Retrospective evaluation of vector-borne infections in cats living in Germany (2012-2020)

I. Schäfer[1,2], B. Kohn[2], M. Volkmann[3], E. Müller[1]
[1]Laboklin GmbH & Co. KG, Bad Kissingen, Germany; [2]Clinic for Small Animals, Faculty of Veterinary Medicine, Freie Universität Berlin, Berlin, Germany;
[3]Institute of Veterinary Epidemiology and Biostatistics, Freie Universität Berlin, Berlin, Germany

INTRODUCTION

Cats are at high risk of contact with blood feeding arthropods e.g. fleas, ticks and sandflies. Vector-borne infections are becoming increasingly important due to increased travel, import of domestic animals and climatic changes in Europe.[1]

AIM OF THE STUDY

Purpose of the the study was to assess the prevalence of vector-borne infections in cats living in Germany that were tested by a "Feline Travel Profile". Another purpose was to identify possible stays abroad.

MATERIAL AND METHODS

Data of a "Feline Travel Profile", established by LABOKLIN, were analyzed retrospectively. Specimens from April 2012 to March 2020 were included. The "Feline Travel Profile" comprised a polymerase chain reaction (PCR) for *Hepatozoon* spp. and *Dirofilaria* spp. Indirect immunofluorescence antibody test (IFAT) for detection of antibodies was carried out for *Ehrlichia* spp., *Leishmania* spp. and from July 2015 on additionally for *Rickettsia* spp. The prevalence was calculated for each vector-borne infectious agent. Possible stays abroad of the individual cats were determined by phone interviews with the corresponding veterinarians.

Table 1: Vector-borne infections in cats (n= 624) living in Germany between 04/2012 and 03/2020.

Infectious agent	Method	No. of tested cats	No. of positive tested cats (%)
Hepatozoon spp.	PCR[A]	618[1]	53/618 (8.6)
Dirofilaria spp.	PCR[B]	618[1]	1/618 (0.2)
Leishmania spp.	IFAT[C]	624	22/624 (3.5)
Ehrlichia spp.	IFAT[D]	624	73/624 (11.7)
Rickettsia spp.	IFAT[E]	467[2]	52/467 (11.1)
Total		624	175/624 (28)

[1]In six cats no EDTA-blood was submitted for PCR-examination; [2]The *Rickettsia* spp. IFAT was only carried out from 07/2015 on
[A] lab method (TaqMan® real time PCR); [B]lab method with probe-detection (according to Rishniw et al., 2006[3]); [C]MegaFLUO® LEISH (MegaCor Diagnostik GmbH, Hörbranz, Austria; › 1:64 positive); [D]MegaFLUO® EHRLICHIA canis (MegaCor Diagnostik GmbH, Hörbranz, Austria; ≥ 1:40 positive); [E]RICKETTSIA CONORII IFA SLIDE (Viracell, Granada, Spain; > 1:128 positive)

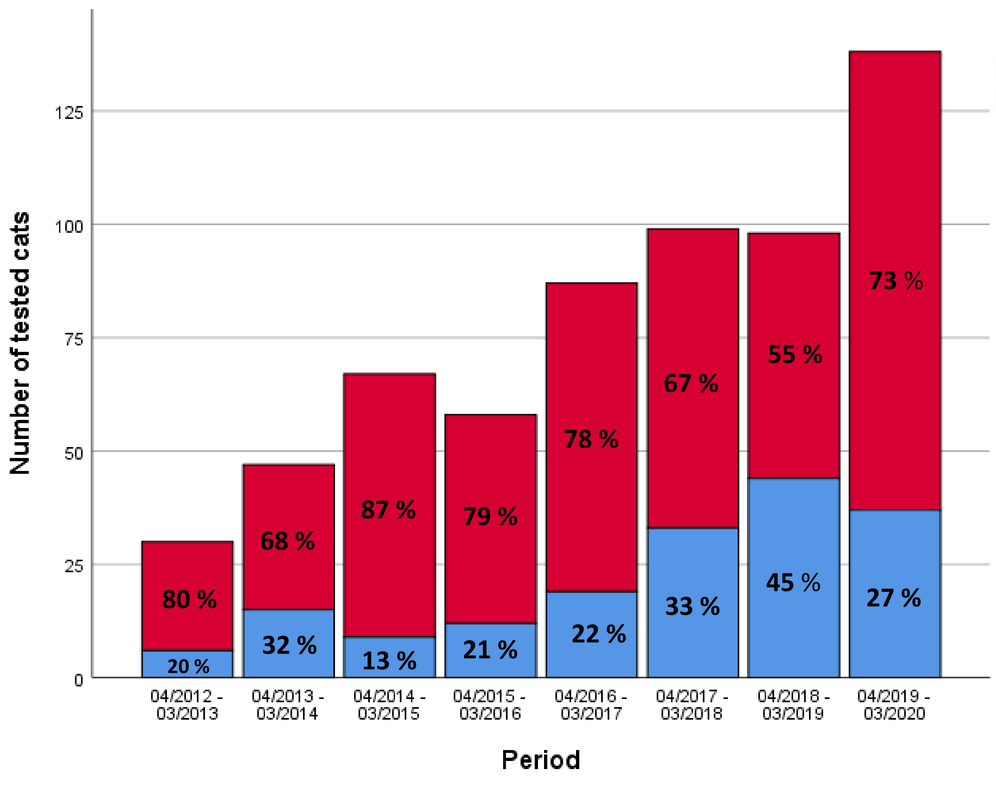

Fig. 1: Prevalence of vector-borne infections in cats (n= 624) living in Germany between 04/2012 and 03/2020.

RESULTS

624 cats were included in the study (sex [n= 573] 53.8% male, 46.2% female; age [n= 536]: median 2.0 years [range: 0.2-18]; breed [n= 554] 76.4% Domestic Shorthair, 12.8% crossbreeds, 10.8% others).

A total of 1715 serological and 1236 PCR tests were carried out. At least one pathogen was detected in 175/624 cats (28%, Table 1). Co-infections with 2-3 pathogens were detected in 22 out of 624 cats (3.5%).

Travel history was known for 363/624 (58.2%) cats (Table 2). Of these, cats were reported to have been imported most commonly from Spain, Greece and Romania (356/363, 98.1%). Seven out of 363 cats (1.9%) had outdoor access whilst visiting a foreign country with their owners (Spain, France, Italy, Romania, Bosnia, Turkey). Eight cats were born in Germany and had never left the country.

Table 2: Vector-borne infections in 363 cats living in Germany with an import or travel history from foreign countries.

Country	No. of positive tested cats (%)	Monoinfections				Coin-fections
		Hepatozoon	*Ehrlichia*	*Ricket-tsia*	*Leish-mania*	
Members of the European Union (EU)						
Spain	51/158 (32.3%)	17	18	8	3	5
Greece	17/52 (32.7%)	7	6	1	1	2
Romania	8/28 (28.6%)	-	2	5	-	1
Bulgaria	7/25 (28%)	1	5	1	-	-
Italy	3/23 (13%)	-	-	3	-	-
Croatia	3/15 (20%)	-	2	1	-	-
Portugal	2/9 (22.2%)	1	1	-	-	-
France[1]	0/4	-	-	-	-	-
Cyprus	2/3 (66.6%)	1	1	-	-	-
Malta	2/2 (100%)	1	1	-	-	-
Slovenia	0/1	-	-	-	-	-
Total EU	**95/320 (29.7%)**	**28**	**36**	**19**	**4**	**8**
Non members of the European Union (EU)						
Non-EU[1]	15/44 (34.1%)	6	3	1	3	2
Total						
Total	**110/363 (30.3%)**	**34**	**39**	**29**	**7**	**10**

[1]One negative-tested cat had been imported from France and regularly accompanied its owners on their annual journey to Turkey, where the cat had outdoor access.

DISCUSSION AND CONCLUSIONS

28% of 624 tested cats were positive for at least one vector-borne pathogen. Infections with multiple pathogens were detected in 3.5% of the cats. Positive test results for *Leishmania* spp., *Hepatozoon* spp., *Ehrlichia* spp., *Rickettsia conorii* and *Dirofilaria immitis* most commonly had their origin in Mediterranean countries or Southeastern Europe, as those pathogens are endemic in these areas. In contrast, for infections with *Dirofilaria repens* as well as with *Rickettsia felis*, Germany has to be discussed as the place of origin. Further differentiation of the species was not carried out for *Dirofilaria* spp., *Hepatozoon* spp., *Rickettsia* spp. and *Leishmania* spp. The data emphasizes the importance of considering feline vector-borne infections as potential differential diagnoses, especially for cats with stays abroad. This study also reinforces the importance of prophylaxis against ectoparasites.

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