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Prevalence of Diseases/Conditions that Lead to Condenmation of Bovine Organs/Carcass at Postmortem Examination

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Abstract: For investigating the common causes for condemning edible organs and carcasses in the abattoir in Akure, a total of 996 (17.8%) pathological lesions were observed in the various organs/carcass of 5592 slaughtered cattle for the period of four months. Two hundred and fifty two (25.3%) of the organs with lesions were condemned while 744 (74.7%) were trimmed and passed for human consumption. The most prevalent diseases were fascioliasis (57.9%) and tuberculosis (19.4%). Other disease/conditions observed include pneumonia, fetal wastages, abscesses, helminthosis and PM changes. Tuberculosis (48.0%) and fascioliasis (4.8%) were also the main reasons for organs condemnation. The most affected edible organ was the liver (63.6%) and the lungs (17.6%) though the lungs had the highest rate of condemnation (23.4%) than the liver (11.5%). The lungs were mostly affected by hydatidosis (0.6%), congestion (1.1%), abscess (12.5%), post mortem changes (1.7%), pneumonia (25.6%), tuberculosis (55.7%), tumors (0.6%) and mixed infections (2.3%) while the disease/conditions that were prevalent in the liver were cirrhosis, fascioliasis, hydatidosis, hardware disease, jaundice, liver abscess, tuberculosis, tumors, postmortem changes and mixed infections with a prevalence of 0.5%, 90.7%, 0.3%, 0.2%, 0.2%, 2.8%, 4.4%, 0.2%, 0.2% and 0.6% respectively. These differences were statistically significantly. In conclusion, the eradication of fascioliasis, hydatidosis and tuberculosis are important to decrease the economic loss due to culling the affected organs or the whole carcass and to prevent the distribution of zoonotic diseases to butchers, Veterinarians and consumers.

Key words: Abattoir · Condemned · Trimmed · Organs · Carcass · Post Mortem Inspection

INTRODUCTION

An abattoir is defined as any premise approved and registered by the controlling authority for hygienic slaughtering and inspection of animals, processing and effective preservation and storage of meat products for human consumption [1]. It also serves to provide the opportunity for detecting diseases of both economic and public health importance [2] and records gotten from ante-mortem and post-mortem inspections in the abattoirs are useful epidemiological data for the evaluation of diseases at farm level and verify the efficacy of prophylactic and therapeutic interventions [3, 4].

Cattle are considered the main sources of animal proteins for the population of Nigeria, where the human demand for animal proteins is annually increasing [5]. Diseases such as Contagious Bovine Pleuro Pneumonia (CBPP), Fascioliasis (Liver fluke) and Bovine Tuberculosis (BTB) are of public health and economic importance in addition to financial implications of carcass condemnations to butcher [6].

In developing countries, beef production is one of the most important economic and rural livelihood activities and the number of organs and carcasses condemned for various reasons implies serious economic losses to farmers and the livestock industry in the country [7, 8].

The main aim of this study is to determine the prevalence of pathological conditions that leads to the condemnation of organs/ carcasses. This will serve as a tool to reveal the public health and economic implications of slaughtering animals without carrying out adequate

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ante mortem and post mortem inspection thereby producing carcass and organs not fit for human consumption.

MATERIALS AND METHODS

Study Area: Akure is the capital of Ondo state in the Southwestern Nigeria and it is located between Latitude 7°12' N - 7 0 12' N and between Longitude 5° 15' E - 5° 17' E. The city has a population of approximately 420, 000 inhabitants. The climate of Akure is subtropical with two main distinct seasons: rainy and dry season. The humidity of the air masses over the city varies from 60 % in January to 80 % in July. The Ondo state semi mechanized abattoir, Akure was used for this study.

Study Animals: The abattoir was visited daily during this study. The study animals included all cattle destined for slaughter within the period of four months (January to April 2019). A total of 5592 cattle were slaughtered within this period and all their organs were examined at post mortem. The organs were observed, palpated and incised where necessary by the Veterinarians on duty. Records were taken of any post mortem lesion seen, the organs affected, diagnosis made and the actions taken on such organs. The economic loss from this study was estimated by assessing the weight and size of the organs and their current prices in the meat market. The number of condemned organs was then multiplied by the current cost of the organs in the meat market.

Statistical Analysis: Each day the data gotten was inputted into Microsoft Excel package. Simple descriptive statistics using IBM SPSS 20.0 was used for this analysis. Chi-square was used to established association between the different variables. A statistical significant difference was said to exist if the p value was less than 0.05.

RESULTS

A total of 5592 cattle were slaughtered in the abattoir within the study period. Nine hundred and ninety six (17.8%) of them had gross pathological lesion in their organs and/or carcass. The monthly distribution of lesions showed that 205, 294, 283 and 214 lesions were observed in the months of January, February, March and April respectively. Out of the 996 organs/carcass with lesions, 252 (25.3%) were totally condemned while 744 (74.7%) were trimmed (partially condemned) and passed for consumption (Table 1). Though January had the least

Table 1: Monthly distribution of the pathological lesions and their rate of condemnation

Months	No. of cattle Slaughtered	Lesions	Condemned	Trimmed	% lesions	% condemned	% trimmings
January	1058	205	70	135	19.4	34.1	65.9
February	1471	294	61	233	20.0	20.7	79.2
March	1544	283	67	216	18.3	23.7	76.3
April	1519	214	54	160	14.1	25.2	74.8
Total	5592	996	252	744	17.8	25.3	74.7

Table 2: Monthly distribution of organs with gross pathological lesions

	Months					
Organs	January	February	March	April	Total	Percentage (%)
Diaphragm	1	0	4	0	5	0.5
Head	0	1	0	0	1	0.1
Heart	1	2	3	0	6	0.6
Intestines	0	1	3	4	8	0.8
Liver	124	206	178	128	636	63.9
Lung	21	46	47	62	176	17.7
Lymph nodes	6	7	19	6	38	3.8
Oesophagus	0	6	4	2	12	1.2
Omentum	0	1	2	0	3	0.3
Scrotum	0	0	1	0	1	0.1
Spleen	7	3	4	0	14	1.4
Thigh muscles	0	0	1	0	1	0.1
Trachea	0	0	1	0	1	0.1
Udder	0	0	0	2	2	0.2
Uterus	45	20	16	10	91	9.1
Whole carcass	0	1	0	0	1	0.1
Total	205	294	283	214	996	100

Table 3: Monthly distribution and prevalence of the major diseases/conditions identified at post mortem inspection (PMI)

	Months				
Diseases/Prevalence	January	February	March	April	Total
Number slaughtered	1058	1471	1544	1514	5592
Number with lesions	205	294	283	214	996
Prevalence of lesions (%)	19.3	20.0	18.3	14.1	17.8
Fascioliasis	107	189	164	117	577
Prevalence (%)	52.2	64.3	58.0	54.7	58.0
Tuberculosis	30	56	63	44	193
Prevalence (%)	14.6	19.0	22.3	20.6	19.4
Fetal wastage	45	20	15	9	89
Prevalence (%)	22.0	6.8	5.3	4.2	8.9
Pneumonia	5	10	19	11	45
Prevalence (%)	2.4	3.4	6.7	5.1	4.5
PM changes	0	0	2	7	9
Prevalence (%)	0.0	0.0	0.7	3.2	0.9
Abscess (lung)	1	9	4	8	22
Prevalence (%)	0.5	3.1	1.4	3.7	2.2
Abscess (liver)	9	4	3	2	18
Prevalence (%)	4.4	1.4	1.1	0.9	1.8
Abscess (lymph nodes)	2	0	0	1	3
Prevalence (%)	1.0	0.0	0.0	0.5	0.3
Abscess (Spleen)	2	0	3	0	5
Prevalence (%)	1.0	0.0	1.1	0.0	0.5

Table 4: Organs with pathological lesions and their condemnation rates

	Actions Taken		Percentage (%)	
Organs	Condemned	Trimmed	Condemned	Trimmed
Diaphragm	5	0	2.0	0
Intestine	5	3	2.0	0.4
Liver	29	607	11.5	81.6
Lungs	59	117	23.4	15.7
Lymph nodes	36	2	14.3	0.3
Oesophagus	8	4	3.2	0.5
Omentum	3	0	1.2	0
Spleen	5	9	2.0	1.2
Uterus	91	0	36.1	0
Whole carcass	1	0	0.4	0
Udder	2	0	0.8	0
Trachea	1	0	0.4	0
Thigh muscle	1	0	0.4	0
Scrotum	0	1	0	0.1
Heart	6	0	2.4	0
Whole head	0	1	0	0.1
Total	252		744	

number of pathological lesions, it had the highest condemnation rate. More (34.1%) organs/carcasses were condemned in the month of January than in any other month and 79.2% of the organs/carcasses were trimmed in the month of February (Table 1).

The difference in the occurrence of organs with pathologic lesions during the months of study as presented in table 2 shows that the organs that had the most lesions were the liver (636), lungs (176) and lymph nodes (38). The commonest diseases/conditions observed during this study were fascioliasis (577), tuberculosis (193), fetal wastage (89), Abscess (48) and pneumonia (45). Abscess occurred in different edible organs. The lungs had more (45.8%) cases of abscesses than other organs. The liver, spleen and lymph nodes had 37.5%, 10.4% and 6.3% occurrence of abscess respectively.

Table 5: Major diseases/ conditions that caused condemnation of organs/carcasses

	Condemnation		Trimming		
Diseases	Frequency	Percentage (%)	Frequency	Percentage (%)	Total
Fascioliasis	12	4.8	565	75.4	577
Tuberculosis	121	48.0	72	9.8	193
Fetal wastage	89	35.3	0	0	89
Pneumonia	4	1.6	41	5.5	45
PM changes	8	3.2	1	0.1	9
Abscess (lung)	2	0.8	20	2.7	22
Abscess (liver)	0	0	18	2.4	18
Abscess (lymph nodes)	1	0.4	2	0.3	3
Abscess (Spleen)	0	0	5	0.7	5
Liver cirrhosis	1	0.4	1	0.1	2
Tumors	0	0	4	0.5	4
Hydatidosis	0	0	4	0.5	4
Cowdriosis	3	1.2	0	0	3
Icterus	1	0.4	0	0	1
Mixed infections	10	4.0	11	1.5	21
Total	252	100	744	100	996

Table 6: Economic losses associated with total condemnation of some edible organs and carcass

Organs	Number condemned	Cost/organ	Economic loss
Lungs	59	5000	295 000
Liver	29	6000	174 000
Heart	6	2500	15 000
Spleen	5	2000	10 000
Thigh muscles	1	30 000	30 000
Intestines	5	3000	15 000
Whole carcass	1	180 000	180 000
Total			719 000

Table 3 shows the monthly distribution and prevalence of the major diseases/conditions identified at PMI. Fascioliasis and lung abscess, were more prevalent in February. Tuberculosis, pneumonia and spleen abscess were more prevalent in the month of March. Fetal wastage, liver abscess and lymph node abscess were more prevalent in the month of January. Post mortem changes were seen in the months of March and April but it occurred more in April.

The organ with the highest rate of condemnation though not edible, was the uterus (36.1%). This is because most of the uteruses were gravid. Other edible organs that were either trimmed or condemned are; lungs (23.4%), liver (11.5%), lymph nodes (14.3%), spleen (2.0%), heart (2.4%) and whole carcass (0.4%).

The financial loss due to total condemnation of carcass and organs in this study was estimated to be ₦ 719, 000. 00

DISCUSSION

The overall prevalence of gross pathological lesions in organs and carcasses in this was 17.8% (996/5592). The monthly distribution of gross pathological lesions varied significantly. The increase in the occurrence of gross pathological lesions was not directly proportional to the condemnation rate of these organs/carcasses. The number of organs and carcasses condemned for various reasons amounts to serious economic losses for farmers and the livestock industry [8]. In addition, condemnations also reduce the availability of meat required by the human population to meet their protein and mineral requirements [9].

The liver (63.6%) and lungs (17.6%) were the most affected edible organs and also had the highest condemnation rates of 11.5% and 23.4% respectively. This finding agrees with Cadmus and Adesokan and Usman Nasir and Belay Abebe [6, 10] and could be due to the fact that lungs are more prone to exposure to physical, chemical and biological injuries owing to their anatomical and histological characteristics [11]. The diseases/conditions encountered from the postmortem examination of the lungs include hydatidosis (0.6%), congestion (1.1%), abscess (12.5%), post mortem changes (1.7%), pneumonia (25.6%), tuberculosis (55.7%), tumors (0.6%) and mixed infections (2.3%).

The disease/conditions that were prevalent in the liver were cirrhosis, fascioliasis, hydatidosis, hardware disease, jaundice, liver abscess, tuberculosis, tumors, postmortem changes and mixed infections with a prevalence of 0.5%, 90.7%, 0.3%, 0.2%, 0.2%, 2.8%, 4.4%, 0.2%, 0.2% and 0.6% respectively. The liver was mostly condemned due to fascioliasis (41.4%), jaundice (3.4%), cirrhosis (3.4%), post mortem changes (3.4%), tuberculosis (41.4%) and mixed infections (6.9%) while the lungs were mostly condemned because of pneumonia (6.8%), post mortem changes (3.4%), abscesses (3.4%), tuberculosis (84.7%) and mixed infections (1.7%) Losses from liver condemnation are generally associated with infections of public health importance and for aesthetic reasons [12]. The differences in the condemnation rate of organs with different diseases/conditions may be due to the differences in the prevalence of the disease and variation in animal management systems at different study sites [13].

Fascioliasis and tuberculosis were the most important zoonotic diseases encountered in this study and they constitute both economic and public health constraints to profitable ruminant production in tropical Africa [14]. This finding agrees with the findings made by Ardo *et al.* and Alawa *et al.* [15, 16]. The Occurrence of Fascioliasis (4.8%) was higher than those reported by Adamu Nuhu Bala *et al.* [17]. This difference may be due to poor meat inspection facilities, seasonality and geographical location [18]. Fascioliasis has recently been shown to be a re-emerging and widespread zoonosis affecting a number of human populations [19, 20].

Tuberculosis occurred with a prevalence of 48.0%, this was relatively high when compared to the 0.7%, 4.05% and 9% reported by Adamu Nuhu Bala *et al.* [17], Aliyu, Adamu and Bilyaminu [21] and Maho, Mbakasse and Boulbaye [22]. Lack of proper meat inspection, geographical location, failure to adapt the test and slaughter policy could be a contributing factor in the different prevalence gotten in this study [21].

Relatively high occurrence of fetal wastage (35.3%) was also observed. The practice of slaughtering female animals should be discontinued because it affects the availability of adequate animal protein of 3g/person/day required for adequate human nutrition [23, 24], also the continuous slaughter of female animals also decreases the annual growth rate of livestock population in Nigeria [25]. The high prevalence of fetal wastage in the abattoir could be attributed to several factors including lack of ante mortem inspection, poverty which leads to selling of productive females to meet household needs. Illiteracy/ignorance is also a factor as most farmers sell their animals without checking their fertility or pregnancy status [26, 27]. Suffocation of animals due to overcrowding in the lairage, lack of enough rest before slaughter and exposure to bacterial and/or viral infections may lead to development of pneumonia and other respiratory conditions [6, 28].

The economic loss (₦ 719, 000.00) associated with condemnation of diseased organs/carcass in this study is relatively high and can deplete the profit margin of both butchers and famers and in the long run affect cattle production.

CONCLUSION

This study revealed a high prevalence of fascioliasis, tuberculosis and fetal wastage in the abattoir. This implies that meat inspection in the abattoir needs urgent improvement. Also, the high rate of condemnation in this present study should not be neglected because the condemnation of edible organs represents a significant economic loss to traders and the livestock industry.

The findings of this work suggest that, meat inspection practices need some improvement. Therefore meat inspection and proper health hygiene should be encouraged so as to produce wholesome meat for human consumption. The following are hereby recommended:

- Enhance the awareness of livestock producers about the need to properly take care of their animals: this would include keeping proper health records at the farm levels and release only healthy animals for sale and slaughter.
- Proper and detailed meat inspection should be done under the supervision of Veterinarians and other appropriate personnel, this will aid in identifying diseased cattle either during Ante Mortem or Post Mortem examinations. Adequate abattoir facilities for meat inspection should also be provided at each abattoir or slaughter slab to aid in effective inspection of food animals for human consumption.
- Butchers should be trained on the health hazards associated with slaughtering of diseased animals, improper meat inspection, unhygienic and fraudulent practices in the abattoir.
- Butchers should be compensated when infected cattle organs or carcasses are condemned during the process of meat inspection. This will guarantee that they cooperate with the Veterinarians in ensuring that diseased meat or offals are not passed for human consumption.

- Those working in the abattoir should be constantly enlightened through seminars and workshops organized by the state government on the need for providing wholesome meat for human consumption to prevent the spread of zoonotic diseases.

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