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A STUDY ON MAJOR CAUSES OF ORGAN CONDEMNATION IN SMALL RUMINANTS SLAUGHTERED AT HASHIM NUR'S MEAT EXPORT ABATTOIR

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ABSTRACT

The study was conducted from September 2016 to January 2017 with the aim of to identify and determine the major causes of organ condemnation in sheep and goats slaughtered at Hashim Nur's Ethiopian Livestock and Meat export (HELIMEX) abattoir in Bishoftu. During the study, standard anti and post mortem slaughter inspection procedures were followed throughout the study period with the former being carried out in the lairage with recording the abnormalities encountered, on the prepared format, followed by post slaughter examination through their identification number to detect the causes that rendered each affected organ to be rejected from local and international markets. A total of 768 animals (384 each of sheep and goats) were slaughtered and 3840 organs were examined post slaughtered. Out of the total organs examined, 397(51.69%) livers, 600(78.13%) lungs 71(9.24%) hearts and 130(8.46%) kidneys (one or both of the right and left) were condemned summing up to give a total of 1198(31.198%) condemned organs. Reasons for the condemnation were: hepatitis 21(2.73%), cirrhosis 27(3.52%), fasciollosis 26 (3.3%), hydatidosis 8(1.04%), Stelesia hepatica 31(4.04%), cysticercosis 93(12.11%). And calcification 191(24.87%) on liver; emphysema 128(16.67%), pneumonia 402(52.34%), abscess 23(2.99%), hydatidosis 15 (1.95%), marbling 24(3.13%) and calcification 8(1.04%), on lung; pericarditis 40(5.21%), hydro pericardium 6(0.78%) and calcification 25(3.26%) on heart and nephritis 78(10.16%), Nephrosis 39(5.08%) and abscess 13(1.69%) on kidney. In conclusions results of the present study justify immediate need of prevention of various pathogens that causes organ and carcass condemnation and pathological abnormalities through development of animal health delivery enforcement of slaughter policy, education on animal welfare/humane slaughter and training of slaughterhouse personnel on standard slaughter operations.

KEYWORDS: Organ condemnation, Hashim Nur's meat export abattoir, Small ruminants, ante mortem inspection, post mortem examination.

1. INTRODUCTION

Small ruminants (sheep and goats) are important domestic animals in the tropical animal production systems (Devendra and Meclory, 1990). Within African society small ruminant comprise a greater proportion of the total wealth of poor families because of low input requirements such as small initial capital, fewer resources and maintenance cost. They are also produce milk and meat in readily usable quantities using marginal lands and poor pasture and crop residues. Furthermore, their production cycle make them need only short periods to reconstitute flocks after disaster and respond quickly to the demand they need only short periods to reconstitute flock after disaster and respond quickly to the demand (Gatenby, 1991).

Sheep and goat population in Ethiopia is approximately 2598 and 2196 million respectively (FAO, 2010). Which cover 30% of all domestic meat production in the Country Small ruminants are found mainly in the low land agro-ecology which constitute 65% of the area where 25% sheep and close to 100% goat is population exist (PACF Ethiopia 2003). They generate cash income from export of meat, edible organs, skins and live animals (Ibrahim 1998). An increase in small ruminants production could contribute to the attainment of food self sufficiency in the country particularly in response to protein requirement for the growing human population as well as to enhance the export earnings (Teferi, 2000).

Abattoir data is an excellent option for detecting diseases of both economic and public health importance (Arbabi

and Hooshyr, 2006, Abbuna et al., 2010) especially in ascertaining the extent to which human is exposed to certain zoonotic diseases in addition to estimating the financial implications of carcass condemnations (Jobre et al., 1996). Surveillance at the abattoir allows for all animals passing in to human food chain to be examined for unusual signs lesions or specific diseases (Alton et al., 2010). Monitoring all conditions at slaughtered has been recognized as one way of information is not fully exploited worldwide (Mellau et al., 2010).

The purpose of meat inspection is to protect public health and to provide risk free products to the society. Also it provides information that can be utilized for animal disease control (Gracey et al., 1999). Meat inspection comprising of ante mortem and post mortem examination, to remove gross abnormalities from meat and its products, prevention of distribution of contaminated meat that could result to disease risk in man and animals and assisting in detecting and eradication of certain diseases of livestock(Van Longtestijin, 1993). Ante mortem inspection attempts to avoid introduction of clinically diseased animals in to slaughter house and also serves to certain information that will be useful in making sound post mortem inspection (Herenda et al., Teka 1997).

Post mortem inspection is the center around which meat hygiene revolves since it provides information essential for evaluation of clinical signs and pathological process that affect the wholesomeness of meat (Herenda et al., 1994). As meat is the main source of protein to man, it should be clean and free from diseases of particular importance to the public such as tuberculosis and cysticercosis. Meat is also zoonoses which are not transmitted to man directly via meat like hydatidosis and other important diseases of animals such as fasciolosis (Jibat, 2006).

Also A serious constraint on small ruminant production in Africa has been the high prevalence of disease and parasites, particularly in the more humid areas. This causes high mortality amongst kids and lambs, diminishing the benefits of their high reproductive performance. It causes extensive financial wastes as a result of direct and indirect economic losses. Studies conducted in lung, nephritis in kidney, and cysticercosis in different visceral organs were found to be the major causes of organ condemnation (Daniel, 1995: Mezgebu, 2003:Miruk, 2005).

Improper slaughtering techniques such as faulty stunning, bleeding, skinning, evisceration and carcass splitting can damage parts of the carcass and certain by products and make them unusable for further use. Poor hygiene practices during slaughtering results in high level of microbial contamination in the products. Thus reducing the shelf life and adversely affecting color, texture and quality of meat properties of the products (FAO, 1994).

Any observation and information obtained at slaughterhouse can contribute to the understanding of slaughtered animals' disease. The pathological examination represents a useful tool to make a diagnosis within the slaughter line. Keeping in view the economical and public health significance of various causes of organs condemnation, this study was design to identify the major causes of organ condemnation at Bishoftu HELMEX export abattoir under taken with the following objectives:

- To identify the major causes of organ condemnation.
- Determine the prevalence of the findings in the organs.

2. MATERIALS AND METHODS

2.1 Study area Description

The study was conducted from September 2016 to January 2017 at the HELMEX (Hashim's Ethiopia Livestock International meat export abattoir) which is found in Debre-zeit town located at 9^{o}N and 4^{o}E latitude and at 47k/m away from Addis Ababa in the south east direction. The human population of the town is about 171,115. Debrezeit has an average altitude of 1,800 meters above sea level and have experienced a bimodal pattern of rain fall with the main rainy season extending from June to September (during which 84% of rain expected) and short rainy season from March to May. The average annual rainfall is 800mm and mean annual minimum and maximum temperature is 12.3^{0} and $27.7C^{0}$, respectively, with an overall average of $18.7C^{0}$. The average relative humidity is $58.6C^{0}$. Debrezeit is the center of Ada'a district or woreda which has a total land area of about 1,610.56km^{2} (NMSA, 2003). The study animals were small ruminants destined for slaughter. These animals were all males originated from different parts of the country including Arsi, Bale, Afar, Shewa, Wollo, Omo, Borena and Jinka. They were transported to the abattoir using vehicles.

2.2 Study population

A total of 768 animals (384 sheep and 384 goats) were studied being identified by species and age during ante mortem inspection. Animals were classified into groups: young and adult, based on eruption of one or more incisor teeth to see the effect of age. Arbitrary classification, according to Steele (1996) and Gatenby (1991) was made to perform the age grouping on both species of animals, which was based on dentition. From 384 slaughtered sheep, 192 were young and 192 were adults and the same holds true for goats also.

2.3 Study design and Methodology

A cross sectional study was conducted in sheep and goats slaughtered in HELMEX abattoirs with the study period ranged from September 2016 to January 2017 in the export abattoir to identify the major causes of organ and carcass condemnation. Animals belonging to a group of young and adult were randomly sampled using systematic sampling method and examined by ante mortem and post mortem examination. Sample size was

calculated using the formula given by (Thrusfield, 2005) with 50% expected prevalence 95% confidence interval and 5% desired absolute precision accordingly the sample size was determined to be 384 for each species.

2.4 Abattoir Survey

2.4.1 Ante mortem examination

In the cross sectional study of active abattoir survey both ante mortem and post mortem inspections were carried out in accordance with the procedures of Ethiopian Ministry of Livestock and Fisheries under the Export abattoir inspection and certification directorate. In the ante mortem inspection pre-slaughter examinations of small ruminants were conducted at lairage and various information concerning age, body condition score and origin of each study animals were properly recorded. The age grouping was done based on dentition standard given by (Vatta et al., 2005). Those animals which have not erupted permanent incisor teeth and one pair of permanent incisors (i.e. < 1 year to 1 1/2 years (for sheep) and < 1 year to 2 years (for goats) were grouped as young. those having two pairs and above permanent teeth (i.e. $\geq$ 1 1/2 years for sheep) and $\geq$ 2 years (for goats) were grouped as adult. body condition scoring was carried out based on the handbook given by Ethiopian Sheep and Goat Productivity Improvement Program (ESGPIP, 2008). the scores were classified in to six categories namely starving (0), very thin(1), thin(2), moderate (3), fat (4) and very fat (5). for convenience these categories were summarized in to three classes as poor (0 and 1), medium (2 and 3) and good (4 and 5). additionally general behavior of the animals nutritional status, cleanliness and sign of diseases and abnormality of any type were registered according to the standard ante mortem inspection procedures and animals that were fit for human consumption were allowed for slaughter (Gracey, 1986).

2.4.2 Post mortem examination

During post mortem inspection liver, heart, kidney, brain and carcasses were thoroughly inspected by visualization, palpation and making systemic incisions where necessary for the presence of cysts, parasites and other abnormalities. Pathological lesions were differentiated and judged according to guidelines on meat inspection for developing countries (Herenda et al., 1994). The results were recorded and the decisions were classified as totally approved, partially approved as fit for human consumption and totally condemned as unfit for human consumption (FAO, 1993).

2.4.3 Data analysis

Collected data from records and from active abattoir survey were entered in to Excel spread sheet and process of coding, cleaning and validating was done on this sheet. Descriptive statistics were used to determine organ and carcass condemnation rates, defined as proportion of organs and carcasses condemned to the total number of organs and carcasses examined. Association of the cause of organ condemnation between and within species in ages was assessed by Pearson chi-square(x^2) and the differences were regarded statistically significant at ($p< 0.05$). The analysis of the data was done using a soft ware program, the STATA version11.

3. RESULTS

3.1 Ante mortem findings

The ante mortem examination was carried out on all 768 small ruminants (384 ovine and 384 caprine) for the detection of any abnormal conditions encountered in the HELMEX export slaughter. A total of 254 small ruminants (139 ovine and 115 caprine species) were found to have the abnormalities listed below (table1), with the respective ante mortem judgments passed.

Table 1: Summary of abnormalities or condition encountered during ante mortem inspection in both species.

	Caprine (384)	**Ovine (384)**	**Total (768)**
	%	%	%
Nasal discharge	42(10.93)	50(13.02)	92(11.98)
Lameness	8(2.08)	20(5.2)	28(3.65)
Emaciation	35 (9.11)	31(8.07)	66(8.59)
Diarrhea	19(4.95)	23(5.99)	42(5.47)
Total	**115(29.95)**	**139(36.21)**	**254 3.07)**

3.2 Post Mortem Finding

All animals that had been examined by ante mortem inspection were also subjected to post mortem examination. a total of 768 shoats were examined by following post mortem procedure from the total organs examined in both species a total of 397 (51.69) livers from caprine 162(42.19) and ovine 235(61.19) were rejected from both local and international markets due to different pathological conditions, like hepatitis, cirrhosis, fasciollosis, cysticercosis, stelesia hepatica infection, hydatidosis and calcification. Statistically significant difference on liver rejections was observed between species due to fasciollosis, hydatidosis and calcification ($P < 0.005$). More livers were condemned in ovine 22(5.73%) than caprine 4(1 .04%) due to fasciollosis.301(78.39%) and 299(77.86%) lungs of caprine and ovine respectively were condemned summing up to give a total of 600(78.13%), due to pneumonia, emphysema, abscess, marbling, hydatidosis and calcification and statistically high significance difference ($P<0.05$) on rejection rates of lung was observed between species due to all these pathologies except emphysema and calcification (Table 2).Out of 768 hearts examined from both goats and sheep,

33(8.59%) and 38(9.89°/o) respectively were condemned due to pericarditis, hydro pericardiurn and calcification and no statistically significant difference on the rejection of heart due to the above mentioned pathological conditions was observed between species (P> 0.05)(Table 2). Statistically high significant difference was observed between species on kidney rejection rate due to nephrosis and high number of kidneys was condemned in caprine than in ovine. Nephritis, nephrosis and abscess are the major causes of kidney condemnation and out of the total of 130(8.46%) kidneys, one or both of the right and left kidneys of caprinc 75(9.77%) and ovine 55 (7. 16%) were condemned from local and international markets.

Table 2: Summary of the major causes of organ condemnation and their frequencies between species.

Cause of organ condemnation of liver	Caprine (384)	Ovine(384)	Total	P-value
Hepatits	12(3.13)	9(2.34)	21(2.73)	0.5
Cirrhosis	9(2.34)	18(4.69)	27(3.52)	0.078
fasciolosis	4(1.04)	22(5.73)	26(3.39)	0.00
Cysticercosis	49(12.76)	44(11.46)	93(12.11)	0.58
Stelesiosis	13(3.39)	18(4.69)	31(4.04)	0.35
Hydatidosis	1(0.26)	7(1.82)	8(1.04)	0.03
Calcification	74(19.27)	117(30.47)	191(24.87)	0.00
Total	162(42.19%)	235(61.19%)	397(51.69%)	---

Cause of organ condemnation of lung	Caprine (384)	Ovine(384)	Total	P-value
Emphysema	55(14.32)	73(14.32)	128(16.67)	0.081
Pneumonia	216(56.25)	186(49.44)	402(52.34)	0.03
Abscess	5(1.30)	18(4.69)	23(2.99)	0.006
Hydatidosis	2(0.52)	13(.39)	15(1.95)	0.004
Marbling	l8(4.69	6(1.56)	24(3.13)	0.013
Calcification	5(1.30)	3(0.78)	8(1.04)	0.47
Total	**301(78.39%)**	**299(77.86%)**	**600(78.13%)**	**301(78.39%)**

Cause of organ condemnation of heart	Caprine (384)	Ovine(384)	Total	P-value
Pericarditis	16(4.17)	24(6.25)	40(5.21)	0.19
Hydro pericardium	3(0.78)	3(0.78)	6(0.78)	1.00
Calcification	14(3.65)	11(2.86)	25(3.26)	0.54
Calcification	14(3.65)	11(2.86)	25(3.26)	0.54
Total	**33(8.59%)**	**38(9.89%)**	**71(9.24%)**	

Cause of organ condemnation of kidney	Caprine (384)	Ovine(384)	Total	P-value
Nephritis	40(10.42)	38(9.90)	78(10.16)	0.81
Nephrosis	31(8.07)	8(2.08)	39(5.08)	0.00
Abscess	4(1.04)	9(2.34)	13(1.69)	0.16
Total	**75(19.53%)**	**55(14.32%)**	**130(16.93%)**	**75(19.53%)**

Table 3: Summary of the major causes of liver condemnation and their frequencies between and within species in age groups.

	Caprine (384)				Ovine (384)			
Causes of liver	**Adult/**	**Young!**	**Total!**	**P-Value**	**Adult/**	**Young!**	**Total!**	**P-Value**
Condemnation	(192)	(192)	(384)		(192)	(192)	(384)	---
Hepatitis	2(1.04)	10(5.21)	12(3.13)	0.019	5(2.60)	4(2.08)	9(2.34)	0.74
Cirrhosis	6(3.13)	3(1.56)	9(2.34)	0.312	10(5.21)	8(4.17)	18(4.69)	0.63
Fasciolosis	2(1.04)	2(1.04)	4(1.04)	1.00	13(6.77)	9(4.69)	22(5.73)	0.38
Cysticercosis	28(14.58)	21(10.94)	49(12.76)	0.284	23(11.98)	21(10.94)	44(11.46)	0.75
Stelesia hepatica	5(2.60)	8(4.17)	13(3.39)	0.397	9(4.69)	9(4.69)	18(4.69)	1.00
Hydatidosis	0(0.00)	1(0.52)	1(0.26)	0.3	4(2.08)	3(1.56)	7(1.82)	0.70
Calcification	41(21.35)	33(17.19)	74(19.27)	0.3	65(33.85)	52(27.08)	117(30.47)	0.15
Total	**84(43.75%)**	**78(40.63%)**	**(‘9(42.19%)**		**129(67.19%)**	**106(55.21%)**	**35(61.19%)**	

Table 4: Summary of the major causes of lung condemnation and their frequencies between and within species in age groups.

	Caprine (n %)				Ovine (n %)			
Causes of lung	**Adult/192**	**Young/**	**Total/**	**P- value**	**Adult!**	**Young!**	**Total!**	**P-value**
Condemnation	(192)	(192)	(384)		(192)	(92)	(384)	
Emphysema	38(19.79)	17(8.85)	55(14.32)	0.002	37(19.27)	36(18.75)	73(19.01)	0.897
Pneumonia	115(59.9)	101(52.60)	216(56.25)	0.15 99	(51.56)	87(45.31)	186(48.44)	0.22
Abscess	0(0.00)	5(2.60)	5(1.30)	0.024	9(4.69)	9(4.69)	18(4.69)	1.00
Hydatidosis	0(0.00)	2(1.04)	2(0.52)	0.16	7(3.65)	6(3.13)	13(3.39)	0.78
Marbling	5(2.60)	13(6.77)	18(4.69)	0.05	3(1.56)	3(1.56)	6(1.56)	1.00
Calcification	3(1.56)	2(1.04)	5(1.30)	0.65	1(0.52)	2(1.04)	3(0.78)	0.56

Within caprine species, statistically significant difference (P< 0.05) was observed on lung rejection rates due to emphysema and abscess in that emphysema causes greater rejection on adults than on young's where as abscess do the reverse.

Table 5: Summary of the major causes of heart condemnation and their frequencies between and within species in age groups.

	Caprine (384)			Ovine (384)		
Abnormalities	**Adult /192**	**Young/192**	**Total/384**	**Adult/192**	**Young/192**	**Total/384**
Pericarditis	9(4.69)	7(3.65)	16(4.17)	13(6.77)	11(5.73)	24(6.25)
Hydro pericardium	1(0.52)	2(1.04)	3(0.78)	2(1.04)	1(0.52)	3(0.78)
Calcification	9(4.69)	5(2.60)	14(3.65)	5(2.60)	6(3.13)	11(2.86)

No significant difference (P> 0.05) was observed within and between species on the rate of heart rejection due to the above causes.

Table 6: Summary of the major causes of kidney condemnation and their frequencies between and within species in age groups.

	Caprine (384)			Ovine (384)		
Abnormalities kidney	**Adult/(192)**	**Young(192)**	**Total**	**Adult(192)**	**Young(192)**	**Total**
Nephritis	15(7.81)	25(13.02)	40(10.42)	23(11.98	15(7.81)	38(9.90)
Nephrosis	19(9.90)	12(6.25)	31(8.07)	8(4.17)	0(0.00)	8(2.08)
Abscess	1(0.52)	3(1.56)	4(1.04)	5(2.60)	4(2.08)	9(2.34)

None of the above findings on kidney brings a statistically significant difference (P> 0.05) on kidney rejection rate within species except nephrosis in ovine which causes a greater rejection on adults 8(4. 17%) than on young's 0(0.00%).

Table 7: Summary of the frequency of the total condemned organs.

Organs condemned	**Frequency of organ condemnation (%)**		
	Caprine (n /384)	**Ovine (n / 384)**	**Total**
Liver	162(42.I9)	235(61.19)	397(51.69)
Lung	301(78.39)	299(77.86)	600(78.13)
Heart	33(8.59)	38(9.89)	71(9.24)
Kidneys	75(9.77)	55(7.16)	130(8.46)
Total	**57 1(29.74)**	**627(32.66)**	**1198(31.198)**

A total of 768 animals were slaughtered and 3,840 organs were examined post slaughter. Out of the total organs examined, 397(51.69%) livers, 600(78.13%) lung 71(9.24%) hearts and 130(8.46%) kidneys (one or both of the right and left) were condemned summing up to give a total of 1,198(31.198%) condemned organs.

Reasons for the condemnation were: hepatitis 21(2.73%), cirrhosis 27(3.52%), Fasciollosis 26(3.39%). hydatidosis 8(1.04%), Stelesia hepatica 31(4.04%), cysticercosis 93(12.11%), and calcification 191(24.87%) on liver; emphysema 128(16.67%), pneumonia 402(52.34°/o), abscess 23(2.99%), hydatidosis 15(1.95%), marbling 24(3.13%) and calcification 8(1.04%) on lung; Pericarditis 40(5.21%), hydro pericardium 6(0.78%) and calcification 25(3.26%) on heart and nephritis 78(10.16%), Nephrosis 39(5.08%) and abscess 13(1.69%) on kidney.

4. DISCUSSION

Ante mortem and post mortem inspections were conducted in the abattoir for the purpose of screening and removing animal products with pathological lesions which were unsafe for human consumption and having poor aesthetic values. It was indicated in national herd and flock by providing feedback information to veterinary service to control or eradicate diseases and to produce wholesome products and to protect public from zoonotic hazards (Van Llogtestin, 1993. Gracy et al., 1999). Hence the gathered information from abattoir record can be used by farmers to improve the husbandry of their animals in such a way that farmers can improve the overall management of their animals so that pre slaughter problems would be reduced (Edwads ea al., 1999).

Meat inspection and meat hygiene shall make sure that meat and meat products are safe and wholesome for human consumption. The classical ante mortem and post mortem procedures were designed to detect diseases in an animal before slaughter and lesions produced by the disease after slaughter respectively (Herenda et al., 2000).

During this ante mortem examination, the most commonly encountered abnormalities were nasal discharge, coughing, lameness, emaciation diarrhea and death. Most of the cases associated with lameness, were supposed to be due to the fatigue resulting from transportation of animals to a long distance on their feet where as coughing and nasal discharges were the result of infection (shipping fever/ pneumonic pasturellosis) that occurs due to the transportation stress predisposition.

In the present study, a total of 768 animals were slaughtered and 3,840 organs were examined post slaughter. Out of the total organs examined, 397(51.69%) livers. 600(78.13%) lungs 7 1(9.24%) hearts and 130(8.46%) kidneys (one or both of the right and left) were condemned from local and international markets summing up to give a total of 1105(28.78%) condemned organs. Livers and lungs were the most frequently condemned organs as of the result of this study, and losses from liver condemnation were assumed to occur since hepatic pathology is associated to infections that might have public health importance (Budke et al., 2006; Radostits et al., 2007) and aesthetic value.

A total of 397(51.69%) livers; 162(42.19%) from caprine and 235(61.19%) from ovine were condemned /rejected from both local and international markets due to different parasitic infections like fasciollosis, cysticercosis, Stelesia hepatica infection, and hydatidosis. Furthermore, different lesions of infectious and non infectious causes like abscess, pericarditis, nephritis and nephrosis were found to be important causes for the condemnation of edible organs. Similarly the same causes were reported at Gondar (Yimam, 2003) and Nigeria (Ojo, 1992).

Statistically significant difference on liver rejections was observed between species due to fasciollosis, hydatidosis and calcification ($P < 0.005$). More livers were condemned in ovine 22(5.73%) than caprine 4(1.04%) due to fasciollosis i.e. the prevalence of fasciollosis is higher in sheep 22(5.73%) than in goats 4(1.04%). This is because of the fact that sheep are grazers and are therefore, more likely to ingest large number of metacercaria attached to grasses close to the ground while goats are browsers and less affected as the number of metacercaria decreases as the feeding gets above the ground.

30 1(78.39%) and 299(77.89%) lungs were condemned from the total inspected lungs in caprine and ovine respectively because of abnormalities like pneumonia, emphysema, abscess, marbling, hydatidosis and calcification, and statistically high significant difference on rejection rates of lungs was observed between species due to all these findings except emphysema and calcification. Even though the lung is not needed at international markets, it is sold at local markets because of being a staple food for pets and other canides and therefore, it has to be examined and condemned (if affected) just for the purpose of breaking the life cycle/transmission cycle of animal diseases.

Based on this finding, pneumonia, calcification and emphysema are the most and major causes for the organ condemnation as similar report was observed during retrospective study (Ezana, 2008). Cysticercosis, nephritis and pericarditis are the second major causes organ condemnation.

Based on this study the prevalence of hydatidosis is higher in goat 7 (1.82%), than in sheep 1(0.26%) also previous finding by (Abiy, 2009), who reported a higher prevalence in goats 1152(2.46%) than in sheep 1536(1.1%). Other study that was conducted at 2006 at HELIMEX abattoir also reported a higher prevalence in goats than in sheep that is 9(3.6%) and 6(2.4%) respectively (Adem, 2006). Lungs are the most commonly affected organs more than liver with Hydatid cyst because, they have large capillary beds encountered by the blood borne onchospheres (Augus, 1978). It is also because of the fact that lung tissue has relatively softer consistency that allows the easier development and fertility of the cyst (1-limonas, 1987).

5. CONCLUSION AND RFCOMM 1NDATIONS

The result of this study reveals that there was a huge amount of economic loss due to organ condemnation in small ruminants' slaughtered at HELIMEX abattoir. According to the result of this study therefore, pneumonia, calcification and emphysema are the most and major causes for the respective organ condemnation. Cysticercosis, nephritis and pericarditis are the second major causes next to the previous mentioned ones. From parasitic infections, Cysticercosis, Stelesia hepatica, fasciollosis and hydatidosis were the major causes for

organ condemnation. It is therefore absolutely necessary that prevention and control- measures with better management systems should be applied in small ruminant production to alleviate the production loss due to condemned organs in HELIMEX and other abattoir as well. Based on the above conclusion, the following recommendations are forwarded:

- Standard regulations and functional meat inspection polices should be formulated for organs and carcass approval/ rejection for abattoirs in order to have positive relation with importing countries so that profitable and sustainable international meat trade to be continued.
- Immediate, safe and controlled elimination of all condemned offal and heads as dogs' feed should be prohibited.
- Regular deworming of small ruminants and dogs and elimination of stray dogs should be practiced.
- Training of abattoir workers on procedures and cares during flaying and evisceration should be done.
- Awareness should be created in producers, local and medium traders, of the animal attendants, farmers, customers and abattoir workers pertaining to and proper disposal of condemned offals and carcasses.
- Further studies should be carried out in small ruminants that are going to be slaughtered in different abattoirs of the country and introduce preventive measures to reduce unnecessary financial losses encountered in the industry.
- Better management and feeding systems to decrease the access of shoats to parasitic and other infections.

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