

معهد بحوث صحة الحيوان - بالدقي .  
مدير المعهد : أ. د. د. / عبد الحي الرفاعي .

### نسبة التلوث بالسلمونيلا وأنواعها المصلية في لحوم الدواجن المجمدة المستوردة

السيد الصاوي ، طلعت شومان ، اسماعيل عيسى ، ناجي واصف ، حسنى السواح

أثبتت الفحوص البكتريولوجية للاجزاء المختلفة من لحوم الدواجن  
المجمدة المستوردة عن تواجد السلمونيلا بنسبة ٩,٥٪ من الفراخ المستوردة  
و ٣٤,١٪ في الرومي مع عزل وتصنيف ٢٢ نوع مصلية .

حيث لوحظ أن نسبة السلمونيلا في هذا النوع من اللحوم متفاوتة  
حسب القطر المصدر ، حيث كانت أعلى نسبة في الدواجن الواردة من فرنسا  
( ١٣,٤٪ ) وإسرائيل ( ١١,٢٥٪ ) وأقلها تلك الواردة من البرازيل  
( ٣,٤٪ ) . وقد تبين أن النوع س. تيفي موريم هو أكثر الأنواع وجودا  
وإنشارا في كل المصادر بالإضافة إلى التنويه بأنه قد تم عزل ( ٧ )  
أصناف جديدة من السلمونيلا لم يسبق عزلها من الدواجن وخاصة  
الفراخ في مصر .

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**INCIDENCE OF SALMONELLAE AND ITS SEROTYPES CONTAMINATED  
THE FROZEN IMPORTED POULTRY MEATS**  
(With 3 Tables)

By  
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**SUMMARY**

Bacteriological examination of 1405 imported frozen chicken and turkey meat samples revealed isolation of salmonella in rates of 9.05% in chicken-meats and 3.4% from turkey meats with the recovery of 104 salmonella isolates, which were differentiated serologically into 22 serotypes.

The incidence of salmonella contamination differed according to the source of importation as follows: France (13.4%), Israel (11.25%), Denmark (9.7%), U.S.A. (6.8%), West-Germany (5%) and Brazil (3.47%).

From the 22 serotypes recovered from the imported frozen poultry meats, *S.typhimurium* was the peridominant type encountered in all countries of importation. Further-more 7 serotypes were recorded in Egypt for the first time from poultry.

**INTRODUCTION**

The authorities of Arab Republic of Egypt (ARE) concerned importation of poultry meats on a large scale was practiced during the last few years to cover the increasing demands of animal proteins. The hygienic status of such imported food stuffs is governed by law to ensure their fitness for consumption before distribution.

In poultry, salmonella has been recognised as a significant disease problem. Council report (1966) showed that 17.648 salmonella cases at a period of three years (1963-1965) were from turkeys and chickens. Studies of fresh poultry meats and retails markets revealed that 42% of samples were contaminated with salmonella.

In the limited compass of this paper, it is hoped that it may assist to clarify the rate of salmonella contamination of imported frozen poultry meats from different sources with determination of serotypes associated and their public health significance.

**MATERIALS and METHODS**

A total of 1405 samples from freezed chicken and turkey meats imported from different countries were collected at random and bacteriologically examined for salmonella contamination. The distribution, types and sources of samples are indicated in table (1). Their number and

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parts of meats were as follows, imported whole frozen chickens (622), chicken quarters (261), chicken livers (211), turkey livers (170) and turkey quarters (241). These samples submitted for routine examination at the Animal Health Research Institute, Dokki, Giza during the period 1980-1982.

For culture technique standard sterile cotton swabs were rubbed several times on the the surfaces and abdominal cavities of intact carcasses. In addition, about 25 g of tissue were obtained aspectically from the pectoral, thigh muscles and also from the livers. The samples were cut in small pieces and placed in 100 ml peptone water for 24 hr. at 37°C then 10 ml from it were inoculated into 100 ml selenite F broth. After incubation at 34°C for 18 hr. a loopfull of enrichment media was streaked on MacConkey and S.S. agar media. Typical colonies, that appeared on the plates after 24 hr. incubation at 37°C, were picked and submitted for screening biochemical reaction and serotyping with polyvalent and monovalent "O" and "H" antisera "Difco" using the criteria of EDWARDS and EWING, (1972).

## RESULTS

Generally, it was found that the salmonella contamination rate of 994 frozen samples from chicken meats was 9.05%, while it was relatively low in frozen turkeys meats (3.4%). Also the results of bacteriological examination showed that the contamination of surface and peritoneal cavities of the whole frozen chicken carcasses was high (10.45%) with the recovery of 65 isolates, in comparison to the lower contamination rate in muscles of quarters (6.83%) and the liver samples of chickens (6.64%). On the other hand, the contamination of the frozen turkeys quarters was relatively low (5.81%) with the recovery of 14 isolates, while the liver samples from turkeys were completely free (Table 1).

Regarding the countries of importation, it was found that the highest contamination rate was recorded in both chicken and turkeys from France (17.14% and 10.63% respectively). Moreover, although most of the frozen poultry meats were derived from U.S.A. (929 samples examined), the contamination rates were relatively low in chicken (9.48%) and turkeys (2.58%) in comparison to that imported from France, Israel and Denmark (Table 2). On the contrary, frozen chickens imported from Brazil and West Germany showed the lowest salmonella rates of 3.47% and 8.00% respectively. Elsewhere, the frozen turkeys quarters from West-Germany were completely free from salmonella in comparison to that imported from France and U.S.A (Table 2). The details of salmonella rates according to sources of importation, the serotypes recovered and their distribution are indicated briefly in tables 2 and 3.

The 104 salmonella isolates were grouped serologically into 8 groups with the identification of 22 serotypes where 90 from chickens and 14 from turkey meats (Table 3). Also it was found that 16 serotypes were recovered from U.S.A and were represented by 66 isolates from the total strains, while *S.typhimurium* was the only serotype recovered from West-Germany. Moreover, the most prevalent serotype in chicken and turkey meats was *S.typhimurium* (47 isolates) which was recovered from all importation sources specially U.S.A. (30 isolates). The other 57 serotypes were distributed among the 8 groups in a range from one isolate to 7 isolates as in case of *S.newport* (Table 3).

It is interesting to mention that 3 serotypes *S.reading*, *S.saint paul* and *S.meunchen* (2 isolates each) were the only types associated in turkey meats otherwise *S.typhimurium*. Consequently, the following 7 serotypes were recovered from chicken-meats in Egypt for the first time, *S.brandenburg*, *S.colindale*, *S.kentucky*, *S.sofia*, *S.farcham*, *S.taksony* and *S.carrau* where the first 3 of them were introduced from U.S.A. *S.sofia* were imported from France,

S.farcham and S.taksony from Denmark, while the two isolates of S.carrau were imported from France and Isreal (Table 3).

### DISCUSSION

The salmonella contamination rate in frozen imported chicken and turkey meats were in general (9.05%) and (3.41%) respectively (Table 1) with the identification of 22 serotypes from the 104 isolates. The highest rates were noticed in chicken-meats imported from France (17.14%) and Isreal (11.25%), while the lowest rates were obtained from Brazil (3.47%) and West Germany (5.0%) as in: Table (2). PATTERSON (1972) recorded that the eviscerated chicken carcasses were positive to salmonella in a rate of (5.7%) with the recovery of five different serotypes. Moreover, he stated that the reduction of infection of poultry carcasses by salmonella must take place at the farm and hatchery since control measures in the processing plants were shown to be insufficient to render carcasses completely free from infection. SAFWAT *et al* (1984) used indirect fluorescent antibody technique (IFAT) for diagnosis of salmonella in imported frozen chicken meat in comparison to cultivation technique. The incidence of (IFAT) showed (15%) positive, while the isolation rate did not exceed (9%). They concluded that the (IFAT) using diluted (1:10) salmonella polyvalent serotype recovered in an incidence of (45.1%) of identified isolates and was the only type recovered from all sources of importation. Council report AVMA (1966) claimed that S.typhi-murium was considered the most prevalent cause of meat borne salmonellosis in man. Besides, S.typh-murium displays the capacity to pass from animal to man and back again by various routes. LABIE (1980) recorded that salmonella food-poisoning come mainly from meat and meat products, where the most frequent salmonella serotype encountered in these outbreaks was S.typhi-murium (47.8% of strains identified). Recently, KAMPELMACHER (1983) stated that in poultry the percentage of clinical healthy carriers to salmonella in poultry may be very high in poultry in many countries and food from them were the most frequent source of human infections.

Moreover, S.typhi-murium was the commonest serotype infecting man and animals in many countries. Other serotypes were also recorded in this work from chicken meats (19 serotypes represented by 51 isolates) and turkey-meats (3 serotypes represented by 6 isolates), where S.meunchen was the only type isolated from chicken and turkey meats otherwise S.typhinuriu (Table 3). This agreed with SHOUMAN and MOUSTAFA (1972-1974) who isolated S.typhi-murium and S.meunchen from outbreaks in young chicks (32.7% and 18.6% respectively) and in turkey poults (27% and 48.5%). Moreover S.saint paul and S.reading were encountered in turkey meats. Both serotypes did not be recorded in Egypt from turkeys but had been isolated from hen eggs by EL-AGROUDI and AWAD (1966) and outbreak in young chicks by SHOUMAN and MOUSTAFA (1972).

Concerning the 7 newly recorded serotypes from the imported frozen chicken in Egypt, S.sofia and S.carrau were already isolated in Egypt from buffalo calves by FARID (1976) and ABOU-ZEID (1979) respectively.

On the other hand, although S.taksony, S.brandenburg and S.kentucky did not recorded previously in Egypt, they were recovered from poultry and food stuffs (HÖFSTAD *et al.* 1978, LABIE, 1980 and MALLINSON *et al.*, 1983).

REFAIE (1970) and LABIE (1980) recommended under the WHO Organisation Committee on the prevention and control of salmonella that results must be negative for at least 4 from 5 samples i.e the preferable limits (20%) of standard samples (25 gm). In Egypt, the public health authorities introduced law No. 298 which restricted the rate of salmonella contamination in imported foods for human consumption to 10% in red meat and 20% in white meat.

KAMPELMACHER (1983) concluded that the appearance of the disease in man is closely related to eating habits and modes of preparation. Therefore, it can be concluded that the food habits in Egypt and preparation of boiled chicks for longtime plays an important role as the cause of low incidence of salmonella food poisoning in the Egyptian consumers in spite of the improper food hygiene, while in many parts of the world meat is consumed raw under cooked.

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Table (1)  
Incidence of salmonella contamination in different parts of frozen chickens and turkeys.

Frozen exam. Parts	CHICKENS			TURKEYS		
	Samples No.	Positive No.	%	Samples No.	Positive No.	%
Whole body	622	65	10.45	-	-	-
Quarter	161	11	6.83	241	14	5.81
Liver	211	14	6.64	170	-	-
Total	994	90	9.05	411	14	3.41

Table (2)  
Frequency of salmonella contamination in frozen poultry meat according to source of importation

Sources of importation	CHICKENS			TURKEYS		
	Samples No	Positives No	%	Samples No	Positives No	%
France	35	6	17.14	47	5	10.63
Isreal	80	9	11.25	-	-	-
Denmark	144	14	9.72	-	-	-
U.S.A	580	55	9.48	349	9	2.58
West Germany	40	2	5.00	15	-	-
Brazil	115	4	3.47	-	-	-
Total	994	90	9.05	411	14	3.41

The % were calculated according to samples examined from each country.

Table (3)  
Salmonella serotypes and its groups from frozen poultry  
meats in relation to importation sources

Salmonella groups and Serotypes	No. of the isolates from countries							Total		
	U.S.A.		Denmark		France		Israel		Brazil	W.G.
	Ch.	Tu.	Ch.	Tu.	Ch.	Tu.	Ch.		Ch.	Ch.
<b>GROUP B</b>										
<i>S. typhimurium</i>	25	5	4	2	3	4	2	2	47	
<i>S. chester</i>	5	-	-	-	-	-	-	-	5	
<i>S. heidelberg</i>	4	-	-	-	-	-	-	-	4	
<i>S. san diego</i>	-	-	2	1	-	-	-	-	3	
<i>S. agona</i>	2	-	-	-	-	-	-	-	2	
<i>S. saint paul</i>	-	-	-	-	2	-	-	-	2	
<i>S. reading</i>	-	2	-	-	-	-	-	-	2	
* <i>S. brandenburg</i>	1	-	-	-	-	-	-	-	1	
<b>GROUP C<sub>1</sub></b>										
<i>S. infantis</i>	5	-	-	-	-	-	-	-	5	
<i>S. ohio</i>	2	-	-	-	-	-	-	-	2	
<i>S. virchow</i>	2	-	-	-	-	-	-	-	2	
* <i>S. colindale</i>	1	-	-	-	-	-	-	-	1	
<b>GROUP C<sub>2</sub></b>										
<i>S. newnachen</i>	-	2	4	-	-	-	-	-	6	
<i>S. newport</i>	3	-	-	-	-	2	2	-	7	
<b>GROUP C<sub>3</sub></b>										
* <i>S. kentucky</i>	1	-	-	-	-	-	-	-	1	
<b>GROUP D</b>										
* <i>S. sofia</i>	-	-	-	2	-	-	-	-	2	
<b>GROUP E<sub>1</sub></b>										
<i>S. anatum</i>	2	-	-	-	-	2	-	-	2	
<i>S. london</i>	1	-	-	-	-	-	-	-	1	
<b>GROUP E<sub>4</sub></b>										
* <i>S. farchem</i>	-	-	2	-	-	-	-	-	2	
<i>S. senftenberg</i>	1	-	1	-	-	-	-	-	2	
* <i>S. talsony</i>	-	-	1	-	-	-	-	-	1	
<b>GROUP H</b>										
* <i>S. carrau</i>	-	-	-	1	-	1	-	-	2	
Total	55	9	14	6	5	9	4	2	104	

\* Serotypes recorded in Egypt from poultry meats for the first time.  
Ch. = chicken Tu. = Turkey.