspected, comprising 4,598 sheep and 6,061 goats on which 226 small ruminants were infested. More cases of infested animals were observed at the Bus Station (63.7%) compared to the commune of Saaba (35.8%) and Tô (0.5%) ($\chi 2 = 5.802$; ddl = 2; $p = 0.0550$), the origins of the slaughtered animals.

The overall prevalence of seizures due to parasitic lesions observed by inspection officers is 2.12%. Sheep (1.182%) were more infested than goats (0.938%). Regardless of the small ruminant species, females (1.651%) were more infested than males (0.469%) ($\chi 2 = 59.347$; ddl = 1; $p < 0.0001$) (Table 1). Similarly, sheep (2.5 ± 0.7 years) were significantly older ($p = 0.0008$) than goats (2.2 ± 0.7 years). In general, these animals had a body condition score below 2.5 although sheep (1.69 ± 0.6) had a very significantly lower body mass ($p < 0.0001$) than goats (2.07 ± 0.5).

During the study, no small ruminant carcasses were seized due to parasitic lesions except organs (Table 2). The organs seized according to the two species of small ruminants are intestines (74.3%), livers (12.8%), lungs (12.4%) and spleen (0.5%) (Table 2) with a statistically

Table 1. Prevalence of parasitic lesions by species, sex and origin of small ruminants slaughtered and inspected during the study.

Parameters		Infested animals	Prévalences	χ^2	P (χ^2)
Species	Sheep	126	1.182	59.347	0.0001
	Goats	100	0.938		
Sex	Male	50	0.469	59.347	0.0001
	Female	176	1.651		
Origins	Bus station	144	1.350	5.802	0.0550
	Saaba	81	0.759		
	Tô	1	0.009		

Table 2. Organs seized due to parasitic lesions by species of small ruminants.

Organs	Numbers (%)		χ^2	P (χ^2)
	Sheep	Goats		
Livers	23 (10.,2)	6 (2.6)	11.725	0.0084
Intestines	83 (36.7)	85 (37.6)		
Lungs	19 (8.4)	9 (4)		
Spleens	1 (0.5)	0 (0)		

Table 3. Prevalence (%) of causes of parasitic lesions according to the organs seized during the study.

Organs	Causes (%)			χ^2	P(χ^2)
	Abscess	Parasitic nodules	Oesophagostomosis		
Livers	3 (0.02)	25(0.23)	1 (0.009)	227.998	< 0.0001
Intestines	0 (0)	0 (0)	168 (1.57)		
Lungs	0 (0)	27(0.25)	1 (0.009).		
Spleens	0 (0)	1 (0.009)	0 (0)		
Total	3 (1.2)	53 (23.45)	170 (75.22)		

significant variation (χ^2 = 11.725; ddl = 3; p = 0.0084) between the organs.

The organs seized were more partial (n = 144 or 63.7 per cent) than total (n = 82 or 36.3 per cent). Partial seizures were significantly higher in goats compared to sheep (χ^2 = 11.706; ddl = 1; p = 0.0006). Table 3 presents the prevalence of the causes of parasitic lesions determined by the inspection officers according to the infested organs. These causes are oesophagostomosis (75.22%), parasitic nodules (23.45%) and abscesses (1.32%) with a statistically significant variation (χ^2 = 227.998; ddl = 2; p < 0.0001) between the three incriminated causes.

Economic losses incurred

Total seizures of infested organs resulted in economic losses to butchers, where the selling prices of organs seized from sheep are generally higher than those of goats (Table 4). These total seizures thus resulted in an overall economic loss of 93,688.6 CFA francs (of which 78.1 per cent in sheep as against 21.9 per cent in goats (Table 5)). The losses incurred by butchers as a result of parasitic lesions were 6,141.2 CFA francs for abscesses, 68,458.1 CFA francs for parasitic nodules and 19,089.5 CFA francs for oesophagostomosis in the Saaba slaughter area during the study.

Table 4. Average selling price (Franc CFA; 1$ = 500 F CFA) of organs seized from small ruminants according to butchers during the study.

Organs	Sheep	Goats
Liver	2 195.6	1750
Intestine	660.2	395.2
Lung	663.1	488.8
Spleen	200	0

Table 5. Economic losses (in CFA) of butchers according to the parasitic lesions observed in small ruminants during the study.

Species	Organs	Losses (in CFA francs)			Total
		Abscess	Parasitic nodules	Oesophagostomosis	
Sheep	Livers	4 391	43 912	2 195.6	50 498.6
	Intestines	0	0	11 883.6	11 883.6
	Lungs	0	9 946.5	663.1	10 609.6
	Spleen	0	200	0	200
Goats	Livers	1 750	10 978	0	12 728
	Intestines	0	0	4 347.2	4 347.2
	Lungs	0	3 421.6	0	3 421.6
Total		6 141	68 458.1	19 089.5	93 688.6

DISCUSSION

This study was conducted to assess the importance of seizures related to parasitic lesions and to evaluate the economic impact suffered by butchers in the rural community of Saaba with a view to making proposals for improvement.

The overall prevalence of parasitic lesions obtained in sheep and goats slaughtered in the Saaba slaughter area was 2.1% during the study period. This reflects a parasitic helminth infestation of sheep and goats in general (Hunter et al., 2006). This prevalence is probably directly related to the life cycle of the parasites in question, which reduces the possibility of re-infestation of pastures during the dry season, the period of this study. Indeed, the dry season does not allow a normal development cycle of the parasitic helminths and could explain the result obtained. According to Jacquiet et al. (1996) and Tsotetsi and Mbati (2003), the conditions of the external environment are unfavorable to the development and survival of the free forms of these parasites during this period. Larval mortality increases rapidly in open grazing areas, and more slowly in wooded areas that offer more shade. As a result, the risk of infection of animals is reduced. This seasonal evolution has been observed under similar climates in West Africa in the Gambia by Fritsche et al. (1993), in Senegal by Ndao et al. (1995) and in Togo by Bonfoh et al. (1995).

The prevalence of parasitic lesions related to the small ruminant species in the study shows that sheep are more infested than goats. This observation among small ruminants could be explained by their feeding behaviour as goats use more woody pastures while sheep prefer grassy pastures (Missohou et al., 2016). To this reason, it could be added that sheep live longer than goats because the latter are quickly sold on the markets by the herders to ensure the daily expenses of the family in rural areas of peri-urban Burkina Faso (Kaboré et al., 2011). However, the observation in this study is contrary to that of Regassa et al. (2013) who noted that goats were more affected than sheep in Ethiopia.

The study also reveals that the effect of sex of the infested animals influences the prevalence of parasitic lesions probably due to helminth parasitism. This result is consistent with that found in Cameroon by Funkeu et al. (2000) and, on the other hand, it is contrary to that of Ndao et al. (1995) in Senegal, who found no significant difference between the two sexes with gastrointestinal parasites. The organs of affected small ruminants are the liver, lungs, inspected intestines and spleen. Parasitic lesions identified by inspection officers are abscesses, parasitic nodules and oesophagostomosis, which are the cause of seizures in these slaughtered animals. These observations are similar to those previously found in slaughter houses in Burkina Faso in small ruminants by Tamboura and Kaboré (2000). In addition, the study reveals that oesophagostomosis is the dominant cause of seizures made by officers. The predominance of this digestive parasitosis could be justified by two phenomena. The poor climatic season being one of the conditions for induction of larval hypobiosis for the pathology, the establishment of a link between the study period and this result could be envisaged. In fact, the study was conducted from February to May, a period in the middle of the dry season when the number of larvae in development stands still high because environmental conditions are more unfavourable to infesting larvae in the outdoor environment. Secondly, oesophagostomosis involves the immune phenomena of the host that would be sensitized during a primary infection. Small ruminants are quite tolerant to initial exposure and may develop latent infestation (Euzeby, 1963; Ganaba, 1988). With repeated exposures, they become resistant and inhibit migration or development of the L_4 larvae. Analysis of the data recorded during the study revealed "parasitic nodules" without any further details. However, these nodules are the cause of a significant number of seizures during post-mortem inspection at the Saaba slaughter area. Similar observations were made by Ganaba (1988) who found that nodules were responsible for seizures of livers, lungs and intestines in the Ouagadougou and Bobo-Dioulasso

slaughterhouses in Burkina Faso. On the livers, the nodules are small and those protruding are whitish or blackish in colour and most often in clusters. Some remain embedded in the parenchyma and are only perceptible by palpation. As for the lungs, the nodules are about the same size as those of the liver or slightly larger. Most of them are embedded in the parenchyma. Those visible on inspection are greyish to blackish in colour. On all viscera, these nodules, in relief, are hard and sclerotic. Also, the results of the study showed that the intestines were more infested with oesophagostomas than other organs and were the organs most seized by meat inspection officers. This is thought to be due to the seasonal nature of the disease, which has a permanent year-round impact, and especially to the "all-origin" nature of the animals slaughtered on the slaughter floor. Also, the results of this study are contrary to the survey results of Regassa et al. (2013) at the Oramia State slaughter house in Ethiopia which reported that the liver was the most affected organ (69.7%) and seizures of small ruminant carcasses (22.1%).

At economic level, the financial losses related to the total seizure of organs (36.3%) during the study are relatively significant and estimated at 93,688.6 CFA francs for the butchers. For the latter, the butchers' job is to seek profit from the marketing of the meat of the small ruminants they buy to slaughter in the Saaba slaughter area. The study revealed that the total seizures made by inspection officers resulted in a high economic loss of 93,688.6 CFA francs for butchers, including 6,141 CFA francs, 68,458.1 CFA francs and 19,089.5 CFA francs for reasons related to abscesses, parasitic nodules and oesophagostomosis respectively during the study. Similar findings have been made by other authors. In Ethiopia, Regassa et al. (2013) estimated the overall losses due to organ and carcass seizures at USD 1,323.257 from 2009 to 2010 for three years in goats and sheep. Yibar et al. (2015) reported losses of USD 3,281 and USD 4,015 due to fasciolosis and hydatidosis respectively in sheep from July to December 2012 at two slaughterhouses in Bursa province in Turkey.

In conclusion, the results of the present study suggest that parasitic lesions probably related to helminths could be considered as a major disease entity in the peri-urban area of Ouagadougou in Burkina Faso. Therefore, strategies based on de-worming campaigns and good husbandry of small ruminants in the region could be pursued to minimize the economic consequences of helminth parasites, which are sometimes of significant public health interest.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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