

Communication

[Comunicação]

Isolation of *Salmonella* spp. in captive Psittaciformes from zoos and a commercial establishment of Fortaleza, Brazil

[*Isolamento de Salmonella spp. em Psittaciformes de zoológicos e estabelecimento comercial de Fortaleza, Brasil*]

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Studies have emphasized the importance of wild birds in the transmission of pathogenic microorganisms to other animals, whether wild or industrial birds, as well as in humans. Among these microorganisms, *Salmonella* spp. has shown relevant importance. Sousa *et al.* (2010a) captured 48 wild birds near poultry facilities in the North of São Paulo city, Brazil and detected three birds positive for *Salmonella* (*Zenaida auriculata*, *Cariama cristata* and *Theristicus caudatus*), which demonstrated that free-living birds may carry and disseminate pathogenic agents, presenting a risk for poultry. Silva *et al.* (2010) emphasized the importance of members of the Ciconiiformes order as carriers of *Salmonella* to other wild birds as well as to poultry.

Another group of free-living birds that have demonstrated a potential role as reservoirs of *Salmonella* are the Psittaciformes, since this microorganism have already been isolated from psittacines in their natural environment (Vilela *et al.*, 2001; Allgayer *et al.*, 2009). Therefore, the possibility of transmission of this pathogen to other free-living or to domestic birds cannot be unconsidered. However, due to the low number of studies currently performed concerning this topic and to the fact that there is no evidence that psittacines are a major source of *Salmonella* to domestic fowl, the psittacines are not included among the free-living birds that cause concern to the poultry industry in this aspect (Butron and Brightsmith, 2010; Sousa *et al.*, 2010a).

Most studies relating *Salmonella* to psittacines involve birds maintained in captivity. The maintenance conditions of captive birds favor the spread of infectious diseases (Mattes *et al.*, 2005),

which may affect negatively not only the health of other birds, but of human beings as well. Several diseases are transmitted from captive or pet birds to humans through direct or indirect contact with sick or asymptomatic birds, and bacteria are the most common zoonotic agents (Akhter *et al.*, 2010). From the reports about several serotypes of *Salmonella* isolated from wild birds come the importance of these microorganisms in the epidemiology of human and animal salmonellosis (Hughes *et al.*, 2008). In Brazil, although few studies have been published in the last decade addressing the presence of *Salmonella* spp. in Psittaciformes, they are still scarce, which makes further research necessary in order to understand the serotypes capable of infecting birds in captivity. Therefore, this study aimed to investigate the frequency of *Salmonella* spp. with the aid of cloacal swabs in captive psittacines from commercial and conservational facilities of the city of Fortaleza, Brazil.

One hundred and eighty-two members of the Psittaciformes order corresponding to a total of 36 species (Table 1), especially parakeets, parrots and macaws from two zoos and a commercial establishment were analyzed. At the sampling moment, all birds were apparently healthy, therefore with no clinical signs of salmonellosis. The bacterial isolation was performed as described by Sousa *et al.* (2010b). Isolates identified as *Salmonella* spp. were streaked on nutrient agar (Oxoid®) and sent to complete identification and serotyping carried out by the Fundação Oswaldo Cruz in Rio de Janeiro, Brazil. This study was approved by the Ethics Committee for the Use of Animals with the following number 10339107-0/48.

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Table 1. Psittaciforme species, common name, positive sample/number examined and *Salmonella* isolated from captive psittacine

Species	Common Name	(n)	Positive Samples
<i>Amazona aestiva</i>	Blue-fronted Amazon	1/31	<i>Salmonella</i> Lexington
<i>Amazona festiva</i>	Festive Amazon	0/02	-
<i>Amazona ochrocephala</i>	Yellow-crowned Amazon	0/03	-
<i>Amazona farinosa</i>	Mealy Amazon	0/07	-
<i>Amazona amazônica</i>	Orange-winged Amazon	0/06	-
<i>Alipiopsitta xanthops</i>	Yellow-faced Parrot	0/04	-
<i>Deroptyus accipitrinus</i>	Red-fan Parrot	0/01	-
<i>Amazona rhodocorytha</i>	Red-browed Amazon	0/04	-
<i>Ara ararauna</i>	Blue-and-yellow Macaw	0/12	-
<i>Ara macao</i>	Scarlet Macaw	0/11	-
<i>Ara chloroptera</i>	Red-and-green Macaw	1/16	<i>Salmonella</i> Saintpaul
<i>Anodorhynchus hyacinthinus</i>	Hyacinth Macaw	0/04	-
<i>Aratinga cactorum</i>	Caatinga Parakeet	0/06	-
<i>Aratinga leucophthalma</i>	White-eyed Parakeet	0/10	-
<i>Aratinga auricapillus</i>	Golden-capped Parakeet	0/03	-
<i>Aratinga jandaya</i>	Jandaya Parakeet	0/07	-
<i>Aratinga solstitialis</i>	Sun Parakeet	0/03	-
<i>Aratinga aurea</i>	Peach-fronted Parakeet	0/02	-
<i>Guaruba guarouba</i>	Golden Parakeet	0/02	-
<i>Pyrrhura perlata</i>	Crimson-bellied Parakeet	0/03	-
<i>Pyrrhura griseipectus</i>	Gray-breasted Parakeet	0/03	-
<i>Pionus fuscus</i>	Dusky Parrot	0/01	-
<i>Pionus menstruus</i>	Blue-headed Parrot	0/13	-
<i>Nandayus nenday</i>	Nanday Parakeet	0/01	-
<i>Pionitis leucogaster</i>	White-bellied Parrot	0/03	-
<i>Pionites melanocephalus</i>	Black-headed Parrot	0/01	-
<i>Ara severus</i>	Chestnut-fronted Macaw	0/02	-
<i>Ara maracaná</i>	Blue-winged Macaw	0/03	-
<i>Primolius auricollis</i>	Golden-collared Macaw	0/02	-
<i>Gradidascalus brachyurus</i>	Short-tailed Parrot	0/03	-
<i>Brotogeris chiriri</i>	Yellow-chevroned Parakeet	0/01	-
<i>Nymphicus hollandicus</i>	Cockatiel	0/03	-
<i>Eclectus roratus</i>	Eclectus Parrot	0/01	-
<i>Psittacula krameri</i>	Ringnecked Parakeet	0/01	-
<i>Cacatua galerita galerita</i>	Sulphur-crested Cockatoo	0/01	-
<i>Melopsittacus undulatus</i>	Budgerigar	1/06	<i>Salmonella</i> Newport
Total	-	03/182	-

A prevalence of 1.65% was found from a total of 182 psittacines analyzed with the following serotypes Lexington, Saintpaul and Newport isolated from *Amazona aestiva*, *Ara chloroptera* and *Melopsittacus undulatus*, respectively. This appears to be the first reported isolation of these serotypes from these studied psittacine species.

In Brazil, Marietto-Gonçalves *et al.* (2010a) investigated 89 cloacal swab samples from three different psittacine species and a single *Salmonella* sp. strain was isolated from an

Amazona aestiva, representing 1.12% from the total analyzed. The same authors isolated the serotype Enteritidis from *Amazona aestiva* originated from wild fauna traffic in São Paulo, Brazil (Marietto-Gonçalves *et al.*, 2010b). Oliveira *et al.* (2009) detected *Salmonella* Hadar in 49 parrots (*Amazona aestiva* and *Amazona amazona*) (8.2%) aging from one to six-month-old. Akhter *et al.* (2010) found *Salmonella* spp. in 45 samples of cloacal, oral and fecal swabs from psittacines allocated at the Dhaka zoo in Bangladesh reporting a prevalence of 46.67%. In

Isolation of *Salmonella* spp...

captive psittacines, several authors described the isolation of various serotypes of *Salmonella* spp., but Typhimurium seems to be the most frequent (Allgayer *et al.*, 2008). This is demonstrated as well by Piccirillo *et al.* (2010) who isolated the serotype Typhimurium DT 160 from *Cacatua moluccensis* in a zoo in Italy. This serotype may manifest as a primary pathogen, or a subclinical infection, in young or weak birds (Vigo *et al.*, 2009).

This study showed a low prevalence of *Salmonella* spp. in captive psittacines from zoos

and a commercial establishment of Fortaleza. None of the isolated serotypes (*S. Lexington*, *S. Saintpaul* and *S. Newport*) have yet been reported in *Amazona aestiva*, *Ara chloroptera* or *Melopsittacus undulatus*. However, the fact that most birds presented negative for *Salmonella* spp. may not imply the absence of this pathogen in these birds, since the intermittent excretion is a well-known characteristic of this microorganism.

Keywords: *Salmonella*, Psittaciformes, *Amazona aestiva*, *Ara chloroptera*, *Melopsittacus undulatus*

RESUMO

A manutenção de aves em cativeiro reúne condições que favorecem a disseminação de doenças infecciosas, sendo a *Salmonella* uma dessas doenças infecciosas que acomete os psitacídeos. Portanto o objetivo do presente estudo foi isolar e identificar *Salmonella* spp. em Psittaciformes mantidos em criatórios comerciais e conservacionistas da Região Metropolitana de Fortaleza. Para o estudo, foram coletados swabs cloacais de 182 psitacídeos clinicamente sadios. Os resultados mostraram que três psitacídeos avaliados (1,65%) foram positivos: *Amazona aestiva* (*Salmonella Lexington*), *Ara chloroptera* (*Salmonella Saintpaul*) e *Melopsittacus undulatus* (*Salmonella Newport*). De acordo com a literatura científica, não há registro desses sorotipos em psitacídeos. Esta pesquisa evidenciou uma baixa prevalência de *Salmonella* spp. em Psittaciformes mantidos em criatórios comerciais e conservacionistas da Região Metropolitana de Fortaleza.

Palavras-chave: *Salmonella*, Psittaciformes, *Amazona aestiva*, *Ara chloroptera*, *Melopsittacus undulatus*

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