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Review Article

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A review on Bovine cysticercosis and its status in Ethiopia

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Abstract

Animal diseases are one of the most important constraints to decrease productivity of food animals in all parts of the world. Parasitism is among the major problems that affect the productivity of livestock worldwide. *Bovine cysticercosis* is a parasitic disease that affects the musculature of cattle and is caused by the *Metace stode*s tage of human intestinal cestode, *Taenia saginata*. The custom of eating undercooked or raw beef dishes such as: kourt, lebleb, kitffo and the habit of defecating in open fields coupled with the tradition of allowing cattle to grazing fields made *cysticercosis* of cattle and *Taeniasis* of human common in developing countries like Ethiopia. Drugs which have shown efficacy against bovine *cysticercosis* including, Niclosamide, Praziquntel, Mebendazole and Albedazole. However it is not feasible to treat animals due to high cost. *Bovine cysticercosis* is food born parasitic zoonsis caused by larval stage of the tapeworm *Taenia saginata* commonly referred to as beef Tapeworm. The economic loss due to *Bovine cysticercosis* is associated with total condemnation of carcasses and treatment cost the average annual economic loss due to tanicidal drugs for treatment in Ethiopia was estimated to be 4,937,583 Ethiopia birr. Personal hygiene, environmental sanitation and protection of cattle from contact with human excretion, not using untreated human feces as fertilizer for pasture land are some of the preventive measures of the disease.

Keywords: Bovine, cyticercosis, prevalence, public health, Ethiopia

Introduction

Ethiopia has one of the largest inventories in Africa with livestock currently supporting and sustaining the livelihoods of an estimated 80 percent of the rural poor. An animal rearing is an integral part of the agricultural production and estimated livestock population is 56,706,389 cattle, 29,332,382.56sheep, 29,112,963goats, 7,428,037donkeys, 2,033,115horses, 1,164,106 camels, 400,329 mules and 56,866,719 poultry (CSA, 2015).

Livestock are the main stays of the livelihood of the majority of the human population by giving draft power, income to farming communities, means of investment and important source of foreign exchange earning to the nation. Moreover, livestock are important cultural resources, social safety nets and means of saving, and are also supply for crop production and transport (DACA, 2006). However, the economic benefit derived from the livestock sub- sector does not commensurate with the potential and the sub-sector remained untapped. The challenge facing

livestock development in Ethiopia is daunting. The potential for Ethiopia to improve the productivity of the livestock sub-sector is clear, however, a number of constraints need to be addressed. Areas in need of attention include animal health and nutrition, availability of quality support services such as extension service, upgrading and dissemination of technology, package to improve animal breeding, marketing, and processing and the collection and analysis of baseline data on which to plan development (Juyal and Single, 2011).

In Ethiopia, the livestock sector contributes about 30% of the agricultural GDP and 19% to the export earnings. In Sub-Saharan Africa, livestock diseases, negatively affect the public health and impede economic growth by incurring direct (morbidity, mortality) and indirect economic losses (Sachs, 1999; Perry *et al*., 2002). Parasitic diseases are highly prevalent in Sub Saharan Africa and incur severe economic losses by reducing productivity. *Taenia saginata/taeniasis/bovine cysticercosis* is one of the major parasitic diseases, which does not only lead to economic loses, but also adversely affect public health. The distribution of *Taenia saginata* is wider in developing countries, where hygienic conditions is poor and where the inhabitants traditionally consume raw or insufficiently cooked or sun cured meat (Larry, 2009).In realizing the severity of food safety problems and control of parasitic meat-borne zoonosis in Africa, the Food and Agricultural Organization (FAO) and the World Health Organizations (WHO) of the United Nations (UN) passed resolutions to improve the food safety situation in Africa (FAO/ WHO, 2005).

The problem of food borne parasitic zoonosis could be further complicated in Ethiopia by lack of efficient inspection at critical control points in abattoirs, lack of awareness and knowledge on the mode of transmission and public health hazard of these diseases as well as due to presence of widespread habit of raw meat consumption both in rural and urban communities. A number of reports in Ethiopia indicated that, certain groups who had easy access to raw meat and meat products (Butchers and abattoir workers) and those people with low level of formal education were reported to be more infected with parasitic zoonosis than those who had low access to raw meat and those with better education. This implies that the frequency of raw beef consumption is higher in these groups of people (Nigatu *et al.*, 2009; Adugna *et al.,* 2012).

Bovine cysticercosis is very common in Africa and is endemic in areas of Central and East African countries like Ethiopia, Kenya and Zaire (Harrison *et al.*, 2001). The custom of eating raw or undercooked beef dishes such as kourt, lebleb, kitffo and the habit of defecating in open fields coupled with the tradition of allowing cattle to graze in such fields made taeniasis of human and cysticercosis of cattle are common in Ethiopia(Teka, 2006). The cultural habit of eating raw meat in form of “Kourt” meat cubes and “Kitffo” minced meat in Ethiopia, has favored the spread of this disease (Dawit, 2004; Fufa, 2006). The economic losses due to *bovine cysticercosis* is associated with total condemnation of carcasses with generalized infestation and downgrading carcasses which are subjected to refrigeration, in addition to the cost of refrigeration and extra handling and transport (Kebede *et al.,* 2009). The parasite is provide to be controlled by routine meat inspection, restriction of raw or undercooked beef consumption, utilization of latrine, treating infected human and public awareness about the life cycle and control measures.

Therefore, the objective of this study is to:

- To provide the concise review on *Bovine Cystcercosis*
- To highlight the epidemiology and economic significance of the disease in Ethiopia.

Bovine Cysticercosis

Etiology

Bovine *cysticercosis* is a disease that affects the musculature of cattle and is caused by the metacestode stage of human intestinal cestode; *T. Saginata* (Taylor *et al.*, 2007). *Taenia saginata*and its metacestode, *Cysticercusbovis*,

the unarmed beef tapeworm, is classified under the kingdom of *Animalia*, phylum of *Platyhelminthes*, class of *Cestoda*, order of *Cyclophylidea*, family of *Taeniidae*, genus of *Taenia a*nd species of *T. Saginata* (Urquhart *et al.*,1996). The adult tapeworm, *Taenia saginata*, is a large ribbon shaped, multi segmented, white flat worm usually 4- 15m long consisting of thousands of segments (proglottids) arranged in a chain (Andreluse*t al*., 2003).The body is divided in to three distinct parts consisting of head (scolex), neck and strobilla (Gracey and Thornton, 1981). The head or scolex bearing attachment organs, a short unsegmented neck and chain of segments. The chain is known as strobilla and each segment as proglottids. The proglottids are continually budded from the neck region and become sexually mature as they pass down the strobilla. Each proglottid is hermaphrodite with one or two sets of reproductive organs. Gravid segments usually leave the host singly and often migrate spontaneously from the anus (Blancou *et al*., 2010).

Taenia eggs passed in the faeces or discharge from ruptured segments are sub spherical to spherical in shape and very resistant, remaining viable for 6 months in pasture and vegetables, 5 weeks in water, 10weeks in stool or hay and 12 weeks in silage sludge. Taenid eggs measure about 30-45µm in diameter; contain an oncosphere (hexacanth embryo) bearing three pairs of hook; have a thick, brown, radially striated embryophore or shell composed of hooks with outer oval membranous coat, the true egg shell, that is lost from fecal eggs (OIE, 2000). The *cysticerci* or larval stage is formed over a period of 3-4 months, after egg is ingested by intermediate host and may viable in the intermediate host for up to 9 months or even up to the entire life of the host (Soulsby, 1982).The infestation in the intermediate host with the larval stage is referred to as bovine cysticercosis. In the bovine animal, the mature *cysticercus* is grayish white, small, pea-sized oval, about 0.5cm-1.0x0.5cm. Long, and filled with fluid in which the scolex is usually clearly visible (Taylor *et al.*, 2007).

Epidemiology

T. Saginata occurs where cattle are raised, human feces are improperly disposed of, meat inspection programs are poor and meat is eaten without proper cooking (Radostits *et al.*, 2007).Geographic distribution and status of the *taeniasis* is considered a serious in the developing countries but less recognized for public health problems. Bovine *cysticercosis* cosmopolitan in distribution and is very common Africa (Minozzo *et al.*, 2002).

It is highly endemic in areas of Central and East African countries like Ethiopia, Kenya and Zaire (Teka, 2006). The custom of eating undercooked beef dishes such as: kourt, lebleb, kitffo and the habit of defecating in open fields coupled with the tradition of allowing cattle to grazing fields made *cysticercosis* of cattle and *taeniasis* of human common in Ethiopia. The higher prevalence of *cysticercosis* in developing countries is associated with poor infrastructure, low awareness and improper disposal of sewage, which pertains to Ethiopia, where the wide spread habit of eating raw meat is an additional risk factor (Tolosa*et al.*, 2009).

Host range: Cattle are the preferred intermediate hosts and humans are the only final hosts of *T. saginata*. Cattle of all agesare susceptible however young age groups are more susceptible. Parasitism is sometimes observed in other ruminants (sheep, goats, antelopes, gazelles, buffaloes) (Pawlowskiz, 1996).

Transmission: In humans, it is the ingestion of under- cooked beef (*T. Saginata*) containing the larval cyst. Intermediate host, such as cows and pigs, are infected with the tapeworm when they come in contact with the worm's eggs located in the feces of infected humans (Townes and knohn, 2004). Human *Cysticercosis* occurs when a person ingests *T. Saginata* eggs that are passed in the feces of a human tapeworm carrier. Tapeworm eggs are spread through food, water or surfaces contaminated with feces. This can happen by drinking contaminated water or food or by putting a contaminated finger into your mouth.

Importantly a human tapeworm carrier can infect him or herself with tapeworm eggs, resulting in *Cystcercosis* (autoinfection), and can contaminate others in the family (Clifton and Atlanta, 2010). In the central nervous system or the eye rather than when develop in voluntary muscles (Townes and Knohn, 2004). Man cannot spread *taeniasis* to his own species. Management of animals in their natural environment predisposes them to infection. Cattle grazing commonly have a higher risk of picking up *T. saginata* eggs as they are frequently in contact with the human feces compared to commercial herds. The risk of cattle coming into contact with *T. saginata* eggs is much higher when cattle are at pasture (Ashwania nd Gebretsadik, 2008).

Life cycle

The life cycle of *T. saginata* is indirect where the definitive host is human and intermediate hosts are cattle (Kebede *et al.,* 2009). Typically, the tapeworm life cycle consists of an adult tapeworm in the final human host. It also produces proglottids segment containing a considerable number of shed on defecation eggs. *Taenia* eggs are containing an embryo (Oncosphere) which is spread into the environment through sewage and Ingested by the intermediate hosts (Cattle). In cattle the embryo moves from the intestine to striated musculature. Here they develop into small vesicles called *cysticerci* containing one protoscolex, head of the future adult tapeworm (Kassai, 1999).The *metacestodes* are found throughout the edible parts of the carcass which included masseter muscles, cardiac muscles, triceps muscles, thigh muscles, shoulder muscles, diaphragm, intercostals muscles, liver, heart, tongue, lung and kidney, (Kebede *et al*., 2009 ;Megersa *et al.,* 2009). The tongue, masseter muscles, heart muscles, triceps muscles and thigh muscles are the main predilection sites of the cysts (Dawit , 2004).Prevention of human *Taeniasis* and bovine *cysticercosis* is achieved by interrupting the life cycle of the parasite (Teka, 1997).

Pathogenesis

Human *Taeniasis* is manifested as mild non-specific gastrointestinal illness including symptoms of abdominal pain, digestive disturbance, nausea, diarrhea and Anorexia (Utulas *et al*., 2007). The tapeworm utilizes nutrition of man thus causing great loss of nutrient in the hosts. Presence of large number of *T. saginata* causes enteritis (Ministry of Agriculture, 1972).

Cysticercus does not cause clinical signs in cattle even in heavy infections (Kassai, 1999). Under natural condition the presence of *cysticerci* in the muscle of cattle is not associated with clinical signs checked although experiments that calve given massive infection of *T. saginata* eggs developed with severe myocarditis and heart failure associated with developing *cysticerci* in the heart and cause of death between 14 to 16 days (Utulas *et al.,* 2007). Heavy infection in cattle may results in fever, gastroenteritis, muscle stiffness and weight loss particularly in young animals (FAO, 2004).

Clinical signs

In Cattle: *C. bovies* not pathogenic for cattle and usually the infection causes no clinical signs**,** unless a vital organ (e.g. the heart) is massively infected, which is very unusual. In case of massive infections muscle stiffness has been reported. Live cattle having *C. bovies* shows no symptoms, however, heavy infestation by the larvae may cause myocarditis or heart failure. Light or moderate cysticercosis in cattle is not usually associated with any defined clinical picture. Heavy infections, those induced experimentally by 200,000 to 1,000,000 *T. saginata* eggs, may give rise to fever, weakness, profuse salivation, anorexia, increase heart and respiratory rate and a dose of one million or more eggs may cause death between 14 to 16 days due to a degenerative myocarditis (Regassa*et al.*, 2009).

In Human: The clinical manifestations in humans include abdominal pain, nausea, debility, weight loss, and diarrhea or constipation. A patient may have one or several of these symptoms and a high percentage of patients experience gastric hyper secretion (Hansen and Brain, 1994).

Diagnosis

The routine Meat Inspection is the only diagnostic procedure in use in Ethiopia for the diagnosis of bovine *cysticercosis*. This method is insensitive and inaccurate and thus the reported prevalence of this infection in different regions of country may be an underestimate. To effectively improve meat, there is a need to increase the area and number of predilection sites observed during inspection procedures (Kumar and Tadesse, 2011). *Metacestodes* (*Cysticercusbovis*) of *T. saginata* usually occur in the striated muscles of cattle (beef measles), but also buffalo, reindeer and deer (OIE, 2000). Meat inspection relies exclusively on visual examination of the intact and cut surfaces of the carcass (eye-and knife method) in the slaughterhouse by meat inspectors who follow officially laid-down procedures(Yoder *et al.*, 2002).

The Following are laid as normal routine inspection of carcasses by the Ministry of Agriculture in Ethiopian Meat Inspection Regulation Notice Number 428 of 1972: Visual inspection, palpation of the surfaces and a longitudinal ventral incision of the tongue from the tip of the root, One deep incision into the triceps muscles of both sides of the shoulder, extensive deep incision into external and internal muscles of masseter parallel to the plane of the jaw, visual inspection and longitudinal incision of the myocardium from base to apex are performed during inspection of carcass(MOA, 2013).

Differential diagnosis

In cattle, *C. bovis* should be differentiated from: *Cysticercus dromedarius* (*C. cameli*) the larval form of *Taeniahyaenae*. The identification of *C. cameliis* by double row of hooks on the lateral invaginated scolex and its length being twice as large as *C. bovis* measuring 12-18mm in length and pearly white in color. *Sarcocystis bovifelis* (*Sarcocystis hirusta*), which is a soft bradyzoite cyst, very large and visible to the naked eye whitish streaks running in the direction of the muscle fibers. The cyst ranges from 0.1mm to 5mm in length. *Onchocercaduki*; which measures 3mm to 6mm in diameter, from intramuscular and subcutaneous nodules that are firm to touch (Urquhart *et al.*, 1996).

Treatment

Chemotherapy of cattle for bovine *cysticercosis* is not common in Ethiopia. However, such treatment has been tried in other countries and treatment with a drug was suggested to be economical where prevalence of bovine *cysticercosis* is very high (Ashwani and Gebretsadik, 2008). Drugs which have shown efficacy against bovine *cysticercosis* including, Niclosamide, Praziquntel, Mebendazole and Albedazole. However, at present, it is not feasible to treat animals due to high cost and the possible public health significance of dead calcified cyst in the meat (Hansen and Brain, 1994). Praziquntel kills both the adult and larvae. Most of the larvae are killed even when encysted and disintegrated within 5 months (WHO, 1995).

Control and prevention

Attempts to control and eliminate *taeniasis* usually interrupt the links between the hosts of the tapeworm via diagnosis and treatment of *taenia* carriers, education of human to use latrines, avoid eating of raw meat and backyard slaughter, serological test of cattle and postmortem inspection of carcass for presence of*C. bovis*. Cattle older than six weeks are inspected for *Cystcercosis* in skeletal and cardiac muscles; a generalized infection of the carcass is deemed unacceptable for human consumption, but a localized infection can be refrigerated for a period of time to be rendered safe (Harrison *et al.*, 2001). In Ethiopia bush defecation, the habit of eating raw beef dishes such as kitfo and kourt, and backyard slaughter might have contributed for the high prevalence of bovine *cysticercosis*. Farmers

should be supported and informed of the life cycle of *T. saginata* and potential risk factors for cattle to become infected (Abusier *et al.,* 2006).

In developed countries the control of *bovine cysticercosis* depends on a high standard of human sanitation, on the general practice of cooking meat thoroughly (the thermal death point of *cysticerci* is 57°C*)* and Preventive measures include strict attention of personal hygiene, environmental sanitation and protection of cattle from contact with human excretion that protection of cattle from grazing on feces or sewage polluted grass, not Using untreated human feces as fertilizer for pasture land which may contain segments and Ova (Acha and Szyfres , 2003 ; Alula, 2010).

Deep freezing of meat will kill all *cysticerci* in 24hrs, but a whole carcass has to be frozen for about 21 days before all parts reach the correct temperature as a meat is a good insulator. The infectiousness of cysts in beef is affected by temperature and other kinds of treatments. Chemotherapy in humans reduces the spread of eggs and infection in cattle (Soulsby, 1982).Industries are involved, since most importing countries have stringent regulations designed to prevent the importation of infected meat (Harrison *et al.,* 2001).

Public health importance

Human taeniasis is caused by infection with the adult stage of the tapeworms, *T. saginata* and *T. solium*, while human *cysticercosis* results from infection with the larvae (*Cysticerci*) of the latter species. Both of these parasites occur in Africa as zoonosis because the usual hosts for the cysticerci are cattle and swine respectively, from which humans become infected with the adult tapeworm (Kassai *et al.,* 1989). About 100 million people worldwide may be infected with either *T. saginata* or *T. solium* (FAO, 1991).

Bovine cysticercosis is food-borne parasitic zoonosis caused by the larval stage of the tapeworm *Taenia saginata* commonly referred to as the beef tapeworm. This larva is meat-borne and human infection results from the ingestion of raw or undercooked beef (Maeda *et al.,* 1996). *Taenia saginata*in the small intestine of man absorbs digested food and its proglottids migrate to different organs causing different signs (Urquhart *et al.,* 1996*).*Adult *Taenia saginata*can live up to 30 to 40 years in the small intestine of its human host. Most humans who carry an adult tapeworm are asymptomatic. Patients may intermittently pass proglottids either with their stool (*T. solium*) or spontaneously (*T. saginata*) (Minozzo *et al.,* 2002).

The economic losses due to bovine cysticercosis are associated with total condemnation of carcasses with generalized infestation (Kebede *et al.,* 2009). Evaluation of the economic impact of *taeniasis/cysticercosis* is very difficult particularly in developing countries like Ethiopia, where necessary information is so scant and considerable proportions of infected people treat themselves with traditional herbal drugs like “Kosso” and others (Abunna *et al.,* 2008).However, countries have high cattle population, poor hygiene, and common occurrence of bovine *cysticercosis* reflect heavy losses. Attempts to reduce the prevalence of *T. saginata* in humans and their *cysticerci* in cattle may have a considerable impact on the economics of meat production industries. *Cysticercosis* in cattle is a significant food safety problem and causes economic loss in food production. This will be particularly important where export industries are involved, since most importing countries have stringent regulations designed to prevent the importation of infected meat (Harrison *et al.,* 2001).

The financial loss to commercial meat producers can be significant. Meat and offal infested with *Taenia* cyst of any species (Even those species not infective to man) will most likely to be rejected from the commercial food chain (will not be able to be sold) because of people will not buy it (People are unlikely to eat meat or organs with cyst in them).*T. saginata* cyst should be found in beef or meat, the meat rejection is likely to be doubly enforced since the organism is significance to human health. Should that

diseased animals be of genetic value (Example good stud bull, high yield dairy cow), then the commercial loss is compounded through the loss of those productive gene to be future generation of animals. Extra cost will be incurred in replacing the valuable animals (Roberts*et al.*, 2005).

The economic impact of the disease in the cost implication scan be broken down in to those involved in treating human *taeniosis* and cattle carcasses (cost of freezing, boiling) or condemned, as well as the costs involved in the inspection procedures amount to millions of dollars (Nunes, 2003). Conventional meat inspection technique is less sensitive (pick only 7-5% of infected cases) and time consuming. Lightly infected carcasses can be easily missed and passed for human consumption, thus the infection transmission is maintained between human and cattle. Thus *taenisosis (cysticercosis)* is remaining a wide spread zoonosis that affects human health and economy through condemnation, quality degradation of frozen meat, cost of refrigeration, cost of human therapy, lowering productivity of infected workers who may be absent from or reduce their working efficiency by creating uneasiness (Nigatu, 2004).

In Ethiopia, there is a wide usage of both traditional and modern taenicidal drugs (Feseha, 1995), which is an indication and diclorophen production in the drug factories in this country between 1996 and 2000 was 31,814,833 Ethiopian birr (Tembo, 2001). The cost implication can be broken down into those involved in treating human *Taeniasis* and cattle carcasses (Cost of freezing, boiling) or condemned, as well as the cost involved in the inspection procedures. The average annual loss due to *taenicidal* drugs for treatment in Ethiopia was estimated to be 4,937,583Ethiopian birr (Dawit, 2004 and Ahmed, 1990).

Status of cysticercosis in Ethiopia

In developing countries, taeniasis/bovine cysticercosis constitutes a serious but less recognized public health problem (Minozzo *et al.*, 2002). Due to the habit of eating raw or undercooked beef dishes such as *kourt* and *kitffo*, taeniasis in human is common in Ethiopia (Gebro-Emanuel Teka 1997). A high (89.41%) prevalence of human infection in different agro-climatic zones of the country has been reported (Tembo, 2001). Low availability of taenicides is a constraint and the use of herbal drugs do not eliminate this parasite from human population and the proglottids are passed out with the faecal matter resulting in cysticercosis in the cattle (Tedla, 1986). Ethiopia is divided into nine ethnically-based administrative regions and three chartered cities and bovine cysticercosis has been reported from different parts of the country (Table 1).

Table 1. Bovine cysticercosis in different parts of Ethiopia

Place	Percent Prevalence	Reference
Addis Ababa, Ethiopia	13.3%	Nigatu, K et al., 2009
Addis Ababa, Ethiopia	2.2%-3.3%	Teka, G, 2006, Alemu, M, 1997
DebreZeit, Oromia	13.85%	Getachew, A, 2008
Wolaita Soddo (Southern Ethiopia)	11.3%	Regassa, A., et al., 2009
Mekelle, Adigrat, Wukro (Tigray region)	8.29%	Kumar, A and Gebretsadik, B, 2008
Mekelle (Tigray region)	7.23%	Getachew, A, 2008
Southern Nations Nationalities People's Region(Southern Ethiopia)	26.25%	Abunna, F, et al., 2008

Amhara National Regional State, Ethiopia	18.49%	Nigatu, K, 2008
Bahir Dar (Amhara region)	19.4%	Alemu, M, 1997
Nekemta, Oromia	21.7%	Ahemed, I, 1990
Gonder, (Amhara region)	-	Amsalu, D, 1989; Dawit, S, 2004
Shoa, Ethiopia	-	Hailu, D, 2005

The metcestodes were found throughout the edible parts of the carcass which included masseter muscles, cardiac muscles, triceps muscles, thigh muscles, shoulder muscles, diaphragm, intercostal muscles, liver, heart, tongue, lung and kidney, (Nigatu, K, *et al.*, 2009; Regassa, A, *et al.*,2009; Abunna, F, *et al.*, 2008; Getachew, A, 2008; Nigatu, K, 2008, Kumar, A and Gebretsadik, B, 2008). The tongue, masseter muscles, heart muscles, triceps muscles and thigh muscles were the main predilection sites of the cysts (Nigatu, K, 2008). Abunna, F, *et al*. (2008) reported these cysts in heart (29.2%),shoulder muscle (25.3%), masseter muscle (26.7%), tongue (10.4%), diaphragm (5.4%), liver(1.4%), lung (0.9%) and kidney(0.5%) while Kumar, A and Gebretsadik B, 2008 reported cysts from tongue (0.61%), masseter muscles (0.59%), shoulder muscles(0.26%), heart (0.26%)and liver (7.45%).

The prevalence of bovine cysticercosis reported by various researchers may be an underestimate since many infections go undiagnosed as reporting was exclusively based on routine meat inspection and the procedure described under Meat Inspection Regulation Notice Number 428, 1972 by Government of Ethiopia(MoA,1972) is not followed strictly at most of the abattoirs.

Conclusion and Recommendations

C*ystcercus bovis*is one of the major problems that affect livestock productivity, highly economically important and have public health significance disease worldwide. In Ethiopia, The disease is common in human and animals and also difficult to control, because of inadequate health education, culture of eating raw meat, Habit of defecating in open field, traditional grazing system of cattle and low availability of *taenicidal* drugs and lack of awareness about the disease among the society.

Based on the above conclusion, the following recommendations are forwarded:

- Competent meat inspection must be strictly implemented at every abattoir of the country.
- Immunodiagnostics must be developed to supplement meat inspection procedures.
- Public education to avoid consumption of raw meat must be made compulsory at different education levels.
- Cysticercosis free husbandry should be encouraged
- Vaccination and chemotherapy must be encouraged to control the infection.

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