ISTITUTO ZOOPROFILATTICO SPERIMENTALE
DELLA LOMBARDIA E DELL'EMILIA ROMAGNA
"BRUNO UBERTINI"
ENTE SANITARIO DI DIRITTO PUBBLICO

BELGIAN ONE HEALTH

Exotic animals as a pet: how these alien species can be a risk for infectious diseases?

Cirasella L. [1]***,***
Perulli S. [1]***,***
Massella E. [2]***,***
Fiorentini L. [1] ***,***
Tosi G. [1]
Siclari C. [1]

[1] *Istituto Zooprofilattico Sperimentale Della Lombardia e dell'Emilia Romagna (IZSLER), Forlì*

[2] *Istituto Zooprofilattico Sperimentale Della Lombardia e dell'Emilia Romagna (IZSLER), Piacenza*

Introduction

Petaurus breviceps **(PB)**, also known as the sugar glider (Fig. 1), is commonly found in New Guinea and Australia. ***Suricata suricatta*** **(Ss)**, depicted in Fig. 2, is a small member of the *Herpestidae* family widely distributed in South Africa. ***Chinchilla lanigera*** **(CL)**, shown in Fig. 3, is a small wild rodent of the *Chinchillidae* family, native to South America. With the growing global trend of keeping exotic animals as pets, PB, SS, and CL have increasingly been domesticated over the past decade. However, there is limited knowledge about the health implications of these species when removed from their natural habitat, particularly regarding the infectious diseases they may carry and which could pose significant risks to their owners. Here we present, to the best of our knowledge, three case studies involving alien species exported from Thailand and sold in Italy as pets. These animals were found to have systemic infections caused by ***Salmonella*** **Typhymurium** (**ST**), ***Salmonella*** **Stanley** (**SS**) and ***Listeria monocytogenes*** (**Lm**), respectively.

Fig. 1 Petaurus breviceps

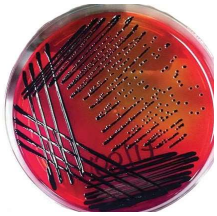

Fig. 2 Suricata suricatta

Materials and methods

During 2024, **PB**, **Ss** and **CL** carcasses were committed to the IZSLER Laboratory of Forlì.
Necropsy were performed according to standard protocols. Organ samples were subjected to routine microbiological analysis. The antimicrobial profile was determined by broth microdilution method.
Minimal Inhibitory Concentration (**MIC**) results were interpreted according to **CLSI** or, when not present, to **EUCAST** breakpoints. *Salmonella* spp. serogroup and serotype identification was performed according to **ISO/TR 6579-3:2014**. Lm was identify according **ISO 11290-1:2017**.

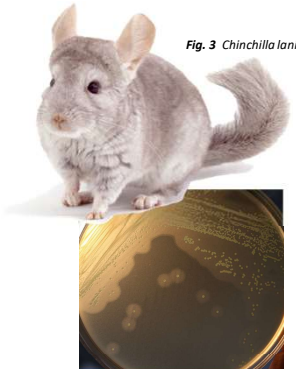

Fig. 3 *Chinchilla lanigera*

Results

Necroscopy revealed plurivisceral congestion. Salmonella in PB and Ss and Lm in CL was isolated from all the organs.
Salmonella serotype identification detected ST to PB and SS to Ss. ST MIC results (**Table 1**) reported resistance to Amoxicillin + Clavulanic Acid, Ampicillin, Amikacin, Cefalexin, Cefazolin, Doxycycline, Gentamicin, Kanamycin and Tetracycline. Ss MIC results (**Table 1**) shows resistance to Amikacin, Cefalexin, Cefazolin, Gentamicin and Kanamycin. Lm MIC result (**Table 2**) shows resistance to Clyndamicin.

Antimicrobial	*MIC BREAKPOINT*	
	Petaurus breviceps S. Typhimurium	*Suricata suricatta* S. Stanley
Amoxicillin + Clavulanic Acid	**32 R**	2 S
Ampicillin	**> 32 R**	2 S
Amikacin	**2 R**	**≤ 1 R**
Cefalexin	**8 R**	**8 R**
Cefazolin	**4 R**	**2 R**
Cefovecin	0.5 (NI)	1 (NI)
Cefpodoxime	≤ 0.5 S	≤ 0.5 S
Doxycycline	**> 16 R**	4 S
Enrofloxacin	≤ 0.06 (NI)	≤ 0.06 (NI)
Gentamicin	**≤ 0.5 R**	**≤ 0.5 R**
Kanamycin	**≤ 8 R**	**≤ 8 R**
Pradofloxacin	≤ 0.12 (NI)	≤ 0.12 (NI)
Tetracycline	**>16 R**	≤ 2 S
Trimethoprim/Sulfamethoxazole	≤ 0.5 S	≤ 0.5 S

Table 1 *S.* Thyphimurium and *S.* Stanley MIC results

Antimicrobial	*MIC BREAKPOINT*
	Chinchilla lanigera *L. monocytogenes*
Amoxicillin + Clavulanic Acid	0.12 S
Ampicillin	≤ 0.12 S
Oxacillin + 2% NaCl	2 S
Penicillin	0.12 S
Clindamycin	**4 R**
Doxycycline	1 S
Tetracycline	1 S
Enrofloxacin	1 (NI)
Erythromycin	0.25 S
Tilmicosin	16 I
Florfenicol	≤ 4 I
Gentamicin	≤ 2(NI)
Kanamycin	≤ 8 (NI)
Rifampin	≤ 0.06 (NI)
Sulfisoxazole	≤ 128 (NI)
Trimethoprim/Sulfamethoxazole	≤ 0.12 S

Table 2 *L. monocytogenes* MIC results

Discussion and conclusion

This case report highlights the presence of zoonotic bacteria, also implicated in human infection outbreaks, in exotic pet animals. The key questions that arises are: how do alien species become infected? Is it through the food or the environment they encounter during their long journey? These findings underscore the need to strengthen controls over the sanitary conditions of imported alien species to prevent the introduction of antibiotic-resistant bacteria. Additionally, they call for a reconsideration of the policies governing the importation of alien species.

References:

1. FRSPH, CWDMSCBE; FSB, Phillip C.; AMSB, Mike Jessop3 BVetMed. A review of captive exotic animal-linked zoonoses. Journal of Environmental Health Research, 12.1: 9.
2. INVASEP, EQUIPO. Zoonosis y especies invasoras.
3. WARWICK, C. Zoonoplasticity as an intuitive risk protocol for companion-animal-linked zoonoses. Rev. Sci. Tech, 2020, 39.3: 817-830.
4. WARWICK, Clifford, et al. Exotic pet suitability: Understanding some problems and using a labeling system to aid animal welfare, environment, and consumer protection. Journal of Veterinary Behavior, 2018, 26: 17-26.
5. SABOČANEC, Ruža, et al. Incidence of listeriosis in farm chinchillas (Chinchilla lanigera) in Croatia. Veterinarski arhiv, 2000, 70.3: 159-167