Prevalence of Fasciolosis in Commercial Cattle of Tulsipur Sub-Metropolitan, Dang, Nepal

Roka, K. R. and Singh, S. K.
Nepal Polytechnic Institute, Bharatpur, Chitwan
Corresponding Email: rokakhemraj1999@gmail.com

Abstract

Fasciolosis is a frequently occurring and economically significant parasitic disease of ruminants that is widely distributed. A cross-sectional study was conducted to find out the prevalence of fasciolosis in commercial cattle farms during the period from April 2023 to June 2023 in Tulsipur sub-metropolitan, Dang, Nepal. A total of 202 fresh fecal samples were collected purposively from the study area from cattle of different ages, breeds, sexes, and stages and examined using the direct method and the sedimentation method. The obtained data were coded and analyzed using the SPSS version 23 software. The overall prevalence of fasciolosis was 32.20%. Age-wise prevalence was found to be 52.83%, 23.46%, and 27.45% in groups less than two years, two to five years, and above five years, respectively. The prevalence of *Fasciola* was found to be 34.62% in cross-breed cattle and 10% in indigenous cattle, and 31.11% in females and 40.90% in male cattle. The stage-wise prevalence of *Fasciola* in calves, heifers and productive cattle were 50%, 39.21% and 22.52% respectively. Breed, age and stage-wise prevalence were found to be statistically significant ($p<0.05$) while sex-wise prevalence was found insignificant ($p>0.05$). Since fasciolosis is significantly prevalent among cattle in the Tulsipur sub-metropolitan area, periodic deworming is required to prevent the infections and maximize cattle production. Further study is required for the identification of the epidemiological risk factors and the preventive measures of the disease in Nepal.

Key words: Fasciolosis, Prevalence, Cattle, Fecal.

Introduction

In Nepal, the total population of cattle is estimated to be 7,466,841 heads and they produce 1,060,487 metric tons of milk annually (MoALD, 2020/21). Fasciolosis is a parasitic disease that affects herbivorous animals and is caused by *Fasciola* species particularly *F. hepatica* and/or *F. gigantica.* Globally widespread *Fasciola hepatica* is primarily found in temperate zones and in cooler areas of high altitude in tropics and sub-tropics, whereas *Fasciola gigantica* is widespread

over most continents but is primarily found in tropical areas (Bennema et al., 2014). The intermediate hosts of *Fasciola* species are *Lymnaea* snails. For *F. hepatica*, amphibious snails serve as intermediate hosts, whereas *F. gigantica* is primarily an aquatic snail that lives in streams, irrigation channels, and marshy wetlands (Urquhart et al., 1996). The life cycle of the *Fasciola* species is indirect (Hansen & Perry, 1994).They cause extensive illness and mortality in domesticated ruminants characterized by anemia, hypoproteinemia, submandibular oedema, decreased milk yield and weight loss (Urquhart et al., 1996). Fecal examination techniques for the detection of eggs are considered to be the gold standard for the diagnosis of trematode infections like fasciolosis, while there are different methods available for diagnosing fasciolosis through immunological and molecular techniques (Esteban et al., 2019). The aim of this study is to investigate the prevalence of fasciolosis among the cattle population in commercial cattle farms in the Tulsipur sub-metropolitan area of Dang, Nepal.

Materials and methods

The study was carried out in the Tulsipur sub-metropolitan area of Dang district, which lies in the Lumbini Province of Nepal. Its total area is 384.8 square kilometers. The Tulsipur sub-metropolitan city is situated between latitudes 27˚57'50" to 28˚ 14'55" North and longitudes 82˚ 12'14" to 82˚ 25'57" East, and its elevation ranges from 546 to 2,047 meters.

A cross-sectional study was conducted to find out the prevalence of fasciolosis in commercial cattle farms during the period from April 2023 to June 2023 in Tulsipur sub-metropolitan, Dang, Nepal. A total of 202 fresh fecal samples were collected purposively from the study area from cattle of different ages, breeds, sexes, and stages.

About 5-10 gm fecal samples were manually collected from the rectum of the animal as well as from freshly voided feces in zip-lock plastic bags. The collected samples were labelled, transported in the cool box containing an ice pack and preserved in the refrigerator (+1 to -5 °C).

The samples were examined in the laboratory of department of parasitology, Veterinary Hospital and Livestock Services Expert Center in Ghorahi-14, Dang. The samples collected in the morning were examined the same day. For laboratory analysis of the fecal samples, direct smear and sedimentation techniques were used as described by (Soulsby, 1965). Eggs were identified according to their microscopic characteristics, like a symmetrical oval, a thin wall with almost similar poles, a yellowish-brown content filling the whole egg, indistinct operculum and indistinct

embryonic cells. For statistical analysis, the data obtained were coded and analyzed by using 23.0 version of SPSS software. Overall prevalence of fasciolosis in cattle along with variations on the basis of different age groups breeds, sexes, and stages were calculated, and their association with the infection was observed using values of P from the chi square test. A p-value less than 0.05 was considered as significant at the 95% level of confidence. In the descriptive statistics, Microsoft Word and Excel were used to generate diagrams, graphs, tables etc.

Results and discussion

Overall prevalence of fasciolosis

Out of 202 fecal samples, 65 (32.20%) were found to be positive, and the rest, 137 (67.80%), were negative.

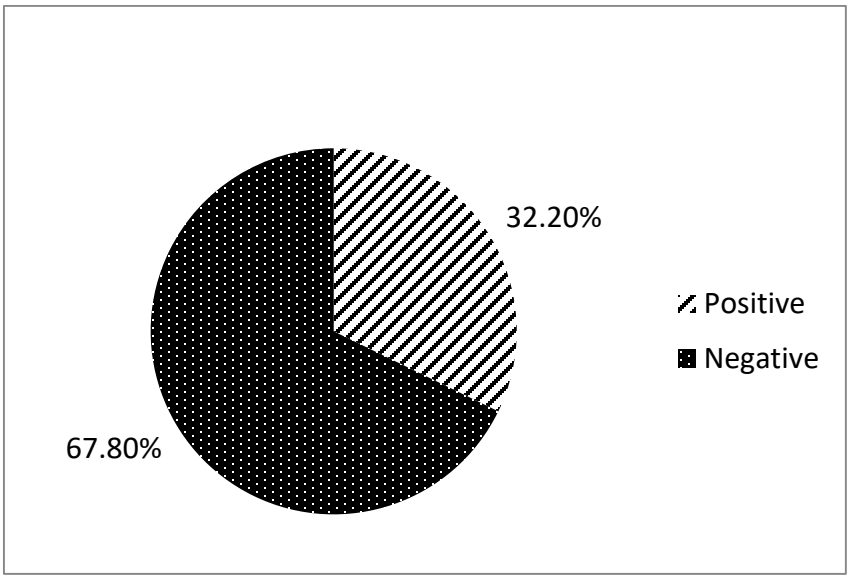

Figure 1: Overall prevalence of fasciolosis

The finding of our study was lower than the previous study done by Frias et al. (2023), who reported a 45.6% prevalence of *Fasciola* in northern Peru, and Yadav et al. (2015), who found 51% in Mahottari and Dhanusa Districts, Nepal. This can be a result of the state of animal husbandry. The population under study comes only from commercial cattle farms, where they are confined to stalls and denied access to natural grazing areas. As evidence, the prevalence is noticeably lower in tethered animals compared to free-range animals, which may be because they

have less contact with risk factors such as metacercaria on the grazing land (Yadav et al., 2015). The finding was also lower than the previous study done by Thapa Shrestha et al. (2020), who reported an 81.8% prevalence of *Fasciola* in Kavrepalanchowk District, Nepal.

However, our finding was similar to that of Da Costa et al. (2019), who found an overall prevalence of 33.9% of fasciolosis in cattle in Peru. The finding was also similar to that of Eslami et al. (2009), who found an overall prevalence of 32.1% of fasciolosis in cattle in the north of Iran. The finding of our study was higher than the previous study done by Nguyen et al. (2017), who reported a 23.4% prevalence of *Fasciola* in Vientam, and Bastakoti et al. (2023), who found a 4.61% prevalence in Chitwan District, Nepal. On farms where the animals are not grazed, *Fasciola* infection may exist depending on a number of risk factors, such as prior infections, contaminated feed, etc. As *F. hepatica* is known to survive for up to 26 months following infection, it is plausible that there may have been an ongoing infection on the non-grazing farm prior to the period of the study (Ross et al., 1967). There are additional probable routes of infection, including newly cut grass and hay, water contaminated with metacercariae, and so on (Boray, 1969).

Age- wise prevalence of fasciolosis

Animals were divided into three age groups (<2 years, 2–5 years, and >5 years) in order to determine the prevalence of *Fasciola* according to age.

It was found that 28 (52.83%) out of 53 animals less than 2 years of age were positive, while 23 (23.46%) out of 98 animals were positive between 2 and 5 years of age. Similarly, 14 (27.45%) out of 51 cattle were positive at more than 5 years of age.

Table 1: Age- wise prevalence of fasciolosis

Age(years)	Total sample	Positive	Negative	Prevalence (%)	P-value
Less than 2	53	28	25	52.83	
2 to 5	98	23	75	23.46	0.001
Above 5	51	14	37	27.45	

This finding indicated a significantly higher prevalence (P<0.05) in less than 2 years old (52.83%), which is supported by Nath et al. (2016), who found that younger animals (6–18 months) had greater infection rates (85.6%) than older animals in Bangladesh. The findings of our study are also supported by those of Nota & Dima, n.d. (2022), who found higher prevalence (52.8%) in < 3 years old. As compared to adults, younger animals may have a higher infestation of parasites since they have inadequate immunity against them. In support of this, young animals are more susceptible to parasitic infestation than adults (Khan et al., 2015). On the other hand, because the adult animals had already been exposed to the parasites, they may have gained immunity against the parasitic invasion (Bista et al., 2020). Likewise, according to Winkler (1982), the host may recover from parasitic infection with advancing years and thereafter develop resistance. Our findings, however, disagreed with those of Karim et al. (2015), Isah (2019), and Bhutto et al. (2012), who found that older cattle had a higher prevalence of fasciolosis than younger cattle. According to other studies, Ssimbwa et al. (2014) found 44.8% in adults and 31.8% in sub adults and Japa et al. (2020) found more in >4 years old (17.1%) and low in 2-4 years old (5.6%). Similarly, the prevalence is 68.08% in the old and 55.62% in adults (Ayele, n.d., 2018).

Breed-wise prevalence of fasciolosis

A total of 202 fecal samples (182 cross and 20 local) were tested for the presence of *Fasciola*. Out of 182 samples of cross-breed cattle, 63 (34.62%) were found positive, whereas 2 (10%) out of 20 samples were found positive in local cattle.

Table 2: Breed-wise prevalence of fasciolosis

Breed	Total sample	Positive	Negative	Prevalence (%)	p-value
Cross	182	63	119	34.62	0.025
Local	20	2	18	10	

The breed-wise study showed significantly higher incidence (P<0.05) in improved or cross breeds (34.62%) than in local breeds (10%), which is supported by Ssimbwa et al. (2014), who found 54.8% in exotics and 25.5% in locals in Uganda, and contradicted by Japa et al. (2020), who found more incidence in locals (9.6%) than in cross breeds (5.3%) in Thailand. Genetic diversity and the

immunological traits of local breeds could be contributing factors to the lower occurrence (Ssimbwa et al., 2014). The finding of this study is also supported by the findings of Aregay et al. (2013), who found the infestation higher in cross breeds (60%) compared to local breeds (34.74). The prevalence of fasciolosis is significantly higher in crossbreeds compared to local breeds due to the lower resistance of crossbreeds (Aregay et al., 2013).

Sex-wise prevalence of fasciolosis

The prevalence of *Fasciola* was found to be 31.11% (56/180) in females and 40.90% (9/22) in males.

Table 3: Sex-wise prevalence of fasciolosis

Sex	Total sample	Positive	Negative	Prevalence (%)	p-value
Female	180	56	124	31.11	0.353
Male	22	9	13	40.90	

The sex-wise study showed a higher incidence of *Fasciola* in males (40.90%) than in females (31.11%), which is supported by Hambal et al. (2020), who found more incidences in males (72%) than females (41%) in Indonesia. The findings of our study are also supported by both Japa et al. (2020) and Isah (2019), and they contradict Muhammad Faez et al. (2023), who reported more *Fasciola* infestation in females (49.0%) than in males (40.2%) in Malaysia. The finding was also contradicted by Prasetyo et al. (2023), who found more *Fasciola* infestation in females (38.72%) and less in males (11.11%). The higher chances of *Fasciola* infection in female animals can be due to increased blood cortisol levels in female animals during several reproductive physiological states, including pregnancy and lactation, which immunologically depress them (Ayele et al., 2018).

In our study, there was no significant ($P>0.05$) difference between the sexes, which is supported by Iboyi et al. (2017), who reported no significant difference between infection in males and females. As a result, it can be assumed that both sexes of cattle have the same chance of being infected when they are exposed to similar risk conditions of invasion. The lower prevalence in females in our study may either be attributable to the significant difference in the number of

animals examined or to the fact that estrogen stimulates the level of the reticulo-endothelial system (RES) in the animal body, as well as increases blood clearance rates and the number of phagocyte cells in the liver, ultimately improving the immune system of female cattle (Hambal et al., 2020).

Stage-wise prevalence of fasciolosis

Animals were divided into three stages (calf, heifer, and productive) in order to determine the Stage-wise prevalence.

It was found that 20 (50%) out of 40 Calves were positive, while 20 (39.21%) out of 51 Heifers were positive. Similarly, 25 (22.52%) out of 111 productive cattle were positive.

Table 4: Stage-wise prevalence of fasciolosis

Stage	Total sample	Positive	Negative	Prevalence (%)	P-value
Calf	40	20	20	50	
Heifer	51	20	31	39.21	0.003
Productive	111	25	86	22.52	

In our study, stage-wise prevalence was statistically highly significant ($P<0.05$). A significantly higher incidence was seen in calves (50%) and lower in productive (22.52%). This finding is supported by the findings of Nath et al. (2016) and Bista et al. (2020), who found the infestation higher in younger calves, whereas Dhakal & Nepali (1984) and Sardar et al. (2006) found adult lactating cattle more susceptible to infestation. As compared to heifers and productive animals, calves have lower immunity to fight off illnesses (Khan et al., 2015). On the other hand, because the adult animals had already been exposed to the parasites, they may have gained immunity against the parasitic invasion (Bista et al., 2020). Additionally, because they are lactating and provide the farmers with a direct source of income, the cattle used for production may have received greater attention and sanitary management from the farmers, which ultimately led to a reduced prevalence as compared to heifers and calves.

Conclusion

The results of this study showed that cattle raised for dairy purposes under an intensive feeding system had a significant liver fluke infection. In the present study, significant differences were

observed in the prevalence of fasciolosis with respect to breed, age, and stage of the host, while no significant differences were observed with respect to sex. Also, certain risk factors such as previous infections, contaminated feed and water, etc. could have been involved in the presence of Fasciolosis in these farms, on which the animals are not grazed. However, poor management and a lack of awareness among the farmers also enhance the high incidence of the infection. The results of this study will help understand the present situation of the fasciolosis in the study area and aware the farmers to develop efficient and effective strategy for the prevention of the disease, thereby maximizing the productivity of the cattle.

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