

Blood Groups in the Cat

I started this investigation following a blood test on our Devon Rex kitten. She was found to be type B, when both her parents had been tested as type A. I had already been involved with the article by Judith Picknell, and the Danish translation of it, so was aware of the potential problems of mismatched blood types for a mating.

I then looked for and found various articles on the Internet, and have compiled all the data available to me into this document. Initially I just listed the URL's and then extracted the data specifically on the distribution of blood groups. They are shown below in text only form. I have corrected any obvious spelling mistakes.

Although the importance of blood groups is known to breeders, the exact reason does not seem to be appreciated. Obviously, for blood transfusions, correct matching is important, although the difficulty of matching is much less than for humans with the more limited range of blood types. However, the effect of incompatibility between mother and kittens is not at all well known. The risk to kittens in the first few hours after birth can, in some instances, be very high; in fact, in some litters mortality *will* be 100% if no precautions are taken.

The reasons for this effect of blood groups in cats can be summarised thus:

Immediately after birth, the surface proteins of the kittens red blood cells may in some circumstances react to antibodies from the mother, and this will destroy the kittens blood cells.

The circumstances are:

only if the mother has type B blood,
and if a particular kitten has type A blood.

A kitten having type A can *only* occur if the father is type A (or type A carrying B).

The kittens obtain the antibodies *only* after birth, from the first milk, colostrum.

This problem in some matings will affect kitten survival and the population make-up:

Hardly surprisingly, in the general cat population, as type B mothers will be prone to lose more kittens than type A mothers, the tendency will favour type A.

However, in geographically closed populations, type B can have the ascendancy.

Similarly, in selected pedigree populations, particularly where the breeder can feed kittens at risk away from the mother for the first 16-24 hours, type B females have the opportunity to find more type B males.

These tendencies are reflected in the statistics presented in various research papers and research based articles:

In general, domestic cats ('the general population') have 7-8% type B in the UK but 1% in the USA

The highest percentages of type B in pedigree cats occur in the British and Rex:

British have from 40-59% in the USA and 59% in the UK.

Devon Rex have from 41-45% in the USA and 54% in the UK.

Cornish Rex have from 33-40% in the USA and from 20-30% in the UK.

In Turkey, Van were 60% type B and Angora were 46% type B.

The reason for the differences between percentages in the different countries own research is probably statistically insignificant. The significant difference for the Rexes between the two countries is very interesting. The difference between the general cat population ('domestics') and the selected ('pedigree') cat population is highly significant.

Generally, it should be clear to all breeders that the death of just born kittens due to this problem is in the main avoidable by blood typing before mating.

If you wish to look at the statistical detail, I have listed below all the sources that I could find for use in this article. At the end of the listings, I have then made a simplified table to compare the various findings. Each link is active.

§§§-1

From Journal of Veterinary Medicine Series A
<http://cat.inist.fr/?aModele=afficheN&cpsidt=15061437>

113 Turkish Van and Angora cats were examined for blood typing using a slide and tube agglutination assay. Of the 85 Van cats surveyed, 40% had type A, and 60% had type B blood. Of the 28 Turkish Angora cats, 53.6% had type A, and 46.4% had type B blood. No type AB cats were found between both breeds. This was in Turkey.

§§§-2

From Judith Picknell
<http://www.rhagorol.co.uk/rexcatz/bloodgroups.htm>

The most extensive study to date of feline blood-type distribution across different breeds has been carried out by Professor Giger and his team at the University of Pennsylvania, USA, which shows 33% of Cornish and 45% of Devons are type 'B'.

§§§-3

From Urs Giger and Margret L. Casal
<http://www.rapidvet.com/fading.html>

Table 4:

Blood type A and B frequency and risk for neonatal isoerythrolysis in the USA

	Blood frequency (%)		Allele frequency (A+B=1)		Proportion of matings at risk for NI (%)
	Type A	Type B	A allele	B allele	
Abyssinian	86	14	.63	.37	12
Birman	84	16	.60	.40	13
British shorthair	60	40	.37	.63	24
Burmese	100	0	1.0	.00	0
Cornish Rex	66	34	.42	.58	23
Devon Rex	59	41	.36	.64	24
Domestic shorthair	99	1	.90	.10	1
Himalayan	93	7	.74	.26	6
Japanese Bobtail	84	16	.60	.40	13
Maine Coon	98	2	.86	.14	2
Norwegian Forest	93	7	.74	.26	6
Persian	86	14	.63	.37	12
Scottish Fold	82	18	.58	.42	15
Siamese	100	0	1.0	.00	0
Sphynx	82	18	.56	.44	16
Somali	83	17	.59	.41	14
Tonkinese	100	0	1.0	.00	0

§§§-4

From DMS Laboratories (associated with Urs Giger) based in the USA

<http://www.rapidvet.com/felinepi.html>

BREED	FREQUENCY OF B TYPE (%)	BREED	FREQUENCY OF B TYPE (%)
Abyssinian	14	Japanese Bobtail	16
Birman	16	Persian	14
British SH	40	Scottish Fold	18
Cornish Rex	34	Somali	17
Devon Rex	41	Sphynx	19

§§§-5

From Dr. Diane Addie based in the UK

<http://www.dr-addie.com/Blood%20groups.htm#What%20is%20neonatal%20isoerythrolysis?>

Breed	Type B	Type AB	Total no. of cats tested by author
Abysinnian	0%		6
Asian	0%		1
Bengal	0%	50% *1	8 *1
Birman	22%		69
British Shorthair	53%	0%	128
Burmese	0%		16
Chinchilla	0%		1
Cornish Rex	20-30% *2		
Devon Rex	54%	7%	28
Domestic shorthair	8%	2%	48
Domestic longhair	7% * 2	14% *1	14 *1
Exotic Shorthair	20-30% *2		
Himalayan	10-20% *2		
Japanese Bobtail	10-20% *2		
Maine Coon	<5% *2		2
Manx	0%		3
Norwegian Forest	<5% *2		
Ocicat	0% *2		
Oriental shorthair	0% *2		
Persian	12% *1		17 *1
Scottish Fold	0%		1
Siamese	0%		7
Somali	10-20%	22% *1	9 *1
Sphynx	10-20%		3
Ragdoll	8%	8%	24
Turkish Van	0%		1

* Where I have not tested any members of a breed, or another author has tested more cats, I've used their percentages: Knottenbelt et al, 1999₁ or Callan & Giger, 1994₂.

§§§-6

From Urs Giger 1991 USA (my translation) Found at-
<http://www.felissana.nl/dutch/text/folders/Folder%20Bloedgroepen%2003-2002.pdf>

Breed	A	B	Total A + B	Fraction B dieren	Geschatte Genfreq. B
Abyssinian	155	39	194	0.201	0.448
Sacred Birman	178	38	216	0.176	0.419
British Shorthair	35	50	85	0.588	0.767
Devon Rex	57	43	100	0.430	0.656
Himalayan	28	7	35	0.200	0.447
Persian	129	41	170	0.241	0.491
Scottish Fold	23	4	27	0.148	0.385
Somali	21	6	7	0.222	0.471
Remaining	33	8	41	0.195	0.442
Pure A	205	0	205	0	0
Total pedigree	864	236	1100	0.215	
Housecat	1069	3	1072	0.003	0.053
Total	1933	239	2172	0.110	

§§§-7

From Knottenbelt et al 1999 UK (my translation) Was also found at
<http://www.felissana.nl/dutch/text/folders/Folder%20Bloedgroepen%2003-2002.pdf>

Breed	Total	A (n + %)	B (n + %)	AB (n + %)
British Shorthair	121	48 (39.7)	71 (58.7)	2 (1.6)
Sacred Birman	24	15 (62.5)	7 (29.2)	2 (8.3)
Persian	17	15 (88.9)	2 (11.8)	0
Burmese	10	9 (90)	1 (10)	0
Somali	9	7 (77.8)	0	2 (22.2)
Bengal	8	4 (50)	0	4 (50)
Ragdoll	7	5 (71.4)	2 (28.6)	0
Siamese	4	4 (100)	0	0
Devon Rex	2	2 (100)	0	0
Abyssinian	2	1 (100)	0	1 (50)
Chinchilla	1	1 (100)	0	0
Turkish Van	1	1 (100)	0	0
Bombay	1	1 (100)	0	0
Total	207	113 (54.6)	83 (40.1)	11 (5.3)
	Total	A (n + %)	B (n + %)	AB (n + %)
Short hair	125	110 (88)	10 (8)	5 (4)
Long hair	14	11 (78.6)	1 (7.1)	2 (14.3)
Total	139	121 (87.1)	11 (7.9)	7 (5)

My combined table

For this I have listed only the results for Type B.
I have also used the EMS breed codes for simplicity.

Under Breeds, the α shows non-FIFe breeds.

In the original abstracts, no indication is given for some breeds as to whether or not both Long and Short Hair varieties are included.

Under the percentages, the * indicates statistically insignificant results.

NOTE that some references above are different abstracts from the same source, but the comparisons below show/that they report *different* figures - perhaps the abstracts were put together from/on different dates?

Breed data from	\$\$\$-1 Turkey	\$\$\$-2 USA	\$\$\$-3 USA	\$\$\$-4 USA	\$\$\$-5 UK	\$\$\$-6 USA	\$\$\$-7 UK
ABY			14	14	0	20	0*
ASL/S α					0		
BEN					0		0
BOM α							0*
BRI			40	40	53	59	59
BUR			0		0		10
Chinchilla? α					0*		0*
CRX		33	34	34	20-30		
DRX		45	41	41	54	43	0*
DomesticSH			1		8		
DomesticLH					7		
EXO					20-30		
Himalayan α			7		10-20	20	
JBT			16	16	10-20		
MAN					0		
MCO			2		<5		
NFO			7		<5		
OCI					0		
ORI					0		
PER			14	14	12	24	12
RAG					8		
SFL/S α			18	18	0	15	
SBI			16	16	22	18	29
SIA			0		0		0*
SPH			18	19	10-20		
SOM			17	17	10-20	22	0
TON α			0				
TUA	46						
TUV	60						0*
Others α					20		
LH?							7
SH?							8
Total pedigree					22		
Total domestic					<1		
Total both					11		

Conclusion

My own personal conclusion from the various documents, as summarised above, is that the British, Devon Rex and Cornish Rex (in that order) breeds are the most at danger of post-natal kitten deaths due to blood type problems. It is clear, assuming the studies were definitely localised by country, that the modern breeders by importing and exporting queens and studs will have in the near future a more pressing need to blood type the cats before mating, if the problem of post-natal kitten deaths due to blood type problems is to be minimised. Additionally, the European policy of reducing the allowed cross-breeding at least in some breeds, is a sensible one from this point of view.

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