International Scholars Journals

African Journal of Poultry Farming ISSN 2375-0863 Vol. 9 (3), pp. 001-004, March, 2022. Available online at www.internationalscholarsjournals.org © International Scholars Journals

Full Length Research Paper

Study on *Salmonella* contamination in poultry lean meat and meat with skin in Tabriz slaughter houses

Javadi Afshin[1]*, Safarmashaei Saeid[2] and Ghadimi Reza[3]

[1]Department of Food Hygiene,Tabriz Branch, Islamic Azad University, Tabriz, Iran.
[2]Young Researchers Club, Tabriz Branch, Islamic Azad University, Tabriz, Iran.
[3]Faculty of Veterinary Medicine, Tabriz Branch, Islamic Azad University, Tabriz, Iran.

Accepted 19 September, 2019

Some microorganisms such as *Salmonella, Listeria* and *Campylobacter* cause foodborne diseases in human, which some control and food safety measures are not able to prevent. However, it is necessary to devise new systems for achieving this target. The purpose of this study was to determine *Salmonella* contamination through cross contamination of meat in slaughtering premises. For this study, a total of 50 samples were taken from slaughterhouses and transported to the laboratory of food hygiene where they were divided to 2 groups; the first group consists of lean meat, while the other group consists of meat with skin. Each sample (25 g) was prepared according to Standard methods of Institute of standards and Industrial Research of Iran. The McNemar test for qualitative data was used to compare the two groups. According to the results obtained from the 2 groups; 17 samples from first group and 10 samples from second group (meat with skin) were positive. A comparison of these two group showed a significant difference ($p<0.05$). The results show that the rate of cross contamination with salmonellosis disease in slaughterhouses was high and it proves that they should be omitted by properly skinning and cooking the contaminant.

Key words: *Salmonella*, poultry meat, skin, infection.

INTRODUCTION

Salmonellosis is a bacterial disease caused by strains of *Salmonella*. It occurs in animals and humans. In both cases it is an enteric disease of varying severity, usually involving diarrhea. With poultry, however, most *Salmonella* infections are without symptoms. In fact, *Salmonella* is one of the most important causes of foodborne disease worldwide. In many industrialized countries, the incidence of salmonellosis in humans and the prevalence of *Salmonella* in many food products have increased significantly over the last twenty years. This bacterium is broad host-spectrum, and can be isolated from a wide range of animal species, including birds and reptiles (Bean et al., 1997; Bryan, 1980; Genigeorgis et al., 1986). The animals usually are healthy carriers, and contaminated feed plays an important role in the epidemiology of salmonellosis. *Salmonella* can survive for a long time in the environment. Humans are usually infected through consumption of contaminated foods of animal origin. However, other food such as fresh produce, seafood and chocolate have also been implicated in outbreaks because of cross-contamination, use of contaminated water, use of manure as a fertilizer, presence of animals or birds in the production area or other factors. Therefore, the aim of this study was to determine the *Salmonella* meat contamination and caused infection cross contamination of meat caused slaughtering premises (Mackey et al., 1980; Slavik et al., 1995).

The consumption of poultry meat has increased worldwide within the last decades (FAO, 1993; McNamara,

*Corresponding author: Afshinjavadi@yahoo.com or Javadi@iaut.ac.ir.

1997; Mead, 1997). Competition for an increased share of the poultry meat market centers on lowering the price, thus making poultry more attractive for the consumer. Therefore, modern poultry processing requires a high rate of throughput to meet consumer demand. With complete mechanization and automation, the number of slaughtered birds in many processing plants can reach 12,000 birds per h (James et al., 2000). During the processing of poultry carcasses, microbial contamination inevitably occurs as a consequence of the processing procedures employed. At each stage of the process, ample opportunity exists for contamination of the carcass by microorganisms from the processing plant or by cross-contamination from other birds. The numbers of bacteria on carcass surfaces vary considerably at different stages of processing (Barnes, 1960; Lahellec et al., 1972; Mead, 1970), and increases and decreases in numbers have been demonstrated (Mead et al., 1973; Notermans et al., 1973; Peric et al., 1971; Van Schothorst et al., 1972).

Two kinds of poultry slaughtering are used in Tabriz. One is an automated poultry slaughtering process established recently, whereby automated systems are used for scalding, plucking, eviscerating, rinsing and packaging carcasses. Carcasses are then stored at 4°C before sale to supermarkets. The second is the traditional slaughtering, which is commonly practiced in shops under poor hygienic conditions. Thus, controlling micro-bial contamination in poultry meat during slaughtering, processing, storage, handling and preparation becomes a great challenge (Abamuslum et al., 2003; Gill et al., 2005; Izat et al., 1989). Against such a background, and recognizing an increase in consumer concerns and pressure in terms of reducing such human, societal and economic costs, there is considerable interest in the development and wider application of more robust and secure methods within poultry production and processing systems. One such system is the hazard analysis and critical control point (HACCP), a systematic science based approach designed to prevent, reduce or eliminate identified hazards in food products (Kukay et al., 1996). It is generally accepted that the HACCP approach is the most effective way of reducing or eliminating contamination during food processing (NACMCF, 1998). The aim of this study was to determine *Salmonella* infection in poultry lean meat and meat with skin.

MATERIALS AND METHODS

For this study, a total number of 50 samples were taken from slaughterhouse. These samples after collection were held at 3 to 4°C and then transferred to laboratory of food hygiene in Islamic Azad University, Tabriz branch, for other steps. Next, these samples were divided into 2 groups; the first group consists of lean meat, while the other group consists of meat with skin. Each sample (25 g) was prepared according to Standard methods of Institute of standards and Industrial Research of Iran; no: 356, 1810 for preparation, culture and detection of *Salmonella* in samples were used. The McNemar test for qualitative data was used (ISIRI, 1993, 1985).

RESULTS AND DISCUSSION

According to results of the present study, from the 2 groups, 17 and 10 samples from the first and second group respectively tested positive (Table 1). A compare-son of these two group showed a significant different ($p<0.05$). The results show that the rate of cross contamination with salmonellosis disease in slaughter-house was high and it proves that they should be omitted as a way of skinning the contamination in cooking time.

Control of *Salmonella* in poultry is a public health concern as *Salmonella* is a leading cause of human food poisoning. Poultry is not the only possible source of salmonellosis, but it is known to be a major global reservoir of *Salmonella*. *Salmonella* are widely distributed in nature; they are commonly carried by wild-animal vectors. Moreover, young poultry are particularly susceptible to infection. Effective control depends upon a number of factors, including improved on-farm biosecurity, use of 'best practices' in husbandry and use of vaccination and competitive exclusion products. In one study by Viktoria Atanassova and Christian Ring on the prevalence of *Campylobacter* spp. in poultry and poultry meat in Germany, of the 509 samples from poultry flocks used, 209 isolates (41.1%) were *Campylobacter* positive. The number of positive cases in broiler carcasses was 45.9%. Furthermore, of 52 pheasants investigated, 25.9% were *Campylobacter* positive. *Campylobacter jejuni* was isolated from 86 (42.0%) poultry flock samples, 47 (43%) broiler samples and 15 (28%) wild pheasant samples. *Campylobacter coli* were found at a rate of 1.2% in poultry flocks, 13% in broilers and 21% in pheasants (Atanassova and Ring., 1999).

In another study by Angen et al. (1996) on retrospective study on salmonella infection in Danish broiler flocks, retrospective longitudinal study was conducted to identify risk factors associated with *Salmonella enterica* infection in Danish broiler production. The study was based on information in the antemortem database (AM database) where data were available for all broiler flocks slaughtered over the 2-year period from 1992 to 1993 in Denmark. The AM database contains information collected by the ante-mortem veterinarians, from the slaughterhouses, and from the salmonella examinations carried out at the National Veterinary Laboratory. The epidemiological unit was the individual broiler flock. The *Salmonella* status of the flock was determined by examining the caecal tonsils from 16 3- week-old chickens

Table 1. *Salmonella* infection of samples.

Sample	Total sample	Positive sample	Negative sample
Meat with Skin	25	10	15
Meat	25	17	8
Total	50	27	23

chickens from each flock. This procedure would detect a *Salmonella*-infected flock, with a probability above 95%, if the prevalence is above 20%. Furthermore, the structure and quality of the collected data have been evaluated (Angen et al., 1996). In a study by De Medici et al. (1998) on comparison between ICS-Vidas, MSRV and standard cultural method for *Salmonella* recovery in poultry meat, two rapid methods for *Salmonella* detection, Vidas-ICS and modified semi-solid Rappaport–Vassiliadis (MSRV) were evaluated using contaminated poultry meat. The sensitivity and specificity of the methods were investigated on field samples and on artificially contaminated samples inoculated with mixtures of *Salmonella* and non-*Salmonella* competing strains. ICS-Vidas and MSRV yielded virtually identical results in full agreement with the standard cultural method (SCM). The MSRV method showed better results with artificially contaminated samples, but was less sensitive than SCM when applied to field samples. The use of the MSRV and Vidas-ICS methods could be particularly advantageous in the application of HACCP (Medici et al., 1998).

In addition, in one study by Corry et al. (2002) on the sources of *Salmonella* on broiler carcasses during transportation and processing, it was found that the modes of contamination and methods of control demonstrated that many of the *Salmonella* serovars detected in the feed mill and hatchery infect broilers on the rearing farms and can also be found on the fully processed carcasses. The feed mills were the source of most of the *Salmonella* within the two companies. Improved cleaning and disinfection, heat treatment of feed, biosecurity and the use of vaccines for breeding and laying flocks have helped to reduce the prevalence of salmonella contamination of broiler carcasses. To assist in this progress, more attention is needed in these aforementioned areas so as to improve the cleaning and disinfection of transport crates, and probably also the transport vehicles, although we did not examine these. In order to achieve this, it will probably be necessary to devote more space, time and physical effort in order to remove the faecal soil so that the crates can be effectively disinfected. Contamination of carcasses cannot be avoided if the incoming birds carry salmonellas, but can be minimized by improved processing systems (Corry et al., 2002).

Conclusion

The results show that the rate of cross contamination with salmonellosis in slaughterhouses was high, and it proves that they should be omitted by properly skinning and cooking the contaminant. These high levels of microbial contamination and occurrence of pathogenic bacteria reflect the poor hygienic quality of poultry meat under these conditions.

REFERENCES

Abamuslum G, Gulmez M, Duman B, Sezer C (2003). The microbiological contamination of traditionally processed raw goose carcasses marketed in Kars (Turkey). Int. J. Food Safety, 3: 4-7. 10.

Angen O, Skov NM, Chriel M, Agger FJ, Bisgaard M (1996). A retrospective study on salmonella infection in Danish broiler flocks. Prev. Vet. Med. 26(4): 223-237.

Atanassova V, Ring C (1999). Prevalence of Campylobacter spp. in poultry and poultry meat in Germany. Int. J. Food Microbiol.. 51(3): 187-190.

Barnes EM (1960). Bacteriological problems in broiler preparation and storage. R. Soc. Health J. 80:145-148.4.

Bean NH, Goulding JS, Daniels MT, Angulo FJ (1997). Surveillance for food born disease outbreaks-United States, 1988-1992. J. Food Prot. 60:1265-1286.

Bryan FL (1980). Food borne diseases in the United States associated with meat and poultry. Food Prot. 43: 140-150.

Corry JEL, Allen VM, Hudson WR, Breslin MF, Davies RH (2002). Sources of *Salmonella* on broiler carcasses during transportation and processing: modes of contamination and methods of control. J. App. Microbiol. 6(5): 424-432.

Food and Agriculture Organization (FAO) (1993). Record poultry meat consumption. Poult. Int. 32: 70-72.

Genigeorgis C, Hassuneh M, Collins P (1986). *Campylobacter jejuni* infection on poultry farms and its effect on poultry meat contamination during slaughtering. J. Food Prot. 49:895-903.

Gill CO, Badoni M (2005). Recovery of bacteria from poultry carcasses by rinsing, swabbing or excision of skin. Food Microbiol. 22: 101-107.11.

ISIRI (Institute of Standard and Industrial Research of Iran) (1993). Preparation of Food Samples for Microbial Analysis.10EH ED. p. 356.

ISIRI (Institute of Standard and Industrial Research of Iran), (1985). *Salmonella* spp. detection in foods. p: 1810

Izat AL, Colberg M, Driggers CD, Thomas RA (1989). Effects of sampling methods and feed withdrawal period on recovery of microorganisms from poultry carcasses. J. Food Prot. 52: 480-483. 9

James CE, Goksoy O, Corry JEL, James SJ (2000). Surface pasteurisation of poultry meat using steam at atmospheric pressure. J. Food Eng. 45: 111-117.

Kukay CC, Holcomb LH, Sofos JN, Morgan JB, Tatum JD, Clayton PP, Smith GC (1996). Applications of HACCP by small-scale and

medium-scale meat processors. Dairy, Food Environ. Sanitation, 16(2): 74-80.
Lahellec C, Meurier C, Catsaras M (1972). The psychrotrophic flora of poultry carcasses. I. Development at various stages through a slaughter house. Ann. Rech. Vet. 3: 421-434.16.
Mackey BM, Roberts TA, Mansfield J, Farkas G (1980). Growth of *Salmonella* on chilled meat. J. Hygiene, Cambridge, 85: 115-124.
McNamara AM (1997). Generic HACCP applications in broiler slaughter and processing.National Advisory Committee on Microbiological Criteria for Foods. J. Food Prot. 60: 579-604.
Mead GC (1997). Safety of poultry products past, present and future. Meat Poult. News. 8: 26-27.
Mead GC, Impey CS (1970). The distribution of clostridia in poultry processing plants. Br. Poult. Sci. 11: 407-414.23.
Mead GC, Thomas NL (1973). The bacteriological condition of eviscerated chickens processed under controlled conditions in a spinchilling system and sampled by two different methods. Br. Poult. Sci. 14: 413- 419.25.
Medici D De, Pezzotti G, Marfoglia C, Caciolo D, Foschi G, Orefice L, (1998). Comparison between ICS-Vidas, MSRV and standard cultural method for *Salmonella* recovery in poultry meat. Int. J. Food Microbiol. 45(3): 205-210.
National Advisory Committee on Microbiological Criteria for Foods (NACMCF) (1998). Hazard analysis and critical control point principles and application guidelines. J. Food Prot. 61: 762-775.
Notermans S, Jeunick J, Van Schothorst M, Kampelmacher EH (1973). Comparative investigation into possible cross-contamination in the spinchiller and during spray chilling. Fleischwirtschaft, 53: 1450-1452.29.
Peric M, Rossmanith E, Leistner L (1971). Untersuchungen uber die Beeinflussung das Oberflachenkeimgehaltes von Schlachthahnchen durch die spinchillerKuhlung. Fleischwirtschaft, 51: 216-218.36.
Slavik MF, Kim JW, Walker JT (1995). Education of *Salmonella* and *Campylobacter* on chicken carcasses by changing scalding temperature. J. Food Prot. 58: 689-691.
Van Schothorst M, Notermans S, Kampelmacher EH (1972). Hygiene in poultry slaughter. Fleischwirttschaft, 52: 749-752. 43.