Sudan University of Science and Technology Collage of Graduate Studies

Prevalence and Risk Factors of Bovine Fascioliasis in Cattle Slaughtered in White Nile State _ Sudan.

نسبة الإصابة وعوامل الخطورة لمرض الفاشيولا (أبو كبيدة) في ذبائح الأبقار بولاية النيل الأبيض ـ السودان

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DEDICATION

To my mother

To the soul of my father

To my sisters

To my brothers

To all who inspired me to face

The ups and downs of life.

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Firstly, praise to Almighty Allah for giving me the strength and stamina to finish this work.With a great touch of pleasure and gratitude, I would like to express thanks to my supervisor, Dr. Mohamed Abd El-salam for his advice, direction and continuous interest and constructive criticism in reviewing the dissertation. And I could say:“He knows how to put the dots on letters “My thanks extend to Dr. Yassir Adam Shuaib for his assistance during the establishing of the scientific papers and to Dr. Ethar Mohamed for assistance during the period of data collection. My appreciation is extended to all who helped me in this study.

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Abstract

An abattoir survey was conducted on 212 cattle slaughtered at El-Dueim abattoir, White Nile State, Sudan, during the period from July 2015 to September 2015 . The objective was to estimate prevalence of Bovine Fasciolasis and to investigate risk factor associated with the disease. Routine meat inspection procedure was employed to detect the presence of *Fasciola* in liver. Faecal materials were collected in to polythene bags directly from the rectum of each of the cattle being sampled after they had been slaughtered.The examined cattle originated from two areas: White Nile and Kurdofan . The prevalence of *Fasciola* infection according to the source of animal: White Nile 41%, and Kurdofan 48.5%. The prevalence distribution of Fasciolasis according to the age of animal was: that young animal (≤2year) 38%, and 51.1% in old animal (>2years) .The prevalence distribution of Fasciolasis according to the treatment against the disease was: 44.2%in animal treated 42.6%in animal not treated according to the owner saied not treatmen. The prevalence of Fasciolasis according to the present of animals in water body area were: 58.6% and 25%in animals those were not present in water body area .The prevalence of Fasciolasis in breed of animal were 38.8% Kenana, 51.2%in Baggara.The prevalence of Fasciolasis in good body condition of animal 28.3%, and 78% in animal with poor body condition. The prevalence of Fasciolasis in animal life in present of snail in area was 64.7%, and 23.6% in animal in area without snails. The prevalence of Fasciolasis in female was 42.1%, and 44.1% in male. The prevalence of Fasciolasis in closed grazing was 26.3%, and 47.1% in opened grazing area.

The result of the univariate analysis by using the chi-square for the following potential risk factors were: age (p-value≥ 0.059 not significant), sex (p-

value≥0.78 not significant), source of animal (p-value ≥0.315 not significant), treatment (pvalue≥0.81 not significant),body condition (p-value≤ 0.00 highly significant),breed of animal(p-value≥ 0.08 not significant), grazing (p-value≤0.019 significant), present of snails (p-value ≤0.00 highly significant), and present of water body (p-value≤0.00 highly significant). The grazing, body condition, present of snails, present of water body were found to be significantly associatially with Fasciolasis.

Using multivariate analysis to determine possible significant association between Fasciolasis and potential risk factor, the result showed that there was significant association between body condition (0.00), and present of snails(0.012) with Fasciolasis.

On conclusion the study showed that the overall prevalence of Fasciola infection in cattle slaughtered in El-Dueim slaughter house was 43.4% and mainly caused by *Fasciola gigantica*.

الــخـــــلاصــــة

اجري البحث علي 212 رأس من البقر مذبوحا في مسلخ الدويم (محلية الدويم) في ولاية النيل الأبيض ,السودان .خلال الفترة من يوليو 2015م الي سبتمبر 2015م ، كان الهدف هو تقدير معدل انتشار مرض الديدان الكبدية في البقر والتحقق من عوامل الخطر المرتبطة بهذا المرض .أجرى التفتيش الروتيني للحوم للكشف عن الديدان الكبدية في الكبد وأخذ عينات من البراز من المستقيم مباشرة بعد فتح الاحشاء الداخلية وذلك من الحيوانات التي سبق اختيارها كعينات قبل الذبح.

كان مصدر البقر المختار من منطقتي النيل الأبيض و كردفان . كان معدل انتشار المرض في الابقار وفقا للمناطق التي اتت منها الحيوانات: 41% في الابقار القادمة من منطقة النيل الأبيض ، و 48.5% في الابقار القادمة من كردفان .وقد كان معدل انتشار المرض في الابقار وفقا لعمرها 38% في الابقار الصغيرة (اقل من أو تساوي سنتين) ،51.1 %في الابقار كبيرة العمر(اكبر من سنتين). اما انتشار المرض في الابقار اعتماد علي معالجتها فكان: 42.6 %في الابقار التي لم تتلقي العلاج ،44.2 %في الابقار التي تلقت العلاج .وكان معدل انتشار الديدان الكبدية في الابقار اعتمادا علي شربها المياه من الارض(الحفاير والترع)كالاتي:25%في الحيوانات التي تسقي من مصادر اخري ،58.6% في الحيوانات التي تعتمد في شربها علي الحفاير والترع .كان معدل انتشار المرض اعتمادا علي سلالة الحيوانات كالاتي: 38.8%في سلالة الكنانة ،51.2 % في سلالة البقارة. اما معدل انتشار المرض في الابقار لحالة الجسم كالاتي: 28.3 في الحيوانات جيدة الحالة , و78% في الحيوانات سيئة الحالة. ومعدل انتشار المرض بالنسبة للجنس كالاتي: 42.1% في الإناث, و44.1% في الذكور. وكان معدل انتشار المرض بالنسبة لنظام الرعي 26.3% في الرعي المغلق, و 47.1% لنظام الرعي المفتوح. وكان معدل انتشار المرض بالنسبة لتواجد القواقع كالاتي: 64.7% في منطقة تواجد القواقع, و 23.6% في المنطقة التي لا توجد بها قواقع.

عندما تم تحليل عوامل المخاطر بواسطة التحليل الاحادي وباستخدام مربع كاي كانت نتيجة التحليل :لعمر الحيوان(p=0.059القيمة) ولمصدر الحيوان(p=0.315القيمة) وللمعالجة (p=0.81القيمة) وللشراب من الارض (p=0.00القيمة) ولسلالة الحيوان(p=0.08القيمة) و لجنس الحيوان (p=0.78القيمة) و لحالة الجسم (p=0.00القيمة) ولتواجد القواقع (p=0.00القيمة). باستخدام مربع كاي لتحليل قيمة عوامل الخطر وجد ان نظام الرعي ,و تواجد القواقع, و شرب الماء من الترع, وحالة الجسم كانت لهم علاقة معنوية بانتشار

المرض .وعندما تم التحليل المتعدد لمعرفة درجة الارتباط بينة وبين العوامل الاخري وجد انة توجد علاقة معنوية بين انتشار المرض وتواجد القواقع و حالة الجسم.

اوضحت الدراسة ان كل معدلات الاصابة بالديدان الكبدية في الابقار المزبوحة في مسلخ الدويم تسببها *Fasciola gigantic.*

INTRODUCTION

Background

Fascioliasis is one of the most prevalent helminth disease throughout the world (Okewole 2000). It has the widest geographic spread of any emerging vector-borne zoonotic disease occurring in more than 51 countries worldwide (Mas-Coma *et al*., 2009). Fasciolosis is also known as Fascioliasis, Distomatosis and liver Rot .The disease is an important disease of cattle caused by trematodes i.e *Fasciola hepatica* and *Fasciola gigantica* (common liver flukes) . This condition of internal parasitism is one of the major problems that lowers the livestock productivity throughout the world (Vercruysse and Claerebont, 2001).

The parasite is transmitted by ingestion of metacercaria of *Fasciola species* on plants from contaminated fresh water (WHO, 1999). The organism causes 'liver rot' among sheep and cattle which are the definitive hosts; humans are incidental hosts (Usip *et al*., 2012). At present, Fascioliasis is a vector-borne disease presenting the widest known latitudinal, longitudinal and altitudinal distribution. *Fasciola hepatica* has succeeded in expanding from its European original geographical area to colonize five continents, despite theoretical restrictions related to its biology and in turn dependent upon environmental and human activities (Mas-Coma 2005). The fluke species are hermaphroditic, have similar life cycles, and cause similar clinical manifestations in animals. Climatic diversities are particularly important to the development of the snails that act as intermediate hosts for Fasciolias is in areas with differing environmental characteristics. Techniques have identified two Fasciolias, including *F. hepatica* and *F. gigantica*. It is established that areas with only one *Fasciola spp*. are distinct from local and zonal areas where both Fasciolids co-exist (Amor *et al*; 2011).

Objectives of the study:

- to estimate the prevalence of Bovine Fascilosis in White Nile state.
- to investigate risk factors associated with the disease in Cattle in White Nile state.

Chapter One

Literature Review

1.1 Classification

According to Saira (2011) *Fasciola SPP* classified as following:

Kingdom: ***Animalia***

Phylum: ***Platyhelminthes***

Class: ***Trematoda***

Order: ***Digenea***

Family: ***Fasciolidae***

Genus: ***Fasciola***

Species: ***Fasciola hepatica***

Species: ***Fasciola gigantica***

1.2 Etiology*:*

Fasciolasis is caused by *Fasciola gigantica and Fasciola hepatica* . Adult flukes of both species (*Fasciola hepatica* and *Fasciola gigantica*) are live in the bile ducts and immature live in the parenchyma of the liver (Vercruysse *et al*., 2001).

1.3 Morphology of Fasciola:

Fasciola gigantica measures 4 to 10 cm in length (Figure 1), and the distribution of the species is limited to the tropics and has been recorded in Africa, the Middle East, Eastern Europe and south and eastern Asia (Torgerson *et al*,. 1999). *Fasciola hepatica* measures 2cm to 3 cm in length by 1.3cm in width (Figure 2), and has a cosmopolitan distribution. *Fasciola hepatica* is one of the largest fluke in the world. The adult worm has a very characteristic leaf shape with the anterior end being broader than the posterior end and anterior cone and a ventral sucker at the base of the cone which allow it to attach to the lining of the biliary ducts. Each worm possesses ovaries and testes which are highly branched and allow for individual flukes to produce eggs independently (Usip *et al* 2012).

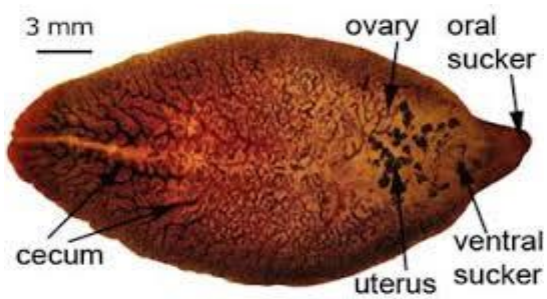

Figure 1: Morphology of mature adult worm of *F. hepatica*

Source: http://www.parasitesinhumans.org/fasciola- hepatica- liver- fluke.

1.4 Morphology of Fasciola Egge:

The *Fasciola* egg is yellow-brown in color, large and oval in shape. It has an indistinct operculum (lid). It contains an unsegmented ovum surrounded by many yolk cells (Monica, 1987). The shape of the eggs (Figure 3) of the two flukes is also very similar with the measurements of *F.hepatica* and *F.gigantica* being approximately 150µm x 90µm and 200µm x 100µm, respectively (Saira , 2011).

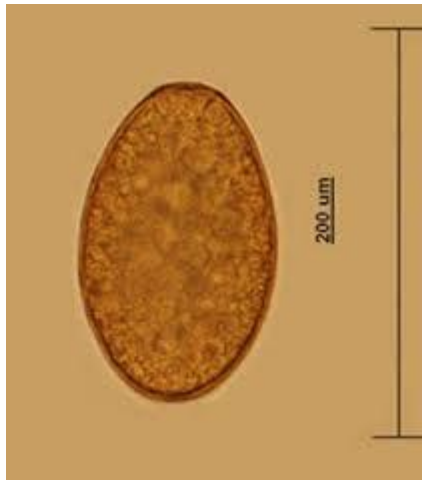

Figure 2: Morphology of *Fasciola* Egge

Source: http://upload.wikimedia.org/wikipedia/commons

1.5Life cycle:

The life cycle of Fascioliasis begins with release of unembryonated eggs into the biliary ducts which are then passed in the stool of herbivores (definitive hosts) or humans (incidental hosts). Eggs become embryonated in water and release miracidia which invade a snail (intermediate host), in the snail the parasites undergo several developmental stages (sporocysts, rediae, and cercariae. The cercariae are released from the snail and encyst as metacercariae on aquatic vegetation or other surfaces. Immature eggs are discharged in the biliary ducts and in the stool. Mammals acquire the infection by eating vegetation containing metacercariae. Humans can become infected by ingesting metacercariae-containing freshwater plants, especially watercress. After ingestion, the metacercariae excyst in the duodenum and migrate through the intestinal wall, the peritoneal cavity, and the liver parenchyma into the biliary ducts, where they develop into adults (figure 4). In humans, maturation from metacercariae into adult flukes takes approximately 3 to 4 months. The adult flukes (*Fasciola hepatica*: up to 30 mm by 13 mm; *Fasciola gigantica*: up to 75 mm) reside in the large biliary ducts of the mammalian host. *Fasciola hepatica* infects various animal species, mostly herbivores (Usip *et al*.,2012).

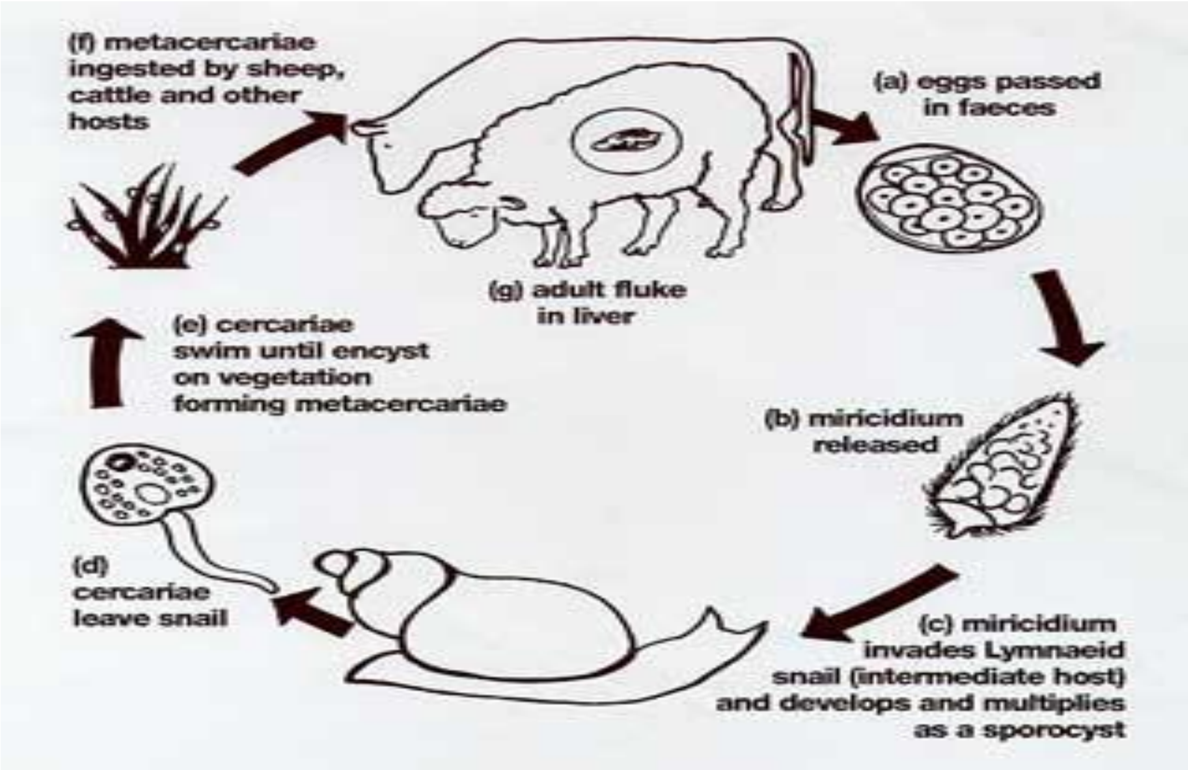

Figure 3: Life cycle of *Fasciola*

Source: http://www.dpd.cdc.gov/dpd

1.6 Pathogenesis and clinical sings:

In adult cattle, the infection usually takes a chronic course, with no obvious clinical signs. Significant production losses occur in the herds having a prevalence of *F. hepatica* infection of 25 % or above (Vercruysse *et al*., 2001). Calves are susceptible to disease but in excess of 1000 metacercariae are usually required to cause clinical Fascioliasis. In this case the disease is similar to sheep and is characterized by weight loss, anemia, hypoalbuminemia and death (Boray, 1969). The course usually is determined by the number of metacrcariae ingested over a short period (The Merck Veterinary Manual, 2005). Acute Fasciolosis is common in sheep and goats while the chronic form is found mostly in cattle. Symptoms of Fasciolosis include anemia, emaciation and reproductive dysfunction in animals with the chronic form. While in acute Fasciolosis, the animals usually show signs of anorexia, dullness, diarrhea, muscular atrophy, subcutaneous edema and impaired immune systems. Hepatic Fasciolosis is often characterized by a swollen liver (Ozung, 2011). The signs and symptoms of Fasciolosis depend upon the intensity of infection, which signifies the number of metacercariae ingested by the animal. In sheep and cattle, clinical presentation is divided into 4 types. Acute type I Fasciolosis occurs when the animal ingests more than 5000 metacercariae, which may lead to its sudden death, without showing any previous clinical signs. The common signs are ascites, weakness and extensive abdominal hemorrhage. In acute type II Fasciolosis infection occurs as a result of the ingestion of 1000-5000 metacercariae. In this case the animal dies by showing signs of pallor, loss of condition and ascites. Sub acute Fasciolosis occurs due to the ingestion of 800-1000 metacercariae. The animal becomes weak, anemic and weight loss may result in death of the animal. Chronic Fasciolosis occurs when 200-800 metacercariae are Ingested. This is prolonged and does not have clear key symptoms except for gradual weight loss (Saira, 2011). Acute Fasciolosis occurs as disease outbreak following a massive, but relatively short-term, intake of metacercariae. It typically occurs when stocks are forced to graze in heavily contaminated wet areas as a result of overstocking and /or drought. Death usually results from blood loss due to hemorrhage and tissue destruction caused by the migratory juvenile flukes in the liver resulting in traumatic hepatitis. This is more commonly seen in sheep than in other hosts (Michael, 2004). Importance of cattle Fascioliasis consists in economic losses caused by condemnation of livers at slaughter and production losses especially due to reduced weight gain. While the worms are in the process of maturing and making their way to a person's bile ducts, he or she will generally experience vomiting and other severe gastrointestinal symptoms. Once the worms reach their full size, which can take three or four months, many of these symptoms will lessen (Usip *et al*; 2014).

1.7 Lesions:

Microscopically, the liver showed areas of coagulation necrosis, extensive hemorrhages in streaks or foci, and disruption of the parenchyma with neutrophil and eosinophil infiltration .There was also fibrosis and bile duct proliferation in some areas. Several vessels were occluded by thrombi. Immature *F. hepatica* flukes were observed in the parenchyma surrounded by fibrosis and degenerated hepatocytes, neutrophils, eosinophils and hemorrhages in several areas. Peritonitis with fibrino-hemorrhagic deposits was observed on the serous surfaces. Multifocal fibrosis, hemorrhages, and neutrophil infiltration were observed in the renal cortex, and hyaline casts were present in the renal tubules (Maria *et al*., 2013).

1.8 Public Health Significance:

Man is usually infected accidentally by eating raw aquatic plants. such as watercress , with encysted metacercariae. These metacercariae can survive
for long periods because the plants are usually submerged.

Human fascioliasis is reported to be common in Cuba, Uruguay and Argentina. The disease, largely caused by *F. hepatica,* is reported to occur in France, England, the Netherlands, and Australia. Disease caused by *F.gigantica* occurs less commonly and has been described in the USSR, Indochina.

West Africa, and Hawaii. Many infected persons are asymptomatic during the migration of the larvae, though some experience fever and pain in the right upper quadrant of the abdomen with an associated eosinophilia and general malaise of varying degree, including myalgia and urticaria.

In heavy infections, there is enlargement of the liver. These symptoms subside until about 3 months later when the clinical disease appears in association with the presence of mature worms in the bile ducts; the severity of the disease, such as biliary colic and jaundice, depends on the number of worms involved. *F. hepaticahas* also been reported to cause pharyngitis and laryngeal edema or "halzoun" due to consumption of raw, infected liver from freshly slaughtered goats and sheep. Halzoun causes intense pain in the back of the throat; extensive edema may cause laryngeal obstruction.(Boray, 1982; Katz *et al.* 1982).

1.9 Diagnosis:

In animals is based predominantly on faeces examinations and immunological methods. However, clinical signs, biochemical and haematological profile, season, climate conditions, epidemiology situation, and examinations of snails must be considered (Torgerson and Claxton, 1999).

Confirmatory diagnosis however, is based on demonstration of *Fasciola spp* eggs through standard examination of feces in the laboratory, post mortem examination of infected animals. Even though it is impossible to detect Fasciola in live animals, liver examination at slaughter or necropsy was found to be the most direct, reliable, and cost effective technique for diagnosis of Fasciolosis. There is other laboratory tests (enzymatic and/or serological procedures) used to qualify the infection mainly for research purposes (Dechasa et al., 2012). The current diagnostic tests for Fasciolosis in cattle are qualitative only, yet the level of infection is considered an important factor in determining production losses. (Dargie, 1987; Vercruysse,. 2001).

The immuno enzymatic techniques as indirect ELISA have been found very suitable for the diagnosis of Fasciolosis due to their high sensitivity and the possibility of many sera samples (Arriaga et al., 1989). During migratory phase of infection, *F. hepatica* antigens are available to the immune system, and it is possible to detect them by serologic probes as sandwich-enzymelinked immunosorbent assay SEA (Langley and Hillyer, 1989). When the parasite is established in the bile ducts less antigen is there available to the immune system, and its detection must be directed to fecal or bile samples. It has been demonstrated that most of pathological damage takes place when flukes are migrating through peritoneal cavity and liver parenchyma before their establishment in the bile ducts. It is very important to use early diagnostic techniques to reduce the great losses in cattle. An indirect-enzyme immune-linked immunosorbent assay IEA allows an early diagnosis of Fasciolosis.

F. hepatica antibodies can first be detected by indirect-ELISA between 3 and 6 weeks after infection during the liver migratory phase of immature worms (Marin, 1992). Long persistence of high levels of immunoglobulin, even though animals have been successfully treated, makes interpretation more difficult in detected antigenemia as early as 2 weeks after infection in cows (Langley and Hillyer, 1989). It is concluded that it is very important and useful to combine two enzymatic assays, indirect and direct ELISA, to achieve a more reliable knowledge of the real infection status of the host.

Molecular identification based on PCR gene specific primers and cloning of internal transcribed spacer and their sequence comparison was also used. The phylogenetic diversity in Fasciola was also studied by using six 38 microsatellite markers. The ITS markers were popularly used in molecular systematics world over in different organisms for determining species origin and classification, whereas microsatellites investigates genetic diversity present in an organism. The presence of diversity in the genome of an organism ensures its successful survival and makes it adaptable to the prevailing environment. The considerable variability present proposes interbreeding which is favorable for diversity (Saria, 2011).

1.10 Treatment and control:

The treatment is essential for controlling spread of Fascioliasis as infected animals pass eggs through feces. These methods involve reduction in the number of intermediate snail hosts by chemical or biological means, strategic application of anthelmintics, reduction in the of snails by drainage, fencing and other management practices and reduction in the risk of infection by planned grazing management(Michael , 2004).

In developed countries it is supported by analyzing on costs and benefits, but in developing countries there are more priorities for utilization of limited reserves of cash and treatment of animal. Grazing on mutual lands is inefficient till a high proportion of livestock owners treat. Treating with an anthelmentic 4 times a year is effective against young parasites, but there are few marked places where it will be feasible. The most frequently used drug in *F. hepatica* infected dairy herds is Albendazole (Mezo et al., 2008), a broad spectrum anthelmintic that is also active against nematodes in gastro intestinal tract which can have a negative effect on milk production (Charlier et al., 2007).

Oxyclozanide is the only effective drug against mature flukes over 14 weeks old (Boray, 1986; Richards et al., 1990) and greater improvement in milk yield would be expected with drugs such as Triclabendazole, which is effective against all stages of parasite. Triclabendazole (TCBZ) is the current drug of choice used for the treatment of *F. hepatica* infections, because of its high activity against both Juvenile and adult flukes (Boray et al., 1983; Fairweather, 2005). Indiscriminate use of anthelmentics has caused resistance (Boray, 1990), so the disease has not been eradicated. Combinations of some older drugs have a high efficacy against the mature and immature flukes (Boray, 1994). One potential strategy to deal with resistance is by manipulating the pharmacokinetics of the drug, thereby enhancing its bioavailability active lifespan, with the goal of increasing its efficacy. The metabolism of benzimidazble-type drugs, as TCBZ, can be affected by co-treatment with inhibitors that target the flarin monooxygenase (FMO) and Cytochrome P450 (CyP450) enzyme pathways. This may lead to an enhancement of the bioavailability of the active metabolisms (Lanusse and Prichard, 1991). In turn, the enhanced bioavailability has been shown to improve the efficacy of the drug (Benchaoui and Mckellar, 1996). Rediae of *F. hepatica* (Boray, 1964) and *F. gigantica* (Wilson and Dennison, 1980) can reduce or sterilize the fecundity of lymnaeid snails by damaging the gonads. *F. hepatica* in *L.truncatula* (Kendall, 1950) and *F.gigantica* in *L.natalensis* (Madsen and Monrad, 1981), impair the growth of snails in the early stage of infection. But in the later stage growth rate may be stimulated by *F. hepatica* (Wilson and Dennison, 1980). When there are heavy infections with *F. hepatica* it kills the snails (Boray, 1964). Although anthelmintic treatment is effective against Fasciolosis, this is an expensive and non-sustainable measure, and drug resistant strains have been reported. The alternative to anthelmintics is the development of a vaccine. In developed countries vaccines would have to be as cost effective as Fasciolicides. Vaccines in developing countries would have to be affordable, but would have the advantage that their efficacy would be independent of the levels of infection in other animals in the community. Lymnaeid Snails with thin shells and no operculum are vulnerable to predators such as, crustaceans, amphibians, birds, rodents and reptiles.(Rana and Roohi *et al* 2014).

Approaches to the control of Fasciolosis in ruminants are compared for developed countries, and for developing countries with particular reference to regions growing irrigated rice. In all environments problem definition and investigation are based on one or more of observation, abattoir surveys, faecal egg counts, tracer animals and snail studies. In developed countries each husbandman grazes a large number of animals, controls access to pasture and water, and markets high value products. Strategic and tactical treatments control Fasciolosis in these circumstances and will continue to do so while anthelmintics remain effective. In many developing countries subsistence families possess small numbers of animals, feed and water sources are shared by many families, and the products are mainly draft power, fertiliser and meat for local consumption. Consequently the agricultural cycle, and the life cycles of the parasite and intermediate host, are closely interrelated and there is some scope for controlling infection by modifying husbandry practices. Anthelmintics are not affordable. Recent observations of a major Fasciola resistance gene with substantial dominance, in Indonesian Thin Tail sheep infected with *Fasciola gigantica*, suggest that parasite control by breed substitution, or cross-breeding and selection, is feasible. Such control would be inexpensive to implement, and sustainable (Roberts and Suhardono 1996).

Behavior changes have the potential to be the most effective and cost efficient approaches to disease control and thus, education is an essential aspect of any public health effort. The primary message of *Fasciola hepatica* campaign is to keep domestic animal herds separate from the growing sites of aquatic plants. This limits the risk of contaminating the vegetation and thus decreases both human infection and the animal reservoir (Chitsulo,et al, 2001). . Infection can potentially be avoided by cooking these plants fully before eating them. In some areas, eating these plants raw is relatively customary, and Fascioliasis in humans is more common in those areas (Usip et al., 2012).

1.11 Geographic distribution and prevalence of Fasciolosis in selected regions of the world:

The prevalence of *Fasciola* infection depends on several factors related to the biology of the vectors, biology of the parasite and the management of flocks and herds. A lot of prevalence studies have been carried out to investigate the level of spread of *Fasciola* species infections. In Africa, Megard (1975) gave the prevalence rates in Kenya (33%), Sudan (37%), Cameroun (45%), Ethiopia (30-90%), Uganda (10%), Central African Republic (62%) and Rwanda (50%).

Perfuse study conducted in Nigeria reports that the prevalence of Fascioliasis in cattle slaughtered in the Sokoto metropolitan abattoir recorded in this research work can be attributed to the climatic conditions of this location which does not favour the survival of the intermediate hosts, the snail. This intermediate host prefers swampy areas with slowly moving water and small streams which also allow sufficient moisture for the survival of the infective metacercariae. In contrast, the study area, Sokoto, occupies low flat and naturally dry land (semiarid area). This probably explains the low percentage of infection with Fascioliasis among cattle slaughtered in the abattoir (Kabir *et al* 2014).

There are many ecological factors affecting snail populations including temperature, light, hydrogen ion concentration (pH), vegetation, depth of water, current of the water, chemical composition of the soil, and snail population competition(Malek 1980, Brown 1994). It has been reported that the Lymnaeid intermediate hosts of *F. gigantica* are distinguishable from those of F. *hepatica*, both similar morphologically and as to habitat requirement (Malek 1980). The species of *Fasciola* can become adapted to new intermediate hosts under certain conditions at least based on laboratory trials. It has been reported that the most important intermediate hosts of *F. gigantica are L. auricularia;* however, *L. rufescens and L. acuminata* are the host snails in the Indian Subcontinent*; L. rubiginosa* and *L. natalensis* are the hosts in Malaysia and in Africa respectively; and the synonymous *L. cailliaudi* is the intermediate host in east Africa (Malek 1980, Souslby 1982). The most important and widespread (Europe, Asia, Africa and North America) intermediate host of *F. hepatica* is *L. truncatula* (Souslby 1982). There is some evidence, at least based on laboratory trails, that the species of *Fasciola* can become adapted to new hosts, either amphibious or aquatic, under certain conditions.

The snail population is low in the summer months due to high temperatures, and increases gradually to reach its maximum in spring when the temperature is mild and vegetation flourishes. Overall, rates of snail infection vary between 10% and 40%. The highest infection rate was found to be in summer and this may be a factor responsible for lowering snail density in this season. *L. cailliaudi* has been found responsible for transmission of both *F. hepatica* and *F. gigantica* (Farag 1998). Tropical Fasciolosis caused by infection with *F. gigantica* is regarded as one of the most important single helminth infections of ruminants in Asia and Africa (Murell, 1994). Together with major nematode infections, Fasciolosis is a significant constraint on the productivity of domestic ruminants throughout Asia, South-East Asia and Africa and is thus a significant impediment to global food production (Murell, 1994). Ogunrinade and

Ogunrinade (1980) reported a total liver condemnation rate of 7% among cattle population of 10 million from slaughter rate of 4% in Nigeria. In 1986, 46.3% of livers were condemned due to *F. gigantica* in Zimbabwe (Chambers, 1987).

A study was carrid in Nigeria examined the seasonal prevalence of Fasciolosis between the sexes in Nigerian cattle .The possible role and effect of sex on prevalence of the disease .One thousand cattle were examined for infection using the fecal and bile examination for *Fasciola* eggs and agar gel precipitation test .Prevalence was higher (52.3%) during the rainy seasons .The annual prevalence was higher in females (63.7%) than in male (36.3%) (Adedokun *et al*., 2008).

In a study aimed to determining the prevalence of Fascioliasis and the economic loss of condemned liver due *to Fasciola* infection in cattle slaughtered at three abattoirs in Eket Urban, Akwa Ibom State of Nigeria. A total of 279 cattle consisting of 185 males and 94 females were examined. The result of the investigation showed of out of 279 cattle consisting of 185 males and 94 females examined, 38 (13.62%) of the cattle were infected with Fascioliasis. The prevalence recorded for female cattle was 17.02% compared to that of the males which was 11.89%. The species of the adult flukes recovered from the liver was *Fasciola gigantica*. about 342kg condemnable weight of livers from 38 cattle ,was lost due to *Fasciola* disease, Fascioliasis is of serious economic importance to the livestock industry, especially in Nigeria where most livestock farmers are still ignorant of the disease (Usip *et al*;2012).

Ogunrinade and Adegoke, (1982) in their research, discovered that out of 1.2 million cattle slaughtered in Northern Nigeria, 30,000 or 2.5% were positive of Fascioliasis, with the highest prevalence record at abattoirs situated in Northern Guinea Savannah being 5.55% while the lowest incidence found in Jos plateau was 0.88%.

A cross-sectional study, to investigate the prevalence and economic loss of Fascioliasis in Iran reports that Overall 3.28% of the livers were found to be infected. For total number of sheep, goats and cattle slaughtered annually in region study, it was estimated that 7 505 livers were infected and total annual economic losses of fascioliasis of studied animals was 41 784 USD (based on market prices in study period). Of this, 23 360 USD, 30 240 USD and 15 400 USD were associated with the Fascioliasis of sheep, goats and cattle, respectively (Hassan et *al*., 2013).

2.12 Geographic distribution and prevalence of Fasciolosis in Sudan:

Bovine Fasciolosis in the Sudan is endemic in the four provinces: White Nile, Upper Nile, Bahr El Ghazal and Equatoria. Some foci of Fasciolosis also exist in Southern Kordofan and Southern Darfur province. Fasciolosis undoubtedly accounts for serious economical losses in the Sudan as a result of mortality, reduced productivity, expenses of treatment and particularly condemnation of infected livers (Haroun; 1975).

A retrospective study aimed to investigate the different pathological conditions reported in livers of slaughtered cattle and sheep leading to their total condemnation at abattoir Al kadaroo Abattoir in North Khartoum-Sudan ,(Suhair 2013)reported that total number of slaughtered cattle and sheep at Al kadaroo Abattoir and the total number of different grossly detected liver affections throughout the study period, compared to the total number of sheep slaughtered, the total number of affected and condemned livers was 1564(0.84%) this value was lower than that reported for cattle, 5793(9.29%). This result could be related to the high prevalence of *Fasciola* infestation in cattle, 5272 (91%) amongst the other liver lesions.

Chapter Two

MATERIALS AND METHODS

2.1Study Area:

White Nile is one of the 18 states of Sudan. It lies between latitude 12-13.3 N and longitude 31-33.3 East . It has an area of 30.411km² and estimate population of approximately 1.188.707 .

2.2El-Dueim abattoir :

This abattoir is located in White Nile State. It consists of administrative building, veterinary services department, maintenance department and the health of the environment. Cattle are slaughtered in hole, goats and sheep on the anther hole. Electric bus is used to move the carcass. It provides services for carcass local consumption. The ante mortem and post-mortem examination are conducted by veterinarians. Fluids are disposed off through the sewage system and the solid parts through burning in the incinerator.

2.3Type of the study:

A Cross-sectional study was conducted at abattoir on three randomly selected days . The animals in these days selected by systematic random sampling method. From each five animals one animal was selected for examination. The study was performed in the period between July 2015 to September 2015 to determine the prevalence and risk factors associated with the disease at a particular point of time.

2.4 Examination:

2.5 Ante –mortem examination :

Regular visits was made by the investigator to conduct ante -mortem examination of animals for slaughtering. During the ante mortem inspection, the age, sex, water body, present of snail, use of treatment, grazing, breed, origin and body condition of each animals most be determined .

2.6.1Laboratory examination :

2.6.1.1Faecal examinations:

2.6.1.1.1 Sedimentation method:

This test was used for detecting those eggs which didn’t float well in available flotation solutions. Those are the operculate eggs such as fluke infestation, Fasciola, Paramphistomes and Schistosoma. Two to three grams of faeces were put in a mortar and emulsified with 42 ml tap water. They were grounded with pestle and mixed well. The suspension was then poured through a tea sieve into a beaker to remove the large particles. The sieved suspension was then poured in a centrifuge tubes and centrifuged at 1500 rpm for two min (this was the first wash). The dirty supernatant was poured off and re-suspended in water and centrifuged at 1500 rpm for two min. This was repeated four times till the supernatant fluid was clear. A bit of the deposit was taken and smeared on slide and covered by slide cover**.**

2.7Post -mortem examination :

Post mortem inspection was carried out according to the method described by Thornton's and Gracey (1981). Meat inspection at El-Dueim abattoir carried out by officials of Ministry of Livestock and nomadic resettlement. The team comprised of a veterinarian with official meat inspectors. Liver examination was carried concurrently during meat inspection of bovine carcasses and organs.

2.8Method of Sampling:

The total number of cattle required for the study was collected based on the formula given by Martin et al (1987).

$n=4PQ/L^2$

n=number of animals to be sampled.

P=expected prevalence of bovine Fasciolosis in Khartoum state. 3.5% estimated by appropriate epidemiological methods by Nada (2015).

Q=1-P in this study Q=(1-0.035)

L=allowable error =5%

Confidence interval of 95%.

The sample size =4*0.035*(1-0.035)/0.0025= 53 cattle.

The small sample size calculated (212) was multiplied by 4 to increase precission of the results (Thursfield, 2007).

2.9Statistical analysis:

Data collected from the active abattoir survey about the risk factors and the results was entered into Excel spread sheet, cases were categorized as either positive or negative and analyzed using Statistical Package of Social Science (SPSS) version 16 were used.

Frequency table of the distribution according to the potential risk factors were constructed.

Cross tabulation of Fasciolosis infection per according to potential risk factors was made.

Univariate analysis: chi-square test was used to describe the variables, number of tested animals and degree of freedoms, chi-square p-value.

Multivariate analysis: by logistic regression models were described the risk factors, number of positive cases, odds ratio, confidence intervals and p-value. Multivariate analysis by logistic regression models was performed for risk factors significant at level (≤ 0.25)in univariate modle. The significant level in the multivariate analysis was (≤ 0.05).

Chapter Three

Results

3.1 Prevalence:

Of the total 212 cattle inspected, 92(43.4%) animals were positive, and 120 (56.6%) animals were negative for bovine Fasciolosis (**Table 1.1**).

Table1.1: Prevalence of Fasciolosis in 212 cattle **liver** examined in El-Duiem Slaughter house, Sudan.

		Frequency	Percent	Cumulative Percent
Valid	_ve	120	56.6	56.6
	+ve	92	**43.4**	100.0
	Total	212	100.0	

Table1.2: Prevalence of Fasciolosis in 212 cattle **feaces** examined pathogenesis in El-Duiem Slaughter house, Sudan.

		Frequency	Percent	Cumulative Percent
Valid	_ve	58	27.4	27.4
	+ve	154	**72.6**	100.0
	Total	212	100.0	

3.2 sex of animal:

One hundred and thirty six of males cattle were examined in this study. The presences of Fasciolssis in cattle were investigated. (Table 1.3) shows the sex distribution of cattle, 136 of cattle were male and 76 of cattle were female. Infection was higher in animal which were male (64.2%) and in female infection rate was (35.8%).

The chi-square test showed no significant association between infection and sex of animal (p-value .059) (Table4).

3.3 Age of animal:

Total 212 of the cattle of various ages were examined in this study. The presences of Fasciola in cattle were investigated. (Table 1.3) shows the age distribution of cattle, 126 of cattle were young (animal age less or equal two years) and 86 of cattle were old (animal age more than two years). Infection was higher in animal which were young (animal age less or equal two years) (59.4%) and in old animal (animal age more than two years) infection rate was (40.6%).

The chi-square test showed no significant association between infection and age of animal (p-value .78) (Table4).

3.4 Origin of animal:

Total of the212 cattle inspected, (Table 1.3) shows the number of infected animal with Fasciolasis from various source .the highest rate of infection was in animal from White Nile(68.9%) and the less rate of infection was in Animal from Kurdofan (31.1%).

The chi-square test showed no significant association between infection and origin of animal (p-value .32) (Table4).

3.5 Breed of animal:

The results showed distribution of Fasciolasis infection in El-Dueim slaughter house by breed .Total number of Kenana breed examined was 134 animals, among this 134 animals 94 were found infected with highest rate of infection (70.1%).Total number of Baggara was 78, among these 78 animal 60 were infected ,with rate of infection 76.9%.

The result of study showed that there is no significant association between Fasciolasis infection and breed of animal (p-value .08) (Table4).

3.6:Grazing :

The grazing and fasciolosis infection had been investigated . The total number of infection was higher in close grazing (73.6%) more than infection were the grazing opened (72.4%).

The chi square test showed there is significant association between the hydatid cyst infction and grazing (p value-0.019) (Table 1.4) .

3.7 The effect of treatment on present of disease:

Total of the 212 cattle inspected, table (1.3) shows the 104 of cattle were treated and 108 0f cattle were not treated. The highest rate of infection was in animal which were not treated (75.9%) and treated animal had low infection rate (69.2%).

The chi-square test showed there is no significant association between infection and treatment (p-value .81) (Table4).

3.8 The effect of knowledge about present of snail on presences of disease:

The relationship of knowledge about present of snail and presences of Fasciolasis in 212 cattle were investigated. Table (1.3) shows that the knowledge about present of snail was (48.1%) and not knowledge about present of snail was (51.9%) .

The chi-square test showed there is significant association between infection and Knowledge about present of snail and disease (p-value .00) (Table4).

3.9 The effect of drinking from water body on presences of disease:

The Drinking from water body and presences of Fasciolasis in 212 cattle were investigated. Table (1.3) showd that 116 (54.7%) of cattle were examined in this study were found to be drinking from water body and had infection rate (81%).

The chi-square test showed there is significant association between cattle Fasciolasis and Drinking from water body (p-value .000) (Table4).

3.10 Body condition :

The body condition of animals and the presence of Fasciolasis had been investigated . 148 of cattle were found to be in good condition and rate of infection was (64.8%) followed by 64 of cattle were found to be in poor condition and rate of infection was (90.6 %).

Chi square test showed there is significant association between the infection and body condition (p – value 0.000) (Table 1.4)

Table1. 3:

Frequency table of distribution of 212 cattle examined for bovine Fasciolasis in El-Dueim slaughter house – White Nile State - Sudan. According to potential risk factors investigated:

Risk factors	Frequency	Relative frequency (%)	Cumulative frequency (%)	Number positive	Percentage (%)
Age					
≤ 2 years	126	59.4	59.4	90	71.4
>2 years	86	40.6	100	64	74.4
Sex					
Female	76	35.8	35.8	58	76.3
Male	136	64.2	100	96	70.5
Origin					
White Nile	146	68.9	68.9	104	71.2
Kurdofan	66	31.1	100	50	75.7
Breed					
Kenana	134	63.2	63.2	94	70.1
Baggara	78	36.8	100	60	76.9

Grazing					
Close	**38**	**17.9**	**17.9**	**28**	**73.6**
Open	**174**	**82.1**	**100**	**126**	**72.4**
Treatment					
Yes	**104**	**49.1**	**49.1**	**72**	**69.2**
No	**108**	**50.9**	**100**	**82**	**75.9**

Risk factors	Frequency	Relative frequency (%)	Cumulative frequency (%)	Number positive	Percentage (%)
Present of Snail					
No	**110**	**51.9**	**51.9**	**66**	**68.7**
Yes	**102**	**48.1**	**100**	**88**	**86.2**
Present of Water body					
No	**96**	**45.3**	**45.3**	**60**	**62.5**
Yes	**116**	**54.7**	**100**	**94**	**81**
Body Condition					
Good	**148**	**69.8**	**69.8**	**96**	**64.8**
Poor	**64**	**30.2**	**100**	**58**	**90.6**

Table 1.4:

Univariate analysis for potential risk factors of bovine Fasciolosis in 212 cattle **Liver** examined at El-Dueim slaughter house – White Nile State - Sudan using the Chi-square test (df =degree of freedom, χ^2 = Chi-square).

Risk factors	Number tested	Number positive (%)	df	χ^2	P-value
Age			**1**	**3.55**	**0.059**
≤ 2 years	**126**	**48 (38%)**			
>2 years	**86**	**44 (51.1%)**			
Sex			**1**	**0.08**	**0.78**
Female	**76**	**32 (42.1%)**			
Male	**136**	**60 (44.1%)**			
Origin			**1**	**1**	**0.315**
White Nile	**146**	**60 (41%)**			
Kurdofan	**66**	**32 (48.5%)**			
Breed			**1**	**3.1**	**0.08**
Kenana	**134**	**52 (38.8%)**			
Baggara	**78**	**40 (51.2%)**			

Grazing **Close** **Open**	 **38** **174**	 **10 (26.3%)** **82 (47.1%)**	**1**	**5.49**	**0.019***
Treatment **Yes** **No**	 **104** **108**	 **46 (44.2%)** **46 (42.6%)**	**1**	**0.058**	**0.81**

Risk factors	Number tested	Number positive (%)	df	χ^2	P-value
Present of Snail **No** **Yes**	 **110** **102**	 **26 (23.6%)** **66 (64.7%)**	**1**	**36.3**	**0.000***
Present of Water body **No** **Yes**	 **96** **116**	 **24 (25%)** **68 (58.6%)**	**1**	**24.2**	**0.000***
Body Condition **Good** **Poor**	 **148** **64**	 **42 (28.3%)** **50 (78%)**	**1**	**45**	**0.000***

***key : p-value ≤0.025 is sig.**

Table 1.5:

Univariate analysis for potential risk factors of bovine Fasciolosis in 212 cattle **feaces** examined at El-Dueim slaughter house – White Nile State - Sudan using the Chi-square test (df =degree of freedom, χ^2 = Chi-square).

Risk factors	Number tested	Number positive (%)	df	χ^2	P-value
Age ≤ 2 years >2 years	 126 86	 90 (71.4%) 64 (74.4%)	1	0.23	0.63
Sex Female Male	 76 136	 58 (76.3%) 96 (70.6%)	1	0.8	0.37
Origin White Nile Kurdofan	 146 66	 104 (71.2%) 50 (75.8%)	1	.47	0.5

Breed **Kenana** **Baggara**	 **134** **78**	 **94 (70%)** **60 (77%)**	**1**	**1.14**	**0.3**
Grazing **Close** **Open**	 **38** **174**	 **28 (73.6%)** **126 (72.4%)**	**1**	**.03**	**0.87**
Treatment **Yes** **No**	 **104** **108**	 **72 (69.2%)** **82 (76%)**	**1**	**1.2**	**0.27**
Risk factors	**Number tested**	**Number positive (%)**	**df**	χ^2	**P-value**
Present of Snail **No** **Yes**	 **110** **102**	 **66 (60%)** **88 (86.2%)**	**1**	**18.38**	**0.000***
Present of Water body **No** **Yes**	 **96** **116**	 **60 (62.5%)** **94 (81%)**	**1**	**9**	**0.003***
Body Condition **Good** **Poor**	 **148** **64**	 **96 (64.9%)** **58 (90%)**	**1**	**14.9**	**0.000***

***key : p-value ≤0.025 is sig.**

Table1.6:

Multivariate analysis for potential risk factors of bovine fasciolosis in 212 cattle **liver** examined at El-Dueim slaughter house – White Nile State - Sudan using logistic regression. Ref: Reference, Exp (B): Exponan (B), 95%CI: 95%Confidence Interval:

Risk Factors	df	Sig.	EXP(B)	95.0%C.I. for EXP(B)	
				lower	Upper
Age **≤ 2 years** **>2 years**	**1**	**0.204**	**1.7**	**0.749**	**3.86**
Breed **Kenana** **Baggara**	**1**	**0.76**	**1.2**	**0.36**	**4**
Grazing **Close** **Open**	**1**	**0.876**	**0.92**	**0.33**	**2.6**
Present of Snail **No** **Yes**	**1**	**0.012**	**4.6**	**1.4**	**14.9**

Present of Water body **No** **Yes**	**1**	**0.912**	**0.939**	**0.311**	**2.8**
Body Condition **Good** **Poor**	**1**	**0.000**	**5.96**	**2.7**	**13.2**

Table1.6:

Multivariate analysis for potential risk factors of bovine fasciolosis in 212 cattle **feaces** examined at El-Dueim slaughter house – White Nile State - Sudan using logistic regression. Ref: Reference, Exp (B): Exponan (B), 95%CI: 95%Confidence Interval:

Risk Factors	**df**	**Sig.**	**EXP(B)**	**95.0%C.I. for EXP(B)**	
				lower	**Upper**
Present of Snail **No** **Yes**	**1**	**.032**	**3.45**	**1.1**	**10.73**

Present of Water body **No** **Yes**	**1**	**.906**	**.943**	**.36**	**2.5**
Body Condition **Good** **Poor**	**1**	**.006**	**4.15**	**1.5**	**11.434**

Chapter Four

Discussion

The results obtained in this study are an indication that bovine Fasciolasis infection occurs in the cattle slaughtered in West White Nile (El-Duiem abattoir), White Nile State, Sudan. High prevalence rate (43.4%).

In ours study the prevalence of Fasciolosis in cattle slaughtered in El-Duiem abattoir, White Nile State, Sudan was 43.4%, which is higher than study conducted in West Omdurman abattoir, Khartoum State (Ammar., 2013) were atotal 400 cattle were inspected, 40 (10%) animals were positive, and 360 (90%) animals were negative for bovine Fasciolosis, also higher than Prevalence of Fascioliasis in cattle slaughtered in Sokoto Metropolitan Abattoir, Sokoto, Nigeria metropolitan abattoir which was 27.68%. However, it is higher than those reported from different countries, which was 28.63% in Ethiopia (Rahmeto et al., 2010), 21% also in Ethiopia (Yemisrach and Mekonnen ., 2012), 16% in Tanzania (Mellau et al., 2010). 357 (8%) at Mekelle municipality abattoir were found to harbor mixed infection of Fasciolosis and hydatidosis(Gebertsadik et al., 2012)., 21% in Brazil(Alves et al., 2011), 32% in Ethiopia(Mihreteab et al., 2010), 20% in Ethiopia (Kassaye et al., 2012), 29% in Ethiopia (Mult et al., 2012), 23% in Ethiopia (Asressa et al., 2012).

On the other hand the prevelance of fasciolosis recorded during this study is lower than the results in other studies which was 75 % in Nigeria (Oyeduntan et al., 2008), 50% also in Nigeria (Ozung, et al., 2011),52.1%

in Nigeria (Olusegun et al., 2011), 51% in Egypt (Kuchai et al., 2011), and 65% in Turkey(Yildirim et al .,2007).

Differences in prevalence among geographical locations could be attributed mainly to the variation in the climatic and ecological conditions such as altitude, rainfall and temperature. *Fasciola* prevalence has been reported to vary over the years mainly due to variation in amount and pattern of rainfall (Mungube et al., 2006).

In univariate analysis the prevalence of bovine Fasciolasis is significantly associated (p-value ≤0.019) with grazing, (p-value ≤0.00) with present of snail, (p-value ≤0.000) with present of water body, and (p-value ≤0.00) with body condition. Age of animals was one factor investigated in this study. Our results showed that the rate of bovine Fasciolosis was 38% in young age (≤2 years) and 51.1% in old age (>2 years) .The results showed that there is no significant association between bovine Fasciolosis and age of animals examined (P-value ≤ 0.059). These results are consistent with other studies regarding young animal's with low rate of infection than old animals. In turkey, the rate of infection in age groups was: 87.2% in the age group ≥6 years, 79.5% in age of 3-5 years and 51.6% in age ≤2 years (Yildirim et al., 2007). In Ethiopia, the prevalence was higher in adult when compared to young (Yemisrach and Mekonnen 2012).

The prevalence of bovine Fasciolasis by source of animal had been investigated in this study. The rate of infection in cattle coming from White Nile was 41%, and Kurdofan was 48.5%.

There is no significant association between bovine Fasciolasis and source of the animals (P-value ≥ 0.315).These results are not consistent with other studies regarding the different prevalence according to the source. In Sudan the rate of infection in Khartoum state was 0%, in Blue Nile state was 27.3%, in White Nile state was 38%, in Darfour state was 0%, in Kordfan state was 0% and in Algdarif state was 50%(Ammar et al., 2013). In Zimbabwe, higher prevalence was found in the watering areas compared to the flat areas (Pfukenyi et al., 2006). In Egypt, the prevalence was higher in comparatively low land areas as compared to high altitudes (Kuchai et al., 2011). The reason behind this maybe due to be of geographic reasons, outdoor rearing in open grazing areas, increase irrigated land masses from the currently constructed dams and ponds and the tendency of famers to feed their animals in these marshy and damp areas because of feed scarcity.

The results of this study showed that Baggara breed cattle have higher rate of infection than Kenana breed, the rate of infection in Baggara cattle was 51.2%, and in Kenana cattle was 38.8%. But There was no significant association between bovine Fasciolosis and breed of cattle (P-value $\geq$ 0.08). This is in disagreement with other studies carried out in Sudan showed significant association between bovine Fasciolosis and breed of cattle foreign breed cattle came from Ethiopia, which rate of infection in foreign cattle was 50%, in indigenous cattle was 7.5% and in cross cattle was 0.0% (Ammar., 2013), in Japan where the prevalence was higher in Japanese native cattle than Friesian or Jersey cattle (Kato et al., 2005), and in Spain where the prevalence was higher in cross breed cattle than that in autochthonous Rubia Gallega Friesian or Brown Swiss cow (Sanchez et al.,2002) .

In the present study multivariate analysis showed that there was significant associated with Fasciolosis and present of snail (p-value=0.012 , ExpB= 4.6, 95% CI = 1.39 – 14.97), also there was significant associated with Fasciolosis and body condition(p-value=0.00 , ExpB= 5.96, 95% CI = 2.68 – 13.245).

Conclusion:

1. The over all prevalence of Fasciolosis was 43.4% .
2. The asignificant risk factor association with the presence of Fasciolosis in white nile state were grazing, present of snail in area, present of the water body, and body condition.
3. The non significant factors associated with the presence of fasciolosis in white nile state were age, sex, origin, breed, and use of the treatment.

Recommendations:

1. Alert policy makers to design governmental control programs against Fasciolosis to minimize the prevalence in Sudan and ensure effective protection not only for animal population but also for humans at risk of contracting the infection.
2. Treatment of animal with anti-parasite medicine and prophylactic anthelmentic dosage for all farm animals .
3. Public health education through media and teaching livestock holders and people who are at risk about periodic epidemiologic investigations.
4. Enhancement of awareness of people about the economic and public health importance of the disease.

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