

CARCASSES AND OFFAL CONDEMNATION AT KOM-ELNOUR ABATTOIR IN DAKAHLIA PROVINCE, EGYPT: MAJOR CAUSES AND ECONOMIC LOSS

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Abstract: An abattoir survey was conducted from October 2020 to September 2021 to identify the primary reasons for offal and carcass condemnation of slaughtered animals in Dakahlia province, Egypt, as well as to estimate their economic loss. During the survey, 643 animals (441 cattle, 178 buffalos, 19 camels, 4 sheep, and one goat) were submitted for ante-mortem and postmortem inspection. The results of both inspections were collected, analyzed, and the total economic loss was estimated by adding the condemnation of offal and carcasses over a twelve-month period. Retail prices for offal (liver, lung, heart, and tongue) and carcass prices per kg were obtained from local markets. Out of 643 animals slaughtered, 2 (0.31%) were totally condemned. In addition, postmortem inspection revealed that 217 (33.74%) livers, 158 (24.57%) lungs, 5 (0.78%) hearts, 14 (2.18%) heads, and 11 (1.71%) tongues were condemned. Offal were condemned mainly due to pneumonia, fascioliasis, telangiectiasis, necrosis, and hydatidosis, whereas carcasses were rejected due to generalized tuberculosis. According to this study, the financial loss at the abattoir owing to carcass and organ condemnations was 244066 Egyptian Pounds over a twelve-month period (15746 USD). The incidence of meat rejection and subsequent financial loss was high compared to the amount of local revenue. The current study concluded that bacterial and parasitic diseases are still prevalent and cause significant economic damage in Dakahlia province, Egypt. This abattoir survey offered regional information on the principal reasons for carcass and organ condemnation in slaughtered animals, as well as an estimate of the direct economic consequences. Furthermore, the findings of the current work underlined the importance of developing an efficient monitoring system for meat condemnation and enforcing animal health strategies in Egypt.

Key words: abattoir; carcass; condemnation; economic loss; meat inspection; offal

Introduction

Meat inspection is an important approach for detecting diseased animals and avoiding the spread of unhealthy meat. Information provided by slaughterhouse inspections of live and slaughtered meat-producing animals is useful epidemiological data for disease evaluation and establishing the efficiency of protective actions. Therefore, slaughterhouses play an important role in differentiating meat with various affec-

tions and preventing the sale of infected meat to customers, as well as providing an information source and a reference point for disease occurrence (1, 2, 3).

Cattle, camels, sheep, and goats are the most predominant animal species in Egypt, according to the Egyptian ministry of agriculture and land reclamation in 2019, with around 9.5 million heads and 484 abattoirs. Meat produced from these animal species is the primary source of high-quality protein as well as a high level of unsaturated fat, phosphorous, vitamin B, and a low content of cholesterol and sodium, all of which are beneficial to human health. However,

some parasitic, bacterial, and viral infections restrict the production of meat (2,4,5). These infections cause massive economic losses varying from mortality of livestock, weight loss, and meat rejection at slaughterhouses (6, 7).

Numerous pathogenic bacteria are prevalent in food animals; these bacteria could be transmitted to humans through contaminated meat handling, preparation, and consumption, as well as during meat condemnation at slaughterhouses (8). However, bovine tuberculosis is a chronic lung condition that can damage other organs like the liver and possibly spread to the entire body, causing weight loss and decreasing animal productivity (9, 10). In addition, severe parasitic infestations such as cysticercosis, hydatidosis, and fascioliasis have a substantial influence on animal health and meat safety (2, 11, 12). The consumption of raw or undercooked meat harboring *Cysticercus bovis* can directly transmit the disease to humans (13). Furthermore, in extensively infested instances, bovine cysticercosis is responsible for carcass condemnation, but in the case of hydatidosis, meat-producing animals serve as intermediate hosts to complete the life cycle (14).

Although there is insufficient data about different animal diseases and affections that cause meat and organ condemnations inside Egyptian abattoirs, routine postmortem examination should be performed as soon as possible after carcass dressing is done. Thus, the aim of this research was to determine the major reasons of meat condemnation in Kom-Elnour abattoir in Mit-Ghamr city, Dakahlia province, Egypt and estimate the resulting financial loss. The outcomes of this research may help in establishing an appropriate strategy in Egypt for the monitoring and prevention of animal diseases, particularly in Dakahlia province.

Materials and methods

Research area

The research was conducted in Kom-Elnour slaughterhouse in Mit-Ghamr city, Dakahlia province, Egypt (Fig. 1). Dakahlia is an Egyptian governorate located northeast of Cairo. It covers around 3,500 km². Its capital is Mansoura and it has a population of approximately 6 million.

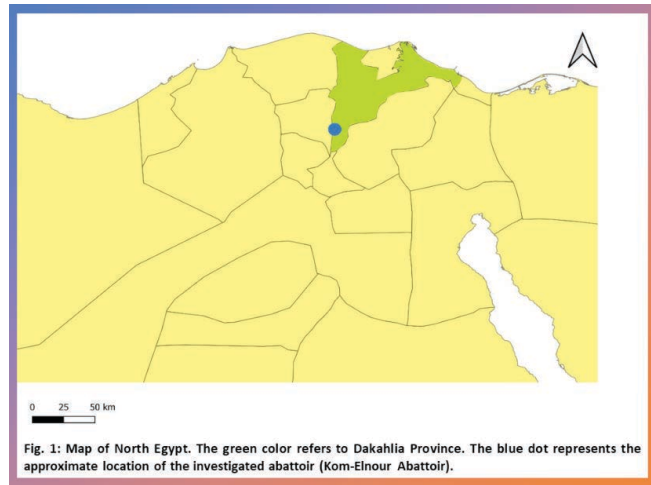


Figure 1: Map of North Egypt. The green color refers to Da-kahlia Provincce. The blue dot represents the approx-imate location if the investigated abattoir (Kom-Elnour Abattoir)

Duration of research and animal population

The research was carried out over a twelve-month period from October 2020 to September 2021. During the research period, 441 cattle, 178 buffalos, 19 camels, 4 sheep, and one goat were slaughtered (n=643). Animals were transported to the abattoirs from the surrounding areas and evaluated to identify the predominant causes of offal and carcass condemnation. A convenient sample procedure was used, and the number, sex, and breed of the animals were recorded.

Research methodology

The inspection procedures, including antemortem and postmortem examinations, were performed by appointed meat inspectors in accordance with the Ministerial decision No. 517/1986 of the Egyptian Ministry of Agriculture and Land Reclamation (MALR) (15). During antemortem inspection, individual animals in the lairage were examined at rest and in motion. Animal movements, behavior, disease symptoms, and any other abnormalities were all observed and registered. Postmortem inspection involves visual inspection, palpation of visceral organs, and incision of lymph nodes and organs. Pathological changes, including alterations in the size, color, texture, and presence of parasites or their related lesions, were identified and

recorded. The decisions and judgments on the findings were classified as completely or partially acceptable for human consumption. While in case of generalized disease such as miliary tuberculosis, a total condemnation decision was taken.

Table 1: Average price of carcasses and their offal in Egypt during 2020-2021

Item	Average weight (kg)	Average price (Egyptian pound / kg)	Total price (Egyptian pound)
Cow	210	120	25200
Buffalo	240	120	28800
Camel	220	120	26400
Sheep	40	150	6000
Goat	30	150	4500
Bovine liver	8	120	960
Camel liver	8	120	960
Ovine liver	1.2	150	180
Bovine lung	8	45	360
Camel lung	8	45	360
Ovine lung	1.2	45	54
Bovine heart	2.5	45	112.5
Camel heart	2.5	45	112.5
Ovine heart	0.5	45	22.5
Bovine head	9	60	540
Bovine tongue & esophagus	0.5	60	30

1 USD was equal to 15.50 Egyptian pounds

Estimation of economic loss

The direct economic loss was calculated using the formula established by Khanjari et al. (16). $DEL = N \times W \times P$

DEL: Direct economic loss; N: number of condemned carcasses / and offal; W: average weight of carcasses / and offal (Kg); P: Average carcasses / and offal price (Egyptian pound/Kg). The average selling price of the different carcasses and their offal was estimated based on their marketable cost in Kom-Elnour, Mit-Ghamr, Dakahlia during 2020-2021 (Table 1)

Results

During the course of this investigation, 643 animals were slaughtered at Kom-Elnour slaughterhouse, with cattle (441) being the most popular, followed by buffalo (178), camel (19), sheep (4), and lastly goat (1). According to the findings of the current study, the greatest slaughtering rates were observed during March (76), April (80), June (65) and July (74) with percentages of 11.82%, 12.44%, 10.11%, and 11.51%, respectively (Table 2).

The lowest percentages were reported after Eid Al-Adha ended in August and September 2021, with 0.62% and 5.29%, respectively. The fluctuation in the number of animals slaughtered between the months might be linked to the feast season (Eid Al-Adha) and people habits. In March 2021, the percentage of affection among slaughtered animals was the highest (20.00%). Furthermore, the number of affections (82) documented during this month surpassed the number of slaughtered animals, as many animals had two or more separate affections in their organs.

According to the current study, no condemnations happened during the antemortem examinations of slaughtered animals, but all condemnations were related to diseases discovered after the postmortem examination. The postmortem findings of animals slaughtered and inspected at Kom-Elnour slaughterhouse in 2020 and 2021 are summarized in Table (3). The results revealed that 217 (33.74%) livers, 158 (24.57%) lungs, 5 (0.78%) hearts, 14 (2.18%) heads, and 11 (1.71%) tongues were rejected. Cows were mostly infected by fascioliasis (109) (Fig. 3B), which predominantly affected female animals (82), whereas pneumo-

nia was the most common infection in buffalo (59) (Fig. 2D), which largely affected male animals (34). The most frequent parasitic infection in camels was *Cephalopina titillator* larvae (Fig. 3E) (10, with 8 males and 2 females). In addition, two buf-

falo (male and female) and one male sheep were among the emergency slaughtered cases that arrived at the slaughterhouse. They arrived broken and the only option was to slaughter them.

Table 2: Numbers and species of animals slaughtered at Kom-Elnour slaughterhouse during 2020 and 2021

Study period	Animal species					Numbers	
	Cow	Buffalo	Camel	Sheep	Goat	Slaughtered * (%)	Affections ** (%)
October 2020	30	9	0	0	0	39 (6.07%)	25 (6.10%)
November 2020	37	14	0	0	0	51 (7.93%)	31 (7.56%)
December 2020	43	8	5	0	0	56 (8.71%)	38 (9.27%)
January 2021	40	13	6	1	0	60 (9.33%)	48 (11.71%)
February 2021	37	16	3	0	0	56 (8.71%)	52 (12.68%)
March 2021	51	21	4	0	0	76 (11.82%)	82 (20.00%)
April 2021	53	26	1	0	0	80 (12.44%)	62 (15.12%)
May 2021	34	14	0	0	0	48 (7.47%)	28 (6.83%)
June 2021	41	24	0	0	0	65 (10.11%)	23 (5.61%)
July 2021	47	23	0	3	1	74 (11.51%)	13 (3.17%)
August 2021	3	1	0	0	0	4 (0.62%)	1 (0.24%)
September 2021	25	9	0	0	0	34 (5.29%)	7 (1.71%)
Total	441	178	19	4	1	643	410

* Numbers and percentages of slaughtered animals per month. ** Numbers and percentages of affections among slaughtered animals per month.

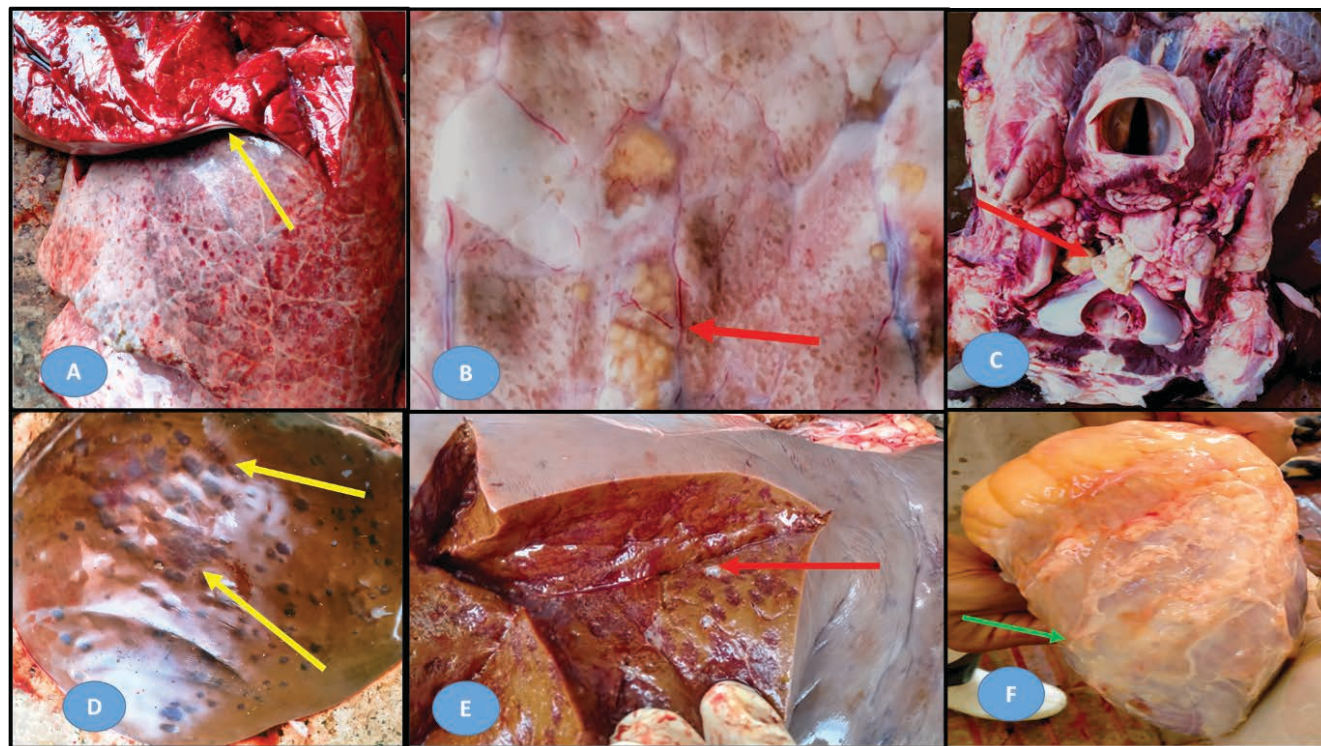


Figure 2: The post-mortem pathological findings of animals slaughtered and inspected at Kom-Elnour slaughterhouse. **(A)** Pneumonia in lung (Yellow arrow); **(B)** Tuberculosis in lung (Red arrow); **(C)** Actinobacillosis in cattle head with oozing pus (Red arrow); **(D)** Telangiectasis in liver (Yellow arrow); **(E)** Telangiectasis in liver (Red arrow); **(F)** Pericardial adhesion (Green arrow)

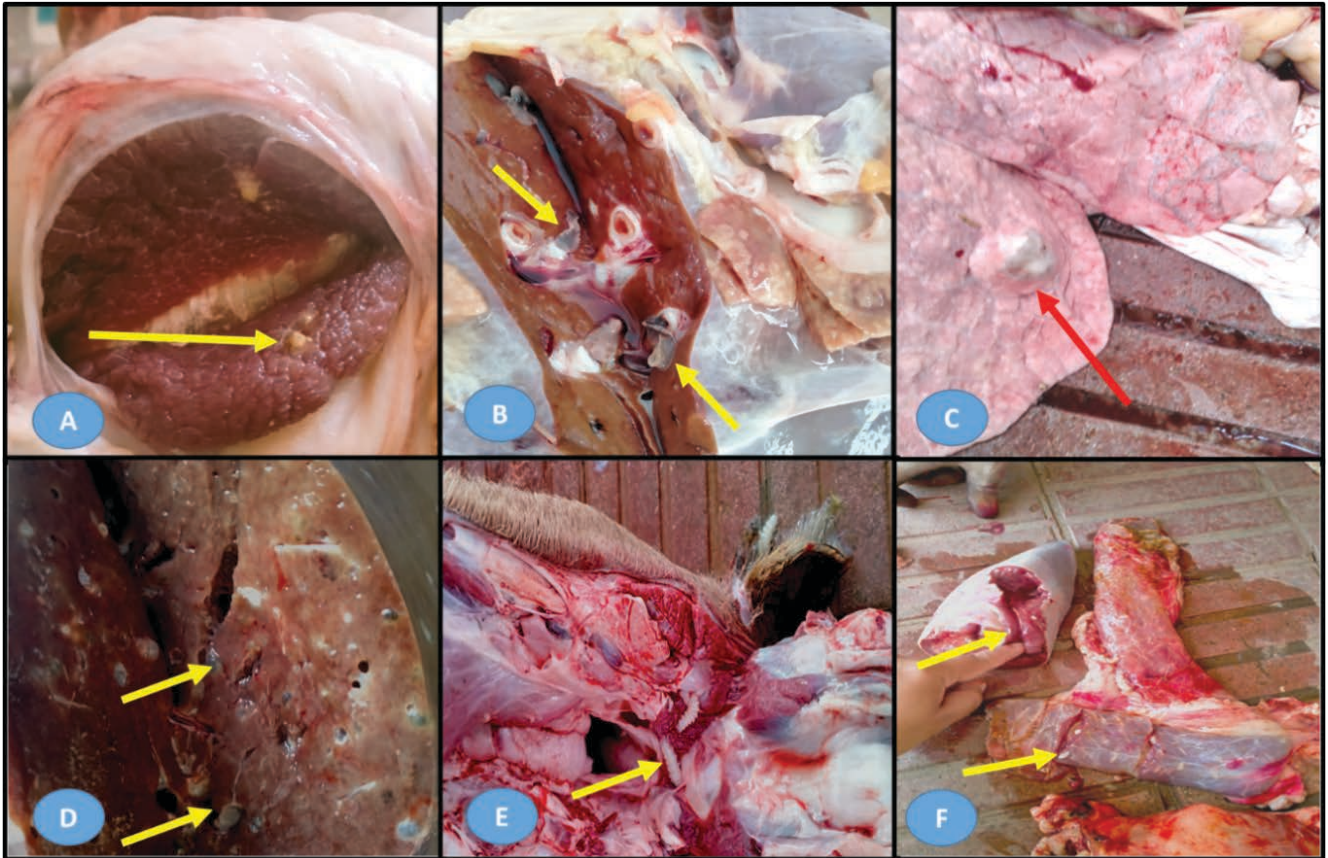


Figure 3: The post-mortem parasitic findings of animals slaughtered and inspected at Kom-Elnour slaughterhouse. (A) *Cysticercus bovis* in masseter muscle (Yellow arrow); (B) Adult *Fasciola* sp. in liver bile duct (Yellow arrow); (C) Hydatid cyst in lung tissue (Red arrow); (D) Multiple small hydatid cysts in liver (Yellow arrows); (E) *Ceph-alopina titillator* larvae in nasopharynx of camel (Yellow arrow); (F) Macroscopic white *Sarcocystis* in tongue and esophagus (Yellow arrow)

Table (4) displays the principal reasons for the partial and total condemnation of slaughtered animals. Two (0.31%) cows with generalized TB were totally condemned, whereas 408 animals were judged with partial approval for consumption after condemnation of various infected parts. The postmortem examination indicated that the lung was mostly condemned due to pneumonia (138), followed by hydatidosis (14) (Fig. 3C) and localized TB (6) (Fig. 2B). However, the most frequent cause of liver condemnation was fascioliasis (129), followed by telangiectasis (46) (Fig. 2D and E), necrosis (40), and hydatidosis (2) (Fig. 3D). Five hearts were condemned owing to pericarditis and pericardial adhesion (Fig. 2F). *Sarcocystis* infection caused the condemnation of (11) tongue and esophagus (Fig. 3F). *Cephalopina titillator* larvae in camels (10), *Actinobacillosis* in cows (Fig. 2C) (3), and *Cysticercus bovis* in cow (1) were the causes of 14 heads condemned (Fig. 3A). Table 5 also depicts the economic loss caused by carcass and organ

condemnations at the Kom-Elnour slaughterhouse. Fasciolosis was clearly the leading cause of financial loss, followed by generalized tuberculosis, telangiectasis, pneumonia, and hepatic necrosis. The total economic loss due to carcass and organ condemnation over a year was estimated to be 244066 Egyptian Pounds (15746 USD).

Discussion

The fundamental purpose of abattoirs is to safeguard public health. Abattoirs provide valuable information and are an excellent indicator of the real incidence of disease among slaughtered animals, which endangers people through the consumption of infected meat. Meat inspection plays a vital role in disease monitoring in the national livestock by offering insights to the veterinary authority in order to manage or eliminate disease, provide wholesome

Table 3: Postmortem findings among animals slaughtered and inspected at Kom-Elnour slaughterhouse during 2020 and 2021

Sex	Number	Lung				Liver					Heart	Tongue & Esophagus	Head		Emergency Slaughter (Fracture)
		Pneumonia		Partial Hydatidosis	Localized TB	Telangiectasis		Partial Hydatidosis	Partial Necrosis	Fascioliasis	Pericarditis	Sarcocystosis	Actinobacillosis	Parasitic affections**	
		Whole	Parts			Whole	Parts								
Cow															
Male	168	0	17	2	0	4	0	5	27	3	0	0	1	0	
Female	273	2	54	6	8	22	0	25	82	1	0	3	0	0	
Total	441	73		8	34	0	30	109	4	0	3	1	0		
Overall *		84				173					4	0	4	0	
Buffalo															
Male	123	3	31	2	0	4	0	5	4	0	2	0	0	1	
Female	55	0	25	2	0	6	0	3	16	1	9	0	0	1	
Total	178	59		4	10	0	8	20	1	11	0	0	2		
Overall *		66				38					1	11	0	2	
Camel															
Male	16	1	4	2	0	2	2	2	0	0	0	0	8	0	
Female	3	0	0	0	0	0	0	0	0	0	0	0	2	0	
Total	19	5		2	2	2	2	0	0	0	0	10	0		
Overall *		7				6					0	0	10	0	
Sheep															
Male	4	1	0	0	0	0	0	0	0	0	0	0	0	1	
Female	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	4	1		0	0	0	0	0	0	0	0	0	1		
Overall *		1				0					0	0	0	1	

During postmortem inspection, two cows were totally condemned, and only one male goat was slaughtered and approved for human consumption. * Total number of lesions per organ of each animal species. ** Parasitic affections include *Cysticercus bovis* and *Cephalopina titillator* larvae

products, and protect the population from zoonotic risks (17).

Causes of whole carcass condemnation

Out of 643 animals slaughtered in Kom-Elnour abattoir, 2 (0.31%) were totally condemned due to generalized tuberculosis. Similar results of 0.27% were detected by Mummed & Webb (18), where tuberculosis was noted in 0.03% of cattle slaughtered at private abattoirs in Ethiopia. Lower results of about 0.026% were obtained in Tanzania at Morogoro Municipality abattoir (19), but the cause was also detection of bovine tuberculosis. Furthermore, Tembo and Nonga (20) reported that the percentage of overall condemnation among cattle assessed at the Dodoma slaughterhouse in Tanzania was 0.05%, with 0.002% of TB.

Partial condemnation of the carcass

Disease conditions in different organs were found in 312 (48.52%) males and 331 (51.48%) females. Among 312 male animals slaughtered, 55 (8.56%) livers, 64 (9.95%) lungs, 3 (0.47%) hearts, 9 (1.40%) heads, and 2 (0.31%) tongues with esophagus were condemned; and out of 331 female animals slaughtered, 162 (25.19%) livers, 94 (14.61%) lungs, 2 (0.31%) hearts, 5 (0.78%) heads, and 9 (1.39%) tongues with esophagus were condemned. The most prevalent cause of partial condemnation was localized liver affections, followed by lung affections. Fascioliasis and telangiectiasis were the major causes of liver condemnation, whereas pneumonia and hydatid cysts were the major causes of lung condemnation. Based on gross pathological findings, 217 (33.75%) livers, 158 (24.57%) lungs, 5 (0.78%) hearts, 14 (2.18) heads, and 11(1.71%) tongues with esophagus were rejected as unfit for

Table 4: Major causes of partial and total condemnation of animals slaughtered at Kom-Elnour slaughterhouse during 2020 and 2021

Study period	Total condemnation	Partial condemnation												
	Generalized TB	Lung			Liver				Heart	Tongue & Esophagus	Head			Emergency Slaughter
		Pneumonia	Hydatidosis	Localized TB	Telangiectasis	Hydatidosis	Necrosis	Fascioliasis	Pericarditis	Sarcocystosis	Actinobacillosis	Cephalopina titillator	Cysticercus bovis	Fracture
October 2020	0	8	0	0	1	0	0	16	0	0	0	0	0	0
November 2020	0	10	0	1	0	0	2	16	0	1	1	0	0	0
December 2020	0	11	0	1	2	0	1	17	1	1	1	3	0	0
January 2021	0	13	2	1	3	0	4	20	0	1	0	3	0	1
February 2021	0	15	2	0	9	0	10	9	1	2	0	2	1	1
March 2021	0	24	3	0	14	2	17	19	0	1	0	2	0	0
April 2021	1	25	5	0	8	0	4	19	0	0	0	0	0	0
May 2021	1	7	2	0	3	0	2	8	2	2	1	0	0	0
June 2021	0	9	0	1	5	0	0	5	0	2	0	0	0	1
July 2021	0	9	0	1	1	0	0	0	1	1	0	0	0	0
August 2021	0	1	0	0	0	0	0	0	0	0	0	0	0	0
September 2021	0	6	0	1	0	0	0	0	0	0	0	0	0	0
Total	2	138	14	6	46	2	40	129	5	11	3	10	1	3

human consumption. Lower results were recorded by Tembo and Nonga (20), with a total of (10.5%) lungs and (6.3%) livers condemned, and Komba et al. (19) who reported condemnation rates of lungs, livers, hearts, and heads were 1.96%, 1.61%, 0.02%, and 0.21%, respectively.

Causes of liver condemnation

In the current study, the livers were found to have the highest abnormal conditions (217). Cows, buffaloes, camels, sheep, and goats had 173, 38, 6, 0, and 0 liver lesions, respectively. The primary causes of liver condemnation were fasciolosis (20.06%), telangiectiasis (7.15%), necrosis (6.22%), and hydatid cyst (0.31%). Pezeshki et al. (11) in Iran (0.25%) and Tembo and Nonga (20) in Tanzania (4.5%) found lower percentages of fascioliasis in cattle. Furthermore, according to Jaja et al. (21), the rate of fascioliasis in cattle was 5.95%, 4.48%, and 2.7% for the years 2010, 2011, and 2012 in South Africa, respectively. While Nzalawahe and Komba (22)

found a higher prevalence of fascioliasis in cattle in Tanzania (76%), Quevedo et al. (23) in southern Brazil (37.06%), Mohammed et al. (24) in Ethiopia (36.06%), Mummed and Webb (18) in Ethiopia (29.74%), Raji et al. (25) in Nigeria (23.41%), Amuamuta et al. (26) in Gondar, Ethiopia (22.9%), and Souza et al. (27) in the state of Minas Gerais (21.95%). Also, a higher distribution of bovine fascioliasis in northern Côte d'Ivoire was revealed by Traoré et al. (28) at the regional (18.0% to 52.3%) and departmental level (14.3% to 64.0%). According to Alizadeh and Amniattalab (29), fascioliasis is crucial in the development of several hepatic disorders in buffaloes, such as bile duct hyperplasia, hepatitis, and fatty change. The data obtained revealed that fascioliasis is common in Egyptian slaughterhouses. The high prevalence of fascioliasis in this study may be attributed to favorable climatic circumstances and the presence of snails. Fasciola infection is common and pervasive in several African nations. It seldom causes mortality in farm animals, and its consequences have resulted in a drop in

Table 5: Economic loss due to carcass and organ condemnations in Kom-Elnour slaughterhouse during 2020-2021

Items	Cause of condemnation	Number of animals	Weight (Kg) *	Economic loss (Egyptian pound)
Whole carcass	Generalized TB	2 cows	420 kg	50400
Liver	Telangiectiasis	34 cows 10 buffalos 2 camels	142 Kg 30 Kg 6 Kg	21360
	Fascioliasis	109 cows 20 buffalos	872 Kg 160 Kg	123840
	Necrosis	30 cows 8 buffalos 2 camels	90 Kg 24 Kg 6 Kg	14400
	Hydatidosis	2 camels	6 Kg	720
Lung	Pneumonia	73 cows 59 buffalos 5 camels 1 sheep	229 Kg 192 Kg 20 Kg 1.2 Kg	19899
	Hydatidosis	8 cows 4 buffalos 2 camels	24 Kg 12 Kg 6 Kg	1890
	Localized TB	3 cows 3 buffalos	24 Kg 24 Kg	2160
Heart	Pericarditis	4 cows 1 buffalo	10 Kg 2.5 Kg	562
Head	Actinobacillosis	3 cows	27 Kg	1620
	<i>Cysticercus bovis</i>	1 cow	9 Kg	540
	<i>Cephalopina titillator</i>	10 camels	90 Kg	5400
Tongue and Esophagus	Sarcocystosis	11 buffalos	5.5 Kg	330
Emergency slaughter	Fracture **	2 buffalos 1 sheep	6 Kg 1.5 Kg	945
Total amount of financial loss due to condemnations				244066

*Weight of Condemned carcasses / organs (Kg), **Condemned area around fracture

animal productivity and the rejection of livers at slaughterhouses (30). Regarding telangiectiasis, Souza et al. (27) in Minas Gerais and Ngwu et al. (31) in Nigeria discovered a higher percentage of telangiectiasis that led to the condemnation of bovine liver (29.20% and 10%, respectively). While Rezac et al. (32) found a lower incidence of 1% in cows in the United States. Because hepatic lesions can reduce animal production and have a negative impact on animal reproduction, it is critical to pay closer attention to the accuracy of anti-parasitic programmes as well as the assessment of the potential role of mycotoxins, poisonous plants, and heavy metals in the development of hepatic lesions in various animals (29).

Causes of lung condemnation

The total number of lesions found in the lungs was 158. Cows, buffalo, camels, and sheep had 84,

66, 7, and 1 lung lesions, respectively. The major causes of lung condemnation were pneumonia (21.46%), hydatid cysts (2.18%), and TB (0.93%). The results coincided with Mumm and Webb (18), who found that pneumonia cases in cattle in Ethiopia were 22.68%. Lower rates of pneumonia were reported in Nigeria by Raji et al. (25) and Ngwu et al. (31) (8.79% and 6.67%, respectively). According to Jaja et al. (33), the percentage of condemned cases caused by pneumonia at three Namibian abattoirs was 1.09%, 2.21%, and 0.77%, respectively. On the other hand, Opara (34) demonstrated a higher percentage of 39.2% in Nigeria.

In terms of hydatidosis, Pezeshki et al. (11) in Iran and Tembo and Nonga (20) in Tanzania reported comparable results (2.25% and 3.1%, respectively). High prevalence rates were observed by Amuamuta et al. (26) in northwest Ethiopia (35.7%), Mulatu et al. (35) in eastern part of

Ethiopia (20.05%), Mummied and Webb (18) (23.01%) in Ethiopia, Ghasemian et al. (36) in Iran (15-20%), and Kere et al. (37) in Kenya (5.3%). In contrast, Komba et al. (19) detected a lower rate of about 0.046% in Tanzania. The variation in hydatidosis occurrence among countries can be attributed to some factors such as country location, the presence of dogs, and the level of animal hygiene (38).

A higher rate of tuberculosis was manifested (1.87%) in Tanzania by Komba et al. (19), (9.1%) in Nigeria by Okeke et al. (39), and in Ethiopia by Shitaye et al. (40), who indicated that the prevalence rate of bovine tuberculosis in slaughterhouses in various places of the country ranged from 3.5% to 5.2%. According to Woldemariyam et al. (41), the overall lesions of bovine tuberculosis among cattle carcasses slaughtered at Debre Birhan municipality abattoir, Ethiopia were 4.7%. However, the routine meat inspection only detected 0.5% of the examined carcasses as having TB lesions. Anatomically, 66% of the lesions were diagnosed in the lungs and associated lymph nodes. In countries where bovine TB in cattle is still highly prevalent and/or insufficient milk hygiene, 10% to 15% of human tuberculosis is caused by bovine TB (42). According to Ameni et al. (43), the primary route of *Mycobacterium bovis* (*M. bovis*) infection in humans is drinking raw milk. Hence, human tuberculosis caused by *M. bovis* is mainly extra-pulmonary, particularly in cervical lymphadenitis. With respect to this, Kiros (44) demonstrated that a significant number of patients with extrapulmonary TB were in intimate contact with animals, in particular those who frequently used to drink raw milk. Regassa (45) illustrated the link between *M. bovis* and *M. tuberculosis* in the transmission of TB in humans and cattle. Cattle belonging to tuberculous patients had a greater incidence (24.3%) than that of cattle held by non-tuberculous owners (8.6%). This highlighted the critical involvement of *M. bovis* in the development of human TB.

Causes of heart condemnation

The overall heart lesions (5) in cows, buffaloes, and camels were 4, 1, and 0 respectively. Pericarditis was the only cause of heart condemnation. This is consistent with EDO et al.

(46), 2014; Mummied and Webb (18), who revealed that the main cause of heart condemnations was pericarditis (1.6%, 4.59%, respectively). The findings of this study corresponded with those of Ahmed et al. (47), who reported that 8% of tested hearts in the Ismailia slaughterhouse, Egypt, were rejected due to traumatic pericarditis and heart adhesions, and Raji et al. (25), who reported a pericarditis percentage of around 17.06%.

Causes of head condemnation

The total head lesions (14) in cows, buffaloes, camels, sheep, and goats were 4, 0, 10, 0, and 0 respectively. The primary causes of heads condemnation in the present research were *Cephalopina titillator* (71.4%), Actinobacillosis (21.4%), and cysticercosis (7.1%). Camel heads were the most frequently rejected among the other slaughtered animals. With postmortem examination, *Cephalopina titillator* larvae were mainly detected in the nasal cavities, turbinate bones, and frontal sinuses of infested camels, and those remained parasitizing the animal for a considerable period of time, causing a significant loss in animal production. Out of 19 camel heads examined, 10 were infested by *C. titillator* larvae, which gives an overall prevalence of 52.6% among camels. Higher infestation percentages (80%) were found in Cairo, Egypt by Attia et al. (48), (82.6%) in Ethiopia by Kissi and Assen (49), while lower results (26.27%) were noted in Sharkia Province, Egypt by Rahman and Mohammed (50), 42.43% in Iraq by Atiyah et al. (51), and 48.3% in Iran by Rad et al. (52).

Cysticercus bovis was identified in 0.16% of cow masseter muscles. Cueto González et al. (53) found closer findings (0.21%) in Northwest México. Higher prevalence (5.5%) was recorded in Ethiopia by Abdella (54) where the masseter muscle had the highest rate (11.5%), 20.57% by Shafi and Elemo (55) in Ethiopia with 20.40% of cysts observed in the masseter, 2.89% in Western Ethiopia by Shuramo et al. (56), where cysts were present in 6.7% of the examined masseter muscles, and 2.0% in Northwest Ethiopia by Ezeddin and Tewodros (57) with a rate of infestation of 33.33% in the masseter muscles, and 4.8% in Nigeria by Karshima et al. (58).

Causes of tongues and esophagus condemnations

There were 11 tongue and esophageal lesions in buffaloes, all of them were caused by *Sarcocystis* infection. Approximately 6.18% of the buffaloes evaluated were infected. Gerab et al. (59) found a higher incidence (26.5%) at Tanta slaughterhouse, Egypt, 12% in El-Minia Governorate Abattoirs, Egypt by Dyab et al. (60), 20% in Malaysia by NA and WOB (61), and 66.42% in Andhra Pradesh, India by JyothiSree et al. (62).

Causes of emergency slaughter

The only emergency slaughter cases recorded in Kom-Elnour abattoir were fracture-related, accounting for 0.47% of all cases. Higher percentages were observed by Raji et al. (25) in Zango-Zaria, Nigeria (6.50%) and by Oziegbe et al. (63) at Jos Abattoir, Plateau State, Nigeria (1.4%).

Financial losses due to condemnations

Another goal of this research was to estimate the financial losses caused by meat condemnation at the Kom-Elnour slaughterhouse. The economic losses at the abattoir were calculated for the years 2020-2021 (Table 5). Fasciolosis was the major cause of financial loss, followed by generalized tuberculosis, telangiectiasis, pneumonia, and hepatic necrosis. The entire economic loss caused by meat condemnation over a year was calculated to be 244066 Egyptian pounds (15746 USD). Several research studies have been conducted in Egypt to investigate the financial consequences of diseased meat-producing animals. Mohammed and Maky (6) conducted research in the North and South of Egypt for two years (2017-2018). They discovered that the financial loss due to the rejection of meat at three abattoirs was 4529010 Egyptian pounds (383063 USD), with TB, icterus, pneumonia, hydronephrosis, parasitic cysts, and fascioliasis being the main causes of meat condemnation.

The economic loss in the current study was greater than the findings published in Egypt by Ahmed et al. (47), who estimated an annual economic loss of 36480 Egyptian Pounds due to organs condemnation from slaughtered male cattle at Ismailia abattoir. Furthermore, Yibar et al. (64) conducted a slaughterhouse survey in

Bursa Province, Turkey, where the monetary loss owing to organ and carcass condemnations at two abattoirs over a six-month period was 245,483 USD. While hydatidosis and fasciolosis were the leading causes of organ condemnation, TB and jaundice were the leading reasons of carcass condemnation. The variation in economic loss between studies could be attributed to differences in livestock populations, disease prevalence, incidence, estimation methodologies, loss items included in the analyses, and differences in animal productivity and prices.

Conclusion

During the current investigation, a significant number of offal was condemned from animals slaughtered at Kom-Elnour Abattoir in Dakahlia due to various pathological abnormalities observed in different organs, such as pneumonia and telangiectiasis. Affected meats were rejected as unsuitable for human consumption. However, one of the drawbacks of this study was the use of gross lesions in disease diagnosis; consequently, only diseases having pathognomonic gross pathological abnormalities were likely to be identified. The postmortem inspection's magnificent role in safeguarding the health of the public cannot be overemphasized. A significant amount of money, over 244066 Egyptian Pounds, was lost as a result of pathological conditions discovered in the investigated slaughterhouse. According to this research, the three most frequent affections that had the biggest impact on the Egyptian budget were liver diseases, fascioliasis, and TB. It is apparent that sufficient preventive and monitoring programmes, as well as frequent use of anti-parasitic medications, are required in Egypt, particularly in Dakahlia province, to reduce the risk of infectious diseases and financial losses.

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