

THE INCIDENCE OF SALMONELLA BACTERIA IN MEAT AND MEAT PRODUCTS DURING THE PERIOD 2009 - 2011 IN DOLJ COUNTY

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ABSTRACT

*During the period 2009-2011, 3971 meat samples and meat preparations collected both from agri-processing units and from alimentary cold stores and food marketing network were analysed within the Sanitary-Veterinary Laboratory of Dolj County, thus seeking to isolate and identify the serotypes of *Salmonella* spp. incriminated in triggering food poisoning.*

Of the total number of samples examined, six samples were positive representing 0.15 percent. The positive samples were composed of pork minced meat (3), a mixture of prepared beef and pork meat (cattle-swine) (1), refrigerated minced pork meat rolls (1) and turkey wings (1).

*All strains of *Salmonella* spp. isolated in the Sanitary-Veterinary Laboratory of Dolj County were submitted for serotyping of relevant isolates of *Salmonella* spp in the reference laboratories within the Institute for Diagnosis and Animal Health (IDSA) and the Institute of Hygiene and Public Veterinary Health (IISPV). Four strains belong to the *Salmonella Typhimurium* serotype, one strain belongs to *Salmonella Goldcoast* and one strain belongs to *Salmonella Hadar*. The dominant serovariant identified among tested isolates is *Salmonella Typhimurium* (66.33 %).*

*Of the four serovariants of isolated *Salmonella Typhimurium*, three serovariants presented the classical antigenic structure and one serovariant exhibited a different antigenic structure, lacking the 1,2 factors – initially denominated as *Salmonella Typhimurium-like*; it has been recently denominated as *Monophasic Salmonella Typhimurium*.*

Key words: *Salmonella spp., antigenic structure, food poisoning.*

INTRODUCTION

The *Salmonella* genus is a member of the family Enterobacteriaceae comprising over 2400 serotypes; and bacteria contained within the genus *Salmonella* have a worldwide proliferation therefore affecting the entire fauna, including the human being (4). Due to its high pathogenicity for human beings through contamination of animal products especially, it is of specific interest for food microbiology (2) Primary *Salmonella* infections determine high economic damages namely by seizing the products and by-

products derived from animals slaughtered (5). The spreading of *Salmonella* infections to human beings is increasing subsequent to handling of food products contaminated through raw materials or during their preparation, manipulation, storage and commercialization. The storage inside cold stores prevents the multiplication of *Salmonella* strains but this does not destroy them.

In most cases disorders in humans are a consequence of the consumption of potentially contaminated food resulted from the meat of animals slaughtered upon requirement which were carrying and spreading germs of the genus *Salmonella*, or the consumption of animal products which were sterilized insufficiently or preserved inadequately.

In addition, it must not be forgotten that food products could be contaminated by people carrying *Salmonella* or infected with *Salmonella* during the handling of food products as raw materials or finished products.

The key feature of food products contaminated with *Salmonella* is the fact that no organoleptic defects emerges which might draw the attention of the potential presence of germs, which means that the appearance, colour, consistency, smell and taste of food products will remain unchanged (1, 3).

The HACCP plan should include control measures for prevention, destruction or elimination of this bacteria and in order to avoid recontamination (1).

MATERIAL AND METHODS

Meat samples and meat preparations and products collected from slaughterhouses, processing units, cold stores and food marketing network have been analyzed.

The detection and identification of bacteria of the genus *Salmonella* was carried out according to the reference method SR EN ISO 6579/2003/AC/2009, but alternative methods (Vidas and Vitek methods) were also used; these methods offers the additional advantage of getting the result within a shorter period of time. However, in the event of a positive result obtained through these alternative methods confirmation by means of classical methods should also be carried out.

According to the reference method the detection of bacteria of the genus *Salmonella* requires four successive stages, namely: pre-enriching in non-selective liquid media; isolation and identification; confirmation.

The detection of *Salmonella* represents the determination of the presence or absence of *Salmonella* in a certain mass or product bulk when tests are carried out according to the classical method.

The pre-enriching is performed by means of buffered peptone water (225ml) which has been pre-warmed to room temperature and has been inoculated to the sample to be analysed (25g), then it is incubated at $37^{\circ}\text{C} \pm 1^{\circ}\text{C}$ for a period of $18\text{h} \pm 2\text{h}$.

The following have been used as liquid selective media: Rappaport media - Vassiliadis cu soia (bulion RVS) și bulionul Muller - Kauffmann tetratrationat/novobiocină (bulion MKTTn). These media are incubated at specific temperatures according to the working standard procedure, for a period of $24\text{h} \pm 3\text{h}$.

For the purpose of isolation and identification two solid growth media are inoculated: agar with xylose - lysine - deoxycholate (XLD) – the first selective medium and the second selective medium – any other solid growth medium complementary with the XLD agar and appropriate especially for the isolation of lactose positive *Salmonella* and the genus *Salmonella* Typhi and *Salmonella* Paratyphi (Istrati Meitert - IM or Edel and Kampelmaker - EK); the selective growth medium Edel and Kampelmaker is currently used in the Sanitary-Veterinary Laboratory of Dolj County. The XLD agar is being incubated at $37^{\circ}\text{C} \pm 1^{\circ}\text{C}$ and it is examined after a period of $24\text{h} \pm 3\text{h}$. The second selective agar is being incubated according to the manufacturer's regulations.

The typical colonies of *Salmonella* grown on XLD agar have a black spot in the middle and a transparent bright reddish area due to the change of the indicator colour.

The confirmation of the supposed *Salmonella* colonies is carried out by means of biochemical or serological tests using identification kits.

The recognition of *Salmonella* colonies is mainly an issue related to experience and their appearance may vary anyway, not only from serovar to serovar but also from a certain selective growth media batch to another selective growth media batch used.

RESULTS AND DISCUSSIONS

Throughout the survey period 3971 samples on different matrices were analyzed within Dolj Sanitary Veterinary and Food Safety Laboratory in order to detect bacteria of the genus *Salmonella* in meat and meat preparations and products.

Table1

Samples collected on different matrices during the period examined

MATRIX	Samples examined 2009	Samples examined 2010	Samples examined 2011
Bovine, sheep, caprine carcases	34	47	30
Pigs carcases	41	42	40
Poultry carcases	38	69	21
Fresh meat and comestible by-products	293	286	38
Minced meat and prepared meat derived from poultry, meant to be cooked	25	33	27
Minced meat and prepared meat derived from species other than poultry, meant to be eaten after being cooked	389	563	330
Processed chicken meat meant to be prepared (cooked)	56	40	35
Heat treated processed meat	500	434	560
Total	1376	1514	1081

Subsequent to the carrying out of analyses and data processing it results the fact that in 2009 two samples were found positive out of a total number of 1376 samples representing a 0.15 percentage of meat and meat preparations' samples. In 2010, two samples were found positive out of a total number of 1514 samples representing a 0.14 percentage; in 2011, two samples were found positive out of a total number of 1081 samples examined representing a 0.19 percentage.

Table2

Positive cases and percentage of positive samples reported to the total examined

Period Samples	2009	2010	2011
Examined	1376	1514	1081
Positive	2	2	2
% positive	0.15	0.14	0.19

The six positive confirmed samples derive from different matrices, namely: three samples are pork minced meat, one sample was collected from a mixture of prepared beef and pork meat (cattle-swine), one sample was collected from refrigerated minced pork meat rolls and one sample was collected from turkey wings.

It should be specified that *Salmonella* spp. strains, dated 2009, were isolated in the following assortments: mixture of prepared beef and pork meat (crude frozen product), sample collected from a cold store; the pork minced meat was taken from a supermarket. *Salmonella* group OC was isolated from the pork minced meat sample according to the reference method SR EN ISO 6579/AC/2006. This strain was confirmed at IDSA and IISPV in Bucharest as being a *Salmonella* Goldcoast strain. Subsequent to the carrying out of the product traceability it has been determined that the manufacturer that had supplied the pork minced meat to the supermarket had purchased the raw material from a swine farm endowed with its own slaughterhouses which had a past history with this type of *Salmonella* (*S. Goldcoast*) detected in its own head.

All strains of *Salmonella* spp. isolated in LSVSA Craiova were submitted for serotyping in the reference laboratories within IDSA and IISPV.

Table 3
Correspondence between positive samples and matrices examined

Period Matrix	2009		2010		2011	
	Samples examined	Positive samples	Samples examined	Positiv e sample s	Samples examined	Positive samples
Fresh meat	293	-	286	1	38	-
Minced meat and prepared meat	389	2	563	1	330	2

Out of the six isolated strains, four strains belong to the *Salmonella* Typhimurium serotype, one strain belongs to *Salmonella* Goldcoast and one strain belongs to *Salmonella* Hadar.

The dominant serovariant identified among tested isolates is *Salmonella* Typhimurium representing 66.33 percentage of the total number of isolated germs of *Salmonella* species.

Among the serovariants of isolated *Salmonella* Typhimurium, three serovariants presented the classical antigenic structure and one serovariant

exhibited a different antigenic structure, lacking the 1,2 factors – initially denominated as *Salmonella* Typhimurium-like; it has been recently denominated as Monophasic *Salmonella* Typhimurium.

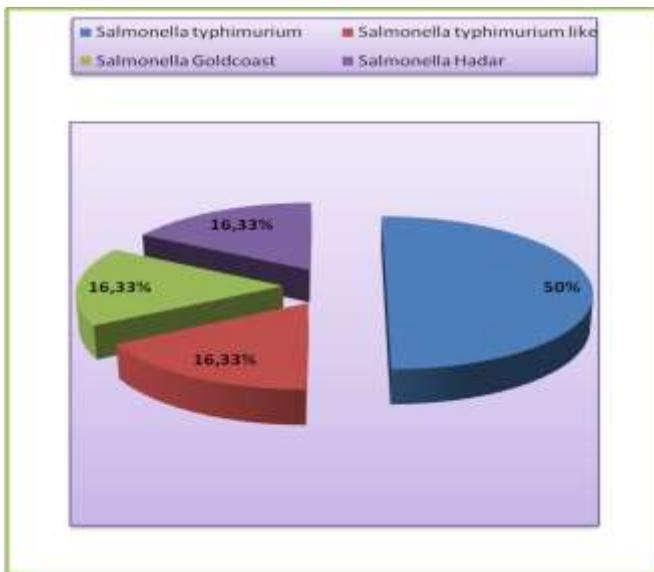


Chart 1- the percentage of the four genii isolated from the total number of samples examined

CONCLUSIONS

Bacteria of the genus *Salmonella* identified, isolated and confirmed throughout the period examined were six; they did not exceed the said 1 percentage of the samples examined each year.

Subsequent to the carrying out of this study, it can be concluded that the majority serovariants isolated were *Salmonella* typhimurium.

The highest percentage of germs of the genus *Salmonella* was detected in meat half-cooked products: minced meat, prepared meat and minced meat rolls paste.

The isolation of germs of the genus *Salmonella* spp. in meat and meat products is mainly the consequence of intense processing and handling labours carried out by people as the highest percentage was isolated from sorts enduring multiple operations.

The epidemiologic surveys performed led to the conclusion that contamination with *Salmonella* inside the slaughterhouses cannot be neglected when slaughtering animals carrying and spreading bacteria of the

genus *Salmonella* and in cases when principles regarding products handling, instruments sterilisation are disregarded as well as in cases of non-compliance with the principle of the two knives.

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