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STUDY OF BOVINE HEART, LIVER AND LUNG CONDEMNATIONS OCCURRED IN THE MUNICIPALITY OF SANTARÉM, PARÁ

ESTUDO DAS CONDENAÇÕES DE CORAÇÃO, FÍGADO E PULMÃO EM BOVINOS ABATIDOS EM SANTARÉM, PARÁ

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Resumo: Objetivou-se estudar as condenações e estimar o prejuízo decorrido do descarte de vísceras vermelhas (fígado, coração e pulmão) em bovinos abatidos no município de Santarém, Pará, Brasil. Para a elaboração da pesquisa, foram realizadas visitas técnicas semanais a Abatedouro-Frigorífico com Serviço Inspeção Federal (SIF), obtendo-se dados de inspeção higiênica, sanitária e tecnológica. Durante o período avaliado, foram abatidos 28.000 bovinos, dos quais, em 22,69%, identificou-se ao menos um tipo de causa/lesão determinante para o descarte parcial ou total das vísceras estudadas. O pulmão foi o órgão que apresentou maiores índices de condenação, com 58,55%, seguido do fígado, com 31,94%, e do coração, com 9,51%. As principais causas de condenações no pulmão foram enfisema pulmonar, que respondeu por 65,33% dos descartes dessas vísceras, aspiração ruminal (13,19%) e congestão (8,9%). No fígado, a telangiectasia foi a que apresentou maior índice de descartes, com 32,06%, seguido por cirrose (27,83%) e contaminação (14,18%). No coração, a contaminação acarretou o maior número de descartes, sendo responsável por 50,82%, acompanhada pela pericardite (45,19%) e tuberculose (2,64%). Neste estudo, as perdas econômicas identificadas pela condenação do pulmão, fígado e coração corresponderiam, em valores atuais, a R$ 241.352,69. Individualmente, o fígado proporcionou maior perda econômica (R$ 142.709,00), seguido pelo pulmão (R$ 85.396,95) e, finalmente, pelo coração (R$ 13.596,04). Diante do exposto, este cenário cria um alerta e destaca a necessidade de programas rígidos de controle de qualidade a fim de mitigar os impactos econômicos advindos da condenação de vísceras.

Palavras-Chave: Prejuízo econômico. Bovinocultura. Abate. Vísceras vermelhas.

Abstract: The objective was to verify the occurrence of *condemnations* of red viscera (liver, heart and lung) in cattle slaughtered in the municipality of Santarém, Pará, Brazil. For the elaboration of the research, weekly technical visits were carried out to obtain data on hygienic, sanitary and technological inspection. During the evaluated period, about 28,000 cattle were slaughtered, of which, in 22.69%, at least one type of cause / lesion, that was determinant for partial or total disposal, was identified. The lung was the organ that had the highest rates of

condemnation with 58.55%, followed by the liver (31.94%) and the heart (9.51%). The main causes of lung disorders were pulmonary emphysema, which accounted for 65.33% of the discards of these viscera, followed by ruminal aspiration (13.19%) and congestion (8.9%). In the liver, telangiectasia was responsible for the highest discard rate (32.06%), followed by cirrhosis (27.83) and contamination (14.18%). In the heart, contamination resulted in the largest number of discards, accounting for 50.82%, followed by pericarditis (45.19%), and tuberculosis (2.64%). In this study, the economic losses identified by the condemnation of the lung, liver and heart would correspond, in current values, to R$ 241,352.69. Individually, the liver provided greater economic loss (R$ 142,638.70), followed by the lung (R $ 85,396.95) and, finally, the heart (R$ 13,596.04). Given the above, this scenario creates an alert and highlights the need for strict quality control programs in order to mitigate the economic impacts arising from the condemnation of viscera.

Keywords: Economic loss. Animal products. Red viscera.

INTRODUCTION

Brazil is one of the main actors in the production and trade of beef in the world. This is due to several development devices that increase not only productivity, but also the quality of the product, increasing its competitiveness and market coverage (IBGE, 2017). According to Duarte (2015) in 2014, 33.9 million animals were slaughtered across the country. The states of Mato Grosso, Mato Grosso do Sul, São Paulo, Goiás, Minas Gerais, Pará, Rondônia and Rio Grande do Sul were responsible for 76.6% of the slaughter in the country (IBGE, 2017).

In this perspective, as pointed out by Silva et al. (2016), health problems are directly linked to the production of cattle carcasses, which may cause damage to the health of the ones who consume that meat. Thus, timely and adequate inspection is essential and must be carried out in slaughterhouses, preventing these improper products from being marketed (ALMEIDA et al., 2017).

According to Israel et al. (2014), during the slaughter, problems related to animal handling and welfare are observed, as well as technological deviations due to incorrect maneuvers, known as “technopathies”. Israel et al. (2014) still add that most cases of loss related to that organ are due to its contamination; in addition, pericarditis is the main pathological disease that causes condemnation of the heart.

A large share of the carcasses' condemnations entail extensive direct economic losses to the industry and indirect to the producer. This is because animals with compromised organs will not have the same economic performance as healthy animals (FRUET et al., 2013). In this context, the highest number of condemnations, according to Almeida et al. (2017), is related to the liver and the lung.

Due to the great perishability of meat and meat products, health inspection is essential to guarantee the quality of those products, being mandatory in all states of Brazil. It ensures, through different methodologies and processes, the hygienic-sanitary and technological quality of the products, making them reach the consumers without posing health risks (SILVA et al., 2016). Thus, our objective was to study the condemnations and estimate the damage resulting from the disposal of red viscera (liver, heart and lung) in cattle slaughtered in the municipality of Santarém, Pará, Brazil.

MATERIAL AND METHODS

The present study was conducted from January to December 2018, at Abatedouro-Frigorifico with Federal Inspection Service (FIS), in the municipality of Santarém, Pará. The

establishment slaughtered cattle mainly from Santarém, although it received animals from neighboring municipalities, members of the western mesoregion of Pará. Weekly visits were made to obtain data on hygienic-sanitary and technological inspection.

For this research, during the specified period, the slaughter of 28 thousand cattle were observed, being specifically evaluated the lung, the liver and the heart. For that purpose, the causes of condemnation of these red viscera were observed based on the visualization of the piece, appreciation of volume, consistency, appearance, color, palpation and incision of the parenchyma of the organs with longitudinal cuts.

When necessary, other causes of conviction were also considered, according to the specifications of the Regulation of Industrial and Sanitary Inspection of Products of Animal Origin - RIISPOA / MAPA (BRASIL, 2017).

To estimate the economic damage caused by the condemnation of lung, liver and heart, the weight of these organs were used, as stated by Almeida et al. (2019), and the value, in reais, practiced during the month of April 2020 for each viscera sold in the slaughterhouse where the study was carried out, as shown in Table 1.

Table 1. Estimation of the weight of each viscera and marketing values.

Viscera	Weight (Kg)	Value (R$)/ Kg
Lung	2.662*	9.00 **
Liver	5.022*	14.00**
Heart	1.732*	13.00**

*Almeida *et al.* (2019).

** Values as marketed at Abatedouro-frigorífico, Santarém, Pará, Brazil.

To calculate the economic loss the following formula was used:

1st) Weight x value in reais of Kg
2nd) Viscera value x total condemned viscera

After collection, the data were tabulated and later organized into Excel spreadsheets (Microsoft Office Excel®2016).

RESULTS AND DISCUSSION

As described in Table 2, the total number of condemned viscera was 6,355, which corresponds to a 22.69% rate of carcass disposal due to general organ damage. Of that total, lung condemnations accounted for 3,721 cases, while liver convictions totalized 2,030 cases. Heart condemnations reached 604 cases. Thus, the lungs obtained the highest rate of condemnation, representing 58.55%. The liver, in turn, had a 31.94% condemnation rate, ranking second place. Finally, the heart, with 9.5% of condemnation, was the least condemned part.

Table 2. Viscera condemnations during slaughter of cattle in a Federal slaughterhouse in Santarém, Pará, in 2018.

Condemned part	No.	%
Lung	3,721	58.55
Liver	2,030	31.94
Heart	604	9.51
Total	6,355	100

Based on the data presented in Table 2, lungs showed dominance in the occurrence of condemnations (58.55%) compared to the other organs. Similar results were observed in a study performed by Fruet et al. (2013) in the municipality of Santa Maria, Rio Grande do Sul, that indicated a disposal rate of lungs of 24.9%, as well as in a study conducted in Uberlândia, state of Minas Gerais, by Silva et al. (2013), in which the total condemnation was of 17.7%.

The liver was the cause of condemnation in 7.25% (2,030 / 28,000) of slaughtered cattle, which represents a total of disposal equivalent to 31.94% of the viscera. Almeida et al. (2017) report that, in the municipality of Garanhuns (Pernambuco), the liver was condemned in 20.65% of the cases, being presented as the second viscera with the highest number of injuries and / or causes of condemnations in their study.

The third viscera with the highest number of discharges due to causes / injuries was the heart, which presented a rate of 2.15% (604 / 28,000) of condemnations in relation to the total number of slaughtered animals and 9.51% in relation to the total of condemnations in this study. Gurgel et al. (2017) also presented the heart as the third viscera with the highest rate of discharge, with a 16.39% condemnation rate in the city of Itaituba, in western Pará.

With respect to lung condemnation (Table 3), it is observed that the main causes were pulmonary emphysema, ruminal aspiration and congestion. In addition, it was possible to identify that other causes caused the discard of 12.58% of these viscera. Similar results were identified in the study developed by Gurgel et al. (2017), in the municipality of Itaituba-PA, in which the lung was the organ with the highest rate of discard, with a percentage equivalent to 36.02% of condemnations when compared to the other viscera. However, this rate differs from the results obtained by Cesari et al. (2017), that observed higher rates of kidney disease (37.10%), followed by the liver (24.40%) and the lung (14.03%).

Table 3. Causes / injuries that led to the condemnation of bovine lungs in Santarém, Pará, in 2018.

Causes	Nº	%
Pulmonary emphysema	2,431	65.33
Ruminal Aspiration	491	13.19
Congestion	331	8.90
Other	469	12.58
Total	3,721	100

In agreement with the results obtained in this study, Israel et al. (2014) identified that the majority of bovine lung condemnations in the city of Rio Branco, Acre, occurred due to pulmonary emphysema, which was responsible for 13.49% of the discards of this organ. In addition, Palma (2013) identified emphysema as the main lesion of this organ with 8.08%. However, Gurgel et al. (2017) reported that, in Itaituba-PA, the main cause of condemnation

was the aspiration of rumen content, this damage being responsible for 25.65% of the occurrences of disposal of this organ.

In relation to the liver (Table 4), the main cause of discard found was teleangectasis, responsible for 32.06% of the condemnations. Supporting the data found in this study, Palma (2013) also pointed out teleangectasis as the main cause of condemnation, but its rates were much lower, presenting only 3.61% of the causes of discard. On the other hand, Israel et al. (2014) reported contamination, cirrhosis and teleangectasis as the main causes of discharges in Rio Branco, Acre.

Table 4. Causes / injuries that led to the condemnation of cattle liver in Santarém, Pará, in 2018.

Causes	Nº	%
Teleangectasis	651	32.06
Cirrhosis	565	27.83
Contamination	288	14.18
Other	525	25.83
Total	2,029	100

The three main causes / injuries found in the heart were contamination, pericarditis and tuberculosis. Other causes were found in only 1.35% of condemnations, as can be seen in Table 5. Israel et al. (2014) showed, in their study, that the greatest loss of heart also occurred as a result of contamination, being responsible for 82.89% of disposal. In the same study, the authors referred to pericarditis as the main pathological cause, corresponding to 15.78% of the condemnations of this organ.

Table 5. Causes / injuries that led to the condemnation of the heart of cattle in Santarém, Pará, in 2018.

Causes / Injuries	Nº	%
Contamination	307	50.82
Pericarditis	273	45.19
Tuberculosis	16	2.64
Other	8	1.35
Total	604	100

Different results were obtained by Almeida et al. (2017), in the city of Garanhuns, in Pernambuco, which indicated subepicardial hemorrhage as the main cause of heart condemnation, with an index of 33.33%

In this study, the economic losses identified by the condemnation of the lung, liver and heart would correspond, in current values, to R$ 241,352.69. This corroborates with the observed by Kale et al. (2011), that affirmed that the commercialization of these organs can maximize the economic gains for the sectors involved.

Individually, the liver provided the greatest economic loss, with a total equivalent to R$ 142,638.70, followed by the lung, with an estimated loss of R$ 85,117.95 reais, and finally, by the heart, with a loss of R$ 13,596.04 (Table 6).

Table 6. Viscera and economic losses in reais, Santarém, Pará, Brazil.

Viscera	Amount	Value of the Viscera (R$)	Economic Losses (R$)
Lung	3,721	23.95	85,117.95
Liver	2,029	70.30	142,638.70
Heart	604	22.51	13,596.04
Total	6,.355	115.76	241,352.69

Fruet et al. (2013) estimated the economic losses of condemned organs and identified losses equivalent to R$ 85,108.05 per year. In Tailândia-PA, Noronha et al. (2019), when assessing the main causes of condemnation at the slaughterhouse in the municipality, pointed out the lung and liver as the organs that most represented economic losses.

CONCLUSION

In these studies, technological failures during the slaughter process proved to be as important as pathologies in terms of the impact of these two factors in the condemnation of the viscera, even being equivalent with regard to the disposal of red viscera. Even for the liver, which had the lowest percentage of losses due to technological deviations, due to incorrect maneuvers during the slaughter, the economic loss was more significant than the lung. This is because the liver has greater size, weight and commercialization than the lung. On the other hand, for the heart, technological failures have overcome the damage caused by pathologies. Although this organ has presented a condemnation volume almost six times smaller than the lung and has the least amount of discarded pieces, due to its high acceptance and, consequently, great commercialization capacity, the technological failures that occurred during the slaughter generated a very high economic damage. Given the above, this scenario creates an alert and highlights the need for strict quality control programs in order to mitigate the economic impacts arising from the condemnation of viscera.

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