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# Prevalence of Fascioliasis in Goat in Sunsari District, Nepal

**Ramesh Prasad Sah[1*] and Ram Babu Sah[2]**

[1]Agricultural Research Station, Pakhribas, Dhankuta, Nepal
[2] Shree Amar Singh Ma Vi, Sahebganj, Sunsari, Nepal

**For Correspondence**

***Correspondence Author**
*Dr Ramesh Prasad Sah, PhD*
*Agricultural Research Station, Pakhribas, Dhankuta, Nepal*

rpsnarc@yahoo.com

**Abstract:** *The goat contributes about 20.4% to the total meat production in Nepal and ranks second after buffalo (54.3%). Fascioliasis is a widely distributed and economically important parasitic disease of ruminants. 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. Presence of a fluke egg or more was considered as positive. 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. Variation in prevalence was also significant in relation to age and body condition score (BCS) of the animals. Therefore, it is essential to make effective control strategies against 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*

## I. Introduction

The goat contributes about 20.4% to the total meat production in Nepal and ranks second after buffalo (54.3%). Fascioliasis is a widely distributed and economically important parasitic disease of ruminants. Fascioliasis is one of the important diseases caused by internal parasites [1] which inhabit in liver of host [2].

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]. Globally, more than 700 million domestic ruminants are at risk and economic loss exceeds US$ 3 billion per year [4]. Human fascioliasis is considered as a neglected tropical disease [5] affecting approximately 50 million people worldwide [6].

The disease is widespread throughout the country affecting all species of ruminant livestock; including yaks and yakows of the Himalayas [7]. Fascioliasis is commonly known to be caused by liver fluke having two species of trematode: *Fasciola hepatica* and *F. gigantic*a [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]. It is an emerging parasitic infection, impacting substantially on both veterinary and human health worldwide [12]. Infestations of *Fasciola* in ruminants cause heavy loss irrespective of geographical boundaries posing serious concern on the socio-economic of livestock farming in terms of milk and meat production [13] as well as human health [6]. The occurrence of fascioliasis might be influenced by a multiple factors such as host, parasite and environment [14].

In past, few studies have already reported the prevalence of fascioliasis from many parts of Nepal [15,16]. However, prevalence of this disease in goats has rarely been documented. Hence, we estimated the prevalence of fascioliasis in goats at various sites of Sunsari district.

## II. 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.

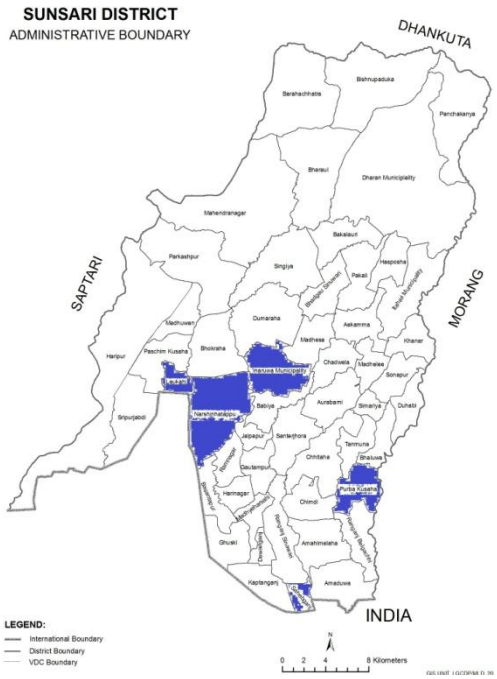


**Figure 1**. Map of Sunsari district showing studied sites depicted with blue color highlighted signs

### 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.

## III. 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).

**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 | | |

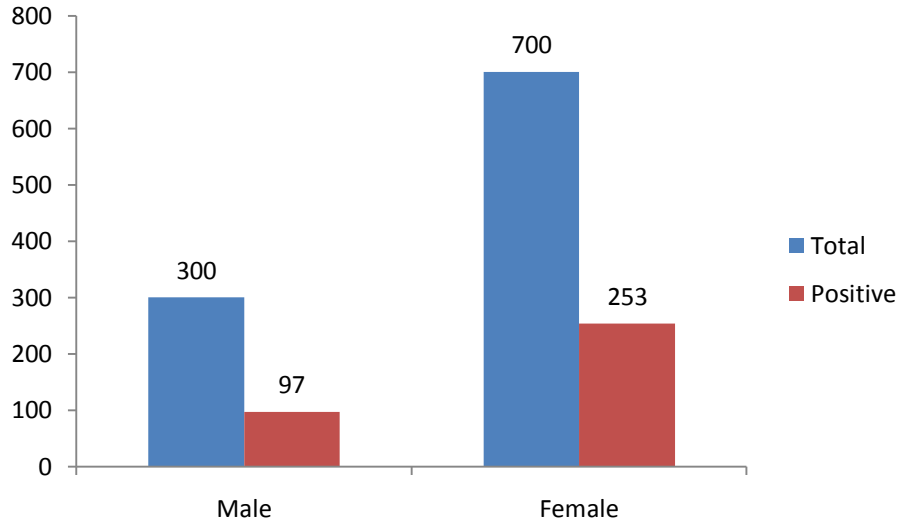


**Figure 2.** Fascioliasis infestation prevalence in male and female goats

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 |

## IV. 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.

## V. 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.

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