International journal of agricultural sciences and veterinary medicine

ISSN: 2320-3730

Vol-1 Issue-01 April 2012

A Goat Fascioliasis Prevalence Study in the Sunsari District of Nepal

Dirk Claassen[1], Stephen Stansfeld[2]

Abstract: The goat contributes about 20.4% to the total meat production in Nepal and ranks second after buffalo (54.3%). Ruminant fascioliasis is a parasite illness that affects a large number of animals and has significant economic implications. A cross sectional study was conducted using sedimentation technique for faecal examination to determine the prevalence of fascioliasis in the goats. In total, 1000 animals were sampled from households in different five sites (i.e. Inaruwa, Narsingh, Laukhi, Sahebganj and Kushaha) in Sunsari district, at four separate times from March, 2017- February, 2018. A positive result was defined as the presence of one or more fluke eggs. From each site, 25 farmers/households were selected randomly and 50 samples were collected at each time period, for a total of 200 samples per site and 1,000 samples overall. The overall prevalence of fascioliasis was found 35% (350/1000; CI at 95%: 32.0-38.0) in goat. Faecal samples from Sahebganj and Kushaha had shown significantly higher prevalence 55% (110/200) and 51% (102/200), respectively of eggs of Fasciola spp followed by Laukhi (31.5%), Narsingh (23.5%) and Inaruwa (14%) [P value<0.05: 0.00001 at 95% confidence interval and Chi-square:109.14]. Rainy season and adult goats having above 6 months old showed high prevalence 58% and 39.6%, respectively. Seasons and age showed significant different at 95% confidence interval and p-value <0.05 was 0.00001. Animals' ages and body condition scores (BCSs) also showed statistically significant variations in prevalence. Thus, it is crucial to devise efficient methods of controlling fascioliasis in goats. Since the fascioliasis in goats is highly endemic, thus strategic deworming in high risk period is recommended along with measure to prevent pasture contamination with goat feces.

keywords: Goats, Fascioliasis, Prevalence, Sunsari.

1. Introduction

After buffalo (which accounts for 54.3% of Nepal's total meat output), goats account for about 20.4%. Ruminant fascioliasis is a parasite illness that affects a large number of animals and has significant economic implications. An important illness induced by parasites that inhabit the host's liver is fascioliasis [1]. The disease causes considerable economic impact due to mortality, liver condemnation, reduced weight gain (up to 20%) and reduced quality and quantity (3–15% loss) of milk production [3,4]. Annual economic losses reach US$ 3 billion, and over 700 million domestic ruminants are in danger across the world [4]. Human fascioliasis is considered as a neglected tropical disease [5] affecting approximately 50 million people worldwide [6]. The illness has an extensive geographic range and affects all ruminant livestock species, including the Himalayan yaks and yakows [7]. It is well-known that Fasciola hepatica and F. gigantica, two species of trematodes, cause fascioliasis, or liver fluke [6]. The F. hepatica species occurred almost throughout the world, but predominates in temperate zones, while F. gigantica is found in most continents, primarily in tropical regions [8,9]. Both species are transmitted in livestock by the snails of the family Lymnaeidae with potentiality to acute and chronic infection with expected blood loss of about 0.2–0.5 ml/worm/animal/day [2,10,11]. Parasitic infections are on the rise, and this new one is having a major effect on animal and human health all around the globe [12]. There is no geographical limit to the devastation that Fasciola

International journal of agricultural sciences and veterinary medicine

ISSN: 2320-3730

Vol-1 Issue-01 April 2012

2.Materials and Methods

2.1. Study Area

For the present study, five locations of Sunsari district of Province 1 of Nepal (Figure 1) were selected because these places were known to possess relatively higher density of goats. The five sites were Inaruwa, Narsingh, Laukhi, Sahebganj and Kushaha. All the study locations were situated in plain lands to know the status of prevalence. Sunsari District lies at latitude 26°38′29.76″N and longitude 87°07′44.76″ E. Farmers raised goats as semi-intensive type of management. Majority of farmers offered leaves of fodder tress and seasonal grasses found in pasture as feed. Only limited farmers provided with local feed materials like maize, dals etc to goats.

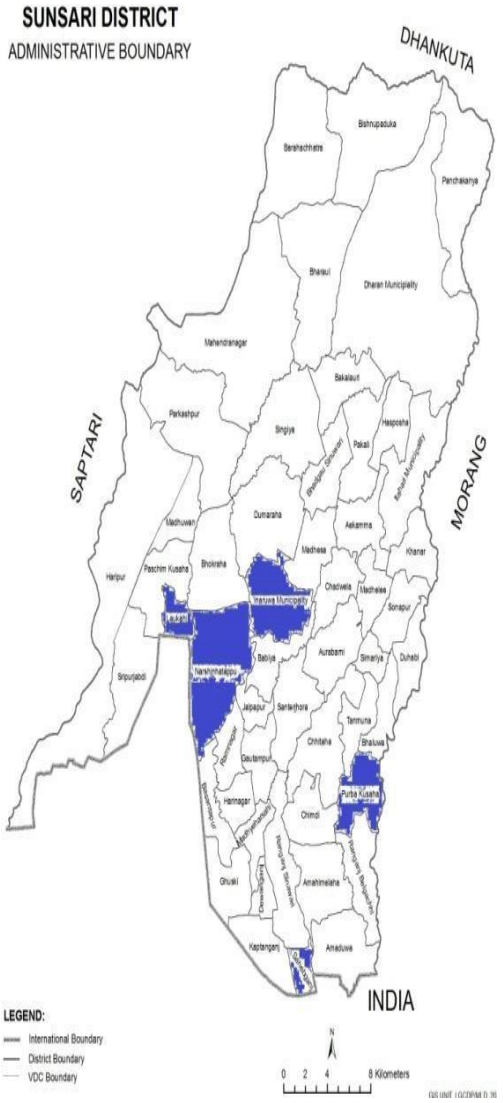


Figure 1. Map of Sunsari district showing studied sites depicted with blue color highlighted signs

International Journal of agricultural sciences and veterinary medicine

ISSN: 2320-3730

Vol-1 Issue-01 April 2012

2.2. Study Design

A total of 1000 fecal samples (200 in each site) were collected randomly from goats of different age, sex in different five sites from March 2017 to February 2018 for 12 months. Breeds of goats were local and Jamunapari cross. The samples were collected from 25 farmers and total 50 fecal samples in each site in each season. Samples were collected in three months interval representing into four seasons viz. Spring (Falgun/March), summer (Jestha/June), rainy (Bhadra/August) and winter (Mangsir/December) from the same locations. Age was categorized into two: young (upto 6 months) and adult (above 6 months old). Body Condition Score (BCS) was performed for each goat.

BCS was categorized into five ranging from 1.0 to 5.0, with 0.5 increments [17]. A BCS of 1.0 is an extremely thin goat with no fat reserves, and a BCS of 5.0 is a very over-conditioned, or obese, goat. In most cases, healthy goats should have a BCS of 2.5 to 4.0. A BCS of 1.0, 1.5 or 2.0 indicates a management or health problem.

2.3. Laboratory Examination

Fecal samples were collected per rectum from the goats. Each samples of 5-10 g of fecal material was collected in clean polythene bag containing 10% formalin as preservative. The samples were properly labeled and brought to animal service centre of respective sites as well as the laboratory of Agricultural Research Station, Pakhribas, Dhankuta. The samples were tested microscopically for the presence of fluke (*Fasciola)* eggs using sedimentation technique [18]. At least three smears were prepared for each sample. Presence of one or more fluke egg in a sample was considered as positive.

2.4. Statistical Analysis

Data were compiled in Microsoft Excel using R 3.4.2 packages for analysis. The relationship of different sites/locations with prevalence of fascioliasis and season were investigated. Spearman's Chi-square Test was used at the level of $P<0.05$ to compare the effect of season, age, sex and other risk factors on the prevalence of fascioliasis in goats.

I. Results

Fascioliasis in goats was prevalent in all the studied sites and in all seasons. The overall prevalence was found to be 35% (350/1000) as shown in Table 1. The overall prevalence of fascioliasis was significantly ($p <0.05$) higher in Sahebganj (55%) and Kushaha (51%) while low was in Inaruwa (14%).

Table 1. Prevalence of fascioliasis in goats in five study sites

Study Site	Positive/ Tested Animal	Prevalence %	95% Confidence interval (CI)	Chi-square test	p-value <0.05
Inaruwa	28/200	14	9.5-19.6	109.1429	0.00001
Narsingh	47/200	23.5	17.8-30.0		
Laukhi	63/200	31.5	25.1-38.4		
Sahebganj	110/200	**55**	47.8-62.0		
Kushaha	102/200	**51**	43.9-58.1		
Overall	350/1000	**35**	32.0-38.0		

The prevalence of fascioliasis was significantly ($P<0.05$) higher in rainy (58%) in comparison to other season (Table 2).

International journal of agricultural sciences and veterinary medicine

ISSN: 2320-3730

Vol-1 Issue-01 April 2012

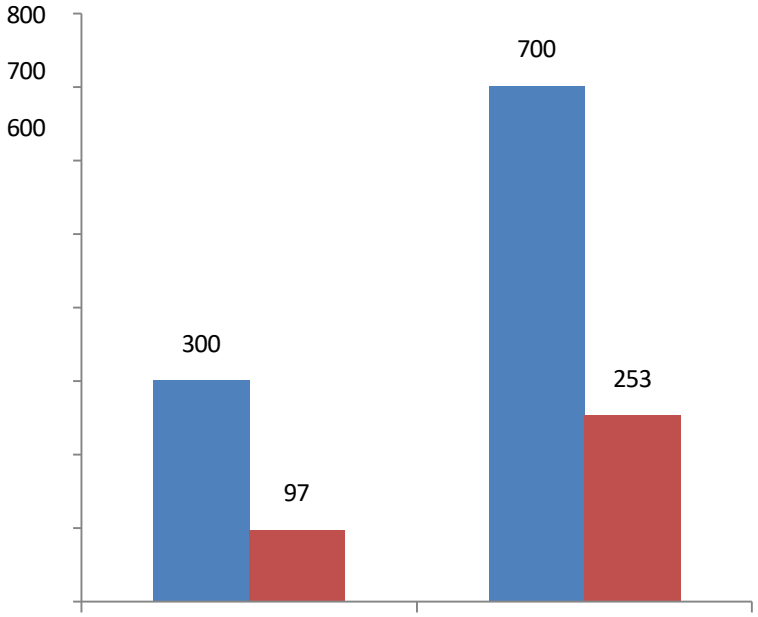
Table 2. Prevalence of fascioliasis in goats in different seasons

Season (Month of collection)	Positive/ Tested animal	Prevalence %	95% CI	Chi-square test	p-value <0.05
Spring (Falgun)	55/250	22	17.0-27.7	118.20	0.00001
Summer (Jestha)	107/250	42.8	36.6-49.2		
Rainy (Bhadra)	145/250	58	51.6-64.2		
Winter (Mangsir)	43/250	17.2	12.7-22.5		

Highly significant prevalence of fascioliasis reported in agewise distribution of goats (Table 3). Adult goats showed high prevalence of fascioliasis (39.6%) followed by young (16.5%). The prevalence of the fascioliasis was higher in female comparing to male (Figure 2).

Table 3. Prevalence of fascioliasis in goats based on age

Age	Positive/Tested animal	Prevalence %	95% CI	Chi-square test	p-value <0.05
Young (upto 6 months)	33/200	16.5	11.6-22.4	37.61	0.00001
Adult (> 6 months old)	317/800	39.6	36.2-43.1		



International Journal of agricultural sciences and veterinary medicine

ISSN: 2320-3730

Vol-1 Issue-01 April 2012

Figure 2. Fascioliasis infestation prevalence in male and female goats

Body condition score (BCS) of all the studied goats were recorded (Table 4). Goats having fascioliasis fell under BCS 1 (8.9%) and 2 (23.7%). BCS 1 and 2 were regarded as poor condition of goats.

Table 4. Body condition score (BCS) of sampled goats

Criteria	BCS	Number of animals	Percentage
Extremely thin with no fat reserves	1.0	89	8.9
Poor	2.0	237	23.7
Moderate	3.0	477	47.7
Good	4.0	192	19.2
Very over-conditioned or obese	5.0	5	0.5

International journal of agricultural sciences and veterinary medicine

ISSN: 2320-3730

Vol-1 Issue-01 April 2012

Discussion

Fascioliasis has been considered as major gastrointestinal parasite in Nepal that seriously affects the production of ruminants. The prevalence of fascioliasis is mostly depends on several factors such as source of infection in that area, availability of intermediate host, environmental conditions that favors the growth of intermediate host snail and association between intermediate host and final host.

We showed that fascioliasis prevalence in goats persisted almost round the year in the study sites. Prevalence of fascioliasis was found significantly difference ($P<0.05$) in case of site of study, season and age. The overall prevalence of fascioliasis was 35% in goats with higher prevalence recorded in rainy (58%) than in spring, summer and winter seasons (Table 1 and Table 2).

Higher prevalence of fascioliasis in goats recorded in Sahebganj (55%) and Kushaha (51%) as compared to other three sites. These two sites were far from city area and people used to administer anthelmintics only for limited period of time. Inaruwa, headqurter of the district recorded low prevalence because farmers are aware to drenching. Our results showed agreement with the findings reported by Yadav *et al*. [19] in Dhanusha district of Nepal (32%), Tasawar *et al*. [20] and Mamun *et al*. [21] in Pakistan. These findings indicated that infection might be supported by monsoon seasons when the temperature and moisture levels were the most favorable both for the vector snails and *Fasciola* developmental stages [22]. The variation in prevalence of fascioliasis between different areas were also likely due to the differences in landscape, such as swampy/marshy areas, and agricultural irrigation practices. During the rainy season, the environment is favorable for the development of intermediate host and subsequently transmission of the fascioliasis [23,24].The prevalence of fascioliasis was found to be significantly ($P>0.05$) associated with season in our study. The *Fasciola* eggs observed in fecal test actually released into the soil and water, where the infection in the form of cyst enters into the animal through grazing along with grass, straw, drinking water into the stomach of goats [2]. Moreover, no restriction on animal importation from outside, movement between the infected localities, grazing and feed materials to animals may also responsible for endemic infestation [25]. Such variations in fascioliasis infection are known to occur due to management practices, presence of intermediate hosts, intermediate hosts in localities, and meteorological differences such as humidity, temperature and rainfall patterns [26].In our study adult goats showed significantly higher prevalence of fascioliasis than young. Similarly the female goats had higher fascioliasis prevalence than in the males. The result of present study prevalence of fascioliasis in relation to age, sex are in agreement with the results of [26,27,28,29,30]. The higher infection rate in older animals could be due higher exposure risk of adults due to physiological differences, such as stress, pregnancy, lambing, inadequate nutrition, infectious diseases their grazing habit close to submerge areas or lowest in younger age animals because of maternal immunity in younger animals [31]. This may be due to males are slaughtered in younger age and only there was small population of males in each herd. The chance of the getting infection in females may be due to aging. Most of the young age animals were also not allowed to graze extensively so this also reduces the risk to get infection in males. Hence the older animals are exposed to parasites overtime.

The fascioliasis affected goats had poor BCS (Body condition score 1.0 and 2.0) indicates a management or health problem. When overall body condition starts to decrease in the herd, it is a sign that managerial intervention is needed such as supplemental feeding, deworming and pasture rotation. Conversely, when overall body condition starts to increase in the herd, it is a sign that the producer should reduce supplemental feeding. Ignoring an animal's body condition and waiting to intervene until goats become either too thin or too fat may result in production and/or animal losses or decreased profits from overfeeding [17]. Therefore, producers need to develop skills in assessing body condition of their goats so that a desired moderate body condition can be maintained.

International journal of agricultural sciences and veterinary medicine

ISSN: 2320-3730

Vol-1 Issue-01 April 2012

Conclusion and Recommendation

This study therefore gives an initial overview on the prevalence and distribution of fascioliasis in goats in Sunsari district of Nepal. We recommend that the Health regulatory agencies should establish and run modern veterinary infrastructure with adequate medications to control liver fluke parasites. Animal breeders should be enlightened on the appropriate breeding methods to adopt, application of proper sanitation, effect of malnutrition, etc. The overall higher incidence of helminths infection in the areas surveyed could be attributed to lower immunity of hosts as a result of malnutrition. All the livestock in the area under investigation largely depended on grazing in deteriorated range-lands. It was also observed that farms in these areas lack fences and cattle, sheep and goats use the same pasture for grazing.

References

[1.] L.J.S. Harrison, Interaction between Fasciolosis and nutrition in growing ruminants, *Project jointly funded by DFID Livestock Production and Animal Health Programmes, Final Technical Report ZC-0008, 2000.*

[2.] N.T. Nguyen, T.C. Le, M.D. Covo, H.V. Cao, L.T. Nguyen, K.T. Ho, Q.N. Nguyen, V.Q. Tran, and Y. Matsumoto, High prevalence of cattle fascioliasis in coastal areas of ThuaThien Hue province, Vietnam, *2017, Available from: https://www.researchgate.net/publication/316602991*.

[3.] D. Piedrafita, T.W. Spithill, R.E. Smith, and H.W. Raadsma, Improving animal and human health through understanding liver fluke immunology, *Parasite Immunol, 32(8), 2010, 572–81.*

[4.] T. Spithill, P. Smooker, D. Copeman, *Fasciola gigantica*: epidemiology, control, immunology and molecular biology. In: J.P. Dalton (Ed.), *Fasciolosis. Oxworth: Commonwealth Agricultural Bureau International, 1999.*

[5.] S. Mas-Coma, M.D. Bargues, and M.A.Valero, Diagnosis of human fascioliasis by stool and blood techniques: update for the present global scenario, *Parasitology, 141(14), 2014, 1918–46.*

[6.] M. Nyindo, and A.H. Lukambagire, Fascioliasis: An Ongoing Zoonotic Trematode Infection, *BioMed Research International, 2015, Article ID 786195, 8 pages, http://dx.doi.org/10.1155/2015/786195*.

[7.] D.D. Joshi, and H.C. Tewari, Some observations on incidence of fascioliasis in yak and hilly cattle, *Bulletin of Veterinary Science and Animal Husbandry, Nepal, 4, 1975, 1-3.*

[8.] S.J. Andrews, The life cycle of *Fasciola hepatica, In: Fasciolosis, Bull. Anim. Health Prod. Afr, 23(1),1999, 57-86.*

[9.] S.C. Bennema, R.G.C. Scholte, M.B. Molento, C. Medeiros, and O.S. Carvalho, *Fasciola hepatica* in bovines in Brazil: Data availability and spatial distribution, *Rev. Inst. Med. trop. S. Paulo, 56(1), 2014, 35-41.*

[10.] M.K. Khan, M.S. Sajid, M.N. Khan, Z. Iqbal, M. Arshad, and A. Hussain, Bovine fasciolosis: Prevalence, effects of treatment on productivity and cost benefit analysis in five districts of Punjab, Pakistan, *Res. Vet. Sci, 87, 2009,70–75.*

[11.] M.K. Khan, M.S. Sajid, M.N. Khan, Z. Iqbal, M. Arshad, and A. Hussain, Point prevalence of bovine fasciolosis and the influence of chemotherapy on the milk yield in a lactating bovine population from the district of Toba Tek Singh, Pakistan, *J. Helminthol, 85, 2011, 334-338.*

[12.] R. Lazara, A. Vazquez, I. Domenech, and L.J. Robertson, Fascioliasis: Can Cuba conquer this emerging parasitosis?
Trends Parasitol, 26, 2010, 26–34.

[14.] A. Maqbool, C.S. Hayat, A. Tanveer, and H.A. Hashmi, Epidemiology of fasciolosis in buffaloes under different managemental conditions, *Veterinarski Arhiv, 72, 2002, 221–228.*

[15.] S.N. Mahato, and L.J.S. Harrison, Control of fasciolosis in stall-fed buffaloes by managing the feeding of rice straw.
Trop. Anim. Heal. Prod, 37, 2005, 285–291.

[16.] B.R. Joshi, Prevalence of Fascioliasis (Liverfluke) in cattle and buffaloes in the Mid-western hills of Nepal, *J. Inst.*
Agri. Anim. Sci, 9(1), 1988, 111-114.

International Journal of agricultural sciences and veterinary medicine

ISSN: 2320-3730

Vol-1 Issue-01 April 2012

[17.] G. Detweiler, T. Gipson, R.C. Merkel, A. Goetsch, and T. Sahlu, Body Condition Scores in Goats, *In Proc. 23rd Ann. Goat Field Day, Langston University, Langston, Oklahoma,US, 2008,127-133.*

[18.] E.J.L. Soulsby, Helminths, Arthropods and Protozoa of Domesticated Animals, *7th edition, Lea and Febeiger, Philadelphia, USA, 1983, 763–777.*

[19.] S.K. Yadav, Md. Ashaduzzaman, S. Sarker, M.A. Sayeed, and M.A. Hoque, Epidemiological survey of fascioliasis in cattle, buffalo and goat in Mahottari and Dhanusha, Nepal, *The Journal of Advances in Parasitology, 2(3), 2017, 51- 56.*

[20.] Z. Tasawar, U. Minir, C.S. Hayat, and M.H. Lashari, The prevalence of *Fasciola hepatica* in goats around Multan,
Pak Vet J, 27, 2007, 5-7.

[21.] M.A. Mamun, M.J.U. Bhuiyan, M.A. Zinnah, M.M. Hassan, M. Atikuzzaman, M.B. Uddin, Prevalence of *Fasciola sp*. infection in ruminants, *Eurasian J Vet Sci, 27(4), 2011, 241-244.*

[22.] M. Khan, A.K.M.A. Rahman, S. Ahsan, A. Ehsan, N.N. Dhand, and M.P. Wards, Bovine fascioliasis: risk factors and space- time clusters in Mymensingh, Bangladesh, *Veterinary Parasitology: Regional Studies and Reports, 9, 2017, 104-109.*

[23.] G.M. Urquhart, J. Armour, J.L. Duncan, A.M. Dunn, and F.W. Jennings, *Veterinary Parasitology, Oxford: Longman Scientific, 1988, 98-109.*

[24.] A. Michael, P. Beyene, and J. Yilma, Infection prevalence of ovine fascioliasis in small-scale irrigation schemes along the Upper Awash River Basin, *J Ethiop Vet Assoc, 9, 2005, 19-27.*

[25.] N.M. El-Bahy, Strategic control of Fascioliasis in Egypt, *Review article: Continual Scientific Committee of Pathology, Microbiology and Parasitology, Egypt, 1998.*

[26.] B. Bhutto, A. Arijo, M.S. Phullan, and R. Rind, Prevalence of fascioliasis in buffaloes under different agroclimatic areas of Sindh Province of Pakistan, *International Journal of Agriculture and Biology, 14(2), 2012, 241-245.*

[27.] M. Selim, M.M. Sen, and A. Rahman, An abattoir survey on the liver diseases of Black Bengal goats, *Bangladesh.*
Vet J, 31, 1997, 113-114.

[28.] K. Murat, Y. Gicik, B. Sari, H. Bulut, and M.O. Arslan, A slaughterhouse study on prevalence of some helminthes of cattle and sheep in Malatya province, Turkey, *J of Ani & Vet Adv, 8(11), 2009, 2200-2205.*

[29.] A.K.M.A. Rahman, S.K.H. Islam, M.H. Talukder, M.K. Hassan, N.K. Dhand, and M.P. Ward, Fascioliasis risk factors and space-time clusters in domestic ruminants in Bangladesh, *Parasites& Vectors, 10, 2017, 288-300.*

[30.] R.P. Sah, H.K. Prasai, J. Shrestha, M.H. Talukder, A.K.M.A. Rahman, and R.B. Sah, Seasonal and Altitudinal Prevalence of Fascioliasis in Buffalo in Eastern Nepal, *Journal of Nepal Agricultural Research Council, 4, 2018, 48- 53.*

[31.] E.F. Ahmed, K. Markvichtr, S. Tumwasorn, S. Koonawootrion, A. Choothesa, and S. Jittapalapong, Prevalence of *Fasciola sp.* infections of sheep in the middle Awash River Basin, Ethiopia, *Southeast Asian J Trop Med Public Health, 38, 2007, 51-57.*