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PREVALENCE OF SOME FOOD POISONING PATHOGENS IN SQUABS AND WOODEN PIGEONS CARCASES IN ASSIUT GOVERNORATE

(With 4 Tables)

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تواجد بعض ميكروبات التسمم الغذائي في ذبائح زغاليل الحمام وحمام البرج في أسيوط

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يعتـبر الحمام مصدراً هاماً من مصادر البروتين الحيواني لغذاء الإنسان. لذلك أجريت هذه الدراسة بهدف معرفة مدى تواجد ميكروبات السالمونيلا ، الكامبيلوباكتر جيجناى ، العنقودي الذهـبي ، الكلسـتريديوم بيرفرنجـنز في نوعين من ذبائح الحمام: زغاليل الحمام ، حمام الـبرج. تـم أخذ مسحات من الأسطح الخارجية وكذلك الأسطح الداخلية للذبائح كما أخذت الأكـباد والقوانص والقلوب وأجزاء من الأمعاء لذبائح نوعي الحمام محل الدراسة لفحصها بكـتريولوجيا. أظهـرت النتائج أنه في ذبائح زغاليل الحمام لم يكتشف تواجد السالمونيلا أو ميكـروب الكولسـتريديوم بيرفرنجنز بينما وجد الكامبيلوباكتر بنسبة ٨% ، العنقودي الذهبي بنسبة ١٦% في ذبائح حمام البرج وعزلت الميكروبات بنسب ١٢% ، ١٦%، ٨% لكل من السـالمونيلا تيفيموريوم ، العنقودي الذهبي ، الكامبيلوباكتر جيجناى على التوالي. كان الكبد أكـثر الأعضاء تلوثاً بالسالمونيلا (٨%) ، الكولستريديوم بيرفرنجنز (٤٨%) في ذبائح حمام الـبرج بيـنما عـزل هذيـن الميكروبين بنسبة ٤% ، ٢٨% من أكباد زغاليل الحمام على التوالي. أوضحت النتائج أن الأعضاء والأمعاء تشكل مصدراً خطيراً لوجود هذه الميكروبات محل الدراسة.

SUMMARY

Squabs and wooden pigeons carcases were removed from commercial processing lines immediately after defeathering and evisceration.The carcases as well as their organs; livers, hearts, gizzards and parts of intestines were examined for the presence of risk pathogens; *Salmonellae, Campylobacter jejuni, Staph. aureus* and *Clostridium perfringens*. From the examined squab carcases, *S. typhimurium* and *C.*

perfringens could not be detected, while *C. jejuni* was positive in 8 % and *S. aureus* in 16%. Wooden pigeon carcases were contaminated with S. *typhimurium* (12%), *S. aureus* (16%) and *C. jejuni* (8%). For organs, livers was highly contaminated with *Salmonella* (8%), *C. perfringens* (48%) in case of wooden pigeons carcases while in squab carcases was 4% and 28%, respectively . The organs and the intestine were implicated as a major source for the presence of such pathogens.

Key words: *Food poisoning pathogens, squabs, wooden pigeons.*

INTRODUCTION

Pigeons carcases during processing can be contaminated with a variety of pathogenic bacteria. The most important pathogens are *salmonellae, campylobacter jejuni, Staph. aureus* and *Clostridium perfringens*, which are undesirable and unavoidable . *Salmonella typhimurium* could be isolated from pigeons by many investigators (Parnas, 1980; Wuthe and Wuthe, 1980, Rosef, 1981 and Polydorou 1983). In domestic squabs examined by Khalfalla and Abd Allah (1995), 2.5% of the examined samples were contaminated by *Salmonella typhimurium*. In feral pigeons, *Salmonella typhimurium* was isolated by Wilson (1960); Farrant et al. (1964), Wilson and MacDonald (1967), Goodchild and Tucker (1968), Shahata et al. (1990) and Woerlen (1990).

Campylobacter jejuni was detected in different percentages pigeons in all over the world by many researchers. In wooden pigeons, Farrant et al. (1983); De Boer et al. (1983); Hartog et al. (1983), Woerlen (1990) and Pitkala et al. (1992) could isolate the organism from the examined pigeons. The pathogen could be isolated from the intestinal content of wooden pigeons by Rosef (1981), De Boer and Stigter (1984) and Woerlen (1990). However, *C. jejuni* was detected in 6% of squab gizzards and 10 squab livers (Khalfalla, 1990). The organism failed to be detected in hearts and livers of feral pigeons (Woerlen, 1990) and in hearts and spleens of squabs (Khalafala, 1990).

Staphylococci are present on the skin of carcasses of pigeons, when they leave the slaughter plant . The commonest source of infection is the human food handler during further processing. Staphylococci can be found in the nose and on the hands of many humans and it is difficult to remove all of them from hand by ordinary washing (Bremner, 1977).

C. perfringens is ubiquitous and although large number occurs in the intestinal tract of birds, this is not an organism that can removed from there by any of the usual control measures (Bremner, 1977).

Little information on the prevalence of the risk pathogens in pigeon carcases in Egypt. The objectives of the research reported herein were: 1. To study the predominance of *salmonella*, C. *jejuni*, *S. aureus* and *C. perfringens* in pigeon carcases. 2. The role of pigeon organs (livers, gizzards and hearts) and intestines in spreading of these pathogens.

MATERIALS and METHODS

Three-hundreds samples were collected from fifty random domestic squabs and wooden pigeons carcases. The samples were outer surface swabs, inner surface swabs, livers, hearts, gizzards and parts of intestine (25 each). Each sample was taken separately in a sterile plastic bag. The cotton-tip swab was put in sterile peptone water. Next, the samples were transferred to the laboratory within 30 min. where, they were examined for the presence of the following pathogens; *salmonellae*, *C. jejuni*, *S. aureus* and *C. perfringens*.

1. presence of Salmonella:

This was determined by preenriching of the tested sample in buffered peptone water (24 h, 37°C). Next, 0.1 ml was transferred to 10 ml of tetrathionate broth (TT) and incubated for 24 h at 42°C. Loopfuls from TT were streaked onto SS and XLD agar and incubated for 24 h at 37°C. Isolates were biochemically and serologically confirmed according the method cited in APHA (1992).

2. Presence of *C. jejuni*:

This was done by inoculating the samples in nutrient broth supplemented by growth and selective supplement (Preston media, Oxoid) without blood in a jar under microaerophilic atmosphere. After incubation for 24h and 48h., campylobacter blood free selective medium (Oxoid) was inoculated by streaking method. The plates were searched for typical colonies (small gray drop like or gray slimy colonies) after 48 h of incubation. Typical colonies were confirmed using microscopic analyses, catalase test, oxidase test and sensitivity to cepholtine and nalidixic acid (Uyttendaele and Debevere 1996).

3. Isolation of *Staph. aureus*

Enrichment of the samples were done in sodium chloride broth (10%) at 37°C for 24 h. Three loopful after icubation were streaked on Baird

Parker agar plates (Baird Parker, 1962) and then incubated at 37°C for 24h. The suspected colonies were confirmed by morphological characters, microscopic examination and coagulase test (Finegold and Martin 1982).

4. Isolation of *C. perfringens*:

The samples were incubated in lactose sulphite broth (Beernes et al., 1986) for 48 h at 42°C. Loopfuls from the incubation positive tubes (black precipitation and gas in durham s tube) were streaked onto SPS agar plates and were incubated anaerobically at 42°C for 48 h. The grown colonies confirmed by CAMP test.

RESULTS and DISCUSSION

From the results achieved in Table 2, it is evidently that Salmonella typhimiurium could isolated from liver, gizzard and intestine of squabs with 4%, 4% and 8%, respectively. The organism failed to be detected in inner swabs and outer swabs of squabs (Table 1) and in hearts (Table 2). Comparing this data with that obtained in wooden pigeon carcases, *S. typhimurium* was found in 12% and 12% in outer swabs and inner swabs respectively (Table 3) and in 8, 4 and 16% in liver, heart, and intestine, respectively (Table 4). In this respect, Parnas (1980) could isolated *S. typhimurium* from domestic and wild living pigeons. Nearly similar results were obtained by Khalafalla and Abd Allah (1995). They found that 2.5% of the examined squabs contained *S. typhimuruim*. In a cloacal specimens of pigeons examined by Casanovas et al. (1995), salmonella spp. could be isolated from 6 samples (1.5%).

The detection of salmonellae in pigeon carcases may be attributed to hygienic measures adopted in the hatchery, breeding and rearing methods which help in the spread of infection. Once infected carcase reaches the plant, it is difficult to have effective control measures. Salmonella may be transmitted from infected to non infected carcases.

C. jejuni was more frequently isolated from intestine than liver, gizzard (Table 2) and inner swabs of squabs (Table 1). Each constituting incidence of 40%, 20% , 4% and 8% respectively. The fact that *C. jejuni* is often present at a high concentration in fecal materials which were released during defeathering and evisceration with subsequent contamination of the carcases and edible organs (Kapperud and Rosef,

1983, Stern et al., 1997). No isolates of *C. jejuni* could be found in hearts and the outer swabs of squabs. This finding was differerent from that recorded by Khalfalla, 1990, who found 10% of squab livers and 6% of squab gizzards contained *C. jejuni*. The organism failed to be detected in outer swabs of the squab carcases (Table 1) and in the hearts (Table 2) . This result comply with that recorded by Khalafala(1990) who found that the squab hearts are free from *C. jejuni*. For wooden pigeons (Table 4), *C. jejuni* was present in higher incidence in the intestine (32%) and lower in the heart (4%). Casanovas et al.,(1995) reported 26.2% *C. jejuni* in cloacal specimens of pigeons in Barcelona.

Consumption of poultry meat has been identified as a risk factor for human campylobacteriosis in several developed countries (Schorr et al., 1994). A part from consumption of raw or under cooked chicken meat (Deming et al., 1987), consumption of chicken liver (Hopkins et al., 1984) have been associated with campylobacter enteritis.

Staph. aureus was detected in outer swabs and inner swabs of squab carcases in 16% and 16% respectively (Table 1) and in hearts, livers, gizzards and intestines of squab in 20, 28, 16 and 24%, respectively (Table 2). The higher incidence was in liver samples while the lower was in inner and outer swabs. On the other hand, the organism was present in 8% (hearts), 8 % (livers), 12% (gizzards), 8% (intestines) as present in Table 4, while 12% (inner swabs) and 16% (outer swabs) of wood pigeon carcases were positive (Table 3). Higher prevalence (16%) was in outer swabs and lower incidence was in liver , heart and intestine (each 8%).

Staphylococci account for the large majority of food poisoning outbreaks. Poultry meat is frequently and unavoidable contaminated during slaughter and processing as live birds carry staphylococci in bruised tissues, infected lesions, nasal sites, skin surfaces and arthritic joints (Bremner, 1977). The natural reservoirs of staphylococci are man and warm blooded animals. *S. aureus* is found in both healthy people and diseased people (Varnam and Evans, 1991). It may present at a number of sites of human bodies including the skin, nose, throat and hair and may be even present in stools (Holmberg and Blacke, 1984) and consequently they contaminate carcases during processing.

From the findings presented in Table 2, it is evident that *C. perfringens* was present in the livers and intestine of the squabs in 28% and 12%, respectively. The pathogens were the etiology of necrotic enteritis and liver lesions in broiler chickens. The percentage of birds

condemned because of liver lesions was 2.9 (Schneitz et al. 1997). The organism failed to be detected in hearts, gizzards, inner and outer swabs of the examined squabs. In wooden pigeon carcases, C. perfringens was found in 8% of innner swabs (Table 3), and in livers, hearts, gizzards and intestines with levels of 12, 4,16 and 32%, respectively (Table 4). This result comply with that obtained by Fukata et al., 1986.

C. perfringens was isolated infrequently and in low numbers from the intestinal tract of broilers (Craven, 1997). The organism is involved in poultry disease and causes food poisoning in humans with poultry often the vehicle of infection (Labbe, 1991).

From this study, pigeon carcases were found to be contaminated with some of the pathogens. The majority of the microbial pathogens are part of gastrointestinal flora of pigeons. These organisms can also be associated with skin and feathers. Many of the bacterial pathogens can also be carried by plant employees (Goodfellow, 1992). The sources of cross contamination may be from, 1. One carcase touches another one 2. One carcase touches a piece of evisceration equipment and another one touches the same location, 3. During the drawing process, the intestine are torn and the evisceration spoon become contaminated, thus contaminating other carcases, 4. Plant personnel who present viscera for inspection can spread contamination from one carcase to another(Surkiewicz et al., 1969).

In conclusions, pigeons naturally can carry a variety of bacteria. The pathogens present either on or in live pigeon result in transfer of these pathogens to the retail product. The organs constitute a risk hazard for consumers. Wooden pigeon carcases and their organs carry more pathogens than in case of squabs and this may be due to the nature of the breeding, feeding and flying.

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Table 1: Prevalence of food poisoning pathogens in squab carcases.*

Samples	*Salmonella*		*S.aureus*		*C.perfringens*		*C.jejuni*	
	No	%	No	%	No	%	No	%
Ou.surface	0	0	4	16	0	0	0	0
Inn.surface	0	0	4	16	0	0	2	8
Total	0		8		0		2	

*N=25 for each sample

Table 2: Prevalence of food poisoning pathogens in squab organs.*

Samples	*Salmonella*		*S.aureus*		*C.perfringens*		*C.jejuni*	
	No	%	No	%	No	%	No	%
Livers	1	4	7	28	7	28	5	12
Hearts	0	0	5	20	0	0	0	4
Gizzards	1	4	4	16	0	0	2	8
Intestines	2	8	6	24	3	12	10	40
Total	4		22		10		17	

*N=25 for each sample type

Table 3: Prevalence of food poisoning pathogens in wooden pigeon carcases.*

Sample	*Salmonella*		*S.aureus*		*C.perfringens*		*C.jejuni*	
	No	%	No	%	No	%	No	%
Ou.surface	3	12	4	16	0	0	0	0
Inn.surface	3	12	3	12	0	0	2	8
Total	6		7		0		2	

*N=25 for each sample.

Table 4: Prevalence of food poisoning pathogens in wooden pigeon organs.*

Samples	*Salmonella*		*S.aureus*		*C.perfringens*		*C.jejuni*	
	No	%	No	%	No	%	No	%
Livers	2	8	2	8	12	48	3	12
Hearts	1	4	2	8	4	16	1	4
Gizzards	0	0	3	12	6	24	4	16
Intestines	4	16	2	8	3	12	8	32
Total	7		9		25		16	

* N=25 for each sample type