



ESTIMATION OF FINANCIAL LOSSES FROM THE ORGANS AND CARCASSES SEIZURES IN AN ITALIAN CATTLE SLAUGHTERHOUSE

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Abstract: Meat is an ideal source of nutrients containing proteins of high biological value with essential amino acids in balanced proportions for the human diet. Beef, which is one of the main foods consumed worldwide, must meet a high standard of food safety to guarantee consumer protection. The investigation carried-out in this study focused on postmortem inspection of the beef carcasses in an Italian cattle slaughterhouse to identify and quantify the major causes of meat and offal condemnation. During the reporting period of February 2022 and May 2023, 21285 kg of liver; 12427.8 kg of lungs; 8357.5 kg of heart; and 75 kg of kidneys were seized. The major causes of seizure were as follows: for liver, carcinomatous hepatitis and hydatid cysts; for lungs, calcified pleuritis; for kidneys generalized interstitial nephritis, for heart, cystic valve endocarditis; for spleen, fibrinous perisplenitis; for carcasses - carcinomatous peritonitis. The financial loss resulting from offal condemnation was more than €67000. The total quantity of carcasses seized amounted to 22140 kg, which means an approximate loss of €243540. Estimated total economic losses resulting from the seizure of carcasses and offal amounted to €311208.5, which is a considerable value.

• Introduction

In modern society, food safety is a major priority. Meat has always played an important role in the human diet, being considered the ideal source of nutrition, energy and vigor, as it is a source of protein of high biological value, containing essential amino acids in balanced proportions for the human diet.

The safety of meat is guaranteed by the veterinary services, which are responsible for controlling meat at all stages of the food chain, from the farm to the consumer. The main purpose of veterinary inspections in slaughterhouses is to control the entire slaughter process, from the reception of animals to the production of meat. After ante-mortem inspection of the animals before slaughter and post-mortem inspection of the carcasses and organs, the official veterinarian declares the meat fit for human consumption if no risk is present.

This paper focused on the post-mortem inspection of beef carcasses in a cattle slaughterhouse in Italy to identify and quantify the economic losses that resulted from condemnation of bovine organs and carcasses infected with pathogens or with various abnormal conditions.

• Results and discussions

1. Carcass and organs condemnation

The most of the animals that arrived at the slaughterhouse and were slaughtered were female (showed various signs of disease or mammary conditions resulting in reduced or stopped milk production), and were over 24 months old, while males were younger and had been fattened.

Total organs and carcasses seizure rate by gender

Gender	No. of examined cattle	Liver (no /%)	Lungs (no /%)	Heart (no /%)	Kidney (no /%)	Spleen (no /%)	Carcass (no /%)
M	12969	1925 (14.84%)	1439 (11.09%)	1020 (7.86%)	108 (0.83%)	12969 (100%)	51 (0.39%)
F	2593	2332 (89.93%)	2327 (89.74%)	2323 (89.59%)	142 (5.48%)	2593 (100%)	72 (2.78%)
p Value		0.001	0.001	0.001	0.062	—	—
Total	15.562	4257 (27.35%)	3766 (24.19%)	3343 (21.48%)	250 (1.60%)	15562 (100%)	123 (0.79%)

Seizure rate of organs and carcasses in cattle by age

Age	No. of animals	Liver	Lungs	Heart	Kidney	Spleen	Carcass
>12 month	5187	480 (9.25%)	417 (8.03%)	143 (2.75%)	30 (0.57%)	5187 (100%)	27 (0.52%)
12-24 month	7580	933 (12.30%)	505 (6.66%)	354 (4.67%)	97 (1.27%)	7580 (100%)	56 (0.73%)
<24 month	2795	2795 (100%)	2795 (100%)	2795 (100%)	127 (4.54%)	2795 (100%)	45 (1.61%)
p value (>12 months/12-24 months)		0.512	0.719	0.484	0.608	-	0.838
p value (12-24 months/ <24 months)		0.002	0.001	0.001	0.172	-	0.572
p value (> 12 months/ <24 months)		0.001	0.001	0.001	0.077	-	0.452

• Conclusions

- Carcass condemnation, even if it is quantitatively reduced, can still inflict a significant financial loss for the slaughterhouse,
- The highest seizure rate was recorded for offal, especially liver and lungs.
- Information on pathological conditions detected in slaughterhouses is useful for veterinary authorities, farmers and other stakeholders to identify pathogens and diseases of public or animal health importance at the farm level and prevent economic losses.

• Material and method

The study was conducted in an Italian slaughterhouse, located in Sicily, over a period of 16 months, between February 2022 and May 2023.

The cattle sent for slaughter came from various micro-farms from a 100 km area. During the study period a total of 15562 cattle were slaughtered.

In accordance with European legislation, post-mortem inspection has the following objectives: to diagnose diseases of importance to both consumers and animals; to detect accidental or deliberate contamination with compounds which are not allowed or are present at higher levels than the legal limits; to verify the absence of visible lesions of importance to animal welfare; to detect other possible contamination.

Economic losses due to the seizure of organs and carcasses in the slaughterhouse under study were assessed by considering the following elements: average weight of organs and carcasses, total number of organs and carcasses seized, average unit cost per kg of organs and carcasses and total financial losses attributed to condemnations.

With the exception of the spleen, which was seized immediately after slaughter in all age categories, the lowest number of organs seized was in the first age category (up to 12 month). In the third age category (older than 24 month), all edible organs were totally seized, except the kidneys (4.54%). These differences may be due to the fact that, in the slaughterhouse studied, the majority of organs (liver; lung) are seized from adult animals, which in most cases show significant pathological changes, both on the surface and in depth. In addition, significant differences ($p=0.001$) were found between the results obtained from cattle aged less than 12 months, and those older than 24 months

2. Condemnations causes

The most important causes of: (i) the liver confiscations were carcinomatous hepatitis and hydatid cysts; (ii) the lungs seizures were calcified pleuritis; (iii) the kidneys confiscations were generalized interstitial nephritis; (iv) the heart confiscations were cystic valve endocarditis; (v) the spleen confiscations were fibrinous perisplenitis; and of (vi) the carcass confiscations were carcinomatous peritonitis.

3. Economic losses

Financial losses resulting from seizures of organs and carcasses

Organs /Carcass	No. of confiscated organs/ carcasses	Medium weight (kg)	Total weight seized (kg)	Unit prices (€/kg)	Financial loss (€)
Liver	4257	5	21285	1.90	40441.5
Lungs	3766	3.30	12427.8	1.00	12427.8
Heart	3343	2.50	8357.5	1.76	14709.2
Kidney	250	0.30	75.0	1.20	90.0
Carcass	123	180	22140	11.00	243540
Total	11739	—	64285.3	—	311208.5

During the study period, different quantities of organs were seized, as follows: 21285 kg of liver, 12427.8 kg of lungs, 8357.5 kg of heart and 75 kg of kidneys. The total quantity of condemned organs was 42145.3 kg. By multiplying the total quantity of condemned organs and the average price recorded on the European market, the financial loss resulting from the seized organs was €67668.5.