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SALMONELLA SPP INVESTIGATION IN TRANSPORT BOXES OF DAY-OLD BIRDS

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ABSTRACT

The presence of *Salmonella* was investigated in transport boxes of newly hatched chicks in the moment they were received in the farms. 1,611 boxes, delivered to 15 farms (one broiler grand-parent farm, four broiler parent farms, two commercial broiler chick farms and seven laying hens farms) were tested. A total of 19 visits to these farms were done, and *Salmonella* was detected in ten of these visits. *Salmonella* Heidelberg was detected in boxes in five farms. *S.* Heidelberg and *S.* Mbandaka were simultaneously detected in one broiler breeder farm. *Salmonella* Enteritidis alone, *S.* Enteritidis and *S.* Mbandaka and *S.* Cerro alone were detected in three, one and one laying hens farms, respectively.

Key words: *Salmonella*, day-old bird, transport box

INTRODUCTION

Avian salmonellosis has been present in poultry flocks in some degree. Usually, traditional diseases, such as fowl typhoid and pullorum disease, are under control (14), although they have been seen in some countries in South and Central America, East European, Asia, Africa and even in Occidental Europe (1,5). However, paratyphoid salmonellosis infections still are a great task to face. The infection of birds may provoke clinical disease and/or the birds become carriers of food-borne salmonellosis agents. Outbreaks of food-borne salmonellosis caused by *Salmonella* Enteritidis were noticed in several parts of the world in the last two decades associated with food prepared with poultry products (1, 13). *Salmonella* Enteritidis may have reached the farms by vertical transmission (10, 12, 13). In the hatchery, cross-contamination among contaminated and non-contaminated eggs may occur (4) and can be found in samples collected inside the hatchery and inside transport boxes (6). In Brazil, the outbreaks provoked by *Salmonella* Enteritidis appeared after the outbreaks in Europe, USA and Japan (9, 17), probably because grand-parent flocks came from the areas where salmonellosis outbreak started. Nevertheless, there is no literature available to show the *Salmonella* status in day-old birds in Brazil. These information would be useful to clarify the importance of the vertical route of introduction of *Salmonella* to chicken flocks and also to show the importance of control programs. Thus, this work was carried out to investigate the presence of *Salmonella* in day-old birds, surveying the presence of the pathogen in the transport boxes. This approach permits the achievement of results without stressing the birds.

MATERIALS AND METHODS

1,611 boxes, delivered to 15 farms (one grand-parent farm, 6 parent farms, 6 laying hens farms and 2 commercial broiler farms) were tested. These boxes transported 161,086 day-old chicks. The sampling was done between March 1997 and March 1998.

The experimental procedure followed Wray and Davies (18) recommendations. The samples were taken from the internal wall and bottom of the boxes using one large gauze swab for each box. The swabs were moistened in PBS pH 7.4 before using. Five swabs were placed in a jar containing 100 mL selenite broth plus novobiocin. After overnight incubation at 42°C, the broth was plated on brilliant green agar and Mac

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Conkey agar. Plates were incubated overnight at 42°C. Typical colonies were inoculated in TSI agar and lysine broth, incubated overnight at 37°C and submitted to serotyping using polivalent sera against O and H *Salmonella* antigens. Isolates were sent to Adolfo Lutz Institute in São Paulo city, Brazil, for complete identification and serotyping.

RESULTS

The results in Tables 1 and 2 are related to broiler production and laying hens, respectively. Some farms were visited twice. According to Table 1, *Salmonella* was found in five out of nine samplings of boxes of day-old chickens for broiler production. All five positive samples were from parent flock farms. *Salmonella* Heidelberg was isolated in all of them, besides *S.* Mandaka which was isolated in one. The results of the search in laying hens farms (Table 2) indicated that 5 out 10 farms were *Salmonella* positive. Three farms were *S.* Enteritidis positive. *S.* Mbandaka was isolated in one farm and *S.* Cerro in another one.

DISCUSSION

The epidemiology of avian salmonellosis is very complex. *Salmonella* may reach a poultry flock through several ways, including vertical transmission. Contamination of birds in the beginning of life is more difficult to control because newly hatched chicks are very susceptible and may excrete salmonellae in high amount and for long periods (2,16). Multiple age flocks and environmental factors, including rodents, play an important role in keeping flocks infected indefinitely (7, 8). *Salmonella* organisms spread out easily among eggs still in the hatchery and among birds later (4,6). In the present work, *Salmonella* serotypes were found in some boxes delivered in 5 parent flocks farms for broiler production and in 5 flocks of laying hens farms. In farm II (Table 1), *Salmonella* Heidelberg was isolated from 10 out of 198 inspected boxes. One week later this serotype was found in the feces collected inside the same house and also in several points far from the initial point of detection (non-published data). The infection of young birds can result in poultry meat and egg containing *Salmonella* organisms (10,

Table 1. Presence of *Salmonella* in transport boxes of day-old chickens for broiler production

Farm Number	Activity	Quantity examined of		Result
		boxes	Birds	
I	Breeding	80	8,000	
II	Breeding	198	19,800	*Salmonella* Heidelberg
II	Breeding	91	9,100	*Salmonella* Heidelberg
III	Breeding	95	9,488	*Salmonella* Heidelberg
III	Breeding	107	10,650	*Salmonella* Heidelberg
IV	Breeding	160	16,000	*Salmonella* Heidelberg *Salmonella* Mbandaka
V	Breeding	96	9,600	
VI	Broiler	1	100	
VII	Broiler	16	1,608	
TOTAL		844	84,346	

Table 2. Presence of *Salmonella* in transport boxes of day-old laying hens

Farm Number	Quantity examined of		Result
	Boxes	birds	
I	62	6220	
II	6	600	
III	70	7000	
IV	63	6320	
V	65	6500	*Salmonella* Enteritidis
VI	156	15600	*Salmonella* Enteritidis
VI	28	2800	*Salmonella* Enteritidis *Salmonella* Mbandaka
VII	27	2700	*Salmonella* Cerro
VIII	225	25000	
TOTAL	767	76740	

11, 12). Thus, the early detection is essential to start a control program. The increase of food-borne salmonellosis due to *Salmonella* Enteritidis was associated with egg and food containing raw egg (17), although recent work done by Silva *et al.* (15) has shown that this serotype is also very common in broiler carcasses. The results indicate that, despite the efforts to control *Salmonella* in poultry farms, they may still become contaminated through the vertical route by day-old birds that are purchased in countries where outbreaks of salmonellosis were noticed (13). In addition, the lack of a good approach to inspect imported day-old breed lines might be responsible for the introduction of *Salmonella* in Brazilian flocks of chickens. In spite of not being compared to the usual sampling procedure suggested for inspection of imported birds, the chance to find *Salmonella* using the sampling method employed in this study is higher since all transport boxes were tested. To reduce costs and labor, five swabs were put together for enrichment. Although partial examination may be satisfactory statistically, full examination may be more successful when the frequency of *Salmonella* is not high, as can happen in day-old breeder flocks. Cross-contamination among day-old birds is very easy. It starts during hatching (4) and *Salmonella* organisms can be found in hatchery fluff and meconium (3). Thus, transport boxes could be suitable to search the organism, without bothering the birds. Albeit further studies are necessary, this sampling methodology looks promising since *Salmonella* organisms were isolated in around 50% of the farms. Nowadays, *Salmonella* Mbandaka, *S.* Cerro and *S.* Heidelberg are not as common as *S.* Enteritidis, however they were also detected in human beings (17) and in birds (9). The strain of *S.* Enteritidis presented atypical biochemical behavior in TSI agar. This strain produced very little or almost none H_2S. Based on the findings of the present work, day-old birds arrived to farms already contaminated with *Salmonella* and the examination of the transport boxes is a useful procedure to detect this contamination.

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RESUMO

Salmonella spp em caixas de transporte de pintos de um dia de idade

Foram examinadas caixas de transporte de pintos de um dia com o objetivo de investigar a presença de *Salmonella* no momento em que chegaram à granja. 1611 caixas foram amostradas em 15 propriedades, sendo uma granja de avós, quatro granjas de matrizes, duas de frangos de corte e seis de aves de postura comercial. Foram feitas 19 visitas a essas granjas e *Salmonella* foi encontrada em 10 delas. *Salmonella* Heidelberg foi encontrada em caixas de cinco granjas, *S.* Heidelberg e *S.* Mbandaka em caixa de uma granja de matriz. *S.* Enteritidis somente, *S.* Enteritidis e *S.* Mbandak*a* simultaneamente, e *S.* Cerro somente, foram detectadas em caixas de três, uma e uma granjas de postura comercial, respectivamente.

Palavras-chave: *Salmonella*, aves de um dia de vida, caixas de transporte.

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