BLOOD TYPES AND RUSSIAN CATS

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In this article I shall be looking at the different blood types in cats, and how they affect the Russian breed.

Cats have three blood types: type A, type B, and type AB. These blood types are determined genetically. The gene for blood type A is dominant over the gene for blood type B. Therefore, cats with two type A genes (AA, homozygous) and cats with one type A and one type B gene (Ab, heterozygous) will be blood type A, while only cats with two type B genes (bb, homozygous) will be blood type B. The blood type AB gene is inherited independently, and appears to be recessive to type A and dominant to type B.

In the general cat population blood type A is by far the most common, being present in 94%-99% of domestic cats in the United States of America, with type B making up most of the remainder. Blood type AB is very rare. However, the distribution of blood types can vary greatly between different countries and between different breeds of cat. Siamese cats and related breeds have so far been shown to be only blood type A, while other breeds, such as the British Shorthair, can have a high frequency of blood type B (up to 60%)[1].

There can be geographical variations within breeds, and so the likely blood type of a cat should not be assumed. The Russian Blue has been considered to be blood type A only; a survey of the *Frequency of Blood Types in Pedigreed Cats* conducted by the University of Pennsylvania found Russian Blues in the USA to be 100% blood type A[2]. However, since the *GCCF Registration Policy for Russian Cats* was updated in 2015 to require DNA tests for imported cats, it has come to light that certain Australian lines carry blood type B, and so it is possible that one or more of the cats imported prior to 2015 might be carriers. Further, the gene for blood type B has even been found in a UK-bred cat. Therefore, it would appear that the UK population of Russian cats should be considered to have a low incidence of blood type B, rather than being clear of it.

The blood type of a cat is **not** a defect, nor is it a health issue for that cat. However, it can present complications in particular situations owing to an incompatibility between blood type

[1] Little and Kornya, 2015, pp. 1-2
[2] Little and Kornya, 2015, p. 2

A and blood type B. Blood type B cats all have naturally occurring high levels of anti-A antibodies in their blood. If a type B cat were to receive a blood transfusion from a type A donor cat, this would cause a severe, even fatal, reaction because the cat's immune system would identify the type A blood as 'foreign' and attack it. Some blood type A cats also have naturally-occurring anti-B antibodies, so they too could develop severe reactions if given a transfusion of incompatible blood. Therefore, it is essential for veterinary surgeons to test the blood types of recipient and donor cats before giving a transfusion[3].

This blood type incompatibility can also present problems for cat breeders. Any antibodies in a queen's blood are passed into her milk and colostrum. During the first 24 hours of a kitten's life, its intestine allows the absorption of these antibodies so that it can acquire 'passive protection' from its mother, which will help to protect it from disease during its early weeks. However, when a type B queen is mated to a homozygous type A stud all of their kittens will be type A, and when they feed on their mother's milk in those first 24 hours, then, along with her protective antibodies, they will absorb her anti-A antibodies. These will destroy the kitten's red blood cells just as if it had received a transfusion of incompatible blood. This condition is known as neonatal isoerythrolysis, and can be a significant cause of death in young kittens in certain breeds. This condition does not happen in type B kittens born to type A queens because type A cats have much lower levels of antibodies against type B blood cells, or even none at all[4].

The signs of neonatal isoerythrolysis can be variable, depending on the level of exposure to anti-A antibodies, and include:

- Sudden death;
- Fading kittens that may appear pale or jaundiced;
- Kittens often pass red coloured urine owing to the presence of haemoglobin from the breakdown of red blood cells;
- The tip of the tail, and sometimes of the ears, may drop off in mildly affected kittens owing to circulation issues;
- Some kittens may be unaffected[5].

[3] International Cat Care, 2017
[4] International Cat Care, 2017
[5] International Cat Care, 2017

In breeds where there is a significant frequency of blood type B, neonatal isoerythrolysis can be prevented by:

- Avoiding breeding from type B cats altogether, but this can result in limiting the gene pool;
- Only mating type B queens with type B studs, but this will eventually result in increasing the frequency of type B cats within the breed;
- Preventing type A kittens from suckling the colostrum of type B queens by removing them from the mother, and hand feeding them, or placing them with a type A foster queen, for the first 24 hours[6].

It is, clearly, important to blood type breeding pairs in high risk breeds.

In view of the problems described above, it would appear that, in breeds or breeding populations, such as the Russian cat in the United Kingdom, that do not have a high incidence of blood type B cats, it would be undesirable to introduce type B cats and thereby increase the frequency of type B within the breeding pool. Similarly, in catteries with mostly type A cats, it would seem advisable to breed away from blood type B, and so minimize potential problems with blood incompatibility and neonatal isoerythrolysis in the future[7]. The use of DNA testing to determine the genetic make-up of a cat's blood type can assist with this. Such tests are available from veterinary genetics laboratories.

[6] International Cat Care, 2017
[7] Little and Kornya, 2015, p. 4

References / Further Reading

International Cat Care (2017) *Feline blood groups and incompatibility*, available from https://icatcare.org/advice/cat-health/feline-blood-groups-and-blood-incompatibility (Accessed 23 November 2018).

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