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Prevalence of some foodborne parasitic affection in slaughtered animals in local Egyptian abattoir

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ABSTRACT

Fascioliasis, cysticercosis and hydatidosis were aimed to be investigated in some slaughtered animals (cattle, buffalo and camel) in local Egyptian abattoir located in Cairo Governorate. 10317, 763 and 290 cattle, buffalo and camel carcasses, respectively were examined in the period of 2017-2018. Results of PM inspection along the investigation period revealed detection of Fasciola in 0.58 and 1.4% of the examined cattle and buffalo carcasses, respectively, while was not detected in camel carcasses. Also, cysticercosis was detected in 0.47 and 0.69% of the examined cattle and camel carcasses, respectively, while was not detected in buffalo carcasses. In addition, hydatidosis was detected in lung and liver of 0.038 and 0.096% of cattle carcasses; 3.4 and 1.03% of camel carcasses, respectively, while was not detected in the examined buffalo samples. Annual values of financial losses because of the condemned affected parts summed total of 11712.5, 32940.0 and 2410LE due to fascioliasis, cysticercosis and hydatidosis, respectively along the investigation period (2017 and 2018). Referring to the obtained results, records of 2017 appeared to be more infection prevalent than 2018 with more financial losses. Moreover, fascioliasis was the most prominent affection in the present study. In addition, the critical veterinary inspection has a great role in protecting human-being to be infected with zoonotic meat-borne parasites. So, magnification and great support should be given to training veterinary inspectors in slaughterhouses in Egypt.

1. INTRODUCTION

Daily human requirement of protein was estimated to be 45-55 grams according to age and daily labor requirements (Wu, 2016). Red meats provide consumers with high quality, excellent source of a high essential amino acids, fatty acids, B-complex vitamins and many minerals supplement (Williams, 2007).

Parasitic infections of slaughtered animals have a significance public health importance and cause great economic losses that reflects the rearing environment. The most important parasites in meat inspection are those which are of zoonotic importance to human by consumption of under cooked meats of affected animals, while other parasites which are not transmissible to man may render the carcasses and organs repugnant and unmarketable (Gupta *et al.*, 2017). Infection of human with such serious meat borne zoonotic parasites such as cysticercosis and/or hydatidosis may be localized in muscle tissues and organs, causing epilepsy, anaphylactic shock, halazone disease and CNS affections (Şamdancı *et al.*, 2019 and Tas *et al.*, 2018).

Meat-borne parasites have been considered as a major public health hazard, especially in areas with poor sanitation and traditionally bad habits populations that consumed raw or under cooked meat results in negative impact on livelihood and spreading of infection (Abdel-Hafeez *et al.*, 2015).

Therefore, the present study was conducted to detect the percentage of parasitic infection in some freshly slaughtered animal species (cattle, buffalo and camel) along two years from 2017 to 2018 in a local abattoir in Cairo, Egypt.

2. MATERIAL AND METHODS

2.1. Area of study:

The study was carried out in a public abattoir located in Cairo governorate, Egypt.

2.2. Study design:

The study was conducted through active survey by daily routine work in the slaughterhouse along the period from 2017 to 2018.

2.3. Animals included in the study:

10317 cattle, 763 buffalo and 290 camel carcasses were examined in the scope of the current study during the full length of the study period.

2.4. Procedures applied for detection of parasitic lesions in slaughtered animals:

The routine PM of apparently healthy animals was carried out according to the method recommended by FSIS/USDA (2019) including head region, different lymph nodes, pluck, and different internal organs

2.5. Percentage calculation:

Prevalence calculation was conducted according to Thrusfield (2007) as follows:

2.5.1 The percentage of the parasitic diseases

The percentage of different parasites among examined animals was estimated by dividing the number of infected animals for each disease (animals with condemned organs or carcasses) by the total number of slaughtered animals then multiplies by 100.

2.5.2 Estimation of economic loss due to parasitic infection

It was calculated by weighing of condemned carcasses and organs by digital balance and multiplies it by current price in market according to Table (1).

Table 1 Price of meat and offal/kg during the investigation period

	2017 price (LE) / Kg	2018 price (LE) / Kg
Cattle/buffalo (Meat and heart)	75	95
Camel meat	50	70
Offal (Liver, lung, tongue, rumen, pancreas, spleen, intestine)	30	40

3. RESULTS

Referring to the obtained results in Table (2), out of 6313 and 5057 examined carcasses along the investigation period of 2017 and 2018, 1.28 and 1.21% were recorded to have different parasitic infections in 2017 and 2018, respectively.

Table 2 The number, species, and percentage of parasitic infection in the examined carcasses.

Years	Cattle			Buffalo			Camel			Total		
	No ₁	No ₂	%									
2017	5598	70	1.25	603	5	0.83	112	6	5.36	6313	81	1.28
2018	4719	49	1.03	160	6	3.7	178	6	3.37	5057	61	1.21
Total	10317	119	1.15	763	11	1.4	290	12	4.14	11370	142	1.25

No₁: Number of the examined carcasses

No₂: Number of the positive Fasciola affected carcasses.

%: percentage of infected carcasses.

Referring to the prevalence of fascioliasis in the examined carcasses as recorded in Table (3) and Fig. (1). Overall, 2017 recorded higher infection rates with Fasciola than 2018 with percentage of 0.73% and 0.49% during 2017 and 2018, respectively. In addition, buffalo carcasses revealed higher infection rate (1.4%) than cattle carcasses (0.58%) along the investigation period, while fascioliasis was not recorded in any of the examined camel carcasses during the current study.

Moreover, cysticercosis, as recorded in Table (5) and Fig. (2), was detected in 0.47% and 0.69% of the examined cattle and camel carcasses during the whole period of investigation, respectively. Although cysticercosis was not detected in 2017, camel carcasses harbored the highest incidence of cysticercosis infection in comparison with cattle carcasses along the investigation period (2017 and 2018); while cysticercosis was not reported in any of the examined buffalo carcasses.

Table 3 Percentage of fascioliasis in the examined carcasses

Year	Cattles			Buffaloes			Camel			Total		
	No ₁	No ₂	%	No ₁	No ₂	%	No ₁	No ₂	%	No ₁	No ₂	%
2017	5598	41	0.7	603	5	0.8	112	0	0	6313	46	0.73
2018	4719	19	0.4	160	6	3.7	178	0	0	5057	25	0.49
Total	10317	60	0.58	763	11	1.4	290	0	0	11370	71	0.62



Figure 1 Cattle liver show Fasciola affection and cirrhosis of bile ducts

Annual financial assessment of condemned liver due to fascioliasis in the examined carcasses was recorded in Table (4). Total losses were summed to be 11712.5 LE along the investigation period, where 2017 recorded higher losses (7132.5 LE) than 2018 (4580 LE).

Table 4 The annual financial assessment of condemned liver due to fascioliasis in the examined carcasses.

Animals	Year	Infected	Condemned Liver (Kg)	Value in EGP
Cattle	2017	41	215.75	6472.5
	2018	19	85.5	3420.0
Buffalo	2017	5	22	660.0
	2018	6	29	1160.0
Total	2017	46	237.75	7132.5
	2018	25	114.5	4580.0
Sum of 2017 & 2018		71	352.25	11712.5

Table 5 Percentage of cysticercosis in the examined carcasses.

Animals		No. of examined carcasses	No. of infected carcasses	%
Cattle	2017	5598	29	0.52
	2018	4719	20	0.42
	Total	10317	49	0.47
Buffalo	2017	603	0	0
	2018	160	0	0
	Total	763	0	0
Camel	2017	112	0	0
	2018	178	2	1.1
	Total	290	2	0.69
Total	2017	6313	29	0.46
	2018	5057	22	0.44
Sum of 2017 & 2018		11370	51	0.45



Figure 2 Cattle heart show multiple cysts by C. bovis

Referring to the records of the affected parts with cysticercosis (Table 6) displayed that 25, 18 and 2 hearts of cattle during 2017, 2018 and camel during 2018, besides, 3

and 2 heads of cattle during 2017 and 2018. Only one cattle carcass's total condemnation during 2017. The total economic losses were 32,940 LE along the investigation period (Table7).

Table 6 Partial and total condemnation due to cysticercosis in the examined carcasses.

Species	Partial condemnation			TC	Total
	Heart	Tongue & Masseter			
Cattle 2017	25	3	1	29	
Cattle 2018	18	2	0	20	
Camel 2018	2	0	0	2	

Table 7 The annual financial assessment of condemned organs and carcasses due to cysticercosis.

Species	Heart (Kg)	Head (Kg)	Carcass (Kg)	EGP (LE)
Cattle 2017	34.5	75	225	25078.5
Cattle 2018	26.7	55	0	7761.5
Camel 2018	2	0	0	100.0
Total	63.2	130	225	32940.0

Table (8) and Fig. (3) revealed the prevalence of hydatidosis in the lung and liver samples of the examined carcasses. Records revealed that buffalo carcasses appeared to be free from hydatidosis along the investigation period. Among the examined cattle and camel's organs, the lung infected with hydatidosis were nearly similar to liver where the rates of infection were 0.12 and 0.11%, respectively; in addition, hydatidosis records in 2018 were higher than 2017.

Table 8 Percentage of hydatid cyst condemnation in the lung and liver of the examined carcasses.

species	Year	Total No. of examined carcasses	Lung		Liver	
			No.	%	No.	%
Cattle	2017	5598	1	0.01	0	0
	2018	4719	3	0.06	10	0.2
	Total	10317	4	0.038	10	0.096
Buffalo	2017	603	0	0	0	0
	2018	160	0	0	0	0
	Total	763	0	0	0	0
Camel	2017	112	6	5.3	1	0.8
	2018	178	4	2.2	2	1.1
	Total	290	10	3.4	3	1.03
Total	2017	6313	7	0.11	1	0.015
	2018	5057	7	0.14	12	0.237
	Total	11370	14	0.12	13	0.114



Figure 3 Cattle liver and the lung show heavy infection with hydatid cyst. Furthermore, the annual financial assessment for condemnation due to hydatidosis equaled 1145 and 1265 LE were the value of economic loss in lung and liver during the whole period of investigation, respectively.

Table 9 the annual financial assessment for partial condemnation due to hydatidosis.

Species	Lung			Liver			Total EGP (LE)
	No. of infected organs	Weight (Kg)	EGP (LE)	No. of infected organs	Weight (Kg)	EGP (LE)	
Cattle							
2017	1	1.5	45	0	0	0	45
2018	3	7.0	280	10	29	1160	1440
Buffalo							
2017	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0
Camel							
2017	6	14	420	1	0.5	15	435
2018	4	10	400	2	2	80	480
Total							
2017	7	15.5	465	1	0.5	15	480
2018	7	17	680	12	31	1240	1920
Sum of 2017 & 2018	14	32.5	1145	13	31.5	1265	2400

4. DISCUSSION

In the current study, a total number of 11370 carcasses (10317 cattle, 763 buffaloes, and 290 camel carcasses) from January 2017 till December 2018 were slaughtered and PM examined for the presence of parasitic infection in a local abattoir in Cairo Governorate. The overall prevalence of infected slaughtered animals in this study was 1.25%. This record was higher than other studies recorded in Egypt (Elmonir *et al.*, 2015) (0.7%), while less than El-Meleh (2019) (1.95%). Among the detected parasitic infection during this study, fascioliasis was the most detected parasitic infection, followed by cysticercosis and hydatidosis, respectively.

Percentage of parasitic infection in food animals varied according to the animal species, age and their resistance to natural infection, grazing habits, as well as difference in the local climatic conditions (Tas *et al.*, 2018).

The prevalence of fascioliasis in the examined carcasses was 62%. This result agreed with Kadir and Rasheed (2008); Taha (2018) (0.7 and 0.8% for cattle and buffalo, respectively) who reported higher prevalence of fascioliasis in buffalos than cattle, while differed with Abdulhakim and Addis (2012); Elmonir *et al.* (2015) (0.07 and 0.14% for buffaloes and cattle carcasses, respectively) who reported that higher prevalence of fascioliasis in cattle than buffalo carcass samples. This may be explained by difference in the total number of slaughtered animals in each study. The recorded results of overall fascioliasis incidence came in agree with El-Meleh (2019) who recorded higher prevalence of fascioliasis in buffalo carcasses than cattle and camels, respectively where the percent of Fasciola infection in cattle, camel and buffalo were 1.65, 2.26 and 0.04%, respectively. Regarding to the prevalence of cysticercosis among slaughtered animals, our results revealed that cysticercosis was recorded in cattle during 2017 and 2018 as 0.52 and 0.42%, respectively. The overall percent of camel cysticercosis (0.69%) was higher than those recorded in cattle (0.47%) along the investigation period, while buffalo carcasses were free on infection. This result differed from those recorded by Elmonir *et al.* (2015) (0.13 and 0.44% for buffalo and cattle, respectively), El-Meleh (2019) who recorded that cattle carcass were the most prominently had cysticercus infection than buffalo and camel carcass samples, respectively (0.7, 0.59 and 0.09%).

The different percentage of cysticercus infection between different studies may be due to growing intensive rearing of cattle than buffalos and camels in Egypt.

Concerning the incidence of hydatidosis in the examined carcasses, the present data revealed that hydatidosis was more observed in cattle's liver than lung samples but was more prevalent in camel's lung than liver samples. In addition, the overall prevalence of hydatidosis in this study showed that camel carcasses were more prevalent infected with hydatid cyst than cattle samples, while buffalo carcasses were free from infection. Our results came in line with those recorded by El-Meleh (2019) who recorded that camel carcass harbored the highest incidence of hydatidosis (2.33%) than cattle (0.91%) and buffalo (1.2%), and Hassanin *et al.* (2013) who recorded higher incidence of hydatidosis in the examined camel samples (8.63%) than cattle (1.15%) and buffalo (1.3%) carcasses.

Variation between the current data and the previous recorded results can be attributed to variation in season of collection, age of the animal, rearing environment, and type of feeding.

5. CONCLUSION

Conclusively, the detected parasitic affections and demonstrated economic losses throw lights over the importance of strict well qualified meat inspection in slaughterhouses to avoid the serious zoonotic meat-borne parasites to the consumers. Additionally, it recommended authorities of the scope to prepare qualified veterinary inspectors to safeguard the public health of the human-being.

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