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A Study on Poor Practices and Assessment of Microbial Contamination of Poultry Meat in Slaughterhouses in the City of Al-Bayda, Libya.

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ABSTRACT

This study aimed to evaluate several private slaughterhouses in the city of Al-Bayda Libya, focusing on their hygiene and disinfection practices during slaughter and processing. It also aimed to conduct a comprehensive assessment of the microbial quality of poultry meat intended for retail sale. Microbiological analysis was performed on approximately 60 different poultry carcasses, including breast, wings, and skin, from six slaughterhouses geographically distributed in Al-Bayda and its suburbs. The analysis included the identification of fecal coliform bacteria, aerobic bacteria, and Salmonella, which was identified as the most dangerous type. All tests were conducted according to the standards of the Codex Alimentarius Commission of the FAO at the Central Laboratory of Animal Health in Benghazi. The results showed two categories: the first category, representing 16.67%, demonstrated good practices during slaughter and processing, with efficient hygiene and disinfection. The second category, representing 83.3%, represented carcasses that were subjected to poor practices during processing, with rates of 50% and 46.66%, respectively. The levels of fecal coliform bacteria, staphylococci, and aerobic mesobacteria were approximately 5.0 $\log^5$ CFU/g, 2.18 $\log^5$ CFU/g, and 1.08 $\log^5$ CFU/g, respectively. These results, based on statistical analysis, demonstrate a significant impact of poor slaughtering and processing practices. Therefore, all public health and food safety organizations recommend the implementation of HACCP and Hazard Analysis (HACCP) systems, particularly for meat and meat products.

1. INTRODUCTION

Slaughterhouses that do not implement health procedures during the slaughtering and processing process, especially hygiene procedures, are among the main factors that cause the spread of many diseases, especially intestinal diseases(Saleh, Kawafi, Zafir, & Mahmoud, 2025). These slaughterhouses can cause the spread of infection in meat that was originally safe(Gomaa, Abdulhadi, Mohamad, & Saleh, 2025). The cleaning of slaughterhouses, utensils, equipment, and the slaughterhouse floor must be a fundamental procedure before using the slaughterhouse, and appropriate disinfectants must be used(Alsadi et al., 2023).

It is well known that meat and its products are primarily responsible for transmitting diseases if contaminated, known as foodborne illnesses. Therefore, caution must be exercised when handling them, as meat is considered a highly perishable food(Abdalnaser, Bellhamad, et al., 2025). It is known that the majority of intestinal bacteria are among the most important types that cause contamination of poultry carcasses in slaughterhouses due to their natural presence in the bird's digestive system(Saleh, Farhat, et al., 2025). HACCP programs and risk analysis must be adopted in order to reduce pollution levels and always adhere to pollution standards and permissible limits(Zafir, Almardi, Alorfi, Saleh, & Hamad, 2023). It is essential to use good detergents and disinfectants, apply hygiene and care standards, and conduct microbial studies continuously to assess the epidemiological situation(Saleh, Mahmoud, Am Zafir, Abd Alati, & Hasan, 2025). It is necessary to focus on the most dangerous types in order to assess the level of pollution in slaughterhouses(Mahmoud & Abdullah, 2024). This study was conducted to determine the effectiveness of good hygiene and sanitation practices on meat quality and its freedom from pathogens that can be transmitted to humans, thus affecting public health and causing significant economic losses.

2. METHOD

2.1biological materials used:

This study was conducted on 60 pieces of poultry meat from slaughterhouses located in and around the city of Al-Bayda, which were prepared for marketing and chilled at a temperature of 4/5 degrees Celsius.

2.2Microbiological analysis test:

Samples of breast and wing meat, which are most susceptible to contamination, as well as pieces of skin, were collected and transported to the laboratory in a refrigerated container. These samples were then placed in sterile, separate bags according to established procedures. The samples were transported to the Central Laboratory of the National Center for Animal Health in Benghazi, where they were received by the laboratory's technical team. Common enteric bacteria, major causes of foodborne illness, including Salmonella, Escherichia coli, and Shigella, were analyzed. E. coli is considered an indicator of fecal contamination. Approximately 25 grams of homogenized meat samples were placed in nutrient broth (peptone water) to activate and promote bacterial growth. These samples were then cultured on selective media to isolate the target pathogens, particularly Salmonella, which was cultured on SS agar. E. coli was cultured on EMB agar. Chemical identification was performed using a pre-prepared Gram stain assay, which identifies species based on staining, as well as oxidase and catalase assays. The quantity of Escherichia coli bacteria was determined using the MPN method.

2.3 Survey templates:

A number of students conducted a survey using pre-prepared forms to find out how the cleaning process is carried out, the number of cleaning workers and disinfectants, and the procedures followed for the microbiological inspection of the slaughterhouse.

2.4 Statistical analysis of the study:

In this study, analyses were performed using SPSS 19 software to determine contamination levels. Results were obtained using the FMCA (Flexible Compatibility Analysis) questionnaire.

3. ETHIC APPROVAL

This study was conducted on a field basis, with samples collected and examined routinely. No experimental procedures were involved, verbal consent was obtained from the slaughterhouse and retail owners, and ethics committee approval was not required.

4. RESULT

3.1Microbial contamination in carcasses:

The microbial analysis conducted on the carcass pieces showed two categories, as shown in **Figure A**

- The first category, 16.67%, is the carcasses that have undergone good practices in terms of cleanliness and disinfection
- The second category represented about 83.33 carcasses that showed poor results, as they were subjected to poor practices in terms of cleanliness, disinfection, and following appropriate methods for the processing process.

3.2 Contamination of meat pieces:

The table shows from the study the contamination of poultry meat cuts with different types of pathogenic bacteria First table The spread of microbial contamination in cuts of meat from poultry carcasses

The table 1. Characteristics of bacteria to study

	Fecal Aerobic Mesophilic total count	Fecal coliforms	S. aureus	Salmonella spp
Number of contaminated study samples	60	60	28	30
Microbial spread	100%	100%	46.6%	%50

The effect of the hygiene process on bacterial contamination of poultry meat prepared for marketing. The hygiene quality and microbiological assessment of the first group were satisfactory, while the second group was unsatisfactory due to poor practices, as illustrated in Figure 1

5. DISCUSSION

Prevalence of Microbial Contamination in the Slaughterhouse Under Study:

The prevalence of Salmonella contamination in the slaughterhouse reached approximately 80.77%, a rate very close to that found by (Amraga, Akriem, Mohammed, Akriem, & Saleh, 2026) which was 22.77%.

Contamination of Poultry Products:

-For Salmonella, the prevalence rate was 60%. Lower prevalence rates were recorded than those found in our study, reaching 19% in Egypt (Ali et al.), while higher prevalence rates were recorded in Turkey (55%) (Bufarwa et al., 2025)as reported by(Abdalnaser, Othman, Saleh, & Mahmoud, 2025) .

- For Staphylococcus aureus, the prevalence rate was 40.66%, with an average contamination load of 1.07 log decimal units per colony-forming unit/gram. This prevalence is higher than the rate found by (Mustapha et al., 2025) (34.40%). (Saeed et al., 2025)and others in 2013 found an average of 1.63 decimal logarithmic units for the number of colonies per gram, which is close to our results.

6. CONCLUSION

The study results showed that poor hygiene pracces in the slaughterhouses spread throughout the city of Al-Bayda have a significant impact on the quality of poultry meat, as well as on microbial contamination of the meat. Hence, it is necessary to implement good hygiene practices in terms of cleaning and disinfection, applying strict procedures to prevent contamination, conducting hazard analysis and critical control points in all slaughterhouses, and monitoring and microbial evaluation periodically, especially by health regulatory authorities.

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