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ISOLATION OF *SALMONELLA SPP.* FROM ITALIAN COMMERCIAL RABBITRIES

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SUMMARY - As international literature reports, the isolation of *Salmonella spp.* from commercial rabbitries is considered to be sporadic and, usually, of scarce pathological relevance. Nevertheless, having several outbreaks being reported in rabbit breeding farms in the north-eastern part of Italy in 1997, we decided to investigate the infection prevalence. Approximately 2700 fecal and environmental swabs were collected in 23 commercial rabbitries, and in each farm feedingstuffs were also sampled. Samples were individually processed by traditional cultural methods. *Salmonella spp.* was isolated from 7 farms (30.4 %), whereas all feed samples were negative. Serotyping of isolates identified S. Indiana (6 units) and S. Typhimurium (1 unit). In the rabbitry where S. Typhimurium was widespread economic losses were high, due to haemorrhagic necrotic metritis in does and to septicemia and haemorrhagic enteritis in suckling animals. S. Indiana did not appear to affect rabbits health condition. Results pointed out the high percentage of salmonella free commercial rabbitries but emphasized the prevalence of S. Indiana infection: this serotype represents a possible source of meat contamination at the slaughterhouse, although not influencing animal productive and sanitary parameters. S. Typhimurium instead appeared as highly pathogen for rabbits. Moreover, due to its multidrug resistance pattern, it represents an hazard for human health and its low prevalence allows to consider the possibility of eradicating the infection rather than controlling it.

Key words: Rabbit, salmonellosis, Salmonella Indiana, Salmonella Typhimurium.

Résumé *- De la même façon que la littérature internationale reporte, l'isolation de la Salmonella spp. dans l'élevage intensif du lapin est considérée sporadique et généralement de faible relevance pathologique. Á la suite de l'observation de quelques cas de salmonellose dans les élevages cunicoles du nord-est de l'Italie en 1997, nous avons décidé de faire une recherche sur la diffusion de l'infection. Approximativement 2700 échantillons fécaux ont été prélevés dans 23 élevages de lapins, et dans chaque élevage on a prélevé l'aliment directement du silo. Les échantillons ont été traités individuellement avec la méthode culturelle traditionnelle. La Salmonella spp. a été isolée dans 7 élevages (30,4%) tandis que l'aliment a toujours été négatif. Les genres des souches isolées étaient S.Indiana (6 élevages) et S.Typhimurium (1 élevage). Dans l'élevage où on a isolé S.Typhimurium les pertes économiques ont été élevées, a cause de métrite hémorragique chez les femelles et d'entérites hémorragiques chez les lapereaux. La S.Indiana n'a pas d'effet sur les conditions sanitaires du lapin. Les résultats soulignent le pourcentage élevé d'élevages "free" mais soulignent aussi la prépondérance d'infections de S.Indiana; ce serotype représente une possible source de contamination de la viande au moment de l'abattage, mais ne représente pas de problème pour la productivité de l'élevage ni pour l'état sanitaire des animaux. Au contraire la S.Typhimurium est très pathogène pour le lapin, et à cause de son profil d'antibio résistance multiple, elle représente un risque pour la santé des personnes; si l'on considère la faible diffusion de cette infection, il vaut mieux réaliser le vide sanitaire plutôt que de contrôler l'infection avec des thérapies.*

Mots-clés: *Lapin, salmonellose, Salmonella Indiana, Salmonella Typhimurium*

INTRODUCTION

Normally rabbit caecum is free from *Salmonella spp.* and the isolation of the micro-organism in subjects of commercial rabbitries is considered to be sporadic and of low pathological relevance (Morisse *et al.*, 1987). Exceptionally Salmonella Thyphimurium can cause severe enterities with high mortality percentages in fattening rabbits; in females Salmonella Typhimurium produces enterities and metrities usually associated with abortions and heavy losses inside the nests (Gatti *et al.*, 1988; Harwood, 1989; Lebastard *et al.*, 1995; Saco *et al.*, 1997).

During 1997 several salmonellosis outbreaks have been reported in intensive rabbitries in the North-Eastern regions of Italy (Zanon *et al.*, 1996). The lack of reports induced us to investigate on the prevalence of *Salmonella spp.* infection in intensive units. Moreover it was evaluated the rule of feedstuff in the pathogen herd introduction and the possible use of fan surfaces sampling as indicator of *Salmonella spp.* contamination.

MATERIALS AND METHODS

During the research 23 intensive rabbitries located in the North - Eastern regions of Italy were monitored. Approximately 120 environmental swabs were collected from each herd and a total of 2712 environmental samples were examined during the research. Inside the herd samples were representative of the fattening, the reproductive and the restocking units . The prevalence of infection was supposed to be 2,5% and the sampling was enough to point out a single positive ($p \leq 0,05$). Environmental samples were represented by swabs and faeces. Swabs were soaked with the pre-enrichment medium then rubbed on cages and nests surfaces; if fresh faeces were available they were collected from cages floors. In farms provided of forced ventilation swabs were rubbed from the fan surfaces (N. 35 swabs). All types of feedstuff were also collected directly at the silos and totally 72 samples were examined. Samples were processed with the microbiological procedures resumed in table 1.

RESULTS AND DISCUSSION

Results are summarized in tables 2, 3, 4 and 5. The research pointed out the prevalence of 30.4% of *Salmonella spp.* in the Italian intensive rabbitries, moreover it evidenced only two serotypes being present: Salmonella Typhimurium and Salmonella Indiana, the former being isolated in one, while the latter in 6 out of 23 herds. In breeding infected with Salmonella Indiana 6% of environmental swabs resulted positive and both the fattening and reproductive units were infected. Salmonella Indiana was never related with clinical symptoms or lesions and their absence seems to indicate the lack of pathogenicity of this serotype in naturally infected rabbits. Nevertheless the presence of the bacterium in the fattening units and the possible contamination of the carcass represents a sanitary human hazard.

Salmonella Typhimurium was isolated in one rabbit farm. Here, three months before, a severe salmonellosis outbreak produced the death of 40% of does and massive losses of offspring. Such severity seems to indicate an high pathogenic degree of the serotype. Moreover this serotype possessed an high infectious ability as it was able to maintain a massive contamination in a herd which has been disinfected and vaccinated for several month before.

Sampling on fans surfaces was intended as farm contamination indicator but results could not support this thesis as only one out of 13 samples collected in infected breeding resulted positive.

Feedstuff did not result a vector of infection between commercial rabbitries as all samples resulted negative. Evidently the pellet heat treatment of feedstuff and the absence of flour of animal origin is sufficient to avoid contamination (Orsenigo and Gallazzi, 1996).

In conclusion we think there is the possibility to reduce the prevalence of rabbit salmonellosis with actions which are different for the two salmonella serotypes. Samonella Indiana prevalence can be controlled with hygienic and therapeutic measures because:

- 70% of rabbit farms are free from *Salmonella spp.*
- inside the infected herd only this salmonella serotype was found
- S.Indiana has got a low pathogenic ability
- inside the herd infected with S.Indiana the prevalence is low (approximately 6%)
- feedstuff in not a vehicle of infection
- the drop drinking trough inside cages of the intensive rabbitries reduces the orofecal transmission of infections

On the contrary we think it will be necessary to eradicate the infection due to Salmonella Thyphimurium because of:

- very low prevalence of this serotype
- high pathogenicity for rabbit
- the zoonosic implication of the serotype with the sanitary hazard amplified by the multidrug resistance pattern

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Table 1. Microbiological processing of samples.

	Swabs	Feedstuff (50 g)
pre-enrichment (37°C x 18 - 20 h)	10 ml Buffered Peptone Water	450 ml Buffered Peptone Water
selective enrichment (41.5°C x 18 - 24 h)	10 ml Rappaport Vassiliadis Soya Broth	
selective and differential medium (37°C x 18 - 24 h)	Xylose Lysine Tergitol 4 Agar	
identification	suspected colonies	negatives
	Brillant Green Agar - Kligler	
	biochemical analysis (API 20 E)	
	serotyping	

Table 2 . Percentage of farms infected and salmonella serotypes isolated.

Examinated farms	Negatives	Positives	S.Typhimurium Positives	S.Indiana Positives
23	16 (69.56 %)	7 (30.43 %)	1 (4.34 %)	6 (26.08 %)

Table 3 . Percentages of environmental swabs resulted positive and salmonella serotypes isolated in farms infected .

Farms infected	**1**	**2**	**3**	**4**	**5**	**6**	**average % between 1-2-3-4-5-6**	**7**
Serotype isolated	S.I.	S.I.	S.I.	S.I.	S.I.	S.I.		S.T.
% of breeding	6.95	3.36	9.16	5	6.66	5.88	6.17	10.92
% in pregnancy unit	2.17	2.56	7.5	2.5	7.5	5.4	4.6	20
% in fattening unit	12.28	5.08	10	5.17	8.33	8.47	8.22	1.75
% in restocking unit	0	0	10	5	0	0	2.5	27.77

S.I. : Salmonella Indiana; S.T.: Salmonella Typhimurium

Table 4 . Results of fan surfaces analysis, in farms provided with forced ventilation.

	N° farms with forced ventilation	N° fans examinated	Fans positives
Salmonella free farms	15	37	0
Farms salmonella infected	4	13	1
Total	19	50	1

Table 5 . Results of feedstuff analysis.

	N° of feedstuff examinated	Positives
Salmonella free farms	49	0
Farms salmonella infected	23	0
Total	72	0