Recommended Breeding Policy

For

The Bengal Cat



THE BENGAL BREED ADVISORY COMMITTEE

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BENGAL BREEDING POLICY

1.0. Introduction

This breeding policy accompanies and supplements the Bengal Registration Policy and Standard of Points and the GCCF general breeding policy and should be read in conjunction with those documents.

The aim of this breeding policy is to give advice and guidance to ensure breeders observe what is considered “best practice” in breeding the Bengal cat. The over-riding objective, as with all breeds, is to produce quality, healthy cats with good type and to continue to improve the Bengal cat standard.

The overall aims of the breeding policy areas are as follows:

a) To encourage the breeding of Bengals which conform as closely as possible to the Governing Council of the Cat Fancy (GCCF) Standard of Points (SOP).

b) To promote the breeding of Bengals with sound conformation, good temperament, good health and free from deleterious alleles or defects known to be heritable traits.

c) To accomplish the development of Bengals over the full range of colours (Brown (Black) Spotted, Brown (Black) Marbled, Snow Spotted, Snow Marbled, Black Silver Spotted, Black Silver Marbled, Blue Spotted and Blue Marbled) without causing either the deterioration of, or effecting the introduction of undesirable alleles or defects into the breeding programmes of other varieties of pedigreed cat.

d) To further the health, welfare and care of Bengal Cats at all times, in keeping with their role as domesticated companion cats.

2.0. Origins and History

The name Bengal comes from the Latin name for the Asian Leopard Cat *Felis Bengalensis*, and was developed from crosses between Asian Leopard Cats and domestic/pedigree cats. Under normal circumstances Asian Leopard Cats will not breed with domestic cats, but they may cross-mate if they have been raised with domestic cats. The original crosses between the two species were first carried out intentionally in America in the 1980s as part of a University research programme to investigate whether it would be possible to transfer the Asian Leopard Cat's apparent natural immunity to Feline Leukaemia to domestic cats. It was found that there was a slightly increased resistance to Feline Leukaemia but the research came to an end when the Feline Leukaemia vaccine became available.

Although the Asian Leopard Cat has the same number of chromosomes as the domestic cat, all F1 males were found to be sterile and were, therefore, excluded from the breeding programme. F1 females generally have limited fertility but some may not be fertile at all and have small litters. Although a small number of third generation (F3) males were found to be fertile, this was very often intermittent or transitory. More recently, second generation (F2), third generation (F3) and some fourth generation(F4) males have been found to be sterile. Some of the first generation(F1) females bred for the research programmes were placed with an interested breeder who attempted to breed on with them. Initially, due to these issues, there were not very many cats available and some of the early litters produced were entirely male so progress was very slow. However, kittens from successful mating's were used in the breeding programme and became the foundation cats of the Bengal breeding programmes that have produced the cats that have been imported into the UK since 1991.

Several close mating's were done in the early generations. This was done from necessity rather than from choice due to the small number of cats available. However, the original cats that had been used to establish the breed were from very diverse backgrounds so it was thought to be within acceptable limits. American Domestic Short Hairs were used together with a male and a female of Egyptian Mau type that had been imported from India. American bred Egyptian Maus were also used in the early breeding programme to widen the gene pool and to strengthen the breed. These early close mating's served to reduce the genetic heterogeneity and to stabilise the pattern of the Bengal Breed. However, It became clear that it would be necessary to widen the Bengal gene pool and also to reinforce the wild type 'look' of the Bengal. Another Asian Leopard Cat had been mated to American bred Egyptian Maus and these lines were then integrated into the original Bengal lines. There are now a considerable number of Asian Leopard Cats in Bengal pedigrees some of which are in the pedigrees of Bengals into the UK.

The foundation cats used in the Bengal breeding programme were mainly Brown Spotted cats. The cats that were produced were originally described as Brown "Leopard" Spotted Bengals although this description was discontinued when Bengals were given Preliminary recognition by the GCCF in 1997. The spots were very large with a horizontal alignment and were sometimes arrow-shaped. Rosettes, which are formed by a part circle of spots around a distinctly lighter centre, were also sometimes produced enhancing the wild appearance. The Bengals had a distinctive ultra soft, silky coat with a "pelt-like" quality that had not been seen in other domestic breeds of cat and had either green or gold coloured eyes. Within a few generations, Bengals with a modified Classic Tabby pattern were produced. These were described as a Brown Marbled Bengals. The pattern was asymmetrical with a horizontal alignment that was more apparent when the cat was stretched out. It has been suggested that the presence of Marbled Bengals in the pedigree increases the incidence of rosettes in the spotted pattern. In addition, Spotted Bengals with very large spots occur in otherwise normally spotted litters. The very large spotting sometimes resembles a marbled pattern that has been cut up. Even the smaller spots sometimes follow what appear to be marbled pattern outlines.

Later, kittens with pure white appearance at birth started to appear in Bengal litters. These kittens slowly developed their colouring and pattern. These were Snow Spotted Bengals with Blue eyes.

Occasionally, a Blue-Eyed Snow Marbled Bengal would appear in a litter. Blue-Eyed Snow Bengals have an almost white background colour with the Spotting or Marbling in a Himalayan pattern distribution. The pointed colour distribution was more apparent in the Snow Spotted Bengals than in the Snow Marbled Bengals. The occurrence of Snow Bengals was attributed to the presence of the Siamese gene in some of the foundation domestic cats as successive generations were bred, it became apparent that both the Snow colouring with the Blue eyes and the Marbled pattern were being carried as recessive genes. Spotted Bengals carrying Snow and/or Marbled produced mixed litters when mated together. Snow-to-Snow mating's produced only Snows and Marbled-to-Marbled mating's produced only Marbleds.

Another outcross, this time to a Burmese, gave rise to a Snow Bengal with the Tonkinese colour restriction in which both the Siamese and Burmese genes were present. A wide spectrum of eye colour has been observed in the Snow Bengals that were produced from this line ranging from Blue-Green to Green to Gold. Mating two of these Tonkinese colour restriction Snows may produce Snow Bengals with Siamese, Tonkinese or Burmese colour restriction. Snow Bengals with Burmese colour restriction usually have gold eyes but again a range of colours are seen except Blue. The presence of the Burmese gene has a marked effect on the strength of the colour both in the Snow Spotted Bengals and the Snow Marbled Bengals. The colour is stronger, the pattern is much more clearly defined and the pointed distribution of the colour and pattern is hardly noticeable at all.

3.0. Characteristics and Temperament

Bengals are alert, friendly and affectionate cats and should be in excellent physical condition with a dependable temperament. Due to the 'wildcat' origins of the Bengal, good temperament is of paramount importance in the breed. The Asian Leopard Cat is essentially a timid cat that is more likely to run away than to attack. However due to their background they do not exhibit a domesticated phenotype. For this reason, breeders have selected breeding cats with good temperament right from the start of the Bengal breeding programme to produce the loving dependable cats that we have today. The practice of selecting for good temperament continues to be of paramount importance in current Bengal breeding programmes.

4.0. Genetic Make-up

The origins of most pedigree breeds lie with *Felis silvestris* or *Felis lybica*, a mackerel tabby ancestor from the north of Africa. Many centuries of evolution and genetic mutations along the way have led to development of the many diverse cat breeds, which we see around us today. The Bengal, in common with all domestic cats, has 38 chromosomes, which hold all the genes necessary for determining the size, shape, colour, and pattern and hair length of each individual.

There are thousands of genes involved, the majority of which are unknown. However, breeders are able to predict the outcome of the majority of mating's via their knowledge of a small group of genes. Over many hundreds of years, genetic mutations have taken place that has resulted in new colours, patterns and hair structure giving rise to the distinct differences between the cat breeds we recognize today. In the case of the Bengal, the key genes influencing colour, pattern and hair length within the breed are as for other breeds.

4.1. Colour Genes

Dense (D) – a gene causing pigment granules in the hair shaft to be evenly distributed, resulting in "dense" colours (often referred to as "Dominant") e.g. Black.

Dilute (d) - the recessive form of D, causing pigment granules to be enlarged and unevenly deposited in the hair shafts. When homozygous (i.e. dd), this results in the familiar "dilute" series of colours e.g. Blue.

Agouti (A) – the "wild type" dominant gene that allows Tabby patterns to be expressed. The basic agouti pattern consists of hairs alternately banded with Black and Yellow . Other pattern genes operate to produce the various tabby patterns (Marbled (modified Classic) and Spotted seen in the breed. The basic Black/Yellow pigmentation may also be affected by other colour genes (see below).

Non-agouti (a) – the recessive form of Agouti; when homozygous (i.e. aa), the appearance is changed from Tabby to Self (solid colour) or Smoke (if the Inhibitor gene is also present). Occasionally, "ghost" tabby markings may be seen on Self or Smoke cats. Self or Smoke cats produced from Bengal parents indicate that the parents are heterozygous for the Agouti gene. This is highly undesirable in a Bengal breeding programme.

Black (B) – the "wild type" colour gene, resulting in a cat with black (eumelanin) pigment in its hairs (or Blue in the dilute form i.e. dd).

Full Colour (C) – produces full expression of colour; pigment is evenly distributed along the hair shafts and over the cat's body.

White Spotting (S) – Can occur in conjunction with any of the other colour and/or pattern genes; responsible for Bi-coloured and Tri-coloured cats. S is very variable in expression (but is generally considered to be "additive" so that mating two "any colour and white" cats may produce higher grade white spotted offspring). Bengal cats are scrutinised closely for any signs of white spotting which is a fault.

Inhibitor (I) – A dominant gene that inhibits the deposition of pigment in hair shafts resulting in 'Silver' i.e. white roots to the hair shaft. The length of the white portion is dependent on other

genes, including the Agouti gene. Agouti cats with the Inhibitor gene are Silver Spotted or Silver Marbled. Non-Agouti cats expressing the Inhibitor gene are termed Smoke.

4.2. Tabby Pattern Genes.

The Spotted/Rosetted and Marbled Bengal patterns are modified Spotted and Classic Tabby patterns found in other breeds. Traditionally it had been believed that the three forms of tabby pattern were inherited as an allelic series. However, it now appears as if at least two and probably three, different loci are responsible for the various Tabby patterns (Lorimer, 1995). At one locus are the alleles for Mackerel and Classic Tabby patterns with Mackerel dominant to Classic; at another locus is the Abyssinian or Ticked pattern, which is epistemic (masking) to both Mackerel and Classic), and at the third locus there appears to be a modifying gene for either the Classic or Mackerel patterns resulting in the Spotted Tabby pattern. These can be summarised as follows;

Mackerel (Mc) – the basic tabby pattern of narrow vertical stripes on the body, overlaying the agouti base (i.e. “wild type”)



Mackerel Tabby Pattern – note ;narrow stripes and three parallel spine-lines

Spotted (Sp) – the current thinking is that a specific single gene is likely to be responsible for the spotted tabby pattern, breaking up the mackerel or classic pattern into elongated or rounder spots respectively or rosettes as found in the Bengal.



Spotted Pattern (a variation of the mackerel tabby pattern)

Classic (mc) – a mutation of the mackerel allele recessive to all other tabby patterns which give a blotched pattern with the characteristic “butterfly” motif across the shoulders and “oysters” on flanks.



Blotched/ ‘Classic’ or Marbled Tabby Pattern

The colours and patterns recognised currently in the Bengal with associated breed numbers are;

Colour	Status	Old Code	New Code
Brown (Black) Marbled Bengal	Championship	76 20	***BEN n 22***
Blue Marbled Bengal	Preliminary	76 20a	***BEN a 22***
Black Silver Marbled Bengal	Championship	76 20s	***BEN ns 22***
Brown (Black) Spotted Bengal	Championship	76 30	***BEN n 24***
Blue Spotted Bengal	Preliminary	76 30a	***BEN a 24***
Black Silver Spotted Bengal	Championship	76 30s	***BEN ns 24***
Any Other Colour Eyed Snow Marbled Bengal	Championship	76a 20	***BEN n 22 32***
Any Other Colour Eyed Blue Snow Marbled Bengal	Preliminary	76a 20a	***BEN a 22 32***
Any Other Colour Eyed Snow Spotted Bengal	Championship	76a 30	***BEN n 24 32***
Any Other Colour Eyed Blue Snow Spotted Bengal	Preliminary	76a 30a	***BEN a 24 32***
Any Other Colour Eyed Silver Snow Spotted Bengal	Championship	76a 30s	***BEN ns 24 32***
Any Other Colour Eyed Silver Snow Marbled Bengal	Championship	76b 20s	***BEN ns 22 32***
Blue-eyed Snow Marbled Bengal	Championship	76b 20	***BEN n 22 33***
Blue-eyed Blue Snow Marbled Bengal	Preliminary	76b 20a	***BEN a 22 33***
Blue-eyed Snow Spotted Bengal	Championship	76b 30	***BEN n 24 33***
Blue-eyed Blue Snow Spotted Bengal	Preliminary	76b 30a	***BEN a 24 33***
Blue-eyed Silver Snow Spotted Bengal	Championship	76b 30s	***BEN ns 24 33***
Blue-eyed Silver Snow Marbled Bengal	Championship	76b 20s	***BEN ns 22 33***

4.3. Other Coat-Related Genes.

Wide-Banding (Wb) - Postulated by Robinson as a distinct gene although this hypothesis has never been proved – in fact more likely to be polygenetic. Undercoat width genes determine the width of the undercoat whether or not the cat has an Inhibitor (Silver) gene. The term “undercoat” refers to the part of the hair shaft closest to the body and includes both guard hairs and the shorter hairs often referred to as “undercoat” hairs. The variability seen in undercoat widths in cats points to the probable polygenetic nature of Wide-Banding genes. If a single gene, it is likely to be an incompletely dominant gene mutation. The effect serves to push the darker pattern colour up and away from the hair base towards the tip, turning normal tabby patterns into the shaded or tipped pattern. This effect is highly undesirable in Bengals whose pattern normally goes down to the roots with the pattern being replicated on the underlying skin.

Shorthair (L) – Longhair in cats is recessive to Shorthair, and in fact it has been found that 4 distinct mutations are responsible for controlling hair length in domestic cats. The longhair genes is carried in certain Bengal lines leading to occasional Longhair Bengal Variant kittens in some litters.

Polygenes – these are collections of genes, which modify the effect of the main dominant and recessive genes above. A build-up of polygenes serves to enhance the effect of the main colour genes, for example rufousing genes which can be observed enhancing the rich ground colour of certain Brown Bengals. In some early Bengal breeding programmes, Abyssinians were used to improve the colour of Brown Bengals although the polygenic effect of the Abyssinian colouring had to be balanced against the introduction of the Ticked Tabby gene, which was detrimental to the pattern quality.

In recent years, selection for Bengal cats with Whited tummies has taken place giving an extreme contrast to the underside of the cat with dark spots on a whited background. This effect varies from a narrow whited band to a full whited tummy.

5.0. The Bengal Standard of Points

5.1 Type

The Bengal is a large to medium cat of foreign type, sleek and muscular with a thick tail which is carried low. The females may be smaller than the males. The Bengal's wild appearance is enhanced by its distinctive rosetted / spotted or marbled tabby coat which should be thick and luxurious.

5.2 Head and Neck

Broad medium wedge with rounded contours, slightly longer than it is wide with high cheek bones. The head should be rather small in proportion to the body but not taken to extremes. The profile has a gentle curve from the forehead to the bridge of the nose. The line of the bridge of the nose extends to the nose leather making a very slight concave curve. The nose is large and broad with a slightly puffed nose leather. The muzzle should be full and broad with a rounded, strong chin and pronounced whisker pads created by the widely set canine teeth. The neck should be thick, muscular and in proportion to the body. Allowance should be made for jowls in adult males.

5.3 Ears

Medium to small, rather short with a wide base and rounded tips. Set as much on the side as on the top of the head, following the contour of the face in the front view and pointing forward in profile. Light horizontal furnishings are acceptable but ear tufts are undesirable.

5.4 Eyes

Almost round, oval preferred, large but not bold. Set on a slight slant toward the base of the ear.

5.5 Body and Tail

Long, sleek and muscular. Large to medium and robust with the hindquarters slightly higher than the shoulders, showing depth of flank. Tail of medium length, thick and even, with a rounded tip; may be tapered towards the end. Brown (Black) spotted, silver spotted &Marbled; tail tip should be black. Snow spotted / marbled; tail tip should be dark brown or charcoal.

5.6 Legs and Paws

Legs of medium length, strong and muscular. The hind legs should be a little longer than the front and be more robust. The paws should be large and rounded. Brown (Black) spotted, silver spotted &Marbled; Paw pads should Black. Snow spotted / marbled; Paw pads should be brown with rosy undertones,

5.7 Coat

Short to medium in length,very dense, luxurious and unusually soft to the touch. Allowance should be made for a slightly longer coat in kittens.

6.0. Bengal Health and Genetic Defects

6.1 Breeders should ensure, to the best of their knowledge, that any Bengal cats included in an on-going breeding programme are of sound temperament, free from hereditary defects, (including those listed in the GCCF Standard of Points), and conform as closely as possible to the GCCF

Bengal Standard of Points. It is advisable to research the pedigrees thoroughly for selection of adult breeding cats. All cats used for breeding should exhibit sound conformation; It is recommended they should be selected from lines known to have vigorous reproductive ability, good temperament and be free from infectious disease and deleterious or harmful alleles or defects known to be heritable traits as discussed below.
Genetic testing should be used where possible to support long term breeding programmes and to eliminate genetic anomalies from the gene pool. It is recommended that cats that exhibit behavioural or skeletal abnormalities (spinal deformations or any abnormality of the bone structure of the tail) should not be bred from. It is also recommended that cats with a Burmese or Siamese head type or body type or with any evidence of white spotting (white areas on the body surrounded by colour) should not be used for breeding.
All Bengal males used for breeding must have a certificate of entirety lodged with the GCCF. All entire Bengal males imported onto the GCCF register must have a certificate of entirety lodged with the GCCF prior to the completion of their registration.

6.2 Infectious Disease

The susceptibility of the Bengal to infectious diseases is comparable to other domestic breeds. Their vaccination requirements are exactly the same as other breeds. The only point for breeders and owners to note is that enteric protozoal infections are not uncommon (in cats acquired mainly from larger breeding establishments and particularly in foreign imports) if hygiene precautions are not ideal. Any cat or kitten showing symptoms of diarrhoea that does not respond to simple treatment should be tested for the protozoal parasites, Giardia llambia and Tritrichomonas foetus.
Feline Infectious Peritonitis (FIP) is a problem in ALL breeds in multicat situations. It is not a simple infectious disease. Although it is not common it is almost invariably fatal and breeders should make every effort to understand this complex disease and take measures to reduce the spread of Feline Coronavirus. Sound breeding practice as regards hygiene, genetic health and limiting stress are also important in the prevention of FIP. More information about FIP can be found via the link below.

http://icatcare.org/advice/cat-health/feline-infectious-peritonitis-fip

6.3 Hereditary Disorders

Known inheritance with DNA test available.

Pyruvate kinase deficiency which causes chronic anaemia in a number of breeds is caused by a defect in an autosomal recessive gene. A commercial DNA test is now available. Although the incidence of affected (homozygous) Bengals has been found to be extremely low (< 3%), breeders are advised to test breeding cats so that mating between carriers can be avoided. Breeders should refer to the link below for more detailed information about the disease and testing. With sensible use of testing it should be possible to eliminate this gene from the breed in the UK without compromising the gene pool.

http://www.langfordvets.co.uk/diagnostic-laboratories/diagnostic-laboratories/general-info-breeders/list-genetic-tests/pyruvate

6.4 Progressive Retinal Atrophy (PRA)

A rare genetic eye disease called Progressive Retinal Atrophy which affects many breeds of cat and dog has been reported in Bengals in the USA but is thought to be rare in the UK. However, it is highly possible that the disease could be imported. It causes progressive blindness in young Bengals and there is no treatment. A DNA test for this condition in the Bengal has been developed and is now available from the UC Davis Veterinary Genetics Laboratory – see link

below. Testing of breeding cats is highly recommended and mating between carriers should be avoided as it is not acceptable to risk producing blind kittens when there is a means of prevention.

https://www.vgl.ucdavis.edu/services/cat/BengalPRA.ph

6.5. Hereditary basis suspected as at least contributory but mechanism unknown – DNA test not available

Flat Chested Kitten Syndrome (FCKS)

FCKS is a multifactorial condition, which usually develops in kittens a few days after birth. It is caused by abnormal development of the rib cage resulting in a flattened angular appearance. Although death from heart/respiratory failure can occur, mildly affected kittens often survive and grow out of the condition to lead normal lives as pets but should never be used for breeding. Genetic and dietary factors are thought to be involved. Kittens destined for breeding should be checked very carefully for any sign of FCKS. Tell-tale signs include a dip behind the shoulders, sharp angulation of the rib cage instead of a normal smooth curve and inward deviation of one or more ribs or the xiphisternum.

There are anecdotal reports that the condition can be prevented by supplementation of the pregnant queen's diet with taurine and some breeders claim that the condition can be reversed in neonatal kittens by supplementing with potassium when signs are first detected. Unfortunately there is no veterinary evidence to support these claims and caution is advised, as both substances can be toxic at excessive doses. See link for more information.

http://icatcare.org/advice/cat-health/flat-chested-kitten-syndrome

Outward deviation of the sternum is rare in Bengals and probably is not associated with FCKS. Nevertheless it is a defect that should be penalised in show cats and renders a cat unsuitable for breeding.

6.6 Heart Disease

Hypertrophic Cardiomyopathy (HCM)

HCM is a hereditary disease caused by a defect in an autosomal dominant gene that affects many species including man. It is the most common heart disease in cats including non-pedigrees and is a problem in many pedigree breeds. HCM does occur in some Bengal lines. The disease shows a highly variable clinical course; in severe cases death from heart failure or aortic thrombo-embolism (Blood clot in main blood vessel) can occur but many cats with mild HCM never show clinical disease and have a normal life span. Unfortunately no commercial DNA test is yet available in the Bengal. Screening of breeding cats by echocardiography is recommended but is not fool proof as many cats do not develop any detectable changes in the heart until middle or old age i.e. after they have been retired from breeding. Known affected cats and cats known to have produced affected offspring should be removed from the breeding program.

Echocardiography only gives you a small piece of the jigsaw. Other measures breeders can take which help prevention include thorough pedigree research, auscultation of the heart for murmurs before mating, and monitoring breeding cats after retirement. A blood test for myocardial (heart muscle) damage (NT Pro-BNP) is now available. Although not sensitive enough to detect early changes in young cats it may be of value for screening retired cats to help assess the risk of HCM in a line.

Other Heart Diseases

A variety of congenital heart diseases occur in domestic pets. The one most commonly seen in young Bengals is Mitral Valve Disease. This usually presents as a heart murmur in young kittens, which persists. Any kitten with a heart murmur that persists beyond 6 months should be examined by echocardiography. Cats with any significant anatomical deformity of the heart should not be used for breeding as there is a significant chance that it will have a hereditary basis.

6.7 Orthopaedic conditions - Patellar Luxation (and Hip Dysplasia)

Patellar luxation was seen in early imports but due to selective breeding the incidence is now low. In this condition the patella (knee cap) slips to the inside of the joint when the limb is extended due mainly to a shallow patellar groove on the end of the femur. If left untreated lameness and chronic osteo-arthritis will result. The condition can be corrected by surgery that is usually highly successful albeit costly. In some cats patellar luxation is associated with hip dysplasia where there is incongruity of the ball and socket surfaces of the hip joint. Again this condition affects the gait and predisposes the cat to osteo-arthritis. Cats with cow hocks may also be more prone to osteo-arthritis as the condition can be associated with joint deformities

6.8 Diseases of the Nervous System and Special Senses

Eye Abnormalities – Squints and Nystagmus

Squints are not uncommon in Bengals. Blue-eyed snow cats are most commonly affected and the squint is usually convergent. Squints develop at a variable age usually becoming apparent in the first year. Affected cats do not seem to suffer obvious sight problems but this is probably because they are good at adapting to the visual field deficit. They should not be used for breeding. The condition has a hereditary basis and is associated with the colour restriction gene inherited from foundation cats, which carried Siamese genes. The primary cause is an excessively high proportion of optic nerve fibres, which cross over at the optic chiasm. This causes a reduced medial visual field. It is thought that a squint develops in this situation due to a muscle imbalance caused by the kitten's eyes automatically attempting to compensate for the visual field deficit.

Nystagmus simply means abnormal eye movement. It can be congenital or acquired as a sequel to other diseases of the nervous system and is not covered further as it has no special predilection in Bengals. Congenital nystagmus is caused by a similar mechanism as squints and is confined to colour pointed varieties of cat. It is reported in blue-eyed snow Bengals but is extremely rare and does not seem to be nearly as common as squint. The nystagmus shows the same oscillatory pattern (fine tremor) as seen in more commonly affected breeds. Again affected cats should not be used for breeding.

Peripheral Neuropathy

A very rare condition called Peripheral Neuropathy is seen occasionally in kittens and young cats. The symptoms are flaccid paralysis of one or more limbs with the hind legs most commonly affected. Diagnosis can be difficult and is based largely on exclusion of other causes of paralysis. The cause of this condition is unknown but it responds extremely well to treatment with corticosteroids and most affected kittens make a complete recovery without relapse if treated early in the course of the disease. The cause is unknown but it may be due to an abnormal response of the immune system as inflammatory changes have been detected in the peripheral nerves of affected cats. A hereditary basis is suspected and kittens that have shown any sign of this condition should not be used for breeding.

In Summary:

- All Bengal cats' pedigrees should be thoroughly researched, the cats should be of sound temperament and scanned for known phenotypic and genetic defects (ideally through genetic testing). Selected breeding animals should be free from hereditary defects.
- Blood types should be ascertained where appropriate to avoid blood type incompatibility although research done by Professor Danielle Gunn-Moore at Edinburgh University indicated that the Bengal breed was almost 100% Blood Group A.

• Pedigrees should be investigated as much as is reasonably feasible to ensure that cats used do not descend from ancestors with hereditary diseases for which DNA testing is not yet available.

• DNA testing should be used where appropriate to ensure that cats used are free from testable genetic diseases.

BENGAL PROGRESSIVE RETINAL ATROPHY (PRA B) AND PYRUVATE KINASE DEFICIENCY (PK Def) TESTING SCHEME

A. ACTIVE REGISTER

All Bengals registered with the GCCF from (June 2016)may be registered on the Active Register, at the breeder's request, only if:

1. **They themselves have been genetically tested as normal (N/N*) for both PRA B and PK def.**

or

2. **Both parents have been tested normal (N/N) as in A1**

or

3. **They are from parents deemed normal (N/N) because of the results from the testing (as in A1) of cats on every pedigree line in previous generations. Pedigree line in this case refers to both parents or 4 grandparents, 8 great-grandparents, 16 great-great-grandparents and so on, or any combination of the same which is inclusive of both the sire's and dam's ancestors.**
   NB Condition A3 applies only when the ancestors are recorded on the GCCF computer. Imports onto the register must comply with either A1or A2. ie the submission of the test certificate(s) is required with the application for registration, or the import will be registered on the Genetic Register.

B. GENETIC REGISTER

Bengals, which have been genetically tested as carriers of PRA B (N/PRA B*) and/or PK def (N/PK Def*) shall be registered on the Genetic Register, or on the Non-Active Register if so requested by the breeder.
Bengals, which are not eligible for registration on the Active Register, shall be registered on the Genetic Register, or the Non-Active Register if so requested by the breeder.
Offspring of cats registered on the Genetic Register may only be registered on the Active Register if they have themselves been genetically tested as normal (N/N) for PRA B and PK Def.
All other offspring of cats registered on the Genetic Register shall be registered on the Genetic Register, or on the Non-Active Register if so requested by the breeder.
Cats must be micro chipped for identification purposes for the test certificate for that cat to be valid for the Active Register. The certificate must have been issued by the approved laboratory which performed the test.**
***Explanation of Genetic Status**
Normal – N/N. The cat has tested normal and does not possess an abnormal gene for the disease in question and will not show any clinical signs of that disease.
Carrier – N/PRA B. The cat carries one copy of the abnormal gene for PRA B. The cat will have normal vision.
Carrier – N/PK Def The cat carries one copy of the abnormal gene for PK Def but will not show any signs of the disease.

Affected – PRA B/PRA B. The cat carries two copies of the abnormal gene for PRA B and is likely to have impaired vision.
Affected – PK Def/PK Def The cat carries two copies of the abnormal gene for PK Def and is at risk of developing anaemia.
****Approved laboratories for DNA testing for PRA B and PK Def are:**

1. **Langford Veterinary Services, Langford House, Langford, Bristol, BS40 5DU**
2. **Veterinary Genetics Laboratory, University of California, Davis Old Davis Road, Davis, CA 95616**

6.9 NOTE FOR JUDGES:

Summary of Withholding Faults seen occasionally in Bengals. Most are rare but they should always be consistently checked for when judging.

Eyes – squint. Usually convergent. Most common in snow Bengals. Nystagmus very rare but should be looked for.

Bite – undershot bite is the most common defect and usually associated with a weak chin.

Chest – always check rib cage carefully as slight abnormalities which can be difficult to detect are common in cats that showed mild FCKS as a kitten. Persistent FCKS related abnormalities include a pronounced dip behind the shoulders, sharp angulation of the rib cage, one or more bent ribs and inward deviation of the tip of the sternum

Hernia – umbilical most common

Patellar luxation – any irregularity in the shape of the stifle (knee joint) or a clicking sensation noticed when the joint is flexed or extended must always be referred to the duty vet. Never manipulate the affected joint

Cow hocks – always check for this with cat standing on trolley

Tail – defects at tip most common

Coat – white lockets on throat and in groin region are not uncommon. Always check the underside of the cat. The white spotting gene is highly undesirable in Bengals. The best way to do this is to stand the cat on the trolley and raise the front end by placing a hand under the chest so that the underside can be inspected.

7.0. Breeding System

7.1. Selection of Breeding Bengals

RECOMMENDATIONS:

The selection of Bengal cats to be used for breeding purposes should be very strict, particularly so in the case of stud cats. Preference should be given to those individuals who conform most nearly to the GCCF Standard of Points with particular emphasis on overall balance and quality, type, characteristic coat quality and coat pattern.

Associated with these guidelines is the parallel requirement that the health and well-being of these cats, including the careful placement of kittens in suitable permanent homes, is to be of paramount importance at all times. The placing of kittens/cats in homes on 'breeding terms' is to be discouraged, especially with inexperienced individuals or novices .Breeders are urged to observe the recommendations of the GCCF Code of Ethics for Breeders & Owners and the advice of their own veterinary surgeons regarding cat welfare, the importance of neutering, health, inoculations and FeLV and FIV testing.

7. 2. Inbreeding

Inbreeding is an inclusive term covering many different breeding combinations and degrees of relationship – including the more distant, less intense. It is consistently more efficient in eliminating heterozygous (varying and diverse) genotypes and increasing homozygous (same) genotype thereby ensuring a greater likelihood that kitten will closely resemble their parents. Used here, the term does not mean close, purposeful, inbreeding of closely related cats (brother/sister, father / daughter), but rather the moderate form that results from the mating of not too distantly related (but not directly related) cats (first cousins, half brother/half sister, second cousins, etc.). Some inbreeding is essential to stabilise conformation around a definite type. Inbreeding is the act of mating individuals of various degrees of kinship and if continued it produces ever increasing homogeneity in the offspring.

It is important to monitor the percentage intensity of inbreeding for any mating (see GCCF general Breeding Policy) – use this consideration as a key part of the decision making process when considering any mating, and remember: "The more intense the inbreeding, the more careful must be the selection". "Loss of innate genetic variability must not be too great". The overall approach should be one of balance and moderation in the degree of inbreeding coupled with consistent selective breeding with a clear objective in mind – i.e. improvement of key aspect and/or the elimination of weak traits or defective genes.

Breeding systems and practices need to operate so as to ensure the Bengal gene pool contains enough variation to give scope to continue improving the breed and avoid the danger of either fixing type too quickly (before the ideal of the standard is reached) or deleterious genes being expressed and fixed in the breed. Breeders need to use a degree of inbreeding to gain sufficient homogeneity to fix recognisable Bengal type and all key aspects that determine the breed but with sufficient variation to both enable improvement, and maintain health and vigour, avoiding fixation of defective genes or unwanted traits (and to ensure the elimination of anomalies).

Anomalies – The problem of the genetic anomaly is something of which all breeders should be aware – this is not to suggest that such anomalies are common but the cat must be expected to have its quota of defects just as are found in other animals. The golden rule is that health is

paramount and must be constantly and consistently monitored. Any evidence of weakness, unsoundness or the emergence of lack of vigour must be dealt with immediately through modification of the breeding system. No cat with any evidence of health problems or lack of vigour should be used for breeding. This is true for breeding programmes with all breeds of pedigree cat or other animal.

7.3. Outcrossing

At this time, there is no allowable outcross for the Bengal and in the short-term it is envisaged that the majority of mating's will be between Bengals. However, it is acknowledged that outcrossing to other specific varieties of shorthaired cat such as Burmese and Abyssinian was conducted historically in order to widen the gene pool although such outcrosses ceased to be acceptable in Bengal pedigrees on 1st June 1997 when Brown (Black) and Snow Bengals were granted Preliminary Recognition by the GCCF.

It is the choice of the individual breeder as to how to plan their overall breeding strategy. However health and genetic diversity (i.e. minimising close inbreeding, which may lead to detrimental effects) must be the overriding consideration. The gene-pool needs to be widened further to ensure the continuance of healthy bloodlines. As stated previously, this can be achieved through introduction of new blood-lines from other countries as long as strict adherence is observed with the 'degree of relatedness' of the breeding animals and the calculated 'inbreeding coefficients' of the offspring.

8.0 References

(1) 'Robinson's Genetics for Cat Breeders and Veterinarians'. 1999 Carolyn M. Vella, C. M., Shelton, L. M., McGonagle J. J., Stanglein, T. W.Butterworth-Heinemann Ltd; 4th Revised edition

Gallery of Bengal Cats

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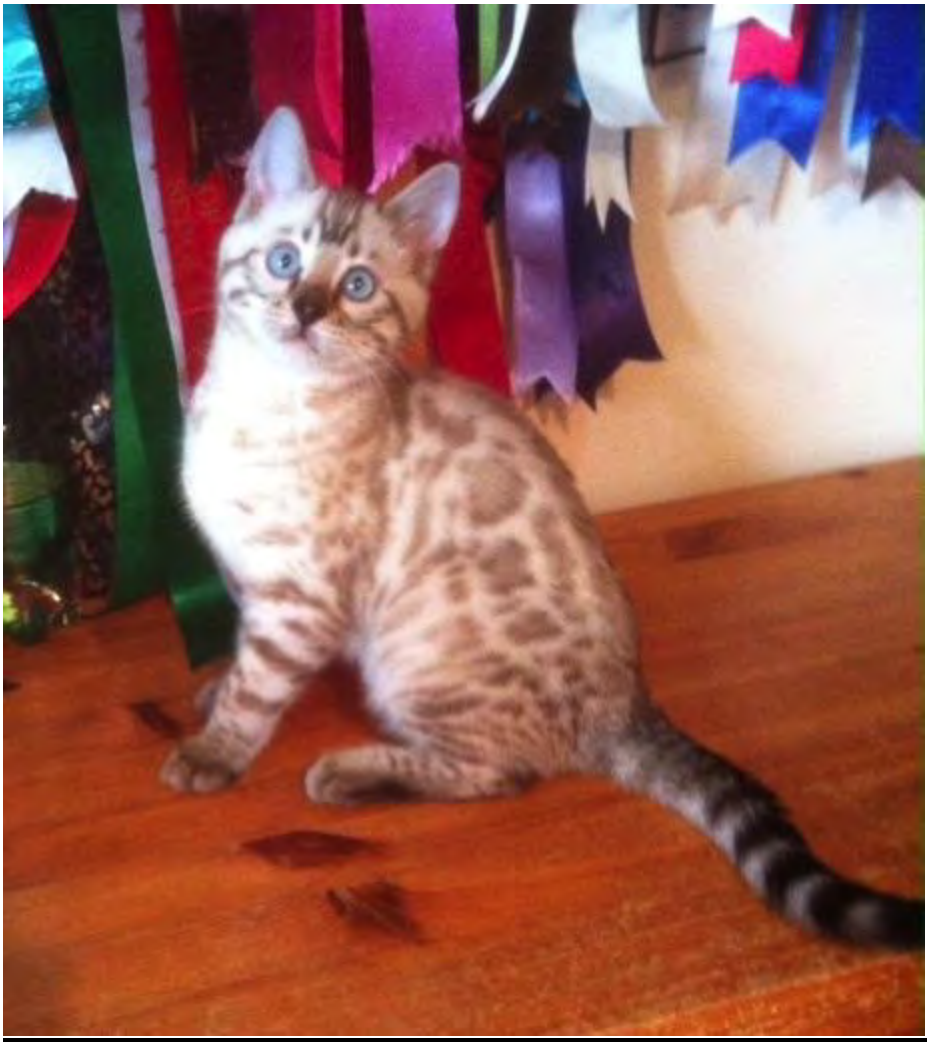
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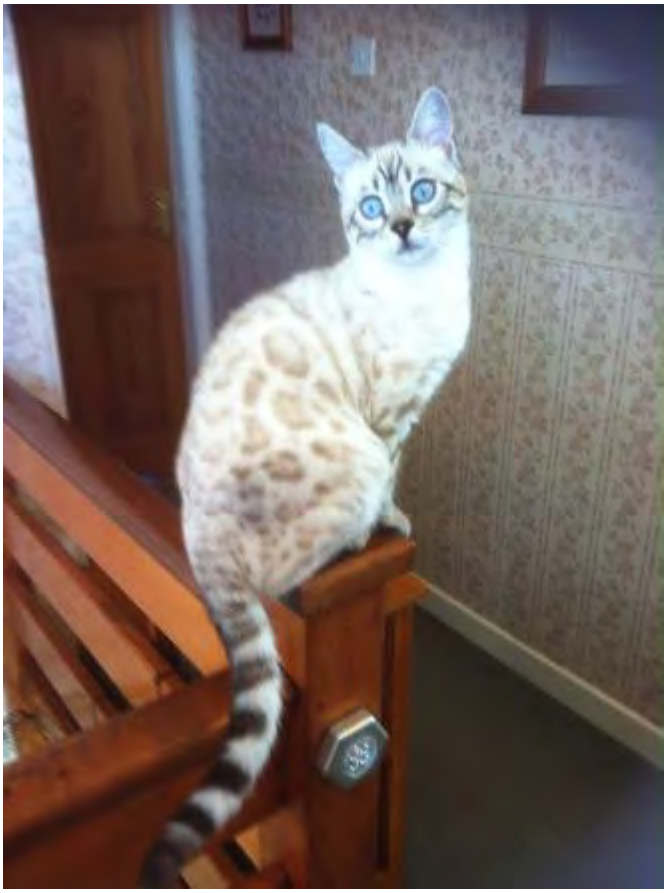
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