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Full Length Research Paper

Abattoir survey on the prevalence and monitory loss associated with Fasciolosis in sheep and goats

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Study was conducted to assess the prevalence and economic loss associated to Fasciolosis in small ruminants slaughtered at Modjo Modern Export Abattoir (MMEA) Modjo in East Shawa, Oromia regional State, central Ethiopia. A total of 1000 animals (500 sheep and 500 goats; 250 animals each from 4 origins) were examined for the presence of *Fasciola* sp. Species, age and origin of animals was taken in to consideration. Liver incision, observation and species identification on the basis of size and morphology of adult worm were applied. An overall prevalence of 3.2% was registered. The prevalence was 5.6 and 0.8% sheep and goats, respectively. It was 1.25% in young and 4.5% in adult by age groups. The prevalence of 7.6, 0.8, 2.4 and 2.0% was observed in animals from Arsi, Borana, Jinka and Yabello in respective origin. Significant difference (P<0.05) was observed in occurrences of *Fasciola* between animals species and age as well as among origin of the animals. The prevalence of 1.9% *Fasciola hepatica* and 1.6% *Fasciola gigantica* was identified from positive cases. Significant difference (P<0.05) was observed in prevalence of *F. hepatia* in animal species, age and origin. Although insignificance difference (P>0.05) in *F. gigantica* among animal origin, significant difference (P<0.05) was observed between animal species and age groups. The current study also shows annual monitory loss of $3784.52 from liver condemnation as result of fasciolosis and other associated pathological and parasitological conditions. Therefore further studies on the epidemiology, seasonal dynamic of the disease, the snail intermediate host and impacts of the disease in animal production with implementations of fruitful intervention strategies in the animal origin areas necessary.

Key words: Fasciolosis, prevalence, goat, sheep, abattoir.

INTRODUCTION

Animal health and economic impact of fasciolosis may vary greatly from year to year, depending on the climate, management, level of infection, host immune status and age of the animal (Urquhart et al., 1996; Euzeby, 1971). In the endemic areas, several clinical outbreaks with high mortality rate are frequent which may result in 50-70% of grazing sheep exposed to liver fluke infection (Euzeby, 1971). In such circumstances, cumulative substantial loss could be very high. It remains untreated particularly when animals are suffering from sub clinical cases (Khallaayoue and Stromberg, 1995). *Fasciola hepatica* (*F. hepatica*) and *F. gigantica* are predominantly reported species responsible for the disease in ruminants where their life cycle involve snail species, encysting of metacercaria in plant or by water environment from which animal can acquire infection (Soulsby, 1982; Urquhart et al., 1996). Mixed infections with both species may occur in areas where the ecology is conductive for replication of the snail intermediate host (Graber, 1975). The clinical manifestation of Fasciolosis in infected animal has three forms: acute, sub-acut and chronic forms (Troncy, 1989). The principal pathogenic effects are anaemia, hypoalbuminaemia, calcification of the biller ducts and

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Table 1. Prevalence of Fasciolosis in sheep and goats slaughtered in the considered risk factors.

Considered risk factors		Number examined	Positive number (%)	χ^2	*P*-value
Animal species	Sheep	500	28 (5.6%)	18.8	0.001
	Goat	500	4 (0.8%)		
Age group	Adult	600	27(4.5%)	8.5	0.03
	Young	400	5(1.25%)		
Origin	Arsi	250	19(7.6%)	21.9	0.001
	Borana	250	2(0.8%)		
	Jinka	250	6(2.4%)		
	Yabello	250	5(2.0%)		
	Total	1000	32 (3.2%)		

enlargement of the gall bladder. It also associated with 'black disease', *Clostridium novyi* type B complicated fatal condition (Urquhart et al., 1996). Human also become infected after consumption of infected aquatic (Masahiko et al., 2005). Thus it is zoonotic (Okewole et al., 2000; Taira et al., 1997). Coprological examination, hematological tests and postmortem examination are some preliminary diagnostic and surveillance procedures in animals (Urquhart et al., 1996). Although it is difficult in juvenile once, the species differentiation can be done using snail intermediate host geographic distribution (Hansen and Perry, 1994), the shape and structure of the adult worm (Urquhart et al., 1996). The prevalence of *Fasciola* has been reported in certain parts of Ethiopia by some authors; Adem (1994) at Zuway, Rahmeto (1992) at Woliso, Getachew (1987) at Addis Ababa, Zewdu (1991) at Jimma and Fikadu (1988) at Bahir Dar. However, fasciolosis and the associated financial loss in small ruminants at Modjo Modern Export Abattoir (MMEA) were not yet assessed. Therefore the study aimed at survey of abattoir epidemiology and the associated monetary loss from the diseases in slaughtered sheep and goats.

MATERIALS AND METHODS

The study was conducted from December 2009 to April 2010 in MMEA at Modjo in East Shawa, Oromia region, central Ethiopia. Study animals are apparently health sheep and goats originated Arsi, Borana, Jinka, and Yabello areas of the country and slaughtered at the Abattoir. Except Arsi which has high altitude, the others have low altitude in agro ecology (CSA, 2009). Veterinary practices and medications against certain diseases are implemented in those areas and others in Ethiopia in general. The ages of animals were determined according to Steele (1996). A simple random sampling method is employed. The sample size for each species of animals was determined according to Thrusfield (1995). Postmortem examination procedures were applied through palpation, multiple incisions and inspection of the bile duct and observing irregularity in the morphology of liver. Through examination for the presence of *Fasciola* sp. was done. In positive case, all flukes were collected for species identification according to Soulby (1982). The findings were analyzed using SPSS 16.0 and STATA 7.0 to find percentage and Chi-squire (χ^2). *P*-value was determined for determination of the significance. The monitory loss associated with liver condemnation due to positive cases was calculated using "$EL = \sum [CSR \times OC_P \times R_P]$; where: EL = total estimated annual economic loss due to organs and carcass condemnation; CSR = annual cattle slaughter rate; OC_P = average cost of particular cattle carcass/organ; R_P = rate of rejection of particular organ" the formula described by Orgurinade and Orgurinade, (1980).

RESULTS

Prevalence

The survey revealed that 32 (3.2%) of the examined sheep and goat livers were found infected with Fasciola. The occurrence in sheep and goats was 5.6 and 0.8%, respectively. Based on the age group, it was 4.5% in adult and 1.25% young. The prevalence of 7.6, 0.8, 2.4 and 2.0% were observed in animal originated from Arsi, Borana, Jinka and Yabello respectively. Significant difference ($P< 0.05$) in infection within the considered risk factors in the present study was observed (Table 1), with regards to the *Fasciola* sp., 1.9 and 1.6% of the study animal harbors *F. hepatica* and *F. gigantica* respectively (Table 2). Unfortunately, mixed infection was not registered in this study. The prevalence of *F. hepatica* were 3.4% in sheep and 0.4% in goats; 2.67% in adult and 0.75% in young's. Highest prevalence, 17 (6.8%) is observed in animal originated from Arsi. Significant difference ($P<0.05$) were observed in *F. hepatica* within the considered risk factors. The occurrence of *F. gigantica* were 2.8% in sheep and 0.4% in goats; 2.3% in adult and 0.5% in young study animals. Significant difference in prevalence of *F. gigantica* between age and species of animals were observed ($p<0.05$) but not

Table 2. Significances of the *Fasciola* species identified in considered risk factors.

Risk factors		Number of examined	*F. hepatica* number (%)	*F. gigantica* number (%)
Species	Sheep	500	17 (3.4)	14 (2.8)
	Goat	500	2 (0.4)	2 (0.4)
	Total	1000	19 (1.9)	16 (1.6)
		χ^2	12.015	9.1463
		P-value	0.001	0.002
Age	Adult	600	16 (2.67)	14 (2.33)
	Young	400	3 (0.75)	2 (0.5)
		χ^2	4.7302	5.1236
		P-value	0.03	0.024
Origin	Arsi	250	17 (6.8%)	4 (1.6)
	Borana	250	0 (0.0)	2 (0.8)
	Jinka	250	1 (0.4)	5 (2.0)
	Yabello	250	1 (0.4)	5 (2.0)
		χ^2	43.0817	1.5244
		P-value	0.001	0.677

among the origin ($p>0.05$).

Financial loss assessment

Using all the necessary information in the formula set by Orgurinade and Orgurinade (1980), the direct annual economic loss from international market was estimated to be $3784.52.

DISCUSSION

Fasciolosis accounts to be great animal health and economic significant in ruminants in Ethiopia. The current overall prevalence of liver flukes in small ruminant is lower than reports of Getachew (1987), in Addis Ababa (51% in sheep and 47% in goats) and Yilma (1983) 49% in Debre Zeit abattoir, this is lower. Similarly lower than the 33, 37, 45 and 10% reports of Mergard (1975) in Kenya, Sudan, Cameron and Uganda, respectively. This may be due to implementations of control strategies over the periods in the study areas and difference in ecology of animal origin in which the prevalence of Fasciolosis is high in the high land wet areas that have suitable conditions for the aquatic snail intermediate host. Similar reasoning was given by Urquhart et al. (1996). High prevalence was observed in sheep than in goats. This could be due to difference in the feeding behavioral these species where sheep are greasing near the ground with high chance of acquiring infection. Moreover, the 3 mixed fluke species infection observed in sheep in this study shows the more susceptibility of sheep than goats for this disease. Dargie and Mulligan (1974) reported that sheep are thought to be highly susceptible to Fasciolosis and show little acquired resistance due to their liver parenchyma contain only small amount of connective tissue. The present study shows high prevalence in adult than young sheep and goats. This might be due to duration of risk of exposure where the adult are exposed longer with relation to their age. *F. hepatica* was identified as the most predominant species infecting sheep and goats, especially in those originated from Arsi but, *F. gigantica* was the predominant in sheep and goats originated from the other three areas. This could be associated with agro ecology of animal origin which favors intermediate snail host. For instance, Arsi has high altitude which suites for *Lymnaea truncatula* the main intermediate host for *F. hepatica*. But the others have low altitudes that maintain *L. natalensis*, an intermediate for *F. gogintica*. *L. truncatula* is the most amphibious snail with a wide distribution throughout the world (Urquhart et al., 1996; Nitchell, 2003). Thus, the significant difference between the species of liver flukes among animal origin of the examined animals could be associated with these factors. Observations of Graber (1975) indicated that in Ethiopia, *F. hepatica* is widely spread disease in area with an altitude above 1800-2000 m above sea level whereas *F. gigantica* appears to be the most common species in area below 1200 m above sea level and both species co-exist in area with altitude ranging between 1200 to 1800 m above sea levels. In the study the estimation of financial loss from liver condemnation as a result of Fasciolosis in small ruminants slaughtered in

MMEA is significantly high. It is inagreement with Roman (1987) report. Hence, it is the major concern diseases to the livestock industry as it causes extensive financial waste. These could be from direct and indirect economic losses associated to the affected animals. These includes cost of treatment programs, inefficient conversion of feed, condemnation of infected liver as unfit for human consumption, retarded growth, reduced wool production and predisposition to other diseases all lead to economic tolerable level. Therefore, proper attention should be paid to this parasitic problem with regards to control and prevention strategies including strategic use of chemotherapy, proper disposal of infected liver at abattoir and control of snail intermediate host. Besides these the transportation and use of contaminated and infected hays with Metacercaria from disease prevalence areas to others should be restricted.

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REFERENCES

Adem A (1994). Prevalence of bovine and ovine Fasciolosis: A preliminary survey around Ziway region. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia. [Unpublished]

Central Statistics Authority (CSA) (2009). Central Statistical Authority Federal Democratic Republic of Ethiopia Agricultural sample survey.

Dargie JD, Mulligan W (1974). The onset and development of anemia and hypoalbuminemia in rabbits infected by *Fasciola hepatica.* J. Comp. Pathol., 81: 187-202.

Euzeby J (1971). Les maladies vermineuses des animaux domestiques et leur incidences sur la pathologie humanine. Tome II. Maladies dues aux plathelminthes. Vigot Freres Ed. Paris, p. 798.

Fekadu R (1988). A preliminary survey of bovine fasciolosis around Bahir Dar and evaluation of the flukicidal activity of rafoxanide and closantel preparations. DVM Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia. [Unpublished].

Getachew T (1987). A survey of Fasciolosis in cattle, sheep and goats slaughtered at Addis Ababa abattoir. ILRI research report, Addis Ababa University, Debre Zeit, Ethiopia, 3: 10-11.

Graber M (1978). Helminths and helminthiasis of domestic and wild animals in Ethiopia. Revue Elev. Med. Vet. Pays Trop., 1: 13-95.

Hansen J, Perry B (1994). The Epidemiology, diagnosis and control of Helminth parasites of ruminants. A hand book, International laboratory for Research on Animal Disease. Nairobi, Kenya, pp. 31-36.

Khallaayoue K, Stromberg EB (1995). Epidemiology and control of *Fasciola hepatica* in the middle Atlas, Morocco. In: parasitology research in Africa. International foundation for Science (I.F.S) workshop, Bobo Diouiasso, Burkina Faso, November 6-10, 1995.

Masahiko K, Yasuyuki M, Motota S, Hideki Y, Yumi Y, Ken-ichi I, Shohe K (2005). Survey of cattle fasciolosis in Tsuyama Abattoir. Environ. Health Prev. Med., 10: 162-165

Mergrad JP (1975). Fasciolosis in Africa. Rev. Med. Vet. Pays. Trop., 37: 299-303.

Nitchell GBB (2003). Treatment and control of liver fluke in sheep and cattle. Technical Notes November, Sac. West mains roads. Edinburgh.

Orgurinade A, Orgurinade I (1980). Economic importance of Bovine Fasciolosis in Nigeria. Trop. Anim. Health Prod., 12: 155-160.

Okewole EA, Ogundipe GAT, Adejinmi JO, Olaniyan AO (2000). Clinical evaluation of three chemoprophylactic regimes against ovine helminthosis in a Fasciola endemic farm in Ibadan, Nigeria. Israel J. Vet. Med., 56(1): 15-28.

Radostits OM, Gay CC, Hinchliff KW, Constable PD (2007). Veterinary Medicine. A text book of the disease of cattle, horses, sheep, pigs and goats 10th ed. Saunders Elsevier, London New York, pp. 1576-1580.

Rahmeto A (1992). Fasciolosis Clinical occurrence, Coprological, Abattoir and snail survey in and around Wolisso. DVM Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia. [Unpublished].

Roman T (1987). Study on economic significance of bovine fasciolosis and hydatidosis at Gonder abattoir. DVM thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia. [Unpublished].

Soulsby EJL (1982). Helminthes, Arthropods and protozoa's of domestic Animals 7th ed. Bailliere Tindall, London.

Steele M (1996). Goat the tropical Agriculturalists. London and Basing Stock, Mc Milan Education Ltd, ACCT., 79-83 p.

Taira N, Yoshifuji H, Boray JC (1997). Zoonotic potential of infection with *Fasciola* spp. by consumption of freshly prepared raw liver containing immature flukes. Int. J. Parasitolol., 27: 775-779.

Thrusfield M (1995). Veterinary epidemiology, 2nd ed. Blackwell Science Ltd., pp. 117–198.

Troncy PM (1989). Helminths of livestock and poultry in tropical Africa. In Fischer. Manual of Tropical veterinary Parasitology. CAB International, UK, pp. 63-73.

Urquhart GM, Armour J, Duncan JL, Dunn AM, Jennings FW (1996). Veterinary Parasitology (2nd ed.). Blank well Science, New York, pp. 102-113.

Yilma JM (1983). Economic importance of bovine fasciolosis: An assessment trial of Debre Zeit Abattoir. The 2nd students scientific Journey, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia. [Unpublished].

Zewdu B (1991). Prevalence and economic analysis of liver fluke infestation qin cattle slaughtered at Jimma Municipal Abattoir. DVM Thesis, Faculty of Veterinary Medicine, Addis Ababa University, Debre Zeit, Ethiopia. [Unpublished].