

STUDY OF FREQUENCY OF SALMONELLA STRAINS ISOLATED FROM MEAT, MEAT PRODUCTS AND ORGANS

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Summary

The aim of this study was to isolate and to identify the *Salmonella* serovars from meat, organs and meat semiproducts. From 564 analyzed samples 124 strains were isolated and were bordered in four serogroups (B, C, E and G). After the serologic identification of 31 strains selected from each serogroup, there have been identified the following serovars:

- serogroup B: *Salmonella derby*, *Salmonella saint paul*, *Salmonella typhimurium*;
- serogroup C: *Salmonella infantis*, *Salmonella virchow*, *Salmonella manchester*;
- serogroup E: *Salmonella norwich*, *Salmonella give*;
- serogroup G: *Salmonella kedougou*

Key words: salmonella meat, meat products

The salmonellas belong to the bacterial group that produce zoonoses, the main contamination source being represented by the animal origin food. Thus, at The Fifth Global Congress of Food Poisoning held in Berlin in June 2004, it was underline the importance of the germs belonging to *Salmonella* genus in the outbreak of food poisoning. Also, it was mentioned the rising incidence of salmonella infections with more rare serovars (1).

Numerous researches reveal that the main contamination source with salmonellas is represented by the pork meat (2, 3, 5).

Materials and methods

The research was conducted on 564 samples (meat, organs and meat semiproducts) collected from processing units from Timis County (table 1).

Table 1

Samples provenance

No.	Product	No. of analyzed samples
1.	Mincemeat	190
2.	Pork liver	62
3.	Fresh sausages	63
4.	Pulp meat	103
5.	Refrigerated pork meat	146
TOTAL		564

The samples were analyzed using the methodology described in SR EN ISO 6579/2003, which imply the following work stages:

- the pre-enrichment stage: peptone buffered water, incubation at 37°C, for 18 ± 2 hours;
- the enrichment stage: *Rappaport Vassiliadis* broth media with soya (RVS) incubated at 41.5°C ± 1°C, for 24 hours, and *Müller – Kauffmann* tetratonat – novobiocine broth (TKTT), incubated at 37°C ± 1°C, for 24 hours;
- isolation and identification of typical colonies stage, by inoculation on two solid media (XLD agar and *Rambach* agar), incubated at 37°C, for 24 ± 3 hours;
- the biochemical confirmation stage, by inoculation on complex media, for revealing the specific metabolic activity;
- the serologic confirmation stage, by rapid agglutination tests. We mention that a number of 31 strains were identified (typified) by The Medical Microbiology National Expertise Centre in Bucharest.

Results and discussions

From 564 analyzed samples, 124 strains (21,98%) belonging to *Salmonella* genus were isolated and were bordered in four serologic groups (table 2).

Table 2

Frequency of *Salmonella* strains

No of samples	Isolated strains		From which		
	No.	%	Serogroup	No.	%
564	124	21,98	B	68	54.84
			C	16	12.90
			E	24	19.36
			G	16	12.90

The obtained data reveal a high incidence of strains belonging to B serogroup (54.84%), there were also identified much rare strains belonging to E and G groups, but with different frequencies, according to the nature of samples (table 3). Thereby, the highest frequency of *Salmonella* strains was recorded in samples derived from refrigerated meat (35.62%) and fresh sausages (22.22%).

Table 3

Strains assignment, according to serogroup

No.	Sample	No. of samples	Isolated strains		Serogroup		
			No.	%	Type	No.	%
1.	Mincemeat	190	37	19.47	B	31	83.78
					C ₁	6	16.22
2.	Pork liver	62	2	3.22	C ₁	2	100
3.	Fresh sausages	63	14	22.22	B	4	28.57
					C ₂	7	50.00
					E	3	21.43

4.	Pulp meat	103	19	18.45	B	9	47.38
					C ₁	5	26.31
					E ₁	5	26.31
5.	Refrigerated meat	146	52	35.62	B	21	40.38
					E	17	32.69
					G	14	26.93

The obtained data reveal that in mincemeat samples prevailed strains from B and C serogroups, while in refrigerated meat, beside strains from B serogroup, there have been frequently isolated strains from G and E serogroups.

From 124 isolated strains, 31 strains selected from the known serogroups were forwarded for typify process to The Medical Microbiology National Expertise Centre in Bucharest.

The obtained data emphasized a high incidence of serovars belonging to B serogroup (51.62%), with the prevalence of *Salmonella derby* strains and to E serogroup (19.35%), represented by *Salmonella give* (table 4).

Table 4

The frequency of identified serovars

Strains no.	Serogroup	No.	%	From which		
				Serovar	No.	%
31	B	16	51.62	<i>S. derby</i>	14	85.72
				<i>S. saint paul</i>	1	7.14
				<i>S. typhimurium</i>	1	7.14
	C	5	16.13	<i>S. infantis</i>	3	75.00
				<i>S. virchow</i>	1	12.50
				<i>S. manchester</i>	1	12.50
	E	6	19.35	<i>S. norwich</i>	1	20.00
				<i>S. give</i>	5	80.00
	G	4	12.90	<i>S. kedougou</i>	4	100.00

Although the identified serovars from C and G serologic groups had a smaller weight, these strains are more and more frequent involved in the detaching of some food poisoning. Thus, *Weinberger* and co. (6) state that the incidence of *S. virchow* serovar in the generation of some food poisoning rise from 7 to 9,1%, also, *Emberland* and co. (1) point out food poisonings produced by *S. kedougou* serovar. Likewise, it has been establish that the identified serovars presented a dissimilar repartition, according to the nature of the analyzed sample (table 5).

Thus, *S. derby* serovar presents a higher incidence, in comparison with other identified serovars (45.16%), but it has been stated that the majority of serovars were isolated from pork meat, this fact confirming the pork meat as the main contamination source with *Salmonella* strains. The presence of *S. derby*, *S. give* and *S. kedougou* serovars with a high percent in pork meat was pointed out by numerous authors (2, 3, 5).

Table 5

The serovars incidence, according to sample nature

Serovar	Sample	No. of typified strains	Total	
			No.	%
S. derby	Mincemeat	4	14	45.16
	Fresh sausages	3		
	Pulp meat	4		
	Refrigerated meat	3		
S. infantis	Mincemeat	1	3	9.67
	Pork liver	1		
	Pulp meat	1		
S. manchester	Fresh sausages	1	1	3.23
S. saint paul	Fresh sausages	1	1	3.23
S. virchow	Fresh sausages	1	1	3.23
S. norwich	Fresh sausages	1	1	3.23
S. give	Pulp meat	1	5	16.12
	Refrigerated meat	4		
S. kedougou	Refrigerated meat	4	4	12.90
S. typhimurium	Mincemeat	1	1	3.23

Conclusions

The incidence of *Salmonella* strains in analyzed samples was 21.98%, with the mention that serogroups B and E were prevalent (54.84%, respectively 19.36%).

The high frequency of strains isolated from refrigerated meat (35,62%) reveal that this meat represents the main source of contamination for seasoned meat, which had not undergo any thermal treatment.

Among 31 identified *Salmonella* strains, 45.16% were bordered in *S. derby* serovar.

The presence of some strains as *S. norwich*, *S. give*, *S. manchester*, *S. virchow*, *S. kedougou* and *S. saint paul* denote the spreading of some less frequent serovars.

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