

## **Evaluation of *Salmonella* Cross Contamination at Retail Chicken Meat Outlets in Kandy Area**

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### **Introduction**

Salmonellosis is among the most frequently reported food borne disease worldwide. While numerous potential vehicles of transmission exist, commercial chicken meat has been identified as one of the most important food vehicle for *Salmonella* (Abd El-Malek *et al*, 2011). The risk in different countries varies according to the control measures and the practices implemented along the food chain from primary production to final preparation of the meat for consumption (FAO/WHO, 2010). The prevalence of *Salmonella* contamination in poultry meat obtained at retail grocery stores is a better indicator of the public health risk. Transportation, handling, storage, additional processing and re-packaging of raw poultry meat products often occur, after the products leave the processing plant or after the animal is slaughtered at retail shop itself. Each of these steps may provide a new opportunity for bacterial contamination or growth. *Salmonella* in retail chicken meat outlets could be attributed to lack of proper cold chains, inadequate power supply and low level of hygiene in retail outlets. Therefore, the current study aimed at evaluating the *Salmonella* cross contamination at retail chicken meat outlets in Kandy area. Furthermore this study focused on making recommendations to improve quality assurance to mitigate the risk to consumers by identifying the risk factors associated with *Salmonella* cross contamination in retail chicken meat outlets.

### **Methodology**

Samples were collected during the month of April 2011.

#### **Swabbing process**

Sterilized swabs were lightly moistened in saline water swabbed along the area of contact surfaces, utensils to recover the microbes. Swabs were placed in labeled containers and returned to the laboratory in an iced (at 4 °C) Styrofoam box. All swab samples were processed immediately after reaching the laboratory.

#### **Data collection**

Fifteen (15) retail shops were selected to collect data based on their type of sales, sales scale, type of products, nature of sales, type of meat display, storage conditions of meat, way of handling meat, source of hygienic condition and etc by using pre prepared questionnaires.

#### ***Salmonella* Isolation Protocol**

Each swab sample was pre-enriched at 37 °C in 5 ml of buffered peptone water (BPW) and placed in incubator overnight (ISO 6579). 0.1ml of each sample of this stock was transferred to 10 ml of Rappaport Vassiliadis (RV) medium. The RV media were then

incubated at 42°C for 24 hours. One loopful of RV media from each sample was streaked onto Xylose Lysine Deoxycolate (XLD) agar plates and the plates were incubated at 37 °C for 24 hours. Presumptively positive black colonies were sub-cultured on Brilliant Green (BG) agar plates and incubated at 37 °C for another 24 hours. Presumptively positive pink colonies were bio-chemically confirmed with Triple Sugar Iron (TSI) agar, Simmons Citrate agar, Urease and SIM medium.

**Results**

Prevalence of *Salmonella* cross contamination at retail chicken meat outlets in Kandy area

Out of 57 swab samples collected, 12 swab samples of *Salmonella* suspected isolates from selective media were bio-chemically identified as *Salmonella*. Therefore the overall prevalence of *Salmonella* in retail chicken meat outlets was 21% (95% C.I 11.37- 33.88). Weighing scale (33%), Meat containing trays/buckets (27%) and Cutting board (25%), showed the highest percentage of *Salmonella* prevalence. Knife (14%) and showcase (9%) showed relatively low percentage of *Salmonella* prevalence.

Prevalence of *Salmonella* cross contamination at retail chicken meat outlets with slaughtering facilities versus without slaughtering facilities

Two types of retail chicken meat outlets were observed during the study. Retail outlets without slaughtering facilities represented 60% of the sample and retail outlets with slaughtering facilities represented 40% of the sample. Retail chicken outlets with slaughtering facilities had a significantly higher prevalence of *Salmonella* positive samples than retail chicken outlets without slaughtering facilities (p <0.05). The retail outlets which had no cooling facilities for raw chicken meat during display, had a significantly higher risk of *Salmonella* prevalence than the other type of retail chicken meat outlets with cooling facilities during displaying meat (p <0.05). Meat stored at room temperature during display was 13 times more likely to be contaminated with *Salmonella* than meat stored at cooling temperature during display (C.I. 0.88-207.63).

Table 1: Multivariate regression analysis of frequency of cleaning, use of detergents and use of disinfectant as risk factors for *Salmonella* contamination at retail chicken meat outlets

Predictor	Categories	No of outlets	%	P
Frequency of cleaning	Two times per day	7	46.7	0.46
	Less than two times	8	53.3	
Use of detergents	Yes	9	60	0.062
	No	6	40	
Use of disinfectant	Yes	5	33.3	
	No	10	66.6	

Statistically significant at (α =0.05)

Risk analysis for *Salmonella* cross contamination at retail chicken meat outlets. Factors that were included in the risk analysis were not significantly associated ( $p > 0.05$ ) with the *Salmonella* cross contamination.

### Discussion

The present study demonstrated an overall *Salmonella* cross contamination of 21% for the retail chicken meat outlets in Kandy area. This level of contamination is lower than with the recent literature from countries like Vietnam 53.3% (Van *et al.*, 2007), India 65.71% for raw chicken breast and 71.43 for raw chicken thigh (Wilfred and Nadeem, 2011), Canada 30% for raw chicken legs (Bohaychuk *et al.*, 2006), but similar to Maryland 23% for raw chicken meat (Myint, 2004). The differences in the prevalence of *Salmonella* in raw poultry may be due to country of origin, type and size of sample analyzed, and methodology (Bohaychuk *et al.*, 2006). The differences in the media used for enrichment, selective enrichment, and isolation can also affect estimates of prevalence (Myint, 2004).

The different rate of contamination in different countries can also be related to climate and temperature of storage of raw meat at retail meat outlets. Better equipment in slaughterhouses, advanced processing practices (including the use of dry chilling of carcasses), and more effective use of refrigeration in meat transport in developed countries could also help to reduce cross contamination of meat (Van *et al.*, 2007).

When high moisture niches are present *Salmonella* may be a significant hazard. The survival and the growth of microbes in a food processing environment may lead to contamination of the finished product. Cleaning and disinfecting procedures for processing, handling, and holding equipment may be critical control points for prevention of post processing recontamination. The requirements for meat handling at retail, it is recommended that hygiene measures should be aimed at minimizing cross contamination between raw chicken and hands, contact surfaces and utensils.

The true incidence of salmonellosis is difficult to evaluate because of lack of an epidemiological surveillance system in the country. The absence of centralized slaughter facility and the small volume of retail business, unstable policy, rules and regulations and the knowledge gap are the hurdles for hygienic production of chicken meat at retail outlets in the country. The conditions during slaughtering, processing, transportation, holding at retail outlet, and opportunities for cross-contamination at retail outlets can result large changes in the risk of salmonellosis to the consuming public. A greater potential risk is that slaughtering animals at same place where all evisceration and cleaning take place, is used for handling, packing, and even further portioning of the final product at the retail grocery store outlet prior to sale to the consumer.

### Conclusions

This higher rate of *Salmonella* cross contamination at retail chicken meat outlets could be attributed to lack of proper cold chains, and minimal facilities and poor level of hygiene in retail outlets. The findings of this study are vital to the public health risk of the country. Therefore, Sri Lanka needs its own unique model of development to assure the quality and safety of poultry products at retail outlets.

## References

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