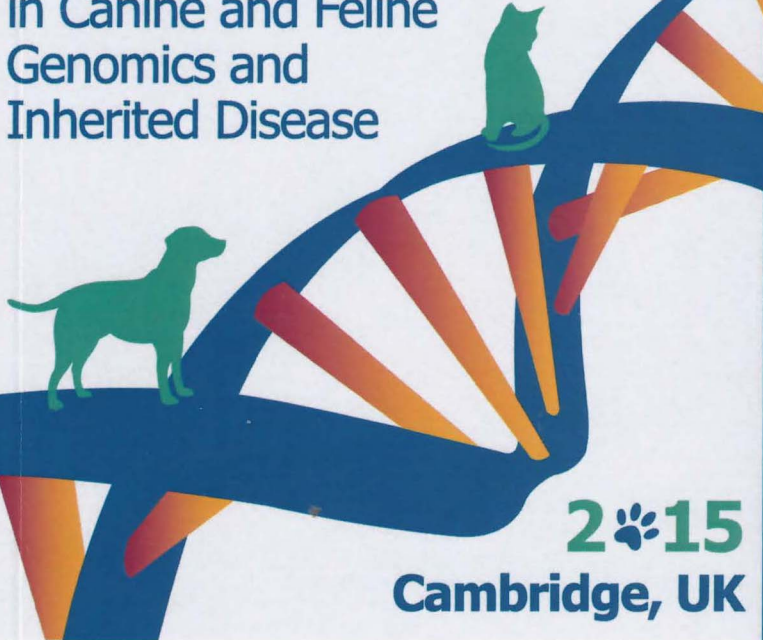


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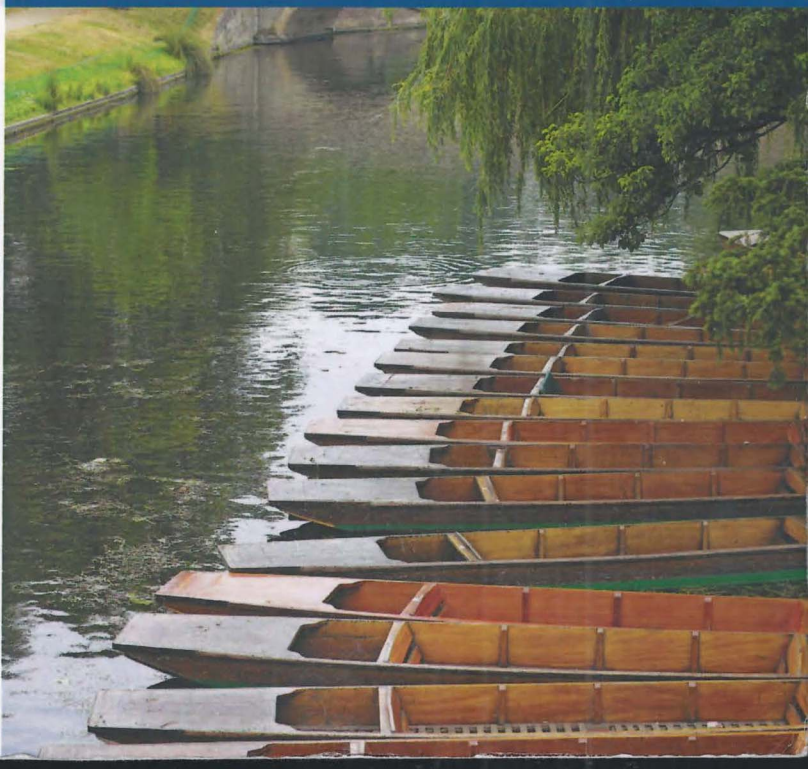


Conference Proceedings
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22nd-26th June

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12. Surveillance of feline inherited diseases in Italy

Cala A², Ferrari P², Knafelz P², Biretoni F³, Giorgi ME³, Calvano D³, Porciello F³, Riva J⁴, Marelli SP¹, Polli M¹, Longeri M¹

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A national database and a local surveillance service are powerful instruments for monitoring the animal inherited diseases in a country. The increased use of genetic tests and the closer attention on everything is "genetic", makes it important a systematic and consistent collection of phenotypes and biological samples both for the service/counselling to the breeders/owners/veterinarians and for the research. In the last decade a positive interaction between scientists (University of Milan and Perugia), a service lab (Vetogene), the Italian Canine and Feline Biobank, many veterinary specialists (the Osservatorio Italiano HCM Felina) and the breeder associations and fancy clubs, was successfully established¹. Blood and DNA samples of more than 30,500 dogs and 4,200 cats were collected in the Biobank, the great majority tested for the most important genetic diseases or for genetic profiling. Out of these cats, 1,272 were enrolled in the Osservatorio: 737 Maine Coons, 126 Norwegian Forest cats, 119 Siberians, 86 Ragdolls, 58 Sphynxes, 38 BritishSHs, 38 Birmans, 16 Bengals, 34 random bred cats and, with less than 10 cats each breed, Persians, ExoticSHs, Turkish vans, Scottish Folds, Chartreuxes, Devon Rexes, AmericaSHs. Their detailed clinical data were recorded. In the seven most represented breeds, HCM (grouping mild, moderate and severe cases) showed an average % of clinical positiveness of 5.14% (st.dev 1.76) ranging from 2.6% in the BritishSHs to 7.89 in the Birmans. Affected random bred, Bengal and Persian cats were also recorded. The Osservatorio's model is now expanding to some dog breeds. More data are provided on the diseases epidemiology, a prospection on the follow-up of the enrolled animals and on the next step aimed to connect this local model to the European and world network.

¹ Longeri M, Ferrari P, Knafelz P, Mezzelani A, Marabotti A, Milanese L, Pertica G, Polli M, Brambilla PG, Kittleson M, Lyons LA, Porciello F (2013) Myosin-binding protein C DNA variants in domestic cats (A31P, A74T, R820W) and their association with hypertrophic cardiomyopathy. *Journal of Veterinary Internal Medicine*, 27: 275- 285.



SURVEILLANCE OF FELINE INHERITED DISEASES IN ITALY



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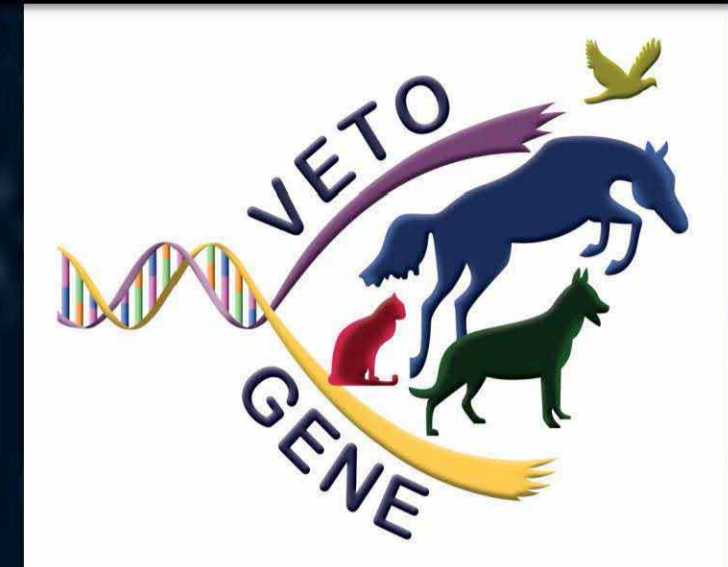


Osservatorio Veterinario Italiano Cardiopatie

² OSSERVATORIO ITALIANO HCM FELINA
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³ UNIVERSITÀ DI PERUGIA
 DEP. VETERINARY MEDICINE
 REP. MEDICINA INTERNA



⁴ VETOGENE,
 SPIN-OFF UNIVERSITÀ
 STUDI DI MILANO

¹ UNIVERSITÀ DEGLI STUDI DI MILANO
 DIP. DI SCIENZE VETERINARIE E
 SANITÀ PUBBLICA

ITALY



Map: location of the veterinary specialists joining the Osservatorio and of the Universities of Milan (Genetic controls and Biobanking), Perugia (Clinical data supervision) and Naples (Clinical support)

A national database and a local surveillance service are powerful instruments for monitoring the animal inherited diseases in a Country. The increased use of genetic tests and the closer attention on everything is “genetic”, makes it important a systematic and consistent collection of phenotypes and biological samples both for the service/counselling to the breeders/owners/veterinarians and for the research. In the last decade a positive interaction between Scientists (University of Milan and Perugia), a service Lab (Vetogene), the Italian Canine & Feline Biobank, many veterinary specialists (the Osservatorio Italiano HCM Felina) and the breeder associations and fancy clubs, was successfully established⁽¹⁾.

Cats owners and breeders are from Italian and Swiss (Canton of Ticino) - **Map**.

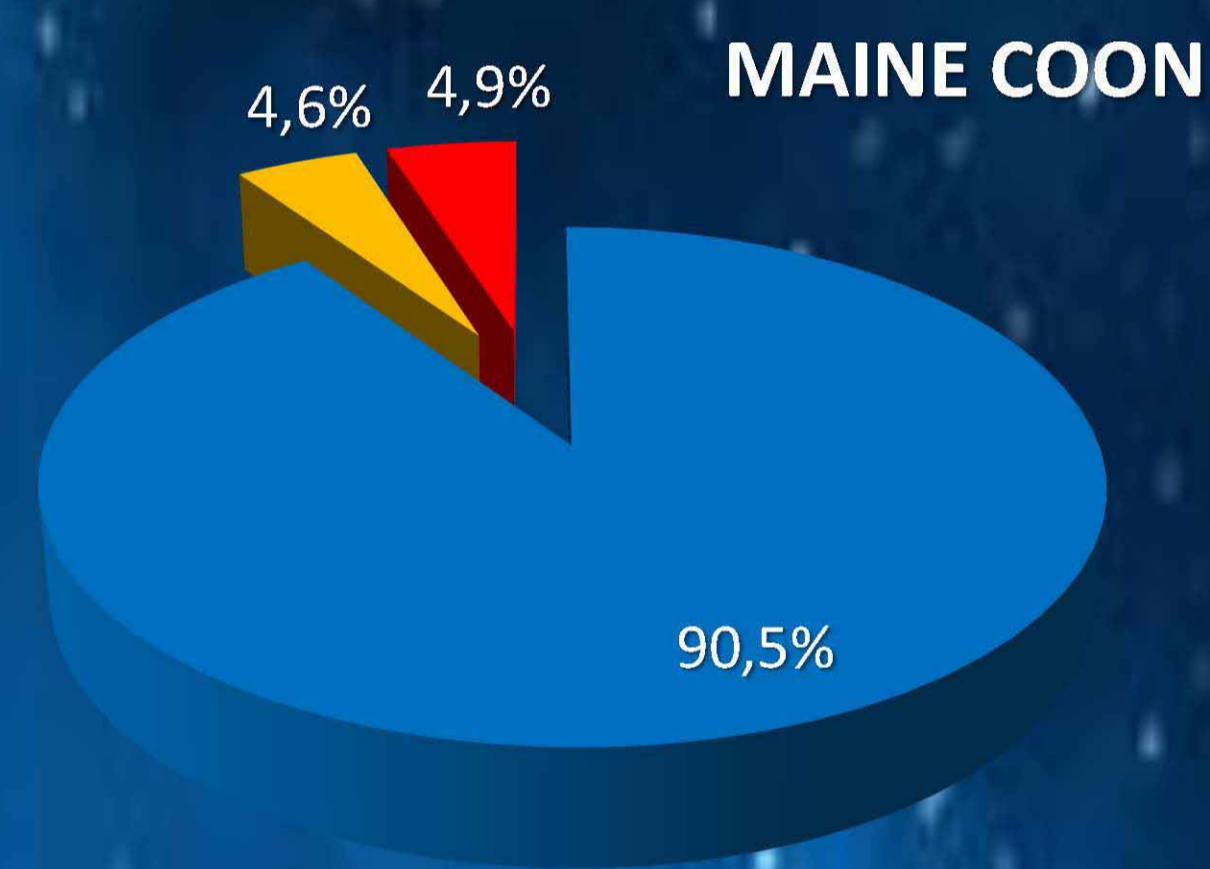
Blood and DNA samples of more than 4000 cats are collected in the Biobank at the moment, the great majority tested for the most important genetic diseases or for genetic profiling (**Tab3**).

Out of these cats, 1272 are enrolled in the Osservatorio Hypertrophic cardiomyopathy - HCM (data March 2015 – **Tab1**).

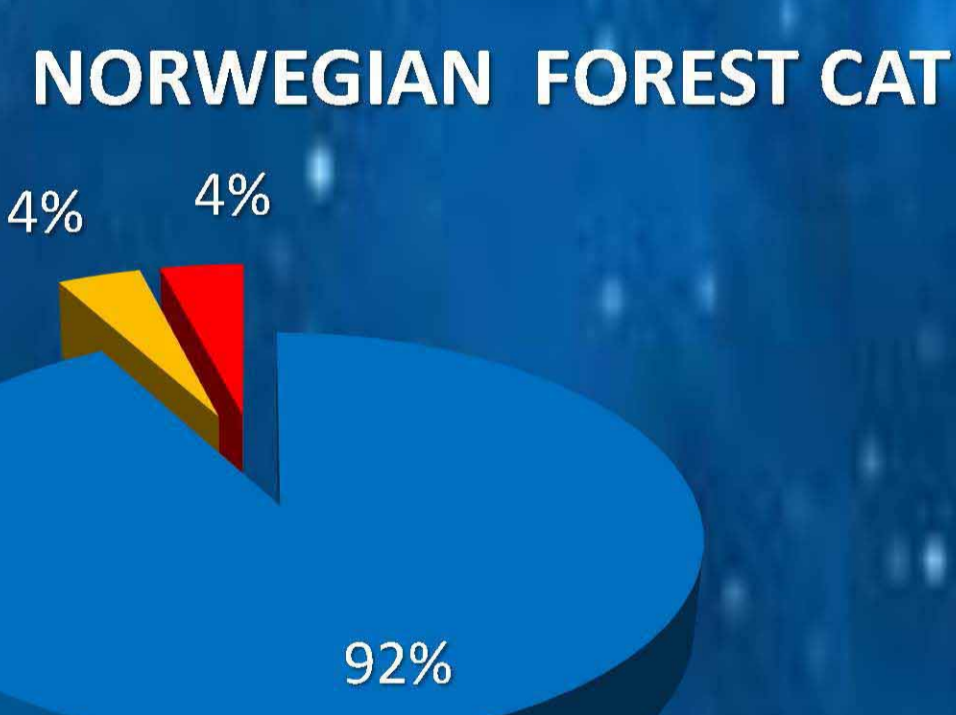
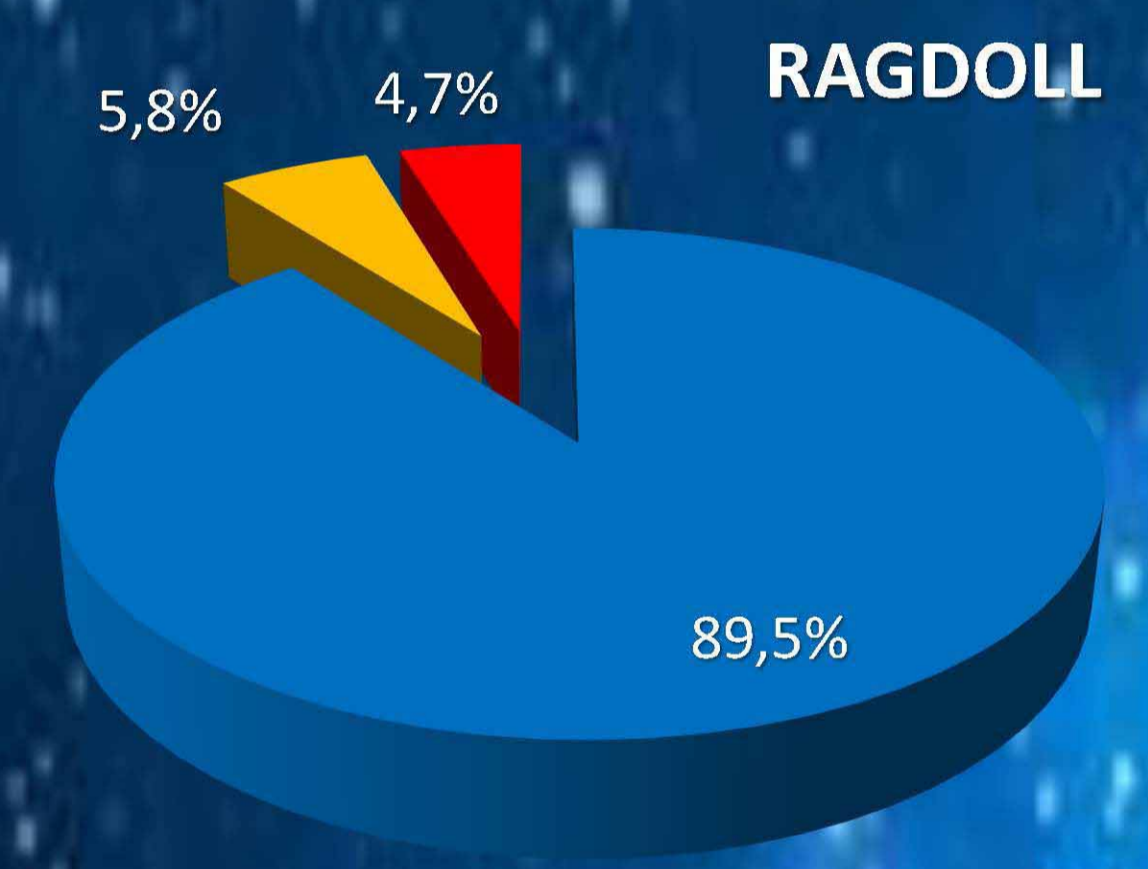
The disease status is defined by echocardiography according to established guidelines (left ventricular diastolic wall thickness <5.5 mm = HCM negative, ≥5.5 but <6 mm = HCM equivocal; ≥6 mm = HCM positive).

In the 7 most represented breeds, HCM (grouping mild, moderate and severe cases) shows an average % of clinical positiveness of 5.14% (st.dev 1.76) ranging from 2.6% in the British SH to 7.89 in the Birman. Affected random bred, Bengal and Persian cats are also recorded (**Tab1**, “Others”).

Long-term follow up of the clinical and echocardiographic status on both healthy and affected cats shows an average of cats re-checked at least once of 14% (detailed % by breed in **Tab.2**).



BREED	% HEALTHY	% BORDERLINE	AFFECTED			TOTAL
			%MILD	%MODERATE	%SEVERE	
MAINE COON	91	5	2	1	2	737
NFC	92	4	2	1	1	126
SIBERIAN	92	3	2	3	1	119
RAGDOLL	90	6	1	1	2	86
SPHYNX	90	3	0	2	5	58
BRITISH SH	95	3	0	0	3	38
BIRMAN	92	0	0	3	5	38
RANDOM BRED	76	9	3	6	6	34
BENGAL	75	13	13	0	0	16
PERSIAN	25	0	25	25	25	4
EXOTIC	100	0	0	0	0	2
TURKISH VAN	100	0	0	0	0	5
SCOTTISH FOLD	100	0	0	0	0	4
CHARTREUX	100	0	0	0	0	1
DEVON REX	100	0	0	0	0	3
AMERICAN SH	100	0	0	0	0	1
OTHERS	81	6	8	3	3	36
TOTAL						1308



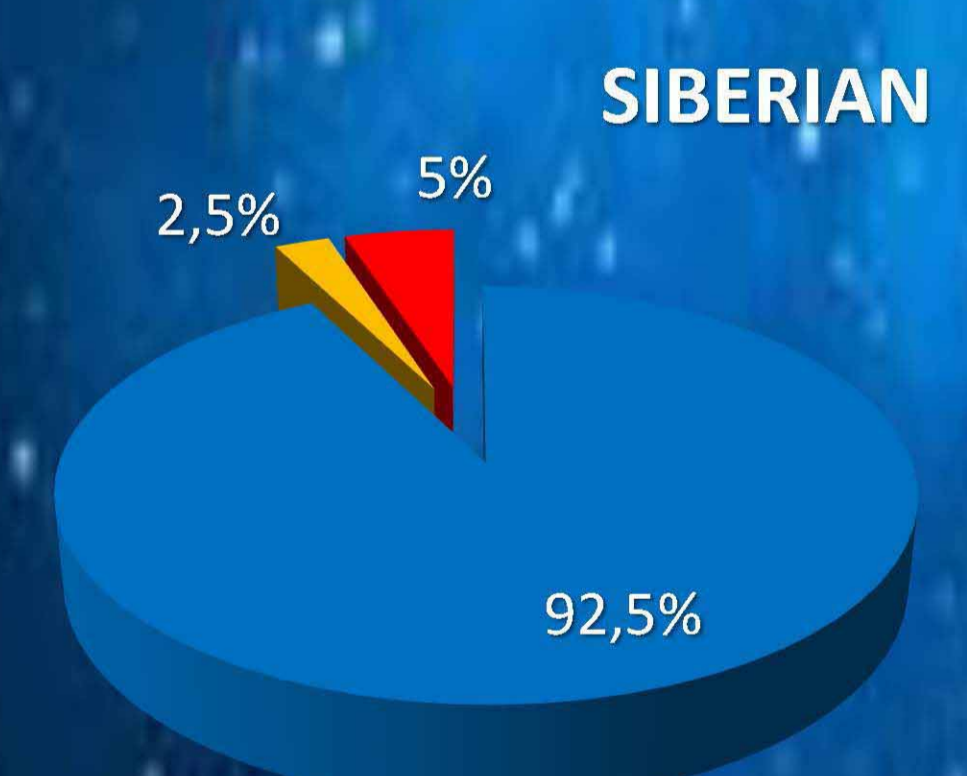
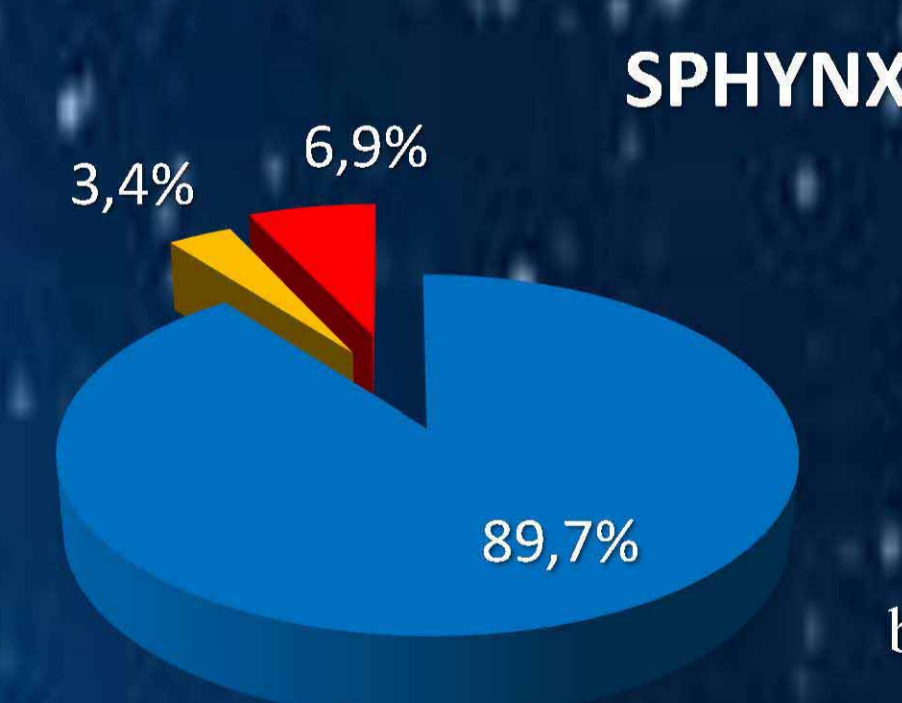
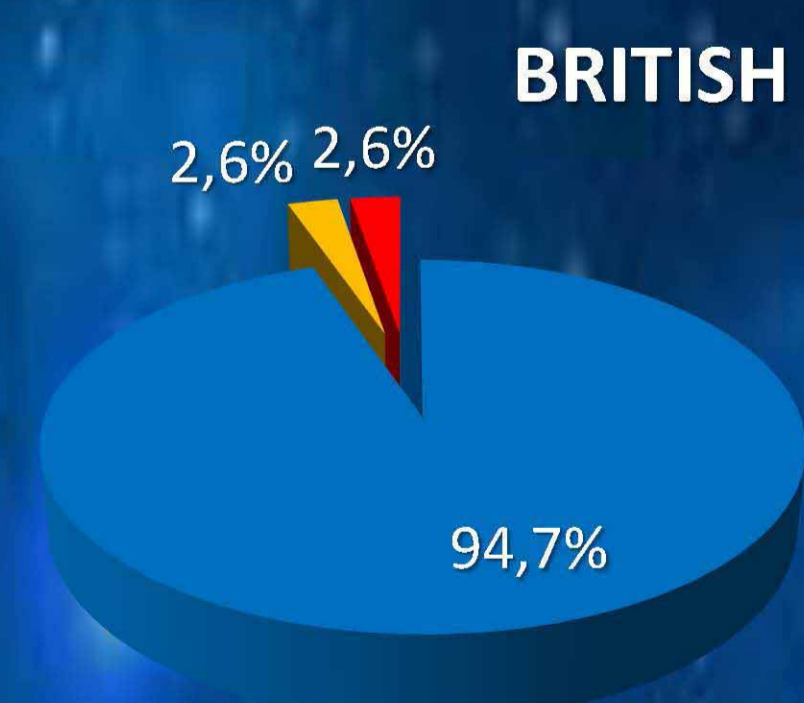
Tab 1. Osservatorio Italiano HCM Felina. Diagnosis of Hypertrophic Cardiomyopathy (HCM) by clinical visit and ultra sounds analysis. % of the cats with different diagnosis by Breed

Below the **legend** of the “Star Wars Spaceship Cakes” which refer to Tab.1 data. In the “cakes” Mild, Moderate and Severe cats are summarized in the class “Affected” (red slices)



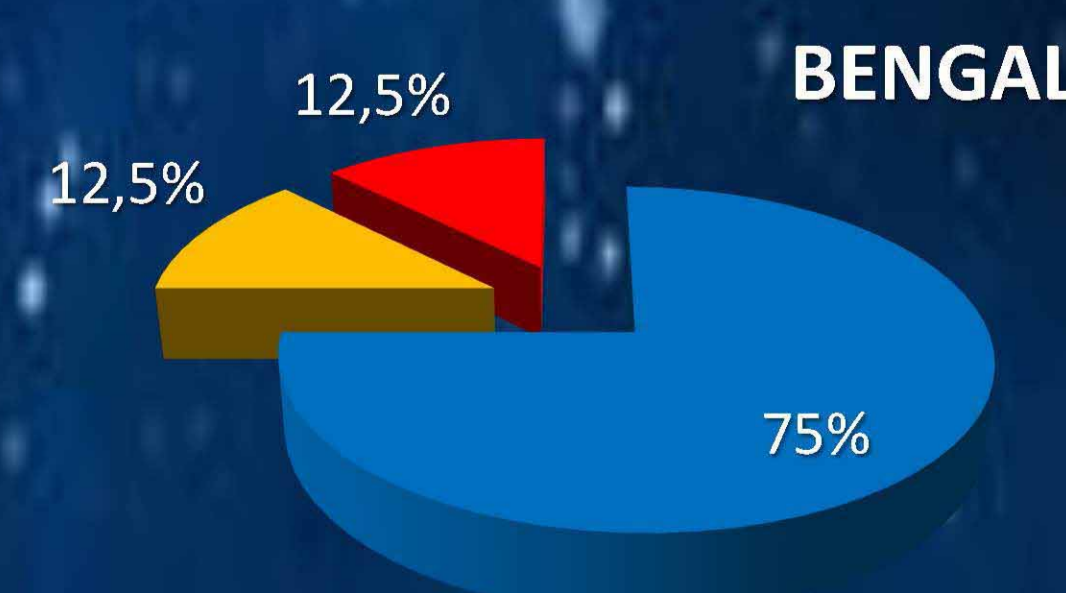
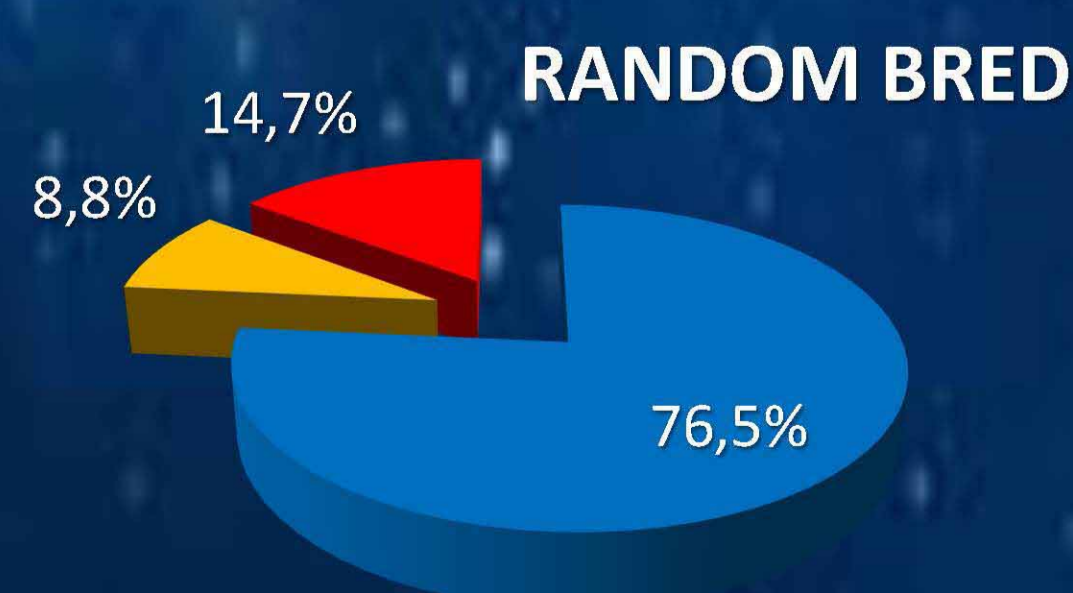
Tab 2. Osservatorio Italiano HCM Felina: Long-term follow up. % of the cats with 2 or 3 or 4 or 5 clinical visits and echocardiographies on the total of the cats with only 1, by breed. The time between the visits ranges from 0.5 to 1 year, according to the cat health conditions and its age.

BREED	FOLLOW UP: % of cats analysed by US / Breed				
	2 Times	3 Times	4 Times	5 Times	TOT
MAINE COON	11%	2%			13%
NFC	23%		5%	2%	30%
SIBERIAN	16%	4%			20%
RAGDOLL		2%			2%
SPHYNX	5%				5%
BRITISH SH	12%	4%			16%



Tab 3. The Italian Feline Biobank-Vetogene: biological samples stored for service to breeders and for research

BREED	CAT SAMPLE STORED (blood or tissue) / BREED	CAT TESTED / BREED	N. of TESTS / BREED
ABYSSINIAN / SOMALI	72	8	8
BENGAL	28	13	24
BIRMAN	128	65	88
BRITISH SH	223	180	316
CHARTREUX	49	39	80
DEVON REX	38	13	18
EXOTIC	212	205	207
MAINE COON	1702	1582	2318
NFC	178	63	86
ORIENTAL	19		
PERSIAN	628	583	595
RAGDOLL	357	329	550
RANDOM BRED	149	7	10
SCOTTISH FOLD	44	38	60
SIAMESE	11		
SIBERIAN	200	82	173
SPHYNX	80	18	27
Others	20	12	12
<i>Panthera tigris</i>	9	9	9
TOTAL	4147		



The Osservatorio's model is now expanding to some dog breeds.

WE THANK:

Associazione Nazionale Felina Italiana (ANFI), Associazioni Feline Federate (AFeF), the Maine Coon Club, the Norwegian Forest cat breeders, the Associazione Italiana Amatori Gatto Sacro di Birmania (AGaBI) and all the Italian breeders.

Mr. Paolo Valiati and Mrs. Caterina Scilini (UNIMI), Enrico Moretti DVM, Alessandra Gessi PhD, Diana Chempis DVM and Mr. Amedeo Picchi (Vetogene), Amedeo Pini DVM, Diana Lenoci DVM and all the Veterinarians collaborating with the Osservatorio.

References: **1** Longeri *et al.* (2013) J Vet Intern Med; 27(2):275-85.

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