A STUDY ON
INTESTINAL HELMINTH PARASITES OF BUFFALOES BROUGHT TO SATUNGAL (KATHMANDU) FOR SLAUGHTER PURPOSE

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTER'S OF SCIENCE IN ZOOLOGY WITH SPECIAL PAPER PARASITOLOGY

BY

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SUBMITTED TO

CENTRAL DEPARTMENT OF ZOOLOGY

INSTITUTE OF SCIENCE AND TECHNOLOGY

TRIBHUVAN UNIVERSITY

KIRTIPUR, KATHMANDU

NEPAL

2007

ACKNOWLEDGEMENT

I would like to express my sincere gratitude and deep respect to my supervisor Associate Prof. **Dr. RANJANA GUPTA**, Central Department of Zoology, Tribhuvan University and my co-supervisor Senior Veterinary Officer **Dr. GANESH RAJ PANT**, Central Veterinary Laboratory, Tripureshwor, for their constant guidance and support.

I am thankful to my honorable head of the Department, **Prof. Dr. TEJ KUMAR SHRESTHA**, Central Dept. of Zoology, Tribhuvan University for wholehearted cooperation to complete this work.

I am very grateful to **Dr. KEDAR KARKI**, M.V.St Preventive Vet. Medicine, Central Veterinary Laboratory, Tripureshwor for guiding me during the period of my Lab. work. I wish to thank **Dr. REBATI MAN SHRESTHA**, Chief, Central Veterinary Laboratory, Tripureshwor for providing me Lab facilities. And I am thankful to the staff of Central Veterinary Laboratory, **Mr. GYAN BAHADUR BOGATI**, **Mr. SIDDHA RAJ JOSHI** and **Mr. DHAN RAJ RAI** for their support and cooperation for this dissertation work.

Finally, I'm very much thankful to **KAILASH CHETTRI, ROBIN SHRESTHA, UNIQUE SEWA PVT. LTD.**, **STAFFS** of the Zoology Dept. and my **PARENT** for their kind support and inspiration for the completion of this work.

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ABSTRACT

Bubalus bubalis (buffalo) is one of the leading species of domestic livestock in Nepal. The helminthic diseases are most varied and of common occurrence in buffaloes. Present study was carried out to find the prevalence of intestinal helminth parasites in 262 stool samples of buffaloes during July to August 2006.Both sedimentation and floatation technique were used for the detection of helminth parasites. A total of 262 stool samples were collected during the study period and examined. The overall prevalence of helminth parasites was found 83.96%. There is significant difference in the prevalence of trematode, cestode and nematode infections among buffaloes. The parasitic infection of trematode was 90.90%, cestode 14.54% and of nematode 49.09%.

Trematodes, *Dicrocoelium lanceatum* and *Ornithobilharzia turkestanicum* are reported for the first time from Nepal. However, no work regarding these species have been reported from any host.

Although trematode *Skrjabinema ovis, Fischoederius elongatus and nematodes, Chabertia ovina, Dictyocaulus* sp and *Capillaria* sp has been reported from various hosts sheep, cattle and goat but not reported from buffalo. **So, *S. ovis, F. elongatus, C. ovina, Dictyocaulus* sp. and *Capillaria* sp. are reported for the first time from the host buffalo in Nepal.**

The trematode genus identified with their prevalence percentage are as follows; *Fasciola* sp. 32.06%, *Paramphistomum* sp. 15.64%, *Dicrocoelium* sp. 20.61%, *Schistosoma* sp. 46.94%, *Gastrothylax* sp. 0.76%, *Fischoederius* sp 0.38%, *Ornithobilharzia* sp. 0.76% and *Skrjabinema* sp. 6.87% respectively.

Among Cestode, only *Moniezia* species was observed with infection rate 13.35%. Nematode included *Strongyloides* sp. 4.19%, *Trichostrongylus* sp. 1.90%, *Toxocara* sp. 22.90%, *Ascaris* sp. 6.87%, *Chabertia* sp. 0.38%, *Trichuris* sp. 2.29%, *Dictyocaulus* sp. 0.76%, *Oesophagostomum* sp. 0.76%, *Capillaria* sp. 0.38%, *Haemonchus* sp. 1.14%, *Ostertagia* sp. 1.52% and *Cooperia* sp. 0.76%.

Mixed infections were observed among 140 positive samples. Among trematode, *Dicrocoelium lanceatum* and *Fasciola hepatica* found to be heavily infected. In cestode,

Moniezia benedeni and nematode, *Toxocara vitulorum* found to be heavily infected in buffaloes.

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ABBREVIATIONS

VETCON	:	Veterinary Conference
FAO	:	Food and Agriculture Organization
CBS	:	Central Bureau of Statistics
VEC	:	Veterinary Epidemiology Centre
IELA	:	Import and Export of Live Animals
LP	:	Livestock Production
GI	:	Gastro-Intestinal
VDC	:	Village Development Committee
WHO	:	World Health Organization
ADPCD	:	Animal Disease Protection and Control Division
rpm	:	rate per minute

INTRODUCTION

Bubalus bubalis (buffalo) is one of the most important species of domestic livestock as a source of dairy, meat, manure and drought power in Nepal. Known to feature in the folklore, literature and religion of many lands, its domestication was in evidence some 4,500 years ago in the Indus valley civilization (Cockrill,1970).The merits, versatility and contribution of buffalo to the agricultural economy have been stressed by a number of workers (Hafez, 1952; Shah, 1967; Cockrill, 1966, 1968, 1970, 1974; Sebastian *et al*.,1970).Known to thrive and adapt remarkably under severest climatic conditions where other domestic stock could barely exist, buffalo excels cow in its ability to digest the coursest roughages, better utilization of nitrogen and good calcium phosphorus.

Buffaloes are substantially distributed in more than 25 tropical countries – stretching from southern – Europe through India and China to the whole of south-east Asia. The world population of domestic buffaloes in 1979 has been estimated at 126 million of which 122 million are in Asia including 60.7 million heads of buffalo in India alone (Kim, 1981). Therefore, nearly half of the world buffalo population is in Indian sub-continent and yet scientific knowledge concerning this animal has not been commensurate with its increasing numbers and importance. Buffaloes are the main producers of milk and preferred species as indicated by the increasing ratio of she- buffaloes to cows in many parts of the country.

Livestock farming is an integral part of the farming system and buffalo contributes substantially in the livestock sector in Nepal. Buffalo, in Nepal has been acclimatized and adapted to a wide range of environmental conditions. It is widely distributed from sub-humid regions of subtropics in terai to cool temperate regions in the hills and mountains (Shah, Shree G, 1981/82). Epstein (1977) has classified Nepalese buffaloes into four regional types: terai, hilly,

midland and himalayan mountain. These types are distinguished by the size, shape, curvature and length of their horns, and the colour of their coats.

The ruminant livestock population in Nepal in the year 2003/04 are 39, 52,654 buffaloes and the rural household keeps an average 0.93 buffaloes (VEC: national information, 2004). Nepal exported about 5,720 buffaloes during 2002/2003 and 7,423 buffaloes in the year 2003/04 to India and abroad through the main routes Kakarvitta (IELA and LP, Nepal, 2002/03 – 2003/04. The number of buffaloes in 2005 was increased upto 40, 81463 with an average of 0.96 buffaloes per household (VEC: national information, 2005).

Traditionally, meat and meat products originating from all domestic farm animals except cattle are consumed in Nepal. Animal slaughter is a common practice not only for consumption but also for religious sacrifices and other traditional ceremonies.

Nepal produced about 1, 33,600 metric tons, buffalo meat and 8, 63,322 metric tons buffalo milk in the year 2003/04 (VEC: national information, 2004) and the annual production of meat per household was 0.05 metric tons and milk per household was 0.3 metric tons in the year 2003/04. The number of milking buffaloes in the year 2003/04 was 10, 15,727 buffaloes (VEC: national information, 2004). According to livestock production, Nepal has produced 1,38,953 metric tons buffalo meat and 8,94,591 metric tons buffalo milk in the year 2005 and the number of milking buffaloes was 10,50,977 in 2005 (VEC: national information, 2005).The annual production of milk was 300 kg per household and meat 51 kg per household in the year 2005 (VEC: national information, 2005).

Buffalo diseases have been identified as one of the major factor which have disrupted the development of the industry in Asia and have caused substantial economic loss to the poor subsistent farmers in the developing

countries (Othman and Baker, 1981).The parasitic diseases are not less important in buffaloes than other infectious diseases. These mainly include gastro-intestinal helminthoses, coccidiosis, fascioliosis and mange (Othman and Baker, 1981).

Among different bubaline parasitic infections, helminthic diseases are most varied and of common occurence. Cockrill (1974) stated that the buffalo is exposed to a higher risk of infection with snail borne helminthes due to the animals propensity to seek rivers, pools or swamps for wallowing. Besides other etiological factors known commonly to affect the buffalo, diverse and manifold types of “helminthosis” and “helminthiasis”, resulting from different grades of infections with fluke, tapeworms, and roundworms, are responsible for marked deleterious effects that tend to lower the overall production both by way of morbidity and mortality.

Trematode species play vital roles which are parasitic in livestock. In general, these trematodes commonly known as flukes, often live in the bile ducts or small intestine and may also affect the lungs. Some are ingested but some burrow into the skin for access. Their eggs are passed with the faeces of the host. Trematode especially include *Fasciola hepatica, Fasciola gigantica, Dicrocoelium , Schistome and Paramphistome* species.

Fascioliasis is a well known parasite of herbivorous animals. It has worldwide distribution on the animal reservoir host. A large variety of animals such as cattle, buffaloes show infection rate that varies from 70% to 90% in some areas. The different local names of this disease, such as namle, mate, lew etc. in different regions, are proof of its continued existence for many years in the animal population of the country.

Infection of domestic ruminants with *Fasciola hepatica* and *Fasciola gigantica* causes significant loss estimated at over US $2000 million per annum

to the agriculture sector worldwide with over 600 million animals affected (Boray, 1985, Hillyer and Apt, 1997).

The economic loss due to fascioliasis in Nepal was estimated to be Rs.14.2 crore (Lohani and Rasaili, 1995). The prevalence of fascioliasis ranging between 50% to 90% has been reported in buffaloes (Mahato, 1993). In addition fascioliasis is now recognized as an emerging human disease.

Cestode/tapeworms found in the gut and acquired by eating contaminated food or water found to be largely affecting the ruminants of the animal. This group comprises species of the genera *Moniezia* which are cosmopolitan in distribution and *Taenia* which are commonly found in the ruminants of the domesticated and wild carnivores. They have been reported from Asia and Africa (Karki, K. 2005).

The most important and widely prevalent nematodes are trichostrongyle group (*Haemonchus, Ostertagia, Trichostrongylus, Mecistocirrus, Cooperia, and Nematodirus*), *Oesophagostomum* and *Bunostomum*. These nematodes in the small intestine may cause severe damage to the intestinal mucous membrane with similar effects. *Toxocara vitulorum*, *Dictyocaulus* species and filarial nematodes has the worldwide distribution and the prevalence is higher in buffalo and cattle (Karki, K. 2005).

Fascioliasis in ruminants ranges in severity from a devastating highly fatal disease in sheep to an asymptomatic infection in cattle. Acute fascioliasis occurs seasonally and is manifest by anaemia and sudden death. Cases of chronic fascioliasis occur in all seasons and the clinical signs may include anaemia, reduced weight gain, decreased milk production, unthriftiness, submandibular oedema and possibly death. The subsequent simultaneous migration of many immature flukes through the liver parenchyma causes severe destruction of liver tissue of the host. The penetration of the liver capsule by a

large number of young flukes results in an inflammatory response of the capsule (peri-hepatitis). The blood sucking activities of the flukes irritate the lining of the ducts, resulting in an inflammatory response and the associated blood loss results in anaemia. Likewise the trematode *Dicrocoelium*, gastro-intestinal trematode *Paramphistomes* and *Schistosomes* the blood trematodes affects the host abundantly.

Cestode *Moniezia* in ruminants of the buffaloes and cattle causes infections by ingesting herbage containing mites carrying the infective stage of the parasite. Heavy infections cause poor growth and diarrhoea in lambs. Light to moderate infections are considered to be non-pathogenic. Similarly, the tapeworm species cysticercus, coenurus and hydatid cysts and the adult parasites which live in the small intestines of domesticated and wild carnivores (*Taenia ovis, Taenia multiceps, Echinococcus granulosus*) and man (*Taenia saginata*) affects the various parts of the host.

The widely prevalent nematodes trichostrongyle group ie.*Haemonchus, Ostertagia, Trichostrongylus, Cooperia*, and *Nematodirus, Oesophagostomum, Bunostomum, Toxocara, Dictyocaulus* species and filarial nematodes greatly affect the host. The larva of *Trichostrongylus* in the small intestine may cause severe damage to the intestinal mucous membrane with similar effects. Animals infected with large numbers of larvae therefore may suffer from anaemia before the parasite eggs can be detected in the animal's faeces. Mixed infections comprising any of the species of *Haemonchus, Mecistocirrus, Ostertagia, Trichostrongylus, Bunostomum, Cooperia, Nematodirus, Oesophagostomum* and *Trichuris* are common. The pathogenic effect of gastro-intestinal parasites may be sub-clinical or clinical. Young animals are most susceptible. The effect of these parasites is strongly dependent on the number of parasites and the nutritional status of the animals they are infecting. The clinical sign comprise of weight loss, reduced, feed intake, diarrhoea, mortality, reduced carcass, quality and reduced wool production/quality. Severe blood

and protein loss into the abomasum and intestine due to damage caused by the parasite often results in oedema in the sub-mandibular region. Some nematode species, especially *Haemonchus* is the most pathogenic of the blood suckers and infectious with large numbers of this parasite often result in severe anaemia in the host. Blood losses from *Bunostomum* and *Oesophagostomum* infections may add to the severity of the anaemia.

Cases of gastro-intestinal nematodes have been reported from several countries like Africa, Asia, Ethiopia, Sahel, and parts of Somalia and Sudan. The widely prevalent nematodes *Haemonchus, Ostertagia, Trichostrongylus, Mecistocirrus, Cooperia, Nematodirus, Oesophagostomum,* and *Bunostomum, Toxocara and Trichuris* are quite pathogenic to animals throughout the world. Infections with gastro-intestinal nematodes usually occurs by the ingestion of eggs by young calves. These nematodes damage the intestinal mucous membrane of the small intestine, migrating larvae may cause damage to the liver and lungs and cause severe anaemia and diarrhoea to the host. Mixed infections with gastro-intestinal nematodes are very common.

The important *Lymnaeae* species of snail involved in the transmission of fascioliasis vary in their geographical distribution in the world. Man and herbivorous animals (sheep, cattle, buffalo, etc.) acquire infection by ingestion of the moist and raw aquatic plants such as water cress, harbouring the infective metacercariae. The metacercariae mature to become adult worms and lay eggs which are passed in the faeces. On coming in contact with water they mature and invade the molluscan host, the fresh water snail and undergo development. The mature cercariae emerge out of the snail and encyst on aquatic grasses, plants and develop into metacercaria which is the infective stage of the parasite. Similarly, dicrocoeliasis is caused by the liver fluke *Dicrocoelium dendriticum* a common parasite of the biliary passages of sheep and other herbivorous and omnivorous animals. Most of the human infections occurs by the ingestion of the liver of infected sheep. Taeniasis, a zoonotic

infection caused caused by the cestodes *Taenia solium* and *Taenia saginata*. It is an intestinal infection of man, acquired by ingestion of uncooked or inadequately cooked beef containing the infective cysticerci. Echinococcosis is one of the most important cestode infection of man and animals caused by the ingestion of contaminated food and drink with *Echinococcus granulosus* eggs passed in the faeces of dogs. Trichostrongyliais is an infection of the gastrointestinal tract of herbivorous animals and man is the accidental host caused by the members of the genus *Trichostrongylus*. The infection is acquired by ingestion of contaminated vegetables or drinks with the filariform larvae. Strongyloidiasis is an intestinal infection of man caused by the penetration of the skin by the filariform larvae of *Strongyloides stercoralis*. Toxocariasis (visceral larva migrans) in humans is widely distributed throughout the world, in both temperate and tropical countries. Man acquires infection accidentally by ingestion of the larvae ascarid of the dog present in the inadequately cooked food of paratenic host.

Significance of the study:

There is insufficient information to the public and butcher about the awareness of the meat borne diseases and zoonotic diseases. Regarding the identification of the intestinal parasitic species of buffaloes scanty work has been done before.

In this study, investigative efforts has been focussed on the "Intestinal helminth parasites of buffaloes brought to Satungal (Kathmandu) for slaughter purpose". This study will be fruitful as it will give information regarding different helminth parasites of buffaloes as well as update the previous findings on the prevalence of helminth parasites of buffaloes. This study will also form a base for the future investigators, those investigating the diseases of buffaloes.

2

LITERATURE REVIEW

Parasitic zoonoses are distributed worldwide and constitute an important group of diseases affecting both the human and animals. Many of the parasitic zoonoses produce significant mortality and morbidity in the human and are responsible for the major economic losses by affecting the animal health. Most of the papers have been presented and published largely after the outbreak of the helminthic diseases among human and animals. Literatures exist in helminthic parasites as the diseases continued to survive with new threats. Major researches efforts that have been directed towards helminth parasites, the portions of the work and reports related to the epidemiology of helminth parasite have been mentioned here.

Important findings in global context:

In 1379, Brie de was the first to describe trematode *Fasciola*.

In 1685, Hartmann was the first to describe the adult worm of *Echinococcus granulosus* in the intestine of dog.

In 1758, Linnaeus first reported the genus *Ascaris*.

In 1818, Rudolphi was the first to report *Dicrocoelium*.

In 1851, Bilharz was the first to demonstrate the adult worm of *Schistosoma* in mesenteric veins of a man in Cairo.

In 1873, Schneider first reported Nemathelminthes.

In 1876, Lewis and Mc Connell were the first to describe trematode *Amphistome* from the caecum of an Indian patient.

In 1876, Normand first provided the accurate description of *S. stercoralis* in the stool sample of French soldier suffering from diarrhoea in Cochin- China.

In 1880, Claus reported about Platyhelminthes.

In 1892, Giles found that the *Trichostrongylus colubriformis* in the most frequent species pathogenic to man.

In 1903, Manson demonstrated the eggs in the faeces of the patients without haematuria.

In 1907, Sambon first pointed out that the egg belonged to a new separate species and named it as *Schistosoma mansoni*.

In 1917, Bhasker first reported *Taenia* infection in man from India, in the emigrant populations of Nagapathnam and Dindigul in tamil Nadu. Subsequently, studies was based on the routine microscopic examination of the faeces.

In 1926, Chandler initially recognized *Schistosoma incognitum* as a parasite of man and claimed the eggs of this parasite from human faeces.

In 1938, Bhalerao was the first to predict occurence of Schistomiasis in India.

In 1941, Maplestone first reported human trichostrongyliasis in India is primarily caused by *Trichostrongylus colubriformis*.

In 1952, Beaner *et al.,* first recognized human Toxocariasis who found the larva of *Toxocara canis* the dog roundworm, in the liver and lung tissues of three children in New Orleans (USA).

In 1957, Dutt incriminated a cercaria of bird *Schistosome*, which he named as *cercaria Srivastaviae* in causation of cercarial dermatitis.

In 1970, Dutt has provided further evidences of Schistosomal dermatitis when he experimentally infected volunteers by *Cercaria srivastaviae* and *Cercaria hardayali*, both of avian origin collected from the villages near Bareilly, India.

Chauhan *et al*., (1973) reported as much as 56.79% of buffalo calves upto one year have been found to harbour the infection of Strongyloidiosis among calves from 3-6 months age.

Srikitjakarn *et al*., (1987) conducted metaphylactic deworming program for buffalo calves in north-east Thailand. Hundred new born swamp buffalo calves from 3 villages in north- east Thailand were divided equally into treatment and control groups. Egg excretion rates for the

roundworms *Strongyloides papillosus* and *Toxocara vitulorum* were recorded as high as 85% and 58% respectively during the first 3 months of life.

Marques and Seroferneker, (1999) conducted a study for *Fasciola hepatica* infection in buffaloes in the state of Rio Grande Do Sul, Brazil. They examined 105 slaughtered buffaloes at a meat packing plant between April 1999 and Nov 1999, in Viamao in Rio Grande Do Sul in Southern Brazil. The occurence rate of *Fasciola hepatica* was 20% for buffaloes. The studied areas represent important endemic region of fascialosis.

Iassan *et al*., (2000) conducted a study on prevalence dynamics of fascioliasis versus other gastro-intestinal helminthes in both buffaloes and cattle in Giza Governorate. They collected 1042 buffaloes and cattle faecal samples. Their coprological examination revealed that 16.46% of the examined buffaloes and 10.35% cattle respectively were harbouring *Fasciola* sp. With the help of faecal test they found 2.07% of the examined animals has *Fasciola* sp. and 2.5% helminth eggs in their faeces. The helminths included mainly other gastro-intestinal parasites such as *Paramphistomum* spp and *Moniezia* spp. Monthly and seasonal prevalence of parasites investigated the spring season was the most favourable one for infection with predominant one for infection.

Oliveira *et al*., (2002) reported hepatic fascioliasis in buffaloes in Abattoir of Vale Do Ribeira, Sao Paulo-Brazil. Hepatic fascioliasis among 130 slaughtered buffaloes was studied at the Cajati Abbatoir from September 2002 to December 2002. The incidence of livers infected by *Fasciola hepatica* was 75%.

Maqbool *et al*., (2002) undertook an epidemiological studies at slaughter houses, livestock farms, veterinary hospitals and on household buffaloes under the different climatic conditions existing in Punjab province. Infection rate was 25.59% at slaughter houses, 20.16% at

livestock farms, 13.7% at veterinary hospitals and 10.5% at household buffaloes. Overall highest 24% seasonal prevalence in all types of buffalo was recorded during autumn, spring and winter. It was found that a higher infection rate was recorded in older buffalo than in youngsters (below 2 years of age). Buffalo of either sex were equally affected.

Carabin *et al*., (2003) conducted a study to estimate the sensitivity and specificity of the Danish bilharziasis in buffaloes in Philippines. Faecal samples from animals were collected on five consecutive days in four villages between January to July 2003. The faecal samples were analysed with the filtration and sedimentation Danish bilharziasis laboratory technique. The prevalences and 95% credible intervals of *Schistosoma japonicum* adjusted for imperfect sensitivity and specificity in buffaloes were 6.3% respectively.

Akhtar and Mohammad (2003) conducted a study on prevalence of helminthiasis in buffaloes in colony, Hyderabad. The prevalence of helminthiasis was found to be 15.2% in buffaloes. Out of 500 samples examined, 9.2% were infected with nematodes and 5.4% were infected with trematodes respectively. Mixed infection was observed in 0.6%. The chief helminths identified were *Toxocara vitulorum* 3.6%, *Fasciola gigantica* 3.2%, *Oesophagostomum radiatum* 3%, *Strongyloides papillosus* 2.4%, *Fasciola hepatica* 2.2%, *Ostertagia ostertagi* 1%, *Paramphistomum cervi* 0.8% and *Trichuris* sp. 0.2%.

Magdoub AA-EI and Sayed IA-EI (2003) studied on relationship between one system of climatic conditions on the helminthic infection rate at middle delta, Egypt. 1178 buffaloes owned by farmers from 160 herds belong to 32 villages in Egypt were randomly chosen to study factors which influence the infection with gastro-intestinal parasites. Relationship between number of parasites, herd size resources of water and season of the year were investigated. The main results

showed (i) *Fasciola gigantica* infection recorded the highest percentage 48.04% followed by *Neoascaris vitulorum* and *Eimeria* sp. (ii) percentage rates of parasitic infection (single, double or triple) in each animal were 62.80%, 29.43%, and 7.77% respectively. (iii) Infection rate tended to increase with herd size in most cases. (iv) Resource of water had highly significant effect on infection rate.

Yadav *et al*., (2003) reported the prevalence rate of fascioliasis and amphistomiasis high in terai region of India followed by hills and plains, respectively. Buffaloes were the most susceptible hosts followed by cattle and sheep. The incidence of *Fasciola gigantica* infection was high in post monsoon season September to January with peak in January in the terai.

Yadav *et al*., (2004) reported the highest incidence of G.I nematodiasis in goats followed by buffaloes and cattle. *Haemonchus, Trichostrongylus, Bunostomum, Oesophagostomum and Strongyloides* species were the main parasites recovered from intestines of sheeps, buffaloes and goats.

Yadav *et al*., (2005) reported various species of *Sarcocystis* viz. *S. fusiformis* and *S. levinei* in buffaloes. The overall prevalence was 73.72% in buffaloes.

Important findings in context of Nepal:

Parajuli, (1967-92) reported flukes in buffaloes from Surkhet district as *Fasciola* sp. 56.75% and *Paramphistomes* sp. 35.13%

Lohani & Jaeckle, (1981-82) conducted a study to indentify *Fasciola* species in Palpa. Liverfluke specimens were collected from five slaughtering places of Tansen in the last week of July and beginning of August, 1981. Identification was done by Hoerning Institute of Parasitology, University of Bern and results were mixed infections with predominance of *Fasciola gigantica*.

Ghimire, (1987) conducted a study on incidence of common diseases of cattle and buffaloes in Surkhet district. The endoparasitic infections recorded were Fascioliasis, Toxocariasis, Paramphistomiasis, internal Schistosomiasis and Monieziasis.

Acharya, (1996) conducted a study on efficacy of trichobendazole and oxyclozanide against fascioliasis of lactating buffaloes and cattle. The study was conducted between January 1996 and March 1996. Of the 317 lactating cow and buffaloes examined 21.6% cows and 30% buffaloes were positive for *Fasciola* infection. However, buffaloes did not response in either treatment groups as effectively as cows.

Mahato *et al*., (1997, 2000) reported on epidemiological basis of the control of fasciolosis in Nepal. Despite increased awareness of the diseases and massive increase in the use of anthelmintics, they found no impact on the prevalence of the disease in the last two decades. Failure to control the disease were mainly due to lack of information about its epidemiology in the country.

Shrestha and Joshi, (1997) carried out a study to evaluate the effectiveness of a strategic drenching against fascioliasis in cattle in the western hills of Nepal. Faecal samples were collected at monthly intervals, and were examined by standard sedimentation method for the presence of *Fasciola* eggs. The strategic drenching reduced the overall infection in treated animals.

Sharma, (1998-99) conducted a study on parasitic infection in animals of Panchthar district. Ascariasis (43.69%) was found to be the most common followed by Fascioliasis (40.12%) and *Paramphistomum* (16.20%).

Regmi *et al*., (1999) conducted a study to know the Fasciolasis prevalence in Thuladihi VDC of Syanja district. Coprological examination revealed that 67.66% buffalo and 62.10% cattle were affected with Fascioliasis.

Pandey; Mahato; and Gupta, (2002) studied prevalence of *Fasciola* infection in *Lymnaea* snails and buffaloes in Devbhumi Baluwa VDC of Kavre district. The infection rate in rice field was found 1.67%, in springs 1.40% and in irrigation channels 0.99%.

Adhikari *et al*., (2002/2003) conducted a study on the prevalence and diversity of *Fasciola* sp. in buffaloes and cattle in areas of Kathmandu valley from 23 April 2003 to 30 June 2003. The prevalence of *Fasciola* sp. was found to be 36 % and 61% in cattle and buffaloes respectively. Other parasite were also found during the study which includes 48% *Paramphistomum* sp. in cattle. Similarly *Paramphistomum* sp. 11% and *Strongyloides* sp. 10% were isolated from buffaloes and cattle. The study concluded that the potential role of liver flukes in the livestock production and development is highlighted.

3

OBJECTIVES

3.1 General Objective

- To study the intestinal helminth parasites of buffaloes brought to Satungal (Kathmandu) for slaughter purpose.

3.2 Specific Objective

- To identify the helminth parasites.
- To determine the prevalence percentage of trematode, cestode and nematode.
- To determine the species wise prevalence of trematode, cestode and nematode.
- To determine the number of eggs present per gram of faeces.

4

MATERIALS AND METHODS

Study area:

Nepal is one of the richest countries in the world in terms of biodiversity due to its unique geographical position and latitudinal variation. Geographically, it is 80˚ 4" to 88˚ 12" East longitude and 26˚ 22" to 30˚ 27" North latitude. It is an independent, sovereign and landlocked country bordered by China to the North and India to the East, South and West. It is approximately 885 km in length and its mean width is 193 km with a total land area of 1, 47,181 sq. km.

The Kathmandu valley, located in the kingdom of Nepal is the capital city. It stands at an elevation of approximately 4,265 ft. (1,300m). The cities of Kathmandu, Patan and Bhaktapur located in this valley, present a high style of Nepalese art and architecture.

The total population of animals that could contribute to national meat production is comprised of 3.4 million buffaloes (CBS, 2002). It was estimated that the total meat consumption in the country during 2002 was about 203, 000 metric tons with per capita consumption of 8.6 kg/ annum (CBS, 2002). On analyzing the contribution of different animal species in national meat supply, it was evident that buffaloes contribute about 57.4% of total meat supply (Joshi *et al*., 2003).

Satungal VDC of Kathmandu metropolitan city is surrounded by Gurjudhara and Naikap from its east and west respectively. The study area ward no. 9 of Satungal VDC is located near the army military camp. The dealing and distribution of buffalo is done at Satungal for the entire places of

Kathmandu. Daily about 1-3 trucks carrying 18-20 buffaloes on each truck are brought to Satungal for slaughter purpose from various places like Nawalparasi, Nepalgunj, Jitpur, Gaur, Jamuniya, Lamki and Janakpur.

This study is carried out for the prevalence rate of helminth infection in buffaloes. The stool samples were collected from the study area and brought at Central Veterinary Laboratory, Tripureshwor for laboratory diagnosis.

4.1. Study design:

The study design is based under laboratory examination.

4.2. Sampling techniques and sample size:

A total of 262 stool samples of buffaloes were collected from ward no. 9 of Satungal VDC which were non symptomatic samples. Mostly the buffaloes brought were from Nawalparasi, Nepalgunj, Jitppur, Gaur, Jamuniya, Lamki and Janakpur.

To ensure better condition during sample collection the following precautions were taken.

a) The fresh stool samples were taken.
b) The samples were collected in airtight container to prevent desiccation.
c) 3-4 drops of 10% formalin were used to fix stool samples.

4.3. Instrumentation:

Tools used in this study were as follows:

4.3.1. Laboratory tools

Cotton, Refrigerator, Coverslip, Centrifuge machine, Slide, Beaker, Cellotape, Glass rod, Stick, Measuring cylinder, Needle, Volumetric flask, Gloves, Electronic weigh machine, Mask, Plastic centrifuge tube, Tea strainer, Microscope, Pasteur pipette ,Rack, Motor and Pistle.

4.3.2. Chemicals:

10% formalin, Distilled water, Sodium chloride solution, Zinc chloride solution, Methylene blue.

4.4. Stool Examination:

The stool samples were collected and brought to laboratory in preservatives and refrigerated. The stool samples were examined by differential floatation technique, sedimentation technique and stoll's counting method.

4.4.1. Differential Floatation technique:

The D.F. technique is widely used for the detection of nematode and cestode eggs. It provides good results among other floatation technique and is one of the easiest and short way for identifying and counting the eggs.

Method:

3 gm of stool sample was taken in a beaker and 42ml of water was added. With the help of motor and pistle, the sample was grinded lightly and filtered with a tea strainer. The filtered sample was poured into plastic tube of 15ml and centrifuged at 1000 rpm for 5 minutes. The tube was taken out and the upper part of the water was removed with the help of a pipette. The tube was noted filled with sodium chloride solution and centrifuged at 1000 rpm for five minutes. More Nacl solution was added upto the tip of the tube. A cover slip was placed over the top of the tube so that the Nacl touches the coverslip for a few minutes and then the coverslip was placed on a slide and examined at 10x.

4.4.2. Sedimentation technique:

The technique is used for the detection of trematode eggs. It provides good results as the eggs of trematode is bit heavier than the other eggs and deposited at the bottom (Source: *Veterinary Lab. Techniques,* 2003).

Method:

3 gm of stool sample was taken in a beaker, 42 ml of water was added and grinded lightly with the help of motor and pistle. The sample was filtered with a tea strainer and the filtered sample was poured in a plastic test tube, centrifuged at 1000 rpm for 5 minutes. The tube was taken out and the upper water was removed with the help of a pipette. Zinc Sulphate solution was filled in the tube and again centrifuged at 1000 rpm for 5 minutes. A drop of deposited materials was taken out from the test tube with the pipette and placed on the slide, added drop of methylene blue into it and examined under the microscope at 4x and 10x.

4.4.3. Stoll's counting method:

It is the easiest quantitative method to count the number of eggs present in the field without the help of Mcmaster. The species wise eggs of helminth parasites has been observed through the microscope present on the slide and were counted.

The number of eggs of trematode, nematode, and cestode was detected and counted. The total number of eggs determines the number of eggs present per gram of faeces.

Key for trematode, cestode and nematode.

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5

RESULTS

5.1. The study has been divided into three parts:

I. Identification of the eggs of helminth parasites

II. General prevalence of helmith parasites in buffaloes

III. Intensity of Infection

I. IDENTIFICATION OF THE EGGS OF HELMINTH PARASITES

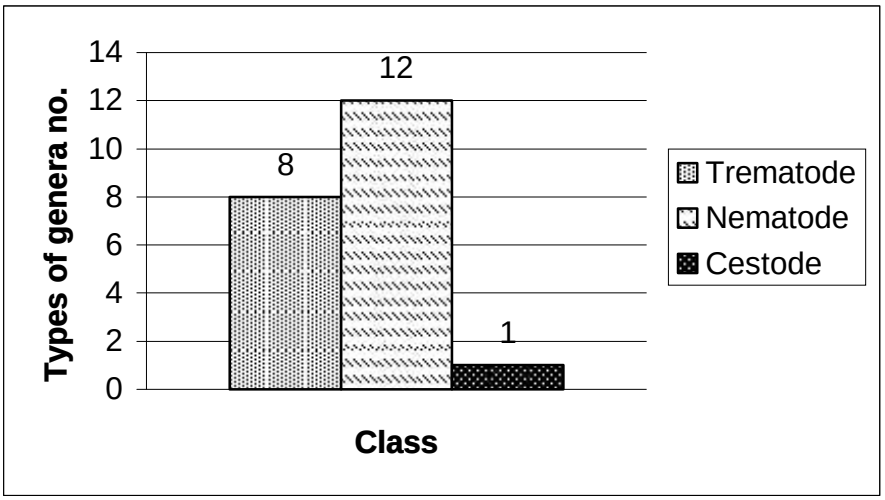
Out of 262 stool samples were examined with the help of sedimentation and floatation technique, 220 (83.96%) samples were found to be positive.The overall prevalence of different species of helminth parasites results statistically significant in buffaloes (χ^2=1322, P<0.05, d.f =38.88).

Altogether 27 species were observed, trematode 10 species belonging to 8 genera, nematode 15 species belonging to 11 genera and cestode 2 species with one genus (Table no. 1).

The species of the various parasitic eggs of the helminth parasites have been identified according to their characters and morphology.

Table No. : 1. Class-wise prevalence of helminth parasites

S. No.	Class	Identified helminthes (species)
1.	**Trematode**	*Fasciola hepatica*
2.		*Paramphistomum cervi*
3.		*Schistosoma spindalis*
		Schistosoma japonicum
		Schistosoma bovis
4.		*Dicrocoelium lanceatum*
5.		*Gastrothylax crumenifer*
6.		*Fischoederius elongatus*
7.		*Ornithobilharzia turkestanicum*
8.		*Skrjabinema ovis*
1.	**Cestode**	*Moniezia expansa*
		Moniezia benedeni
1.	**Nematode**	*Strongyloides papillosus*
2.		*Trichostrongylus axei*
		Trichostrongylus colubriformis
3.		*Toxocara vitulorum*
		Toxascaris leonina
		Toxocara canis
4.		*Ascaris vitulorum*
5.		*Chabertia ovina*
6.		*Oesophagostomum radiatum*
7.		*Haemonchus contortus*
8.		*Ostertagia* sp.
9.		*Cooperia* sp.
10.		*Dictyocaulus* sp.
11.		*Trichuris ovis*
12.		*Capillaria* sp.



Graph 1: Class wise prevalence of helminth parasites

TREMATODES

- ***Fasciola hepatica***

Description of the eggs:

Eggs are 130µm by 150 by 63-90 µm in size, yellowish in colour, consist of embryonic mass and shell, operculum usually indistinct.

Discussion:

In 1758, Linnaeus, reported *F. hepatica* from the bile ducts of the sheep and other ruminants.

From Nepal,

In 1967-92, Mainali reported *Fasciola* sp from Lulu Cattle.

In 1967-92, Parajuli reported *Fasciola* sp. 56.75% in buffalo from Surkhet district.

In 1970, Singh reported *F. hepatica* in sheep and goat from middle terai.

In 1978, Joshi reported *Fasciola hepatica* in goats from Jamunapari of Nuwakot district.

In 1981-82, Lohani and Jaeckle reported *Fasciola* sp from Palpa district.

In 1987, Karki reported *Fasciola* spp in sheep.

In 1987, Ghimire reported *Fasciola* sp in cattle, buffaloes and goats from Surkhet district.

In 1996, Acharya reported *Fasciola* infection among 30% lactating buffaloes.

In 1997-98, Sharma reported *Fasciola* infection 40.12% in animals from Panchthar district.

In 1999, Regmi; Dhakal and Sharma reported *Fasciola* infected 67.66% in buffalo and 62.10% in cattle from Thuladihi VDC, Syangja.

In 2002, Pandey; Mahato and Gupta reported *Fasciola* infection in *Lymnaea* snails and buffaloes from Devbhumi Baluwa VDC of Kavre district.

In 2002/03, Adhikari *et al*., reported prevalence of *Fasciola* sp was found to be 61% among buffaloes from areas of Kathmandu Valley.

In 2003, Rabwin; Joshi and Chettri reported *Fasciola* sp in yaks from Chandanbari, Langtang.

- ***Paramphistomum cervi***

Description of the eggs:

Eggs are 114-176 µm by 73-100 µm in size, Oval in shape, whitish to transparent in colour, distinct operculum, knob-like thickening at the acetabular end of shell, embryonic cells distinct.

Discussion:

In the present study, *P. cervi* 15.64% were found to be positive.

In 1876, Lewis and Mc Connell were the first to describe the trematode *Paramphistomum* from the caecum of an Indian patient.

From Nepal,

In 1967- 92, Parajuli reported *Paramphistomes* 35.13% in buffalo from Surkhet district.

In 1967-92, Mainali reported *Paramphistomum* sp from Lulu cattle.

In 1982, ADPCD reported *Paramphistomum* sp. in cattle and buffalo from Kathmandu.

In 1987, Ghimire reported *Paramphistomum* sp. in cattle, buffaloes and goats from Surkhet district.

In 1997-98, Sharma reported *Paramphistome*s 16.20% in animals from Panchthar district.

In 2002/03, Adhikari *et al*., reported 48% *Paramphistomum* sp in cattle from areas of Kathmandu Valley.

In 2003, Khakural and Khakural reported *Paramphistomum* sp in farm ruminants from Maidi VDC, Dhading.

- ***Dicrocoelium lanceatum***

Description of the eggs:

Eggs are 36-45µm by 20-30µm in size, operculated and thick shelled, brown in colour.

Discussion:

In 1899, Looss reported *D. lanceatum* from the bile ducts of the sheep, goat and cattle.

From Nepal,

No such work on *D. lanceatum* was found.

- ***Schistosoma spindalis***

Description of the eggs:

Eggs are 200µm by 70-90µm in size, spindle shaped, flattened at one side, greatly elongated with straight slender terminal spine.

Discussion:

In 1966, Montgomery reported *S. spindalis* from the mesenteric veins of ruminants.

From Nepal,

In 1987, Ghimire reported *Schistosoma* sp. in cattle, buffalos and goats from Surkhet district.

- ***Schistosoma japonicum***

Description of the eggs:

Eggs are 70-100 μm by 50-80μm in size, possess a knob-like spine, spherical or oval in shape.

Discussion:

In 1904, Katsurada reported *S .japonicum* from the portal and mesenteric veins of both man and animals.

From Nepal,

In 1987, Ghimire reported *Schistosoma* sp. in cattle, buffalos and goats from Surkhet district.

- ***Schistosoma bovis***

Description of the eggs

Eggs are 132-247μm by 38-60μm in size, spindle- shaped, small ones are frequently oval.

Discussion:

In 1876, Sonsino reported *S. bovis* from the portal and mesenteric veins of cattle and sheep.

From Nepal,

In 1987, Ghimire reported *Schistosoma* sp. in cattle, buffalos and goats from Surkhet district.

- ***Gastrothylax crumenifer***

Description of the eggs:

Eggs are 115-135µm by 66-70µm in size, distinct operculum, embryonic cells.

Discussion:

In 1847, Creplin reported *G. crumenifer* from the rumen of sheep, cattle and buffalo.

From Nepal,

In 1970, Singh reported *Gastrothylax compressus* in buffalo from Kathmandu.

In 1973, Singh *et al*., first reported *Gastrothylax crumenifer*.

- ***Fischoederius elongatus***

Description of the eggs:

Eggs are 125-152µm by 65-75µm in size, elliptical in shape, distinct acetabulum.

Discussion:

In 1883, Poirier reported *F. elongatus* from the rumen of cattle.

From Nepal,

In 1973, Singh *et al*., reported *Fischoederius elongatus* from goat intestine.

- ***Ornithobilharzia turkestanicum***

Description of the eggs:

Eggs are 72-77µm by 18-26µm in size, terminal spine, short appendage at the other end.

Discussion:

In 1913, Skrjabin reported *O. turkestanicum* from the mesenteric veins of sheep, cattle and water buffalo.

From Nepal,

No such work on *O. turkestanicum was found.*

- ***Skrjabinema ovis***

Description of the eggs:

Bean shaped in appearance, eggs are fully embryonated.

Discussion:

In 1915, Skrjabin reported *S. ovis* from the sheep and goat.

From Nepal,

In 1997, Joshi reported *Skrjabinema ovis* in goat from western hills of Nepal.

CESTODES

- ***Moniezia expansa***

Description of the eggs:

Eggs are 56-67µm in diameter, triangular, globular or quadrangular in shape, contain a well developed pyriform apparatus.

Description:

In 1810, Rudolphi reported *M. expansa* from the small intestine of sheep, cattle and other ruminants.

From Nepal,

In 1982, ADPCD, reported *Moniezia* sp from calves and sheep.

In 1987, Ghimire reported *Moniezia* sp. in cattle buffaloes and goats from Surkhet district.

In 1989, Gupta reported first reported *Moniezia expansa* from goat.

- ***Moniezia benedeni***

Description of the eggs:

Eggs are 75µm in diameter, triangular, globular or quadrangular in shape, contain distinct double layer, pyriform apparatus.

Discussion:

In 1879, Moniez reported *M. benedeni* from the ruminants of cattle.

From Nepal,

In 1965, Malakar first reported *Moniezia benedini* from buffalo calf.

In 1982, ADPCD, reported *Moniezia* sp from calves and sheep.

In 1987, Ghimire reported *Moniezia* sp. in cattle buffaloes and goats from Surkhet district.

NEMATODES

- ***Strongyloides papillosus***

Description of the eggs:

Eggs are 40-60µm by 20-25µ in size, ellipsoidal, thin shelled, embryonated when laid.

Discussion:

In 1856, Wedl reported *S. papillosus* from the small intestine of sheep and cattle.

From Nepal,

In 1973, Singh et al. reported *Strongyloides* sp from goat and sheep of Kathmandu.

In 1977, Shaky reported *Strongyloides stercoralis* from human.

In 1997, Joshi reported *Strongyloides papillosus* from goat and sheep of western hills of Nepal.

In 1999, Acharya reported *Strongyloides papil losus* in sheep and goat of IAAS livestock farm.

In 2002/03, Adhikari *et al*., reported 10% *Strongyloides* sp among buffalo from areas of Kathmandu Valley.

In 2003, Khakural and Khakural reported strongyles in from suminants from Maidi VDC, Dhading.

In 2003, Rabin; Joshi and Chettri reported *Strongyles* spp. in horses from Kyanjin gompa, Langtang.

- ***Trichostrongylus axei***

Description of the eggs:

Eggs are 79-92µm by 32-49µm in size, oval and bilaterally symmetrical, shell has a thin and transparent outer chitinous layer and a thin inner lipoidal layer, embryonic mass multisegmented and varies from 16-32 in number.

Discussion:

In 1967-92, Mainali reported *Trichostrongylus* sp from Lulu cattle.

In 1973, Singh reported *Trichostrongylus* from cattle and buffalo.

In 1978, Joshi reported *Trichostrongylus* sp in goats from Jamunapari of Nuwakot district.

In 1879, Cobbold reported *T. axei* from the abomasum of sheep and cattle.

From Nepal,

In 1997, Joshi reported *Trichostrongylus axei* from cattle and goat from western hills of Nepal.

In 1999, Joshi reported *Trichostrongylus* spp in sheep and goat from Kaski district, Pokhara.

In 1999, Acharya reported *Trichostrongylus* spp. in sheep and goat of IAAS livestook farm.

In 2003, Thakur reported *Trichostrongylus axei* in pigs from eastern hills of Nepal.

In 2003, Rabin; Joshi and Chetri reported *Trichosponglylus* sp in Yaks from Chandanbari, Langtang.

- ***Trichostrongylus colubriformis***

Description of the eggs:

Eggs are 79-101µm by 39-47µm in size, oval thin shelled, segmented when laid.

Discussion:

In 1892, Giles reported *T. colubriformis* from the small intestine of sheep and cattle.

From Nepal,

In 1967-92, Mainali reported *Trichostrongylus* sp from Lulu cattle.

In 1973, Singh reported *Trichostrongylus* from cattle and buffalo.

In 1978, Joshi reported *Trichostrongylus* sp from in goats from Jamunapari of Nuwakot district.

In 1997, Joshi reported *Trichostrongylus Colubriformis* from cattle and goat of western hills of Nepal.

In 1999, Acharya reported *Trichostrongylus* spp. in sheep and goat of IAAS livestook farm.

In 1999, Joshi reported *Trichostrongylus* spp in sheep and goat from Kaski district, Pokhara.

In 2003, Thakur reported *Trichostrongylus axei* in pigs from eastern hills of Nepal.

In 2003, Rabwin; Joshi and Chettri reported *Trichostrongylus* sp in Yaks from Chandanbari, Langtang.

- ***Toxocara vitulorum***

Description of the eggs:

Eggs are 75-95µm by 60-75µm in size, sub-globular and have finely pitted albuminous layer

Discussion:

In 1782, Goeze reported *T. vitulorum* from the small intestine of cattle and buffalo.

From Nepal,

In 1967-92, Joshi and Ghimire reported *Toxocara vitulorum* in buffalo calves from Lumle ,Pokhara.

In 1982, ADPCD reported Toxascaris in dog and cat from Kathmandu.

In 1987, Ghimire reported *Toxocara* sp. in Cattle, buffaloes and goats from Surkhet district.

- ***Toxascaris leonina***

Description of the eggs:

Eggs are 75-85µm by 60-75µm in size, slightly oval with smooth shell, often single celled, occasionally two celled.

Discussion:

In 1902, Linstow reported *T. leonina* from the small intestine of dog, cat and wild felidae.

From Nepal,

In 1970, Singh reported *Toxascaris leonina* from leopard (Felis tigers).

In 1987, Ghimire reported *Toxocara* sp. in Cattle, buffaloes and goats from Surkhet district.

In 1999, Gautam *et al*., reported *Toxocara leonina* 6.7% from pet dogs of Kathmandu Valley.

In 2003, Khaniya and Sah reported *Toxocaris leonina* in dogs.

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- ***Toxocara canis***

Description of the eggs:

Eggs are 90µm by -75µm in size, markedly pitted shells, sub-globular in outline.

Discussion:

In 1970, Singh reported *Toxascara canis* from dogs.

In 1782, Werner reported *T. canis* from the small intestine of dog and fox.

From Nepal,

In 1987, Ghimire reported *Toxocara* sp. in Cattle, buffaloes and goats from Surkhet district.

In 1999, Gautam *et al.,* reported *Toxocara canis* 39.8% from pet dogs of kathmandu valley.

In 2003, Khaniya and sah reported *Toxocara Canis* in dogs.

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- ***Ascaris vitulorum***

Description of the eggs:

Eggs are 50µ-90µ in size, laid in morula stage, subglobular

Discussion:

In 1782, Goeze reported *A. vitulorum* from the small intestine of cattle and buffalo.

From Nepal,

In 1965, Sharma *et al.,* first reported *Ascaris* spp from human.

In 1965, Sharma reported *Ascaris lumbricoides* in human from Bhaktapur.

In 1975, Soulsa reported Ascaris *lumbricoides* in human from Pokhara.

In 1977, Shakya reported *A .lumbricoides* in human from Surkhet.

In 1980, Khetan reported *A. lumbricoides* in human from Narayani.

In 1981, Bol reported *A. lumbricoides* in human from Lalitpur.

In 1982, IFP ans PCP reported *A. lumbricoides* in human from Panchkhal.

In 1982, ADPCD reported *Neoascaris vitulorum* in buffalo and chauri from Kathmandu.

In 1982, ADPCD reported *Ascaris suis* in pigs from Kathmandu.

In 1997-98, Sharma reported Ascariosis 43.69% in animals from Panchthar district.

- ***Chabertia ovina***

Description of the eggs:

Eggs are 90-105µm by 50-55µm in size, laid in morula stage, oval shaped.

Discussion:

In 1790, Gmelin reported *C. ovina* reported from the colon of sheep, cattle and other ruminants.

From Nepal,

In 1973, Singh reported *Chabertia ovina* in sheep, cattle and goat from Kathmandu.

In 1977, Joshi reported *Chabertia ovina* in sheep and goat from western hills on Nepal.

In 1999, Acharya reported *Chabertia ovina* in sheep and goat of IAAS livestock farm.

- ***Oesophagostomum radiatum***

Description of the eggs:

Eggs are 70-76µm by 36-40µm in size, strongyle-like.

Discussion:

In 1803, Rudolphi reported *O. radiatum* from the colon of cattle and water buffalo.

From Nepal,

In 1982, ADPCD reported *Oesophagostomum* sp in pig, cattle and buffalo from Kathmandu.

In 1997, Joshi reported *Oesophagostomum venulosum* in goat from western hills of Nepal.

In 1999, Acharya reported *Oesophagostomum* spp in sheep and goat of IAAS livestock form.

In 2003, Thakur reported *Oesophagostomum* sp. in pigs from eastern hills of Nepal.

- ***Haemonchus contortus***

Description of the eggs:

Eggs are 70-85µm by 41-48µm in size, embryo 16-32 celled when laid.

Discussion:

In 1803, Rudolphi reported *H. contortus* from the abomasum of sheep, cattle and other ruminants.

From Nepal,

In 1967-92, Mainali reported *Haemonchus* sp. from Lulu cattle.

In 1973, Singh et al., reported *Haemonchus* sp. in cattle, sheep and buffalo from Kathmandu.

In 1978, Joshi reported *Haemonchus* sp in goats from Jamunapari of Nuwakot district.

In 1997, Joshi reported *Haemonchus contortus* in sheep and goat from western hills of Nepal.

In 1999, Acharya reported *Haemonchus contortus* in sheep and goat of IAAS livestock farm from central lab. Tripureshpureshwor.

In 1999, Joshi reported *Haemonchus contortus* in sheep and goat from Kaski district, Pokhara.

- ***Ostertagia* sp.**

Description of the eggs:

Eggs are 80-85µm by 40-45µm in size, elliptical in shape.

Discussion:

In 1907, Ranson reported *Ostertagia* sp. from the abomasum and small intestine of sheep, cattle and other ruminants.

From Nepal,

In 1982, ADPCD reported *Qstertagia* sp in pig, cattle and buffalo from Kathmandu.

In 1997, Joshi reported *Ostertagia nianquingtangluaensis* in goat and sheep from western hills of Nepal.

In 1999, Acharya reported *Qstertagia* spp in sheep and goat of IAAS livestock, central Lab. Tripureshwor.

In 1999, Joshi reported *Qstertagia* sp in sheep and goat from Kaski district, Pokhara.

In 1999, Acharya reported *Qstertagia* spp in sheep and goat of IAAS livestock farm.

- ***Cooperia* sp.**

Description of the eggs:

Eggs are 68-82µm by 34-42µm in size, consist of a double layer.

Discussion:

In 1907, Ransom reported *Cooperia* sp. from the small intestine and abomasum of ruminants.

From Nepal,

In 1982, ADPCD reported *Cooperia* spp in goat, sheep and buffalo from Kathmandu.

In 1997, Joshi reported *Cooperia curticei* in sheep from western hills of Nepal.

In 1997, Joshi reported *Cooperia punctata* in sheep from western hills of Nepal.

In 1999, Acharya reported *Cooperia* spp in sheep and goat of IAAS livestock farm.

- ***Dictyocaulus* sp.**

Description of the eggs:

Eggs are 82-88µm by 33-30µm in size, ellipsoidal, contain fully developed larva when laid or first stage larva may pass.

Discussion:

In 1809, Rudolphi reported *Dictyocaulus* sp from the bronchi of sheep, goat and wild ruminants.

From Nepal,

In 1982, ADPCD reported *Dictyocaulus* sp in goat and sheep from Kathmandu.

- ***Trichuris ovis***

Description of the eggs:

Eggs are 70-80µm by 30-42µm in size, unsegmented, brown in colour, barrel shaped with transparent plug at either pole.

Discussion:

In 1795, Abildgaard reported *T. ovis* from the caecum of sheep, cattle and other ruminants.

From Nepal,

In 1965, Sharma reported *Trichuris Trichura* in human from Bhaktapur.

In 1970, Singh reported *Trichuris globulosa* in goat from Kathmandu.

In 1977, Shakya reported *Trichuris Trichura* in human from Surkhet.

In 1981, Bol *et al*., reported *Trichuris Trichura* in human from Lalitpur.

In 1981, IFP and PCP reported *Trichuris Trichura* in human from Panchkhal.

In 1982, ADPCD reported *Trichuris Trichura* in cattle, sheep, goat and buffalo from Kathmandu.

In 1982, ADPCD reported *Trichuris suis* in pig from Kathmandu.

In 1988, Gupta reported *Trichuris Trichura* in human from Kirtipur.

In 1997, Joshi reported *Trichuris ovis* in goat and sheep from western hills of Nepal.

In 2003, Thakur reported *Trichuris* sp. in pigs from eastern hills of Nepal.

- ***Capillaria* sp.**

Description of the eggs:

Eggs are 30µ-63µ in size, unsegmented, barrel shaped, colourless shell.

Discussion:

In 1800, Zeder reported *Capillaria* sp from the small intestine of dog and cattle.

From Nepal,

In 1967-92, Mainali reported *Capillaria* sp. from Lulu cattle.

In 1982, ADPCD reported *Capillaria* sp. in poultry from Kathmandu.

II. GENERAL PREVALENCE OF HELMINTH PARASITES IN BUFFALOES:

A total of 262 stool samples were collected from the study area ward no.9 of Satungal VDC where buffaloes are brought from out of the valley and kept for sale for slaughter purpose.

With the help of floatation and sedimentation technique, these samples were examined. Among them 42 samples were found negative (16.04%) and 220 samples were found to be positive (83.96%).

Therefore, the general prevalence rate of helminth parasites in buffaloes was found to be 83.96%.

II.a. Class wise prevalence of helminth parasites:

Altogether eggs of 21 genus and 27 species were observed. These are arranged according to their classes. Out of the 220 (83.96%) positive samples, 200 (90.90%) samples were found positive for trematode species, 108 (49.09%) samples for nematode species, and 32 (14.54%) samples were found positive for cestode species.

The total number and species of genera observed were as follows

Trematode = 10 species belonging to 8 genera.

Nematode = 15 species belonging to 12 genera.

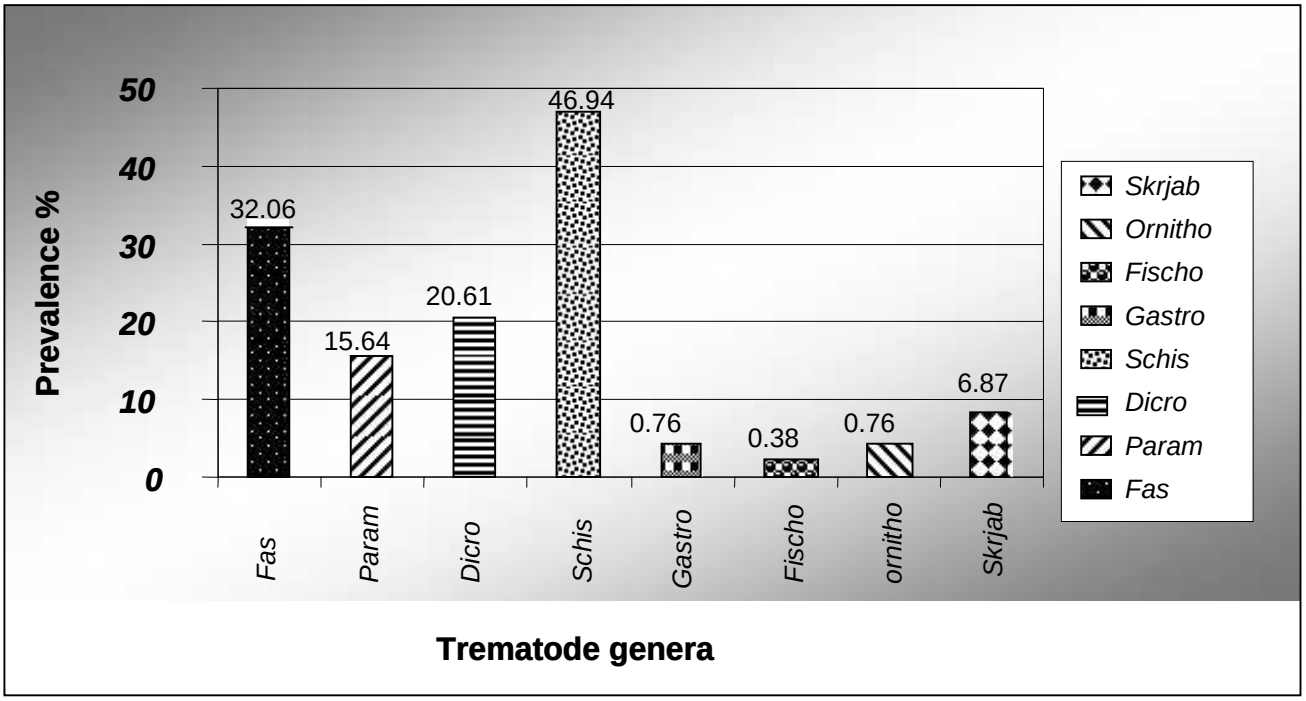
Cestode = 2 species belonging to 1 genus**.**

II.b. Prevalence of trematodes:

Out of the 200 (90.90%) positive samples for trematode, 8 genera were observed with 10 species. *Schistosoma* spp 46.94% was found in highest numbers followed by *Fasciola* 32.6%, *Dicrocoelium* 20.61%, *Paramphistomum* 15.64%, *Skrjabinema* 6.87%, *Gastrothylax* 0.76%, *Ornithobilharzia* 0.76% and *Fischoederius* species 0.38%.

Table No.: 2 . Prevalence of trematode genera.

S. No.	Name of the genera	Total samples examined	Positive samples	
			Nos.	%
1.	*Fasciola*	262	84	32.06
2.	*Paramphistomum*	262	41	15.64
3.	*Dicrocoelium*	262	54	20.61
4.	*Schistosoma*	262	123	46.94
5.	*Gastrothylax*	262	2	0.76
6.	*Fischoederius*	262	1	0.38
7.	*Ornithobilharzia*	262	2	0.76
8.	*Skrjabinema*	262	18	6.87



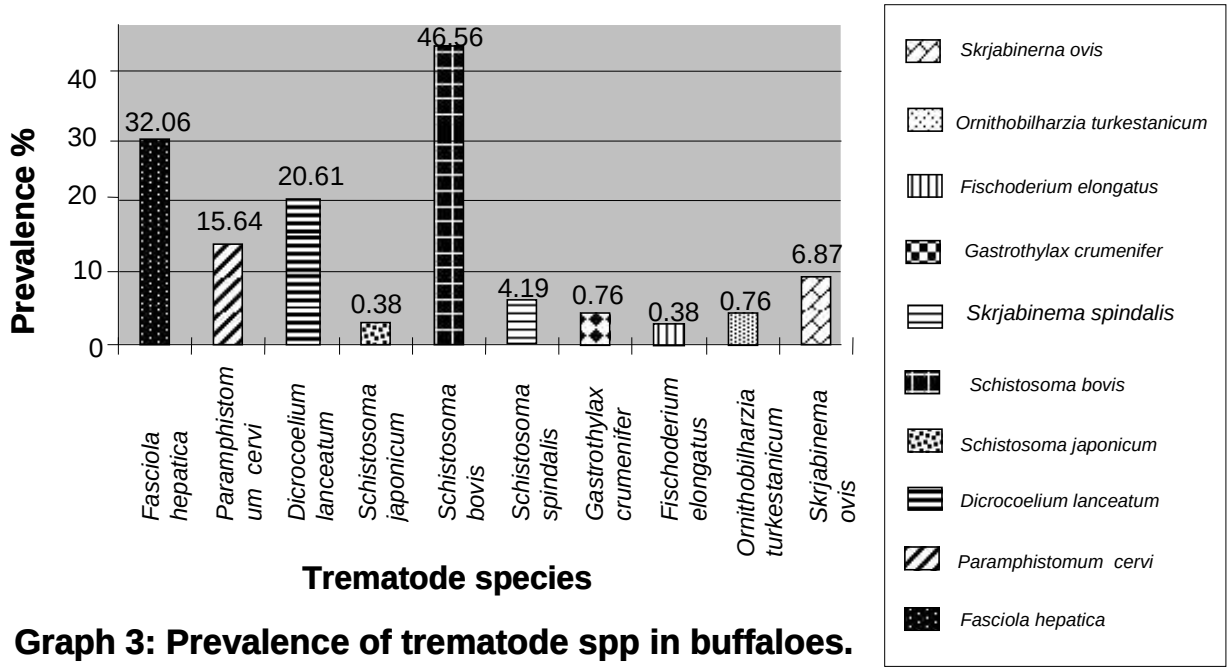
Graph 2: Prevalence of trematode genera in buffaloes.

Species wise prevalence:

Schistosoma bovis with 46.56% was found in highest numbers followed by *Fasciola hepatica* 32.6%, *Dicrocoelium lanceatum* 20.61% and *Paramphistomum cervi* 15.64% respectively. The prevalence of different species of trematode results statistically significant in buffaloes (χ^2= 472, P< 0.05, d.f.= 9).

Table No.: 3. Prevalence of trematode species.

S. No.	Name of the species	Total samples examined	Positive samples	
			Nos.	%
1.	*Fasciola hepatica*	262	84	32.06
2.	*Paramphistomum cervi*	262	41	15.64
3.	*Dicrocoelium lanceatum*	262	54	20.61
4.	*Schistosoma japonicum*	262	1	0.38
5.	*Schistosoma bovis*	262	122	46.56
6.	*Schistosoma spindalis*	262	11	4.19
7.	*Gastrothylax crumenifer*	262	2	0.76
8.	*Fischoderius elongatus*	262	1	0.38
9.	*Ornithobilharzia turkestanicum*	262	2	0.76
10.	*Skrjabinema ovis*	262	18	6.87



Graph 3: Prevalence of trematode spp in buffaloes.

II.c. Prevalence of cestodes:

Out of the 32 (14.54%) positive samples for cestode, 1 genera were observed with 2 species. *Moniezia* species 12.21% was found among cestode..

Table No.: 4. Prevalence of cestode genera.

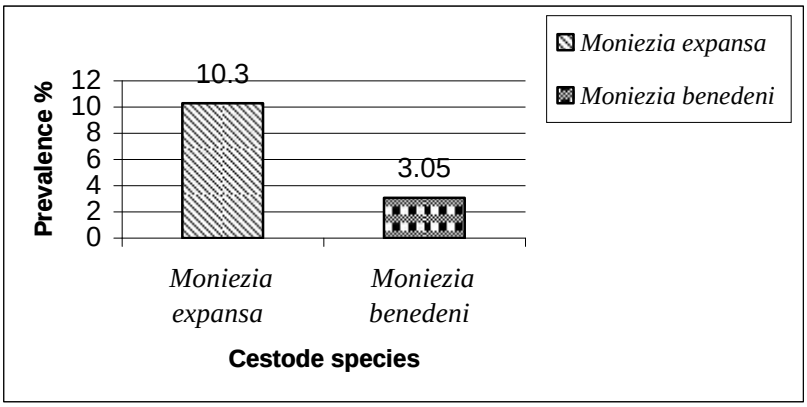
S. No.	Name of the genera	Total samples examined	Positive samples	
			Nos.	%
1.	*Moniezia*	262	32	12.21

Species wise prevalence :

According to the table no.5 *Moniezia expansa* 10.30% was found in highest numbers followed by *Moniezia benedeni* 3.05%. The prevalence of different species of cestode result statistically significant in buffaloes (χ^2 = 9, P< 0.05, d.f.= 1).

Table No.: 5. Prevalence of cestode species.

S. No.	Name of the species	Total samples examined	Positive samples	
			Nos.	%
1.	*Moniezia expansa*	262	27	10.30
2.	*Moniezia benedeni*	262	8	3.05



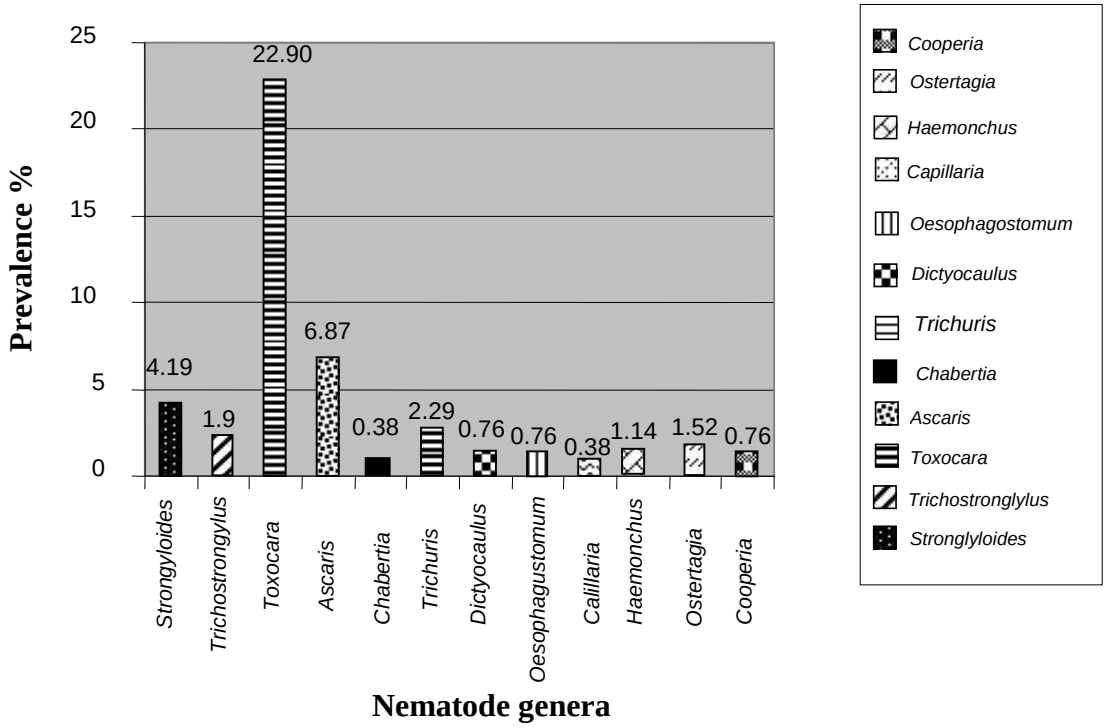
Graph 4: Prevalence of cestode spp in buffaloes.

II.d. Prevalence of nematodes:

Out of the 108 (49.09%) positive samples for nematode, 12 genera were observed with 15 species. *Toxocara* spp was found in highest numbers 22.90% among various nematode. Followed by *Ascaris* 6.87%, *Strongyloides* 4.19%, *Trichuris* 2.29%, *Trichostrongylus* 1.90%, *Ostertagia* 1.52%, *Haemonchus* 1.4%, *Dictyocaulus* 0.76%, *Oesophagostomum* 0.76%, *Cooperia* 0.76%, *Chabertia* 0.38% and *Capillaria* species 0.38%.

Table No.: 6. Prevalence of nematode genera

S. No.	Name of the genera	Total samples examined	Positive samples	
			Nos.	%
1.	*Strongyloides*	262	11	4.19
2.	*Trichostrongylus*	262	5	1.90
3.	*Toxocara*	262	60	22.90
4.	*Ascaris*	262	18	6.87
5.	*Chabertia*	262	1	0.38
6.	*Trichuris*	262	6	2.29
7.	*Dictyocaulus*	262	2	0.76
8.	*Oesophagostomum*	262	2	0.76
9.	*Capillaria*	262	1	0.38
10.	*Haemonchus*	262	3	1.14
11.	*Ostertagia*	262	4	1.52
12.	*Cooperia*	262	2	0.76



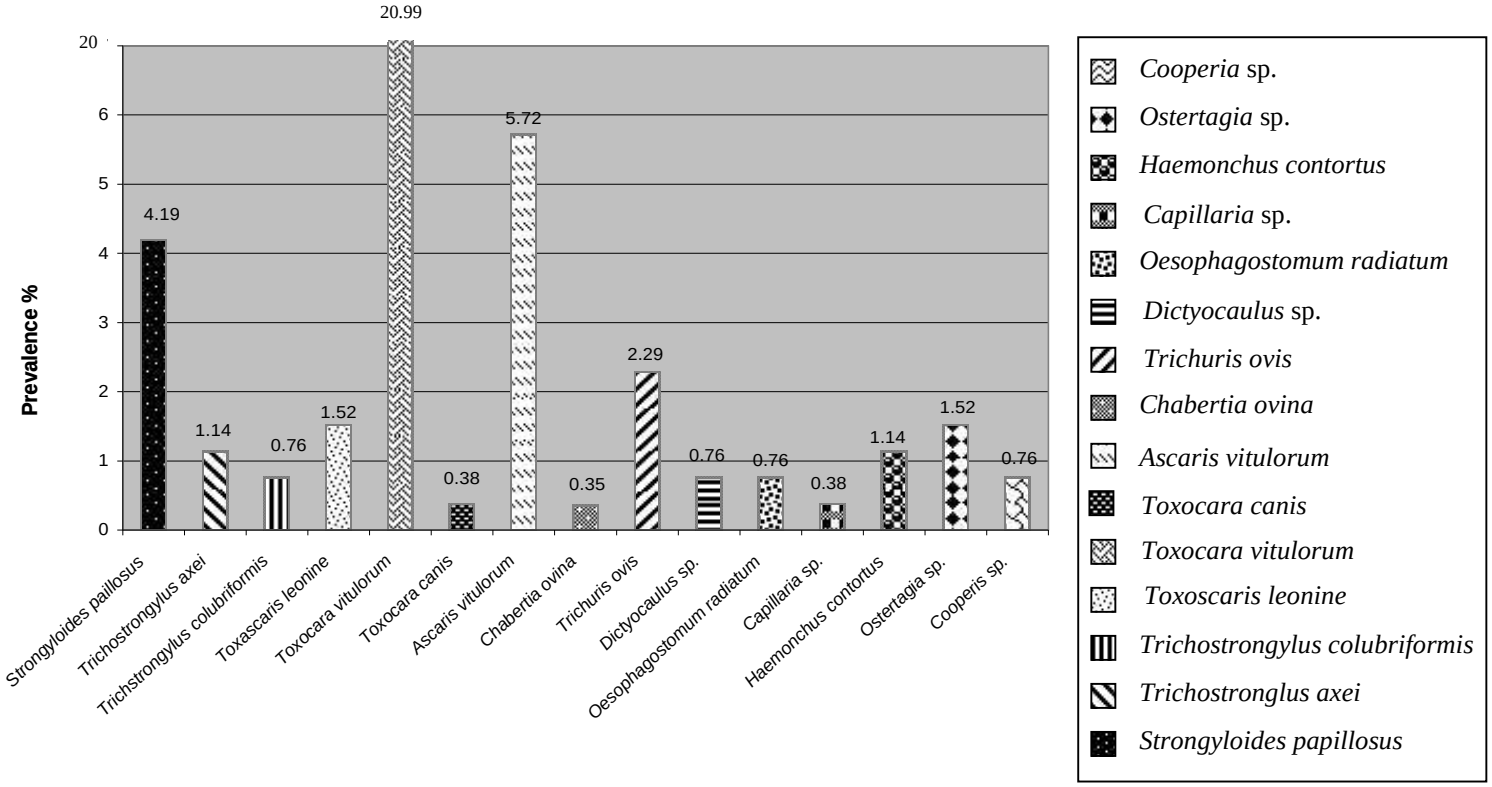
Graph 6: Prevalence of nematode genera in buffaloes.

Species wise prevalence:

Toxocara vitulorum 20.99% was found in highest numbers followed by *Ascaris vitulorum* 5.72% and *Strongyloides papillosus* 4.19% respectively. The prevalence of different species of nematode result statistically significant (χ^2 = 373, P< 0.05, d.f.= 14).

Table No.: 7. Prevalence of nematode species.

S. No.	Name of the species	Total samples examined	Positive samples	
			Nos.	%
1.	*Strongyloides papillosus*	262	11	4.19
2.	*Trichostrongylus axei*	262	3	1.14
3.	*Trichostrongylus colubriformis*	262	2	0.76
4.	*Toxascaris leonine*	262	4	1.52
5.	*Toxocara vitulorum*	262	55	20.99
6.	*Toxocara canis*	262	1	0.38
7.	*Ascaris vitulorum*	262	15	5.72
8.	*Chabertia ovina*	262	1	0.38
9.	*Trichuris ovis*	262	6	2.29
10.	*Dictyocaulus* sp.	262	2	0.76
11.	*Oesophagostomum radiatum*	262	2	0.76
12.	*Capillaria* sp.	262	1	0.38
13.	*Haemonchus contortus*	262	3	1.14
14.	*Ostertagia* sp.	262	4	1.52
15.	*Cooperia* sp.	262	2	0.76



Nematode species

Graph 6: Prevalence of nematode spp in buffaloes

III. INTENSITY OF INFECTION

Table no.:8. Intensity of infection.

S.no.	Class	Name of the species	+	+ +	+ + +	+ + + +
1.	Trematode	*Fasciola hepatica*	59	19	3	3
2.		*Paramphistomum cervi*	29	10	1	_
3.		*Dicrocoelium lanceatum*	28	13	7	6
4.		*Schistosoma japonicum*	1	_	_	_
5.		*Schistosoma bovis*	70	43	9	_
6.		*Schistosoma spindalis*	11	_	_	_
7.		*Gastrothylax crumenifer*	2	_	_	_
8.		*Fischoederius elongates*	1	_	_	_
9.		*Ornithobilarzia turkestanicum*	2	_	_	_
10.		*Skrjabinema ovis*	12	5	1	_
11.	Cestode	*Moniezia expansa*	15	2	2	_
12.		*Moniezia benedeni*	5	2	_	1
13.	Nematode	*Strongyloides papllosus*	11	_	_	_
14.		*Trichostrongylus axei*	3	_	_	_
15.		*Trichostrongylus colubriformis*	2	_	_	_
16.		*Toxocara leonina*	4	_	_	_
17.		*Toxocara vitulorum*	37	12	1	5
18.		*Toxocara canis*	_	2	_	_
19.		*Ascaris vitulorum*	15	_	_	_
20.		*Chabertia ovina*	1	_	_	_
21.		*Trichuris ovis*	6	_	_	_
22.		*Dictyocaulus* sp	2	_	_	_
23.		*Capillaria* sp	1	_	_	_
24.		*Haemonchus contortus*	3	_	_	_
25.		*Ostertagia* sp	4	_	_	_
26.		*Cooperia* sp	2	_	_	_

+	=	less than 2 ova per field. } Light infection
+ +	=	2-4 ova per field. } Mild infection
+ + +	=	4-6 ova per field. } Moderate infection
+ + + +	=	6 or more ova per field. } Heavy infection

Multiple Infections:

In the present study, the rate of mixed infection was also observed. Among 220 (83.96%) positive samples, 140 (63.63%) positive samples were examined mixed infections with 2-5 species in each samples. Among helminths, the intensity of light infection (Table no.8) was noted due to *Schistosoma bovis* with 70 (+) positive samples (50%) and mild infection was due to *Schistosoma bovis* with 43 (+ +) positive samples (30.71%). The moderate infection with was noted due to *Schistosoma bovis* with 9 (+ + +) positive sample (6.42%) and the heavy infection with was noted due to *Dicrocoelium lanceatum* in 6 (+ + + +) positive samples (4.28%).

6

DISCUSSION AND CONCLUSION

The aim of the study was to investigate the prevalence of helminth parasites in buffaloes. During the study period stool samples were collected from ward no. 9 of Satungal VDC. Out of 262 samples examined, 220 (83.96%) samples were found positive. The positive samples for trematode species were 200 (90.90%) samples, whereas 108 (49.09%) samples for nematode species and 32 (14.54%) samples were found positive for cestode species.

The helminthiasis has been emerged as an important parasitic disease since from the past decades in the world, but in Nepal it had been reported upto certain extent.

In the present study, 10 types of trematode species, 2 types of cestode species and 15 types of nematode species were examined.
Among trematodes, *F. hepatica, P. cervi, D. lanceatum, S. japonicum, S. bovis, S. spindalis, G. Crumenifer, F. elongatus, O. turkestanicum* and *S.* ovis were found.

In cestodes, the observed species were *M. expansa* and *M, benedeni*.
In Nematodes, *S. papillosus, T. colubriformis, T. axei, T. leonina, T. vitulorum, T. canis, A. vitulorum, C. ovina, T. ovis, Dictyocaulus* sp, *O. radiatum, capillaria* sp, *H. contortus, Ostertagia* sp and *Cooperia* sp were found.

Species of trematodes , *Dicrocoelium lanceatum* and *Ornithobilharzia turkestanicum* are reported for the first time from Nepal. No work regarding these species was found. These species are also not have been reported from other hosts.

However, trematode Skrjabinema ovis, Fischoederius elongates and nematodes, Chabertia ovina, Dictyocaulus sp and Capillaria sp has been reported from various hosts sheep, goat and cattle except buffalo. Therefore these 5 species are reported for the first time in the host buffalo from Nepal.

The prevalence of trematode species found in buffaloes (Table no. 3) were *Fasciola hepatica* 32.06%, *Paramphistomum cervi* 15.64%, *Dicrocoelium lanceatum* 20.61, *Schistosoma japonicum* 0.38%, *Schistosoma bovis* 46.56%, *Schistosoma spindalis* 4.19%, *Gastrothylax crumenifer* 0.96%, *Fischoederius elongatus* 0.38%, *Ornithobilharzia turkestanicum* 0.76% and *Skrjabinema ovis* 6.87%.Among cestode, (Table no. 5) *Moniezia expansa* 10.30% and *Moniezia benedeni* 3.05%.

In nematode, (Table no.7) *Strongyloides papillosus* 4.19%, *Trichostrongylus axei* 1.14%, *Trichostrongylus colubriformis* 0.76%, *Toxascaris leonina* 1.52%, *Toxacara canis* 0.38%, *Toxocara vitulorum* 20.99%, *Ascaris vitulorum* 5.72%, *Chabertia ovina* 0.36%, *Trichuris ovis* 2.21, *Dictyocaulus* sp. 0.76%, *Oesophagostomum radiatum* 0.76%, *Capillaria* sp. 0.38%, *Haemonchus Contortus* 1.14%, *Ostertagia* sp. 1.52%, and *Cooperia* sp. 0.76%.

Accurate data are not yet available to the extent of helminthiasis worldwide. However, high prevalence of *Fasciola hepatica* i.e. 67.66% has been reported from Thuladihi, Syangja among buffaloes (Regmi *et al*.,1999) followed by 56.75%. *Fasciola* infection from Surkhet district (Parajuli,1967-92) and 40.12% infection in animals from Panchthar district (Sharma, 1997-98) which were the highest infection among buffaloes comparing to the present study i.e. 32.06%. Similar, type of prevalence of the parasites has been reported from Rio Grande Do Sul, southern Brazil in buffaloes (Marques *et al*.,1999). Likewise, the prevalence of *Paramphistomum* cervi ie. 35.13% has been reported from Surkhet district (Parajuli,1967-92) is higher than the present

prevalence i.e.15.64%. But the prevalence reported 16.20% in animals form Panchthar district (Sharma, 1997-98) is bit similar with the present study.

Most of the species like *Schistosona spindalis*, *Schistosoma japonicum* and *Schistosoma bovis* has been reported among buffalo from Surkhet district (Ghimire, 1987) which has been also found in the present study among buffaloes. Such species of trematode has been reported from Kathmandu among buffaloes are *Fishchoederius elongatus* and *Gastrothylax crumenifer* (singh *et al*., 1973). As *Skrjabinema ovis* has been reported form western hills of Nepal (Joshi, 1997) which is also found in the present study.

Cestode, *Moniezia benedeni* and *Moniezia expansa* has been reported from Kathmandu and Surkhet district (Malakar, 1965/ Gupta, 1989/ ADPCD, 1982/ Ghimire, 1987) among buffaloes, goat & cattle but no rate of prevalence has been described. Similar type of species has been reported in the present study among buffaloes.

The prevalence of helminthiasis in buffaloes was found to be 15.2% in the colony of Hyderabad (Akhtar *et al*., 2003). The chief helminth were *Toxocara vitulorum* 3.6%, *Oesophagostomum radiatum* 3.0%, *Strongyloides papillosus* 2.4%, *Ostertagia ostertagi* 1.0% and *Trichuris* sp. 0.2%. Comparing to the present study, the prevalence of *Toxocara vitulorum* 20.99% followed by *Strongyloides papillosus* 4.19%, *Ostertagia ostertagi* 1.52% and *Trichuris ovis* 2.29% were higher because these are the common nematodes of buffaloes and may occurred due the ingestion of contaminated soil and herbage during grazing and propensity to seek rivers, pools or swamps for wallowing. *Oesophagostomum radiatum* 0.76% has been found lower comparing to the prevalence of colony of Hyderabad may be the infection of *O.radiatum* is less on the infected buffalo.

The gastro-intestinal nematodosis reported from terai, India (Yadav *et al*.,2004) were *Haemonchus*, *Trichostrongylus*, *Oesophagostomum* and

Strongyloides were the main parasites among buffaloes which were found similar to the present study because the strongyle groups are common in buffaloes and most of the buffaloes were brought from terai site which may be infected buffaloes brought for slaughter purpose.

Nematode, *Trichostrongylus* species has been reported form Kathmandu among buffaloes (Singh, 1973) but the same species has been reported in buffaloes of present study.

Infection with *Strongyloides papillosus* 85% and *Toxocara vitulorum* 58% among buffaloes has been reported form Thailand (Srikit Jakarn *et al*.,1987) is greatly higher than the present study ie. *Strongyloides papillosus* 4.19% and *Toxocara vitulorum* 20.99%.

Ascariosis 43.69% reported from Panchthar district (Sharma, 1997-98) is found to be higher than the present study ie. 5.72% may be the animals of Panchthar district were infected with more contaminated water and other *Ascaris* infected matters.

Similarly *Chabertia ovina*, *Cooperia*, *Dictyocaulus* and *Capillaria* Species has been reported among buffaloes (ADPCD, 1982) is found to be similar to the present study.

In the present study, quantitative technique was used to determine the number of eggs present per gram of faeces with the sedimentation and floatation technique.

Among trematode, *Dicrocoelium lanceatum* was found to be heavily infected (4.28%) followed by *Fasciola hepatica* (2.14%) of buffaloes. Castode, *Moniezia benedeni* (0.71%) and nematode, *Toxocara vitulorum* was found to be heavily infected in (3.75%) of buffaloes.

Mixed infections 0.6% with species of *Fasciola hepatica, Ostertagia ostertagi, Paramphistomum cervi, Trichuris sp, Oesophagostomum radiatum* and *Strongyloides papillosus* have been reported from the colony of Hyderabad among buffaloes (Akhtar and Mohammad, 2003). Comparing to it, the overall mixed infection 63.63% was noted higher in the present study but similar types of mixed species were observed.

7

RECOMMENDATIONS

- Anthelmintics treatment should be applied to eliminate the parasite from the host.
- Animal slaughter and meat inspection act should be implemented for better quality and disease free meat.
- The program for awareness of the meat born disease and zoonotic disease to the public and butcher should be developed.
- This study will be base for the future investigators and further detailed study can be done on new species.

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EGGS OF NEMATODES AND CESTODES

Fig 1: *Toxocara vitulorum*

Fig 2: *Trichostrongylus axei*

Fig 3: *Strongyloides papillosus*

Fig 4: *Trichuris ovis*

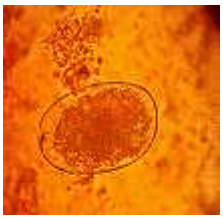

Fig 5: *Haemonchus contortus*

Fig 6: *Dictyocaulus* sp.

Fig 7: *Toxascaris leonina*

Fig 8: *Ascaris vitulorum*

Fig 9: *Oesophagostomum radiatum*

Fig 10 : *Ostertagia* sp.

Fig 11: *Cooperia* sp.

Fig 12: *Capillaria* sp.

Fig 13: *Chabertia ovina*

Fig 14: *Trichostrongylus colubriformis*

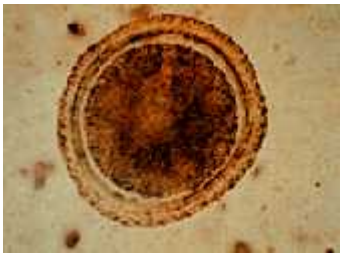

Fig 15:*Toxocara canis*

Fig 16: *Moniezia benedeni*

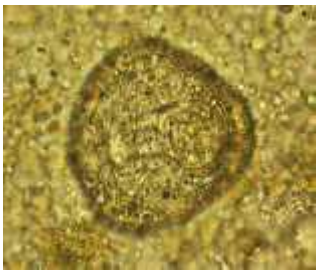

Fig 17: *Moniezia expansa*

EGGS OF TREMATODES

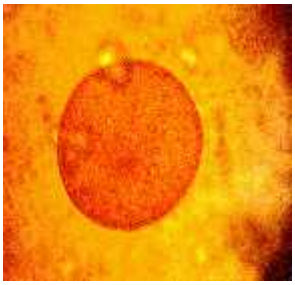

Fig 18: *Dicrocoelium lanceatum*

Fig 19: *Paramphistomum cervi*

Fig 20: *Schistosoma bovis*

Fig 21: *Fasciola hepatica*

Fig 22: *Skrjabinema ovis*

Fig 23: *Shistosoma japonicum*

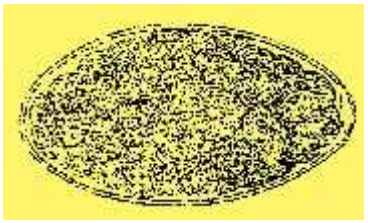

Fig 24: *Fischoederius elongatus*

Fig 25: *Schistosoma spindails*

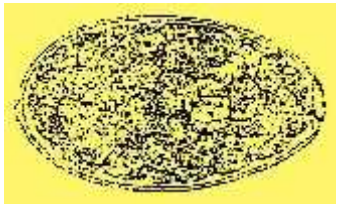

Fig 26: *Gastrothylax crumenifer*

Fig 27: *Ornithobilharzia turkestanicum*

Fig 28: Study area: ward no. 9, Satungal VDC

Fig 29: Buffaloes kept for slaughter

Fig 30: Preserving stool samples

Fig 31: Collecting stool samples

Fig 32: With veterinarians (Germany) & dealers

'HOTOCOPIES OF THE NEWSPAPER CUTTINGS

नाम्लेरोगबाट डेढ अर्बभन्दा बढीको क्षति

(GORKHAPATRA DAILY MARCH 6, 2000)

THE RISING NEPAL, KATHMANDU, MARCH 6, 2000 MONDAY

Fasciolosis claims 70% of buffaloes in mid-hill regio

Kathmandu, Mar. 5 (RSS):

Fasciolosis or liver-rot claims some 70 per cent of buffaloes in the mid-hill region of Nepal causing a loss of some Rs. 1,685 million every year.

According to a survey of 1972, 50 to 90 per cent of buffaloes in the mid-hill region contracted the disease causing a loss of some US $ 20 million, while a study carried out in 1993 incurred a loss of some US $ 30 million. As compared to other animals, buffaloes are more likely to contract the disease.

Despite public awareness about the disease and investment of some 60 per cent of the budget for eradication of livestock diseases, there is no decline in the cases of fasciolosis.

The disease spreads from the grazing ground and hay before and after harvesting crops. Sluggishness, weight loss, reduction in milk-producing capacity, etc are the symptoms of the disease.

A research jointly conducted for the past four years by the Agriculture Research Station Pakhribas (ARS-P) and the Centre for Tropical Veterinary Medicine (CTVM) with the assistance of Department of International Development (DFID) of the United Kingdom shows that extra feed supplements can be a viable alternative to drug treatment in alleviating the effects of fasciolosis in growing ruminants, provided it is of medium protein content (about 14 per cent).

But, high protein supplements. E. G. 19 per cent crude protein such as oil seed cakes and fodder legumes were not suitable alternative to drug treatment.

Chief veterinary officer of the Livestock Services Department Animal Health Division Dr. Shambhu Narayan Mahato, CTVM experts, and Dr. B. Pak and D. B. Subba of the A[illegible] expressed these views [illegible] international workshop on "Strategies for feed management in areas endemic for fasciolosis" jointly organized by the ARS-P and CTVM of scotland here today.

Joint Secretary at the Ministry of Agriculture Dr. S. K. Shrestha, inaugurating the workshop, said it is necessary to control fasciolosis which farmers can also identify.

Director General of the Department of Livestock Services Dr. Pralhad Sapkota, from the chair, noted that livestock farming contributes 31 per cent to the gross agriculture production.

Various other speakers including chief of ARS-P Dr. K. R. Regmi and NARC executive director Dr. D. Joshi also expressed their views at the function.

Some 75 persons had taken part in the day-long workshop.