Economic Losses of Condemned Livers and Lungs due to Infectio with Common Reportable Diseases of Slaughtered Ruminants at Kerbala Abattoirs

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Abstract

A study was carried out at kerbala slaughterhouses during 6 month-period from October 2015 to March 2016 in order to estimate the economic losses of condemned livers and lungs of slaughtered ruminants due to common reportable diseases. Diagnosis of diseases and lesions of livers and lungs depended on pathological changes of organ, color, size, consistency, presence of parasites and lesions. Out of 67,500 heads of slaughtered sheep, goats, cattle, and buffaloes which were slaughtered during this study at Kerbala abattoirs, condemnation of livers and lungs was carried out in 2002 (2.96%) of the slaughtered animals, of which 22 (0.03%) , 15 (0.02%) , 302 (0.45%) , 91 (0.13%) of the slaughtered animals were due to hydatidosis, facioliasis , lung worms, pneumonia and hepatitis respectively. The highest infection rate of the condemned livers in slaughtered ruminants was recorded due to hydatidosis 1,324(1.96%), followed by hepatitis 91(0.13%) and fascioliasis 22(0.03%). The livers of 1.32% sheep, 7.42% goat, 3.36% cattle and 4.06% buffaloes carried hydatid cysts, and the infection rate of hydatidosis in livers of goats was significantly higher than other animal species with ($P< 0.05$). However, lungs of slaughtered ruminants were frequently disposed due to hydatid cyst (1.004%) ,followed by pneumonia (0.45%) and lung worms (0.02%), and that lungs of goats (3.72%) were condemned more frequently with a significant difference ($P <0.05$) than other animal spp. The findings of the current study revealed that condemnation of livers and lungs of sheep, goat, cattle and buffaloes in kerbala abattoirs due to parasitic infestation and other pathological lesions caused considerable economic losses. The estimated total losses due to condemned livers and lungs in buffaloes and cattle were (28,250,000 Iraqi Dinars ,ID) (21,730 $) but in sheep and goats ,the losses were (46,650,000 ID) (35,884 $) and the total economic losses recorded in this period of study for all species of animals slaughtered in abattoirs due to condemned lungs and livers were (74,900,000 ID) (57,615 $) .

Key words: Economic losses, condemnation, livers and lungs, reportable diseases, abattoirs, Kerbala.

الخسائر الاقتصادية الناتجة عن إتلاف الأكباد والرئات بسبب الأمراض الشائعة والمسجلة في الحيوانات المجزورة في مجازر محافظة كربلاء

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المستخلص

أجريت دراسة في محافظة كربلاء خلال 6 أشهر وضمن الفترة من تشرين الأول 2015 ولغاية آذار 2016 لتحديد معدل الخسائر الاقتصادية من إتلاف أكباد ورئات ذبائح المجترات بسبب عدد من الأمراض والطفيليات التي تصيب هذه الأعضاء ، والتي تم تشخيصها من خلال التغيرات المرضية للعضو المصاب فيما يخص اللون ، الحجم ، الشكل ، وجود الآفة وكذلك وجود الطفيلي إضافة إلى الفحص ألمختبري. تم فحص ما مجموعه 67500 رأسا من الأغنام والماعز والأبقار والجاموس وقد حدث الإتلاف في 2002 (2.96%) بسبب الأكياس المائية ، 22(0.03%) ديدان الكبد ، 15(0.02%) ديدان الرئة ،302 (0.45%) ذات الرئة و 91 (0.13%) التهاب الكبد. أوجدت الدراسات إن أعلى معدل لأتلاف الأكباد كان بسبب الأكياس المائية1324(1.96 %) ويليه التهاب الكبد 91 (0.13%) ثم ديدان الكبد22 (0.03%) , إن أكباد الأغنام (1.32%,) ,الماعز (7.42%), الأبقار (3.36%) , والجاموس (4.06%) وجدت مصابة بالأكياس المائية وان معدل الإصابة في أكباد الماعز كانت هي الأعلى مع وجود فرق معنوي ($p<0.05$) . ومن جانب أخر فان رئات ذبائح المجترات كانت تتلف بالدرجة الأولى بسبب مرض الأكياس المائية (1%) يليه ذات الرئة (0.45%) ثم ديدان الرئة (0.02%) مع وجود فرق معنوي ($P<0.05$%) في أعداد الرئات التي تم إتلافها في الماعز عن باقي الحيوانات .لخصت الدراسة الحالية بأن إتلاف أكباد و رئات ذبائح المجترات في مجازر كربلاء نتيجة الأمراض الطفيلية والأمراض الأخرى تمثل خسائر اقتصادية كبيرة للبلد حيث وجد إن الخسائر التي تتسبب نتيجة إتلاف الكبد والرئتين في الجاموس والأبقار بلغت (28250000 دينارا عراقيا)($21730) لكنها كانت اكبر في الأغنام والماعز حيث بلغت (46650000 دينارا عراقيا) (35884 $) ومجموع الخسائر الاقتصادية التي سجلت خلال هذه الفترة في جميع الحيوانات المصابة والمجزورة في مجازر كربلاء كانت (74900000) (57615 $) .

Introduction

Ruminants are commonly infected with hydatid cysts, Fasciola spp, Dictyocaulus spp. (5) causing significant losses due to death and partial or complete rejection of the carcasses at slaughterhouses (20). The high rates of these helminthes infection (hydatidosis , fascioliasis and lung worms) in food-animals causing great loss of disposed organs and carcasses , in addition to lowering of production and performance of animals (11) .

The Consolidated Annual Report/ 2014 issued by the State Company for Veterinary Services of Iraq on the common post-mortem pathological conditions (recorded by veterinarians during meat inspection in abattoirs)stated that hydatid cysts, liver fluke, lung worms, pneumonia and hepatitis were the most prevalent disease conditions reported in slaughtered animals in all 15 central and southern provinces of the country (24).

A comparative study on liver and lung helminthes infections which was conducted in kerbala slaughterhouses by (6) , the total infection rate of hydatid cysts was found to be the highest followed by Fascioliasis and lung worms .However, another slaughterhouse study which was also conducted in Kerbala abattoirs revealed that partial or complete condemnation of livers and lungs was carried out in slaughtered ruminants due to hydatidosis, fascioliasis, lung worms, pneumonia and hepatitis (7).Nevertheless, a cross sectional study which was conducted on distribution of liver and lung helminthiasis in domestic ruminants slaughtered at Kirkuk abattoirs by (14) revealed that hydatid cyst was the most prevalent parasite followed by liver fluke then lung worms.

Other workers such as (15) also found that fascioliasis was the most prevalent parasitic infection followed by hydatid cysts , and lung worms , whereas the overall prevalence of pneumonia and hepatitis were 0.3% and 0.34% respectively. A slaughterhouse survey conducted in Tanzania reported that livers of cattle , sheep and goats were disposed due to 11 diseases/conditions namely, fascioliasis, calcified cysts, abscess, Cysticercus tenuicollis infection, telangiectasis, hepatitis, fatty degeneration , melanosis and liver cirrhosis (18).

Hydatid cysts in ruminants and humans have been recognized as the most important helminthes- zoonosis with great public health and economic significances in the developing countries (4). Moreover, fascioliasis has recently been shown to be an emerging and widespread zoonosis affecting a number of human populations (17). Nevertheless, as a zoonotic disease, the World Health Organization (WHO) estimated that 2.4 million people were infected with Fasciola in 1995 and a further 180 million were at risk of infection (25).

The purpose of this study was to estimate the economic losses of condemned livers and lungs due to infection with common reportable diseases of ruminants slaughtered at Kerbala abattoirs.

Materials and methods

The study was conducted at three main abattoirs of Kerbala governorate during 6-month period extended from October 2015 to the end of March 2016, and included examining livers and lungs of ruminants slaughtered there. Livers and lungs of 54000 sheep , 3600 goats,8100 cattle and 1800 buffaloes were visually inspected , palpated and wherever required incision was made. Diagnosis of diseases and lesions of livers and lungs was based on pathological changes of organ color, size, morphology, consistency, presence of lesions and parasites (figure 1). Further examination and identification of the parasites and lesions were undertaken for all partial and total rejected

livers and lungs. Identification of fasciola spp was performed as described by (21), and lung worms were identified according to (22), while hydatid cyst was grossly diagnosed. None of the examined parasites were recovered in all examined- cases of hepatitis in liver and pneumonia in lung none. The collected data were analyzed using Chi -Square analysis , and the test was used to record the variation in the infection rates of the different animal species during the study, as well as for finding significant and non significant values.

Figure 1.Visual examination of condemned livers and lungs due to the presence of parasites and lesions.

Estimation of Economic Losses:

The economic losses of condemned livers and lungs due to the reportable diseases , namely, hydatidosis, facioliasis, lung worms, hepatitis and pneumonia in kerbala abattoirs were estimated by counting the daily total condemned visceral organs by the average market- cost of the healthy organs multiplied by the period of the work. In

case of sheep and goat ,and due to its small size the whole plug (both liver and lung) was condemned when the infection detected in either liver or lung.
weight of liver in buffalo &cattle = 4kg average
weight of lung in buffalo &cattle = 4kg average
cost of the plug (liver & lung) in sheep and goat =25,000 ID
cost of 1 kg of liver in buffalo &cattle = 12,250 ID
Total cost of 4kg of liver in cattle and buffalo = 50,000 ID
cost of 1kg of lung in buffalo &cattle = 12,250 ID
Total cost of 4kg of lung in cattle and buffalo = 50,000 ID
number of infected buffaloes & cattle slaughtered during the studied period =101+465= 566 heads
number of infected sheep and goat slaughtered during the studied period = 1361+505 = 1866 heads

Result

The results illustrated in table 1, revealed that out of 67500 heads of slaughtered ruminants which were examined during this study, condemnation (either partially or completely) of livers and lungs was done in 2002(2.96%), 22(0.03%), , 15 (0.02%), 302(0.45%) and 91(0.13%) of the examined animals due to hydatid cysts, fascioliasis, lung worms, pneumonia and hepatitis respectively. Significant differences ($P<0.05$) in the infection rates of infections were recorded between animal species.

Table 1: Incidence rates of parasitic and pathological infections in livers and lungs of slaughtered ruminants.

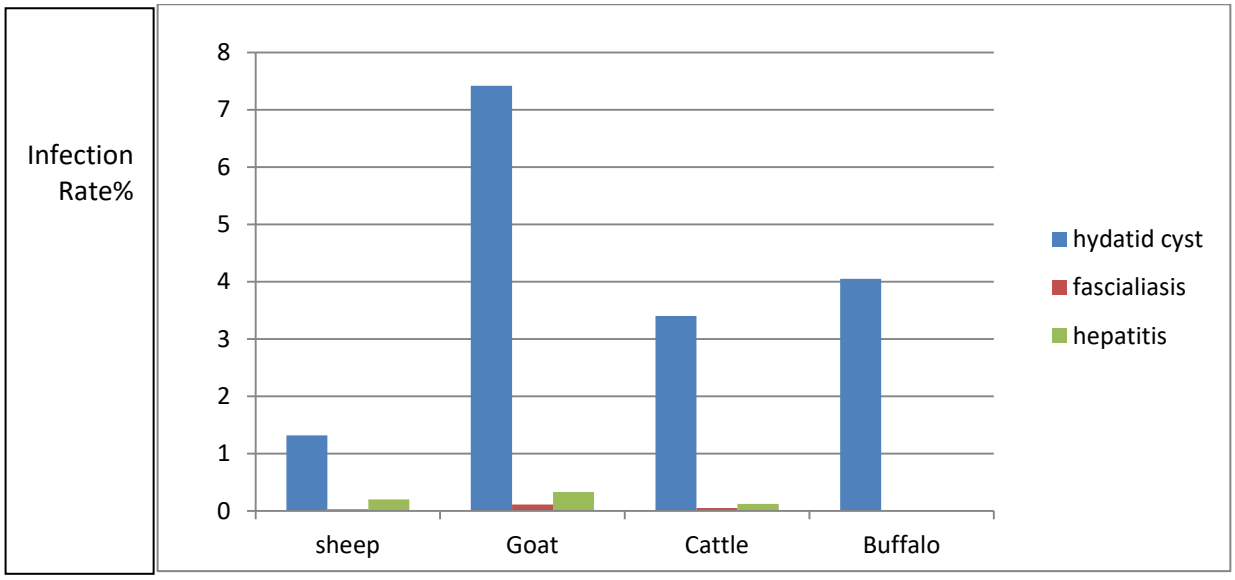
Species	No. Examined Animals	No .of infected livers(%)			No .of infected lungs (%)		
		Hydatid cysts	Facioliasis	Hepatitis	Hydatid cysts	Lung worms	Pneumonia
Sheep	54000	712(1.32%) A	14(0.03%) A	69(0.13%) A	405(0.8%) A	7(0.01%) A	154(0.29%) A
Goat	3600	267(7.42%) B	4(0.11%) A	12(0.33%) B	134(3.72%) B	6(0.2%) B	82(2.3%) B
Cattle	8100	272(3.36%) B	4(0.05%) A	10(0.12%) A	117(1.44%) B	2(0.02%) A	60(0.74%) B
Buffalo	1800	73(4.06%) C	0 A	0 B	22(1.22%) C	0 A	6(0.33%) C
Total	67500	1324 (1.96%)	22 (0.03%)	91 (0.13%)	678 (1%)	15 (0.02%)	302 (0.45%)

Capital similar letters in the same column = non significant values
Capital different letters in the same column = significant values
$P < 0.05$

The findings displayed in table 1 also demonstrated that the total infection rates of the condemned livers in slaughtered ruminants due to hydatid cysts , fascioliasis and hepatitis were 1324 (1.96%), 22(0.03%) and 91(0.13%) respectively. The infection rates of hydatidosis in livers of animals showed significant variation between goats

and other animal species (P < 0.05), as well as between cattle and other animals (P<0.05).However, no significant difference was reported between goats and cattle . The results shown in table 1 also indicated the infection rates of condemned lungs in slaughtered animals due to hydatid cysts, lung worms, and pneumonia were 678 (1%) , 15 (0.02%) and 302 (0.45%) respectively.

The differences of infection rates of condemned livers in different species of slaughtered animals have been displayed in figure 2.



Chi square : P< 0.05

Figure 2. infection rates of condemned livers in slaughtered ruminates with hydatid cysts , fascioliasis ,and hepatitis

The results presented in Table 2 showed condemnation of livers and lungs was carried out in 1361, 505 , 465 , 101,of sheep ,Goat, Cattle and Buffalo and the total amount of economic losses in both cattle and buffalo were 28,250,000 ID (21730 US$) ,and the losses in both sheep and Goat 46,650,000 ID (35884 $) whereas the grand total losses in all animal species were 74,900,000 ID (57615 US$).

Table 2: Economic losses due to condemned organs of the slaughtered ruminants

Diseases	Affected Organs	Species				Total condemned organs	Total losses(ID)* in cattle & Buffaloes	Total losses(ID) in sheep& Goats	Grand total losses
		Sheep	Goats	Cattle	Buffalos				
Hydatid cysts	Liver	712	267	272	73	1324	17,250,000	24,475,000	41,725,000
	Lung	405	134	117	22	678	6,950,000	13,475,000	20,425,000
Fascioliasis	Liver	14	4	4	___	22	200,000	450,000	650,000
Lung worms	Lung	7	6	2	___	15	50,000	325,000	375,000
Pneumonia	Lung	154	82	60	6	302	3,300,000	5,900,000	9,200,000
Hepatitis	Liver	69	12	10	___	91	500,000	2,025,000	2,525,000
Total	Livers & Lungs	1361	505	465	101	2432	28,250,000 21730 $	46,650,000 35884 $	74,900,000 57615 $

* ID : Iraqi Dinar (exchange rate of each 1 US $ equals to 1300 ID)

Discussion

The results of this study demonstrated that livers and lungs of ruminants slaughtered at Kerbala abattoirs were commonly condemned due to parasitic infestation and pathological lesions. The parasitic infestations and their prevalence in liver and lung which are illustrated in Table 1 were found to be hydatid cysts (2.96%), liver fluke (0.03%) and lung worms (0.02%). Moreover, pneumonia (0.45%) and hepatitis (0.13%) were also found to be the main pathological conditions behind destruction of examined lungs and livers respectively.

The findings of this study on parasitic infection which are documented in Table 1 were in agreement with those reported in Kerbala abattoirs by (5) who found hydatid cysts (1.24%), liver fluke (0.29%), lung worms (0.44%), pneumonia (0.66%) and hepatitis (0.37%) in livers and lungs of the slaughtered animals. The results were also similar with those found in Kirkuk by (14) who reported the infection rates of hydatid cysts (1.6%), liver fluke (0.6%) and lung worms (0.2%) in liver and lungs of slaughtered animal. Nevertheless, and with the exception of hydatid cysts, the results are slightly lower than those recorded in a survey conducted in kerbala abattoirs by (7) , through that survey the total infection rates of hydatid cysts , liver fluke, lung worms ,pneumonia and hepatitis in slaughtered ruminants were found as 1.24% , 0.29% ,0.44 %, 0.66% and 0.37% respectively. The higher prevalence rate of hydatidosis in this study might have been attributed to the presence of favorable epidemiological factors of the parasites such as large number of stray dogs, improper disposal of af-

fected organs and illegal slaughter of food animals outside the abattoirs, particularly during religious occasions.

The findings of the present study displayed in table 1 also revealed that the livers of goats were infected with hydatid cysts (7.42%), fascioliasis (0.11%), and hepatitis (0.33%) significantly higher ($P< 0.05$) than sheep, cattle and buffaloes. Similarly, the lungs of goats also recorded significantly higher infection ($P<0.05$) with hydatid cysts (3.72%), lung worms (0.2%) and pneumonia (2.3%) than sheep, cattle and buffaloes. The highest infection rates of hydatid cysts, fascioliasis, hepatitis, lung worms and pneumonia in goats reported in the current study could be attributed to the relatively softer consistency of liver and lung in goat which permits easier development and infestation with the parasites there, as well as secondary infection with other micro-organisms (7).

The results of this study shown in Figure 2 indicated that infection rate of hydatidosis in condemned livers of sheep (1.32%), goat (7.42%) , cattle (3.36%) and buffalo (4.06%) was higher than the infection rates of facioliasis and hepatitis in the same organ. The results of the current study indicated that hydatidosis was the leading cause of condemnation of livers and lungs in sheep, goats, cattle and buffaloes alike.

The findings of this study shown in figure 2 reported that condemnation of livers was also done due to Fascioliasis and hepatitis. The infection rate of condemned livers with fascioliasis in sheep, goats, and cattle was 0.03%, 0. 11%, and 0.05% respectively. The findings of this study were consistent with those reported in Kerbala abattoirs by (7) who found liver fluke in 0.22% sheep, 0.52% goats, 0.42% cattle . However, no fascioliasis was recorded in buffaloes during our study which differs from that reported by (6) who found 0.85% of buffaloes harbored the parasite. Absence of fascioliasis in buffaloes in our study may be explained due to lack of water and dryness of large areas of marshes and swamps where the intermediate parasite (snails) prefers to live in. The results were also in agreement with(8) who found the incidence of Facioliasis in slaughtered ruminants in Kirkuk abattoir was 0.5% sheep, 0.3% goats and 3.2% cattle . The results also resembled those reported by (4) who found Facioliasis in liver of sheep 0.36% , goats 0.14%,and cattle 1.27% . However, results of the present study on the incidence of facioliasis in liver of slaughtered ruminants were lower than those reported by other workers from other countries, such as(8), found liver condemnation due facioliasis was sheep,3.1% goats and 8.6% cattle. In addition to that, surveys in Tanzania, Ethiopia and Zambia reported higher prevalence of 14.04%, 24.3% and 41.3% respectively (12 ,19,23). Once again, the dryness of the grazing lands of food animals in Kerbala governorate, particularly swamps areas might have lead to destruction of the snails and lowering the infestation rate of fascioliasis accordingly.

Our findings on the occurrence of hepatitis in livers of ruminants which are displayed in figure 2 indicated that the highest rate was reported among goats 0.33% followed by sheep 0.13% , cattle 0.12% and buffalo 0%. The disposal of liver due to hepatitis also resembles those reported by other workers. In a study conducted by (4)

found the highest rate of hepatitis in cattle 1.12% followed by sheep 0.32% and goats 0.05% but no hepatitis observed among slaughtered buffaloes. Other results reported from other countries, such as (9) reported 2.9% condemnation rate of liver due to hepatitis in ruminants in Nigeria, whereas, (23) recorded hepatitis in 1.1% cattle, 1% sheep and 1.5 goats slaughtered at Arusha, Tanzania. Another study (10) found out the incidence of hepatitis in goats in North east Brazil to be 2.5%. in addition to that, (2) recorded 3.8%. liver condemnation rate in Bangladesh due to abscesses and hepatitis. It might be useful to mention, that hepatitis happened due to migrating intestinal parasites which pre optimize the conditions for a secondary bacterial infection (10).

The results of this study in table 2 revealed that the grand total economic losses due to condemnation of livers and lungs in sheep ,goat ,cattle and buffalo infected with hydatid cyst (62,150,000) Iraqi Dinar (ID) (47,807 $) ,facioliasis (650,000 ID) (500$) ,lung worm (375,000 ID) (288 $), pneumonia(9,200,000 ID) (7076 $) and hepatitis(2,525,000 ID)(19423$). However, the recorded losses which occurred during the period of the study in Kerbala abattoirs due to condemnation of livers and lungs infected by hydatid cysts in cattle and buffaloes were (17,250,000 ID) (13269 $) in livers ,and (6,950,000 ID) (5346 $) in lungs. Nevertheless, higher losses were recorded in livers and lungs due to hydatidosis in sheep and goats,(liver = 24,475,000 ID ,18826 $) , (in lung =13,475,000 ID)(10365$) and the total condemnation of the hydatid cysts in the livers and lungs in all species (62,150,000 ID)(47807 $). The results are comparative with similar studies in Kirkuk (1) which found the economic losses which caused by hydatid cysts were lower than those reported by our study, the same study reported the economic losses in sheep livers (1,420,000 ID) (10923 $) in lungs (176,000ID) (1353 $) but losses of cattle - livers (1,600,000 ID) (12307 $) in lungs (178.000 ID) (1369 $) and the total losses in livers and lungs in sheep and cattle (3,374,000 ID) (25953 $), whereas no case infection of hydatid cysts was reported in buffalos and goats in Kirkuk.

The results of this study illustrated in table 2 revealed that the economic losses due to condemnation of livers in sheep and goat due to facioliasis (450,000 ID)(346 $) were lower than those reported by a similar study conducted in sulaimania governorate (853,300 ID) (7110 $) (3). However, our results revealed the economic losses due to condemnation of livers in cattle due to facioliasis was (200,000 ID) (153 $) .These losses were lower than that reported in cattle in sulaimania province which reached (22,566,840 ID) (16119 $) but higher than that recorded in Baghdad 88407 ID (13) and in Basra it reached 98521 ID (16) .The results of the current study in table 2 also indicated that losses came from lung worms infection in sheep and goats (325,000 ID) were higher than those resulted from cattle and buffaloes (50,000 ID).

Regarding the economic losses resulted from pathological lesions, the results of our study pointed out that condemnation of lungs due to pneumonia in sheep and goats caused considerable losses (5,900,000 ID) which were higher than in cattle and buffaloes (3,300,000 ID). Similarly, losses resulted from condemnation of livers due to hepatitis infection in sheep and goats (2,025,000 ID) were also higher than those in

cattle and buffaloes (500,000 ID). Obviously, these losses resulted due the high incidence rates of pneumonia and hepatitis in sheep and goats compared with cattle and buffaloes.

Finally, the economic losses of slaughtered animals in Kerbala abattoirs revealed that the total outcome of these losses in small ruminates (sheep and goats) due to condemnation of infected lungs and livers were (46,650,000 ID) (35884 $) which were greater than those in large ruminants (cattle and buffaloes) the summation of losses in buffalos and cattle's (28,250,000 ID) (21730 $) and the total economic losses in all species due to condemnation of lungs and livers was reading (74,900,000 ID) (57615 $). Bad management and husbandry used for housing and raising sheep and goats were presumably the main epidemiological factors behind the high incidence rates and accordingly the resultant losses of these parasitic infestation and pathological lesions in sheep and goats.

Accordingly, we recommend to conduct a comprehensive campaign to control the hydatidosis through destruction of stray dogs , preventing illegal slaughter and proper disposal of infected Organs. In addition, we also recommend adopting a proper ante mortem inspection procedure inside the abattoirs for detecting the infected animals and applying the proper measures for good meat hygiene inspection, as well as establishing an incinerator for proper disposal of infected organs. It is also required conducting an awareness campaign to make people aware of the risk of these diseases. Concerning fascioliasis, it is preferable to prevent grazing near swamps and marshes to avoid the intermediate host (snails) and to break up the life cycle of the parasite.

References

1- Ahmed LM and Rasheed SA. 2013): Distribution of liver and lung helminthic infections among slaughtered animals in Kirkuk abattoir. Journal of Genetic and Environmental resources Conservation, Vol.1 1) 36-40.

2- Ahmedullah, F.M., Akbor, M.G., Haider M.M., Hossain M.A. and Khan, N.A. (2007): Pathological investigation of liver of the slaughtered buffaloes in Barisal district. Bangladesh. J. Vet. Med.., 5: 81-85.

3- Al-Barwari SE. A survey on the liver infections with F. gigantica among slaughtered animals in Iraq. Bull End Dis 1978; 18: 75-92.

4- Amr, Z., Rifal L. and Al-Melhim W. (2005): An abattoir survey of liver and lung helminthic infections in local and imported sheep in Jordan. Turk. J. Vet. Anim. Sci., 29(1): 1-2 5. Kobir, H.B. Eliyas M., and Miazi o.f. (2010): Prevalence of zoonotic parasitic disease of domestic animals in different abattoirs of comilla and Brahman baria region in Bangladesh University. J. Zool. Rajshahi., 28:21-25.

5- Al- Nassir, H.S. (2012). Epidemiological study on the prevalence of hydatidosis in slaughtered ruminants in Kerbala Governorate. Journal of Kerbala University, Vol. 10.No. 4, pp 326-333.

6- Al-Nassir H.S., Alzugaibi, EM and Al-Garrawi A.K. (2012). Comparative study on liver and lung infections with hydatid cysts, liver flukes and lung worms among slaughtered ruminants in Kerbala abattoirs. Journal of Kerbala University, Vol.10, No.4. pp 320-325.

7- Al-Nassir H.S. (2014). A surveillance study on condemnation of ruminant,s livers and lungs due to common disease conditions in Kerbala abattoirs. Kufa Journal of Veterinary Medical Sciences.233.

8- Berhe, G., Berhane, K, and Tadesse, K. (2009): Prevalence and economic significance of fasciolosis in cattle in Mekelle Area of Ethiopia Trop. Anim. Health Prod. 4:1503-1504.

9- Cadmus, si.B., Adesokan H.K. (2009): Causes and implications of bovine organs/offal condemnations in some abattoirs in Western Nigeria. Trop. Anim. Health Prod., 4: 1455-1463.

10- EASL Jury. EASL International Consensus Conference on Hepatitis B , 13–14 September , 2002: Geneva , Switzerland . Consensus statement (short version). J Hepatol 2003 ; 38 : 533 –40 (http:// www.easl.ch /hbv2002 / 01630170. pdf)

11- Getachew H., Guadu T, Fentahun T. and Chanie M. 2012): Small ruminants Hydatidosis: occurrence and Economic Importance in Addis Ababa Abattoir. Global Veterinaria 8(2): 160-167.

12- Ghazani M.H.M. Valilou MR., Karati F.B. and Zirak K. (2008): Prevalence of sheep liver hydatid cyst in the Northwest Region. AJAVA, 3: 30-35.

13- Iraqi Journal of Veterinary Sciences, Vol. 26, Supplement III, 2012 (83-88) Proceedings of the 6th Scientific Conference, College of Veterinary Medicine, University of Mosul.

14- Kadir M.A and Rasheed SAA(2008): Prevalence of some helminthes among slaughtered ruminants I Kirkuk slaughterhouse Iraqi Journal of veterinary sciences, Vol. 22, No. 2 pp 81-85.

15- Kadir M.A. Ali N.H. and Ridha RG.M. (2012): Prevalence of Helminthes, pneumonia and hepatitis in Kirkuk slaughterhouse, Kirkuk, Iraq. Iraqi Journal of Veterinary sciences, Vol. 26, supplement lll, PP 83-88.

16- Mahdi NK, Al-Baldawi FAK. Hepatic fascioliasis in the abattoir of Basrah. Ann Trop Med Paras itol 1987; 81: 377- 379.

17- Mas-Coma, S., Bargues M.D., and Valero M.A.(2005): Fascioliasis and other plant-borne trematode zoonoses. Int J.Parasitol., 35: 1255- 1278.

18- Mellau LS.B., Noga H.E. and Karimuribo E.D. (2010): A slaughterhouse survey of liver lesions in slaughtered cattle, sheep and goats at Arusha, Tanzania. Research Journal of Veterinary Sciences 3(3): 179-188.

19- Phiri, A.M., Phiri, K. , Siziya, C.S,Sikasunge, Chembensofu, M., and Monrad, J. (2005): Seasonal pattern of bovine fasciolosis in the Kafue and Zambezi catchment areas of Zambia. Vet. Parasitol., 134: 87-92.

20- Salem o.A., Schneegan F, Chollet JY, Jem M.H. (2011) Epidemiological studies on Echinococcosis and Characterization of Human and Livestock Hydatid cysts in Mauritania Iran J. Parasitol. 6(1); 49-57.

21- Schantz, P.M., (1990): Parasitic zoonosis in perispective International. J. Parasitol., 22:165-166.

22- Soulsby, ELJ(1982). Helminths, Arthropods and Protozoans of Domesticated Animals. 7th ed. Bailliere Tindal, London, pp:809.

23- Swai, E.S. and Ulicky, E. (2009): An evaluation of the economic losses resulting from condemnation of cattle livers and loss of carcass weight due to fasciolosis: A case study from Hai town abattoir, Kilimanjaro region, Tanzania. Tanzania. Livestock Res. Rural Dev., Volume 21: 224 231.

24- The Consolidated Annual Report(2014): Iraqi Ministry of Agriculture State Company for Veterinary Services.

25- World Health Organization, 1995. Control of foodborne trematode infections. WHO Tech. Report Series, 849: 1-157.