Salmonella prevalence in foods from animal origin in Belgium

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Introduction

- *Salmonella* is among the most important meat pathogen worldwide. The prevalence and the level of contamination are essential for an efficient risk assessment program but all the different serovars have not the same virulence potentiality. In 1998, the Belgian zoonosis surveillance program has assessed the contamination with *Salmonella* in a panel of meat.

Material and Methods

- The surveillance plan was designed to detect a contamination rate of 2% in the sample population, with a probability of 95%.
- Several matrixes of pork and poultry were sampled and all samples were investigated two times (sample itself and a dilution of it, see Table 1)
- The analytical method used was a preenrichment in buffered peptone water (18h, 37°C), enrichment on Diassalm plate (24h, 42°C), isolation on xylose-lysine-desoxycholate agar (24h, 37°C), followed by biochemical characterisations (Api 20E).
- Isolates were then serotyped and tested for antimicrobial resistance by MIC method, some of them (*S.* Typhimurium, *S.* Enteritidis, *S.* Hadar and *S.* Virchow) were also lysotyped.

Table 1: Matrixes and quantities tested.

		Sample	25-fold dilution
Porks	Carcasses (skin)	554 cm^2	23 cm^2
	Liver	646 cm^2	27 cm^2
	Retail cuts	25g	1g
	Minced meat	25g	1g
Broilers	Carcasses	25g	1g
	Liver	25g	1g
	Boneless breast	25g	1g
Layers	Carcasses (skin)	25g	1g
Turkeys	Carcasses (skin)	25g	1g

Results and discussion

Salmonella is frequently isolated from pork and poultry even in a little quantity of matrix (Figure 1 and 2).
In pork, *S.* Typhimurium (with 17,5% of DT104, Table 2) and S. Derby represents more than the half of the isolates (Figure 3). In Layers (Figure 4), *S.* Enteritidis (with 49,2% of PT4, Table 2) is isolated in at least 50% of the cases. In broilers (Figure 5), S. Hadar appears as the major serotype just before *S.* Typhimurium. All isolates of turkeys belonged to *S.* Enteritidis (6 strains).

As shown in Table 2-4, the results of serotyping, lysotyping and resistance to antimicrobials are similar to those obtained in animals.

Table 2: Results of lysotyping for *S.*Typhimurium and *S.* Enteritidis

S. Typhimurium			*S.* Enteritidis			
	Pigs	Broilers		Broilers	Layers	Turkeys
n=	63	22	n=	36	130	6
1		18,2%	1	5,3%	11,5%	83,3%
3	1,6%		4-like	72,2%	49,2%	16,7%
4	1,6%		4a		0,8%	
12	7,9%		5		2,3%	
12- like	3,2%		6a-like	2,8%	3,8%	
17	1,6%		6a		3,8%	
40	1,6%		7-like		0,8%	
66		4,5%	7		0,8%	
104	17,5%	40,9%	8-like	11,1%	2,3%	
104-like	1,6%		12		9,2%	
119	1,6%		20	2,8%		
120		22,7%	21-like	2,8%	10,8%	
120-like	7,9%		21		3,1%	
186	1,6%		RDNC-z		2,3%	
186-like	1,6%		NT		2,3%	
Add	19,1%					
RDNC	19,1%					
NT		13,6%				

Figure 1: Prevalence of *Salmonella* in pork

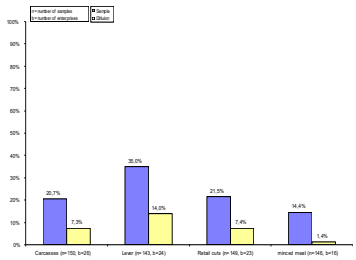

Figure 2: Prevalence of *Salmonella* in poultry

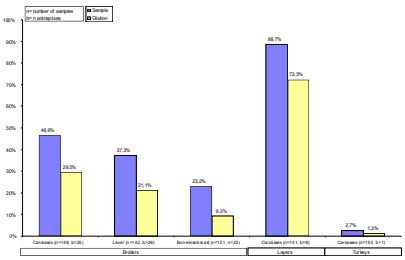

Table 3: Major serotypes of human, animals and foods isolates (in %)

	Human *	Animals ** Poultry	Food *** Broilers	Food *** Layers	Food *** Turkeys	Animals ** Cattle	Food *** Cattle	Animals ** Pigs	Food *** Pigs	Animals ** Feed
	n=14239	n=841	n=235	n=225	n=6	n=79	n=19	n=626	n=175	n=128
S. Enteritidis	58,1	23,3	15,3	58,7	100,0	1,3		1,0		3,1
S. Typhimurium	23,5	13,0	10,2	1,8		70,9	52,6	47,7	36,3	4,7
S. Hadar	4,7	20,7	20,4	1,3		1,3		0,4		2,3
S. Brandenburg	2,1	1,3	1,3					5,7	14,5	1,6
S. Infantis	1,9	7,0	3,4	7,5				1,9	6,5	5,5
S. Derby	1,1	0,2	2,1				5,3	20,9	21,7	3,9
S. Bovismorbificans	1,1	0,2						1,5		
S. Virchow	0,8	6,1	12,3	3,1				1,1	0,7	2,3
* Data 1997 (3)	** Data 1998 (4)					*** Data 1998 except for cattle 1997				

Figure 3: Serotypes from pork samples

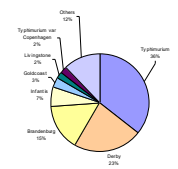

Figure 4: Serotypes from broilers samples

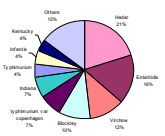

Figure 5: Serotypes from layers samples

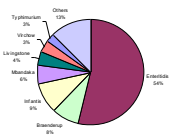

Table 4: Antimicrobials resistance in animal and foods (in %)

	Animals*	Food**		
		Pigs	Broilers	Layers
	unknown	n=210	n=305	n=269
Ampicillin	26,1	0,2	44,4	0,1
Chloramphenicol	12,0	0,1	11,1	0,0
Kanamycin	1,6	0,0	1,3	0,0
Nalidixic acid	16,9	0,1	33,6	0,1
Tetracycline	32,4	0,4	37,0	0,1
Ceftriaxone		0	0	0
Cotrimoxazole		98,1	98,7	98,5
Ciprofloxacine		0	0	0
Enrofloxacine	0,02			
Trimethoprim		60,4	51,0	45,1
Trimethoprim/sulfonamides	6,0			
* Data 1998 (4)	** Data 1998			

Conclusion

- *Salmonella* is a common pathogen found in pork and poultry.
- Isolated strains belong to same serotypes, lysotypes and have similar antibiotic resistance profiles that those isolated in human and animals.
- An advanced analyze of results is needed in order to precise the sources of human salmonellosis.
- The rate and the level, and thus the risk, is very higher in poultry than in pork.
- These results should be used to take preventive measures in order to lower the contamination rate and the resistance to antibiomicrobials of *Salmonella*.
- These results should be compared with those of others European countries (1).

Bibliography

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