

RESEARCH ARTICLE



Risk Assessment of Poultry Slaughterhouses in Tirana Region

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Abstract

This study consists on compliance level assessment with Good Hygiene Practices (GHP) of Tirana poultry slaughterhouses as well as the assessment of their carcasses microbiological quality. The study was carried out in the period: February 2015-July 2015, in two slaughterhouses in Tirana. We took 15 samples from broiler carcasses, and we analyzed them in IFSV (Institute of Food Safety and Veterinary). The detection of *Salmonella spp.* in broiler carcasses is based on ISO 6579: 2002 method. From the samples that are analyzed, only 6.6% resulted with *Salmonella spp.* or one case positive from 15 samples analyzed. The presence of *Salmonella spp.* in broilers meat is more evident in the birds themselves, which carry the microorganism in their organs and make easier the distribution after the process of evisceration. However, the equipments, and the staff are considered as contaminant factors of meat. Particular importance should be paid to the carcasses cleaning, water and equipments disinfection used during slaughtering process. Statistical analyzes detected a significant impact of the hygienic conditions in the slaughter process toward the hygienic quality of poultry carcasses. The application of Good Hygiene Practices (GHP) and the implementation of HACCP in poultry slaughterhouses are considered an absolute necessity.

Keywords: *Salmonella spp.*, Good Hygiene Practices (GHP), slaughterhouse, broiler carcasses.

1. Introduction

The organisms that generate the most interest in relation to public health and safety of poultry meat, both locally and internationally are *Salmonella spp.* and *Campylobacter spp.*

Poultry meat is responsible for many zoonotic foodborne infections in the world. Foodborne diseases have a serious impact on the public health and therefore to economic losses due to the fact that food poisoning are in billions. *Salmonellosis* and *Campylobacteriosis* are among the most frequently reported foodborne diseases worldwide. *Salmonella spp.* is one of the most common and widely distributed foodborne pathogen in the European Union. Surveillance programs and intervention strategies to control foodborne salmonellosis have been implemented in EU Member States. We should take in consideration that a precise evaluation of such intervention is difficult, partly due to the lack of information toward public-health impact on the

incidence of foodborne infections. It is of great important to identify and to set priorities on effective food safety interventions, to the burden of human salmonellosis [1] [2]. Salmonellosis symptoms consist of self-limiting gastroenteritis and sometimes require hospitalization. In a few cases, infection can lead to more severe, long-term illness such as septicemia, reactive arthritis or Guillan-Barré syndrome [12].

The poultry slaughterhouse is one of the major critical points with potential effects on poultry meats hygiene. The slaughtering process provokes undesirable phenomenon such as inter- contamination which stimulates the bacterial pathogens proliferation on carcasses. While numerous potential vehicles of transmission exist, commercial chicken meat has been identified as one of the most important food vehicles for these pathogen organisms. In this respect, specific data on the burden of foodborne disease are associated with *Salmonella* and *Campylobacter* in poultry meat because the role of poultry is considered to be significant.

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1. Material and Methods

In our study we have investigated the presence of *Salmonella* spp. in the final product (Carcasses after chilling). The study was carried out during the period: February 2015-July 2015 in two slaughterhouses of Tirana region. We took 15 samples from broiler carcasses and we analyzed them in Institute of Food Safety and Veterinary.

The detection of *Salmonella* spp. in poultry carcasses is based on ISO 6579: 2002 method [4] [11]

2.1 Sampling

After carcass chilling we collected, randomly 15 carcasses (for *Salmonella* spp. analyses). The sample was considered a piece of 10 g which was cut from the skin neck from each poultry carcass. Before starting the test, the skin samples were deployed in order to form samples with quantity of 5×25 g until final manipulation [10].



Figure 1. Sampling of samples

2.2 Microbiological procedures.

Meat samples were tested for the *Salmonella* spp. presence (using ISO 6579: 2002 method). Fresh meat samples were defatted, weighed (25 g), and was externally decontaminated by dipping in absolute alcohol and further flaming. The procedure was followed by homogenization in 225 ml buffered peptone water (BPW), Ongoing we incubated the samples for 18 h at $37 \pm 1^\circ\text{C}$. Further were inoculated into a modified semisolid Rappaport Vassiliadis (MSRV) medium, 3 drops (33 l each) in incubated BPW. Later the plates were incubated for 24h at $41.5 \pm 1^\circ\text{C}$ (negative samples were re-incubated for an additional 24 h). One microliter of the presumptive *Salmonella* growth (detected by halo generated in MSRV after 24 or 48 h) was transferred in two selective media (xylosine lysine deoxycholate [XLD] and brilliant green [BG] agars). Suspected colonies were biochemically confirmed (triple sugar iron [TSI] agar, urea agar, L-lysine de-carboxylation medium, and indol reaction) [4].

3- Results and Discussions

There are a number of pathways by which poultry can become contaminated with *Salmonella*. Some are more likely for one organism than for the other. Contamination of birds by *Salmonella* on-farm can usually be traced to one or more of three factors: contaminated feed; environmental sources; and/or vertical transmission from contaminated eggs [3].

The contamination of poultry meat is very much dependent on the status of the birds prior to slaughter and on operational hygiene during meat processing. Processing converts live birds into poultry carcasses causing meat exposure versus outside contamination from of the bird, bird intestinal contents and the environment processing.

Processing can be divided into a number of stages. Different studies based on the stages effect versus the level and prevalence of *Salmonella* on chicken carcasses indicates large variability associated with each process. In the following table (table nr 1) is highlight the typical processing factor effect versus

Salmonella number and state on chicken carcasses, it is recognized that individual plants or companies may perform their tasks (according to the actions described

in the table) differently and to different levels of hygiene.

Table 1. Presence of *Salmonella* spp. affected by different stage of meat processing

<i>Slaughterhouse Code</i>	<i>Reduce</i>	<i>Minimal</i>	<i>Increase</i>
Stun/Slaughter		<i>Salmonella</i>	
Scald - Low temperature			<i>Salmonella</i>
Scald - High temperature	<i>Salmonella</i>		
De-feathering			<i>Salmonella</i>
Washing	<i>Salmonella</i>		
Evisceration			<i>Salmonella</i>
Washing	<i>Salmonella</i>		
Chilling – immersion			<i>Salmonella</i>
Chilling – air3		<i>Salmonella</i>	
Portioning			<i>Salmonella</i>

However, the risk in different countries varies according to control measures and practices implemented along the chain from primary production to final preparation of the meat [12].

Our study was conducted during the period: February 2015-July2015. We analyzed in total, 15 samples that were sampled from broiler carcasses. The detection of *Salmonella* spp. in poultry carcasses is based on ISO 6579: 2002 method. From this investigation (15 analyzed samples), were obtained the following results: from the carcasses was isolated only one positive sample with *Salmonella* spp. Out of total samples, 6.6% resulted with *Salmonella* spp. In the figures no. 2 is demonstrated the plate, after 24 hour, in agar plate XLD, where is possible to see the grown colonies of *Salmonella* spp. While in Fig. no.3 is demonstrated graphical appearance of positive sample.



Figure 2. The presence of *Salmonella* spp. after 24 hour, in agar plate XLD

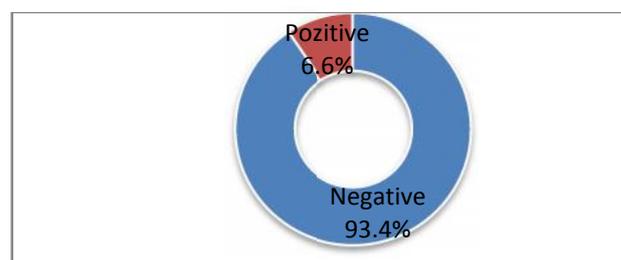


Figure 3. Presence of *Salmonella* spp. in 15 analyzed samples

A review of the incidence of foodborne *Salmonella* in humans in the EU over the last 10 years show that in 2012, the highest proportions of *Salmonella*-positive single samples were reported for fresh broiler meat and turkey meat at an average level of 5.5%. According to the Regulation no. 2073/2005, the presence of *Salmonella* in carcasses (process hygiene criteria), even in a low level of contamination reflects that the application of GHP in two slaughterhouses is not carried out at the required level.

Available evidence indicates hygienic handling and proper preparation of poultry meat (either at home or food service) play a significant role in reducing the risk of food-borne illness associated with *Salmonella* spp. A sensitivity analysis of the model inputs indicates that the probability of illness due to

Salmonella contamination of poultry meat was most sensitive to the level and prevalence of the organism on the carcass at the end of processing, and its growth during distribution and storage. Improper thawing was also a significant factor. Cross-contamination and inadequate cooking were positively correlated with increased likelihood of illness [5] [6] [8] [9] [10].

4- Conclusions

In our study, we isolated only one positive sample with *Salmonella spp.*, or 6.6% from the total samples analyzed. Referring to the Commission Regulation (EC) No 2073/2005, amended by Regulation (EC) 1441/2007 of 5 December 2007), interpretation of the test results, reveal that *Salmonella* in carcasses is satisfactory, if the presence of *Salmonella* is detected in a maximum of c/n samples (5/50 samples or 10%).

Statistical analyzes showed a significant impact of the hygienic conditions of the slaughter process on the hygienic quality of poultry carcasses. The application of Good Hygiene Practices (GHP) and the implementation of HACCP in poultry slaughterhouses has become an absolute necessity.

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