

# **Recommended Breeding Policy for the LaPerm cat**



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## **INTRODUCTION**

This breeding policy accompanies and supplements the LaPerm Registration Policy and should be read in conjunction with that document. If there are any queries regarding either document, these should be referred to the BAC delegates of the affiliated LaPerm Breed Clubs

The aim of the breeding policy is to give advice and guidance to ensure breeders observe what is considered “best practice” in breeding LaPerms. The over-riding objective is to conserve and improve the LaPerm cat, working to meet all aspects of the Standard of Points, which describes the ideal for the breed. Breeders should learn how to understand the breeding value of their LaPerms and how to make decisions in their breeding programmes that are 'best for the breed' in its ongoing development. They should balance the need for selective outcrossing to increase the gene pool and improve stamina and health with the need to breed LaPerms with sufficient preceding generations of LaPerm to LaPerm matings to produce consistent type. Co-operation between breeders, within the GCCF and internationally, will ensure that diverse breeding lines are maintained within the breed and that breeders have sufficient options to maintain low inbreeding coefficients.

The LaPerm is a medium sized, curly coated cat of foreign type and is recognised in both longhaired and shorthaired varieties. Kittens are usually born with wavy coats but may be born with straight or virtually no coat, the curls or waves developing as they grow. Breeders have bred selectively and today the majority of kittens are born with a curly coat. Many LaPerms have a heavy moult during their kittenhood, after which their coats grow back in curlier and thicker, but with minimal undercoat.

## **ORIGINS AND HISTORY**

The LaPerm, unlike most breeds but typical of other rex breeds, owes its origin to one cat - Curly, who was born in 1982 on Linda and Dick Koehl's farm in The Dalles, Oregon. The Koehls had acquired a number of working farm cats when they moved to the farm in order to act as natural pest control. Curly was born to one of these working farm cats: an ordinary brown tabby shorthair called Speedy. She was almost bald at birth with tabby markings visible on her skin, and she developed a soft, curly coat as she grew. It seems likely that she was the result of a spontaneous mutation.

Curly became a favourite of the Koehls due to her unusual appearance and the fact that she lived in the house with them for some time recovering from an accident and bonded closely with the couple during this time. After her recuperation she carried on working as a farm cat, but the Koehls decided not to have her spayed and in time she gave birth to a litter of kittens. The litter contained five males all of whom had the same LaPerm coat as their mother. Again the Koehls were intrigued by these kittens and decided not to have them neutered. Several years of unregulated breeding gave rise to a small colony of curly, or rex coated, cats on the farm. In addition to the farm cats, a neighbour's Siamese contributed genetic input, helping to define the foreign body type and adding genes for chocolate and colourpoint.

At the beginning of the 1990s the Koehls took some of their cats to a cat show where experienced breeders and judges were impressed by the uniqueness of the cats. Subsequently key figures in the American cat fancy advised and encouraged the Koehls to develop a formal breeding programme and gain recognition for the cats as a new breed.

When selective breeding began the colony of curly-coated cats were the basis of the breed. As with other rex breeds, starting with a small gene pool meant that outcrossing to straight coated

cats was vital to improve the size, health and strength of the breed's gene pool. Both long and short coats were present in the original colony and are recognised within the breed.



Breed founder Linda Koehl with Chocolate tabby point LaPerm stud Kloshe BB Silver Fang, born 1992.



Although no photos survive of Curly, the first LaPerm, her granddaughter Kloshe BB Papoose was said by Linda to be almost identical.

Breeders in the USA expanded the gene pool by outcrossing to Ocicats, Somalis and non-pedigree cats. One of the first countries outside the USA to develop a breeding programme for LaPerm cats was New Zealand and breeders there added Asian group cats as an outcross option. The GCCF list of breeds approved for outcrossing with LaPerms reflects the outcross breeds already in use at the time that the breed was first imported to the UK and present in LaPerm pedigrees. The approved outcross breeds were chosen because they are the most appropriate breeds to use to expand the gene pool while maintaining moderate type and avoiding unwanted genes.

The first LaPerms in the UK were imported in 2002 when a lilac tortie & white longhaired LaPerm, Uluru BC Omaste Po of Quincunx was imported pregnant with a litter of five kittens by Woodlandacre BC Windfire of Crearwy. The UK breeders group then subsequently became established brought in a series of further imports from the USA, New Zealand and Europe. Import lines and new outcross lines were combined to form the basis of the gene pool in the UK.



TICA Champion Uluru BC Omaste Po of Quincunx, Lilac Tortie & White LH LaPerm, bred by Anne D. Lawrence and owned by Anthony Nichols, the first LaPerm to be imported into the UK in May 2002, pictured above with her PETS passport.





The first UK-born LaPerm litter

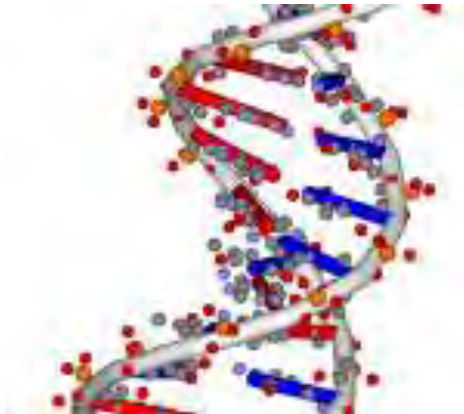


Early import Coiffurr BC Cappuchino, Chocolate LH male from New Zealand

## GENE POOL

LaPerm breeding programmes have always encouraged the use of outcrossing to an approved list of breeds in order to expand the gene pool and maintain it at a healthy size. Outcrossing is more straightforward for LaPerms with their dominant gene, than it is for other breeds based on recessive genes, because curly-coated kittens are present in the first generation. This situation worked in the breed's favour in that it has encouraged those breeders who worked on the establishment of the breed to outcross and bring new blood lines into the breed. Studies suggest that a breed needs to be founded on over sixty unrelated individuals to provide sufficient genetic diversity and the LaPerm has a much higher number of founders and outcross lines, well over 300. This very diverse gene pool helps to mitigate against high levels of inbreeding and is beneficial for the overall health of the breed. Ongoing allowances for outcrossing will ensure that a steady trickle of new blood guards against the shrinkage that can occur in a closed gene pool.

## LAPERM GENE



The LaPerm gene ( $L_p$ ) is dominant so LaPerm Variants do not carry the LaPerm gene, but may be useful in breeding programmes when mated back to LaPerms. LaPerms may carry the straight haired gene recessively so LaPerm x LaPerm matings can sometimes produce LaPerm Variants. LaPerms which carry the straight haired gene are known as Heterozygous LaPerms. Homozygous LaPerms do not carry the straight coated gene and will produce only rex coated offspring. There are no differences in appearance between Homozygous and Heterozygous LaPerms. The eventual aim of the LaPerm breeding programme is to produce Homozygous LaPerms but while the breed is still developing it is important to maintain breeding with both Homozygous and Heterozygous LaPerms.

The LaPerm gene differs from all other rex genes in that it is a complete dominant. The Cornish Rex and Devon Rex genes are recessive and the Selkirk Rex is an incomplete dominant. The symbol for the LaPerm gene is Lp. Dominant genes are always written with a capital letter and recessive genes with a small letter. So the straight hair allele of the LaPerm gene is written as lp. A normal cat would have a pair of genes for straight hair, so its genotype would be lplp. The homozygous LaPerm's gene pair consists of two LaPerm genes (LpLp), while the heterozygous LaPerm's gene pair consists of a LaPerm gene and a straight hair gene (Lplp).

## **COLOUR AND PATTERN GENES**

All colours and patterns are permitted in the LaPerm breed. For further information see the document **Colour and Pattern Genes in Sphynx and Rex Breeds**, at Appendix 2.

## **USE OF DNA TESTING**

An increasing number of DNA tests are now available to help cat breeders make decisions. Advice about DNA testing, suitable testing laboratories and interpreting results can be obtained from the LaPerm BAC. LaPerm breeders can use available DNA tests as follows;

### **Hair length**

Kittens whose parents are both shorthaired LaPerms can be tested to see if they carry the longhair gene.

### **Colour and pattern**

Tests for colour and pattern genes can be used both to determine the correct colour and pattern to register a kitten under and to see what colour and pattern genes a cat or kitten carries. Available tests include

- Agouti
- Black/Chocolate/Cinnamon
- Albino Series (Colourpoint, Burmese colour restriction)
- Dilute

### **Diseases**

LaPerms are not at particular risk of any of the genetic diseases which can currently be tested for. However, some outcross breeds used in LaPerm breeding programmes do have genetic diseases identified in their gene pools which can be tested for. These include

- Burmese, GM2 Gangliosidosis
- Abyssinian, Somali and Ocicat, Erythrocyte Pyruvate Kinase Deficiency (PK Def) and Progressive Retinal Atrophy (PRA)

Some of these are covered by screening requirements in GCCF registration policies, but LaPerm breeders should be aware of what testing can be carried out to prevent unwanted disease genes entering the gene pool. It is recommended that cats used for outcrossing should be screened clear of the diseases listed above.

## **BLOOD TYPING**

Blood type B appears to be very rare in the LaPerm. It is recommended that cats with blood type B should not be introduced into the LaPerm breeding programme in order to prevent the occurrence of problems with blood type incompatibility.

It is recommended that breeders should ensure that cats used for outcrossing from breeds in which blood type B is present in significant quantities are tested to ensure that they are blood type A.



The recommended method for blood type testing is the DNA test and the blood test for blood type should not normally be used.

DNA testing is less intrusive for the cat and provides more detailed information as it can give the following results:

Type A (homozygous for dominant A)

Type A (heterozygous, i.e. carrying the gene for B)

Type B (homozygous for recessive B)

Type AB (Rare third blood group)

The blood test to determine blood type is the less favourable option of the two because it is more intrusive for the cat and it cannot differentiate between the homozygous and heterozygous forms of Type A blood. Only the DNA test can show if an A type cat carries B or not.

Blood type incompatibility can result in a condition called Neonatal Isoerythrolysis (NI), which results in fading kittens with symptoms such as weakness, jaundice, dark-coloured urine and tissue death, particularly at the extremities, such as the tail. The condition is frequently fatal for the kittens. NI can occur when a B type female is mated to an A type male.

NI occurs because kittens whose blood type is incompatible with their mother's can absorb antibodies against their own red blood cells from their mother's milk for several hours after birth. NI can be avoided by only mating together cats of compatible blood types. Experienced breeders with a good reason for carrying out a mating between cats of incompatible blood types can avoid NI by preventing the kittens from suckling during the critical period after birth; during these hours supplementary feeding with kitten formula is required to prevent hunger, distress and dehydration.

### **LAPERM TYPE**

The ideal type of the LaPerm is fully described in the standard of points. Good type is of great importance when selecting for breeding of LaPerms and cats should be well balanced with moderate foreign type, good musculature and medium boning.

The head should be a modified wedge shape, longer than it is wide, but of moderate proportions. The muzzle should be broad in proportion to the wedge with full and prominent whisker pads and a moderate to strong whisker break. The medium to large ears should be set to continue the line of the wedge shaped head. The profile should show a straight nose of medium length and a gentle nose break. The eyes should be medium large, slanting towards the outer corner of the ear and almond in shape, appearing rounder when alert.



Longhair



Shorthair

### THE LAPERM COAT

The curly coat is the primary defining characteristic of the LaPerm and great progress has been made to improve coats during the breed's development through judicious use of outcrossing and carefully considered breeding decisions. There is a detailed description of ideal coat type in the standard of points. Coats should be curly or wavy with some frizziness in the coat, but not to the exclusion of any defined curls or waves. Good curls are preferable in longhaired LaPerms, especially in the ruffs, while shorthaired LaPerms are permitted to have less pronounced curls due to their comparatively reduced coat length.



Breeders must work to improve several aspects of the LaPerm coat. A coat which naturally forms well-defined, unstructured curls is desirable. The texture should be moderately soft, although the degree of softness may vary among individuals, however, it should not feel silky and should have a feeling of texture to it, which is sometimes compared to mohair. It should be loose, springy and light, standing away from the body. Coat density should be moderate; it should be light and airy enough to part with a breath in longhairs. A dense undercoat will cause a heavy, thick coat, which is undesirable, however a sparse undercoat leaving a predominance of guard hairs is equally wrong. The coat will go through many changes affecting length, density and texture. As LaPerms age their coats will often soften; younger LaPerms will often not achieve the coat length and softer texture of mature adults. Full maturity can take up to three years of age. There are significant seasonal variations in LaPerm coats with significantly reduced coat length and density in summer compared to winter. Hormonal influences also affect the coat and calling queens may have less stable coats. Neutering can lead to changes in coat length, texture and stability with more stable coats.

Breeders should strive to improve the stability of the LaPerm coat. The standard of points is used for judging a cat as it appears on the day of the show. Some LaPerms may retain good coats throughout the year while others may be subject to very heavy moults which can at times leave cats with very sparse coats or with areas (particularly on the flanks) which are almost bald, with only very short fur. Certain lines seem to be more affected and outcrossing has done a lot to improve coat stability. Finer coats may be more stable and some of the



'older' LaPerm lines containing only non-pedigree outcrosses may be less stable but this does not always hold true. Breeders should select away from sparse, unstable or indeed harsh coats

## **BREEDING FOR COLOUR AND PATTERN**

No points are awarded to LaPerms for colour and pattern and they are irrelevant for showing purposes. Selection for colour and pattern is down to the breeder's individual preferences and all colours and patterns are permitted. Good health, type and coat should always take precedence in breeding decisions over personal preferences for certain colours or patterns. Breeders can gain great satisfaction from focusing on certain colours and patterns but they should never be tempted to breed with a LaPerm on the basis of its colour or pattern or the colour/pattern genes it carries if the individual cat is a notably poor example of the breed or has any genetic defects.

## **BREEDING SYSTEM**

Listed above are the main genes that help define the LaPerm cat through the expression of pattern, colour and coat, but of course there are a large number of other genes that together create the distinctive physical shape and confirmation which is the essence of LaPerm breed type.

In order to ensure the maintenance of the good LaPerm breed type already achieved, while allowing scope to further improve aspects of type, coat, pattern and colour, to meet the ideal described in the Standard, breeders need to have a clear, definite and well understood *breeding system*. This means the development and management of a breeding programme in which certain cats are affirmatively selected to be bred to others, for predetermined reasons. Equally important, it also means that breeders allow no matings until they have given careful consideration to the outcome. In particular three key rules must be followed:

- **Health must be the overriding consideration in any LaPerm breeding programme.**
- **The good and bad features of the individual cats should be assessed and weighed against each other before any mating.**
- **When planning a breeding programme, breeders must realise that doubling of the good traits in a cat also results in doubling the defects; the breeding of cats with similar faults should be avoided at all costs otherwise there is a danger of fixation.**

The prime motive is to perpetuate the LaPerm as a recognisable breed; to improve the quality of the breed as measured against the Standard; and also to gain success on the show bench.

The skill in breeding lies in the choice of the individual cats and how these cats may be mated with each other – these two acts should be regarded as completely separate, although interconnected.

### ***Selection***

The phenotype of the individual cat is made up of a large number of genetic characteristics of varying expression. The ideal LaPerm is one in which the expression of each of these characteristics is just right in the eyes of the breeder – this means that an intermediate expression will be required for some characteristics, but a more extreme expression required for others. This expression is controlled by selective breeding. However, selection by itself is not very efficient in eliminating heterozygous genotypes (the producers of variation and diversity) – it is one of the tools available, but has its limitations.

### ***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 kittens 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 in-breeding is essential to stabilise conformation around a definite type. In-breeding 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 – use this consideration as a key part of the decision making process when considering any mating, and remember: ***“The more intense the in-breeding, 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 LaPerm 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 acceptable levels of inbreeding to gain sufficient homogeneity to fix recognisable LaPerm type, 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).

The golden rule is that health is paramount and must be constantly and consistently monitored; any evidence of weakness 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.

Breeders should also be aware that research has shown that highly inbred animals are less likely to be show winners. Although a certain level of acceptable inbreeding can help to fix desirable traits inbreeding depression can cause asymmetries and weaknesses that can be damaging to a cat's potential show success.

### **INBREEDING DEPRESSION**

A breed, breeding line or individual can suffer from inbreeding depression when inbreeding co-efficients are raised to high levels and a loss of heterozygosity results. Inbreeding depression can result in a general loss of vigour, even if the animals in question are not suffering from specific recessive genetic diseases. A small gene pool can result in inbreeding depression in a breed. A popular and numerous breed with a small gene pool has a low 'effective population size', regardless of the numerical size of the breed's population. A popular breed with a small effective population size can be compared to an overinflated balloon.

Inbreeding depression can compromise a cat's immune system and make it less able to resist disease. A group of genes called the Major Histocompatibility Complex, or MHC plays an important role in the immune system. The way in which the genes in the MHC are inherited

means that it is particularly vulnerable to inbreeding depression and a loss of genetic diversity in the MHC can impact on the health of the cat.

Inbreeding depression can manifest in different ways depending on the particular make-up of the gene pool in question. Few cases of inbreeding depression will manifest all of the signs. Although these are problems which can occur in any random-bred cat, a combination of some of these signs could well indicate a problem with inbreeding depression. A LaPerm breeder who is worried about inbreeding levels in their lines should consider introducing LaPerms from different lines or outcrossing to approved breeds.

Signs of inbreeding depression include slow growth rate, small adult body size, small litter size, reduced fertility, increased kitten mortality, increased prevalence of allergies, reduced ability to fight infections, physical asymmetries, especially facial, an increase in congenital abnormalities, increased prevalence of cancers, increased incidence of genetic disease, and reduced life expectancy.

### **Acceptable levels for Co-efficients of Inbreeding;**

0 to 10 % = Low

10 to 20 % = Fair

20 to 25% = Acceptable

25 to 40% = High. Only to be undertaken by experienced breeders for specific reasons.

40%+ = Not advised

Inbreeding coefficients should ideally be calculated back to foundation in order to give the most accurate reading. The LaPerm Cat Club holds a database of LaPerm pedigrees and help to calculate the inbreeding coefficient for any cat, kitten or potential mating.

### **BREEDING GUIDELINES**

The majority of matings are most likely to be between LaPerm x LaPerm, LaPerm x Approved Outcross Breed and LaPerm x LaPerm Variant. Matings between LaPerm Variant x LaPerm Variant cannot produce LaPerms but the offspring of such matings may be registered as LaPerm Variants.

Matings of LaPerm x LaPerm Variant, or of LaPerm x Approved Outcross breed can only produce heterozygous LaPerms and LaPerm Variants. Matings of heterozygous LaPerm x heterozygous LaPerm can produce homozygous LaPerms, heterozygous LaPerms and LaPerm Variants. Matings of homozygous LaPerm x heterozygous LaPerm can only produce homozygous LaPerms and heterozygous LaPerms. Matings of homozygous LaPerm x homozygous LaPerm can only produce homozygous LaPerms.

Breeders should ensure, to the best of their knowledge, that any LaPerms or LaPerm Variants from which they breed are of sound temperament, free from any hereditary defects, (including those listed in the GCCF Standard of Points), and conform as closely as possible to the Standard of Points, (excluding the coat description where variants are concerned).

All cats used for outcrossing should be thoroughly researched, of sound temperament and free from any hereditary defects. Blood type B appears to be very rare in the LaPerm. It is recommended that cats with blood type B should not be introduced into the LaPerm breeding programme in order to prevent the occurrence of problems with blood type incompatibility. DNA testing should be used where appropriate to ensure that cats used are free from testable genetic diseases. Pedigrees should be investigated as much as is feasible to ensure that cats used do not descend from ancestors with hereditary diseases for which no DNA test is yet available.

LaPerms are not compatible with Cornish, Devon or Selkirk Rex. Such matings are therefore highly undesirable. The product of such matings will be registered on the Reference Register and cannot be considered to be LaPerms or LaPerm Variants. They cannot be used in any Rex breeding programme and should be placed on the non-active register. It is considered to be in the best interest of the LaPerm breed to keep it entirely separate from other incompatible Rex mutations.

Under no circumstances should any cat with Sphynx ancestry be introduced into the LaPerm breed. Selection for hairlessness contradicts the coat quality requirements for Rex cats. The product of any matings between Sphynx and LaPerms will be registered on the Reference Register. They cannot be considered to be variants nor be used in any LaPerm breeding programme and should be placed on the non-active register.

Breeders shall ensure that any LaPerms or LaPerm Variants from which they breed shall be registered with the GCCF in accordance with the Rules in force at the time. It is recommended that the progeny from any matings that are not required for LaPerm breeding, should be placed on the Non-Active Register, to avoid the introduction of the LaPerm gene into other varieties of pedigree cats.

### **BREEDING WHITE LAPERMS**

A small minority of white cats are deaf, and the modifying factors that determine whether a cat is deaf or not cannot be directly controlled in a breeding programme, however by selectively choosing hearing cats for breeding purposes the natural progression should be to avoid any increase in the incidence of deafness across generations. For this reason all white LaPerms used for breeding are required to take a hearing test, which is necessary to show that the cat is not bilaterally or unilaterally deaf. This should be either a brainstem auditory evoked response (BAER) test or an Otoacoustic Emmission (OAE) test. No white LaPerm kittens can be registered with the GCCF unless a BAER or OAE certificate of freedom from deafness for the white parent(s) is supplied. For identification purposes cats must be micro chipped prior to testing.

### **OUTCROSSING**

Breeds which have been approved for use in outcrossing are:

- Somali & Abyssinian
- Ocicat
- Asian Group & Burmese
- Tonkinese

All variants of these breeds are also permitted, e.g. Somali Shorthair, Tonkinese Longhair, Pointed Ocicat, Ocicat Classic etc.

- Domestic longhairs and shorthairs are also approved for use in outcrossing. These are cats of no known or suspected pedigree ancestry.

Chinchillas are permitted at the fourth and fifth generations of LaPerm pedigrees if they precede Asian group cats because Chinchillas are permitted to appear in the background of Asian group cat pedigrees. Siamese, Balinese, Oriental SH and Oriental LH may also be seen in the background of pedigrees where outcrosses to these breeds were carried out before the LaPerm's promotion to Provisional status.

All other breeds are listed as non-approved.

When undertaking an outcross mating the breeder's primary objective should be to expand the LaPerm gene pool, so they should plan how the offspring could be used for breeding in order to retain the new blood gained.

Breeders should be aware that the type of the breeds on the approved outcross list is not the same as ideal LaPerm type and therefore the first generation kittens from an outcross mating may have intermediate type. Breeding cats with ancestors with differing type yields more variability and less consistency in the type of the kittens and this affect can last for two or three generations. In order to make a distinction between LaPerms which are close descendants from outcross breeds these are placed on the supplementary register. The full register is reserved for LaPerms with three preceding generations of LaPerm to LaPerm breeding (i.e. parents, grandparents and great grandparents).

Breeders should chose examples of outcross breeds which have type suitable for breeding in a LaPerm breeding programme. These cats may not be the best examples of their own breed and LaPerm breeders should never chose to use a cat from an outcross breed based on its show success. Cats from outcross breeds whose type approximates more to typical LaPerm type compared to their own breed type should give better outcomes.

Matings with approved outcross breeds may introduce certain features into the resulting first generation LaPerm kittens. Some of these features may be desirable and others undesirable. Certain aspects of breed type in the approved outcross breeds differ from desired LaPerm breed type. Breeders should understand that developing an outcross line requires a commitment to selecting those kittens with the most desirable features for future breeding. Careful consideration should be given to the good and poor features of a LaPerm cat when deciding which outcross to use. The breeder should aim to off-set the poor feature by the choice of outcross.

Breeders considering undertaking an outcross mating should read the BAC's Guidance Notes on Outcrossing For LaPerm Breeders (Appendix 1)

## **GENETIC 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.

### **Tail tip faults**

The GCCF Standard List of Withholding Faults for all breeds includes the following:  
Fixed Deviation (kink) of the Spine or Tail at any point\* - Small bony excrescences need not debar the cat from being placed, but should be taken into consideration.

Tail tip faults have been seen in LaPerm cats. These can take the form of a slight deviation in direction at the final or penultimate vertebrae, or of a small bony excrescence at the final vertebrae.

These are undesirable and breeders should aim to select cats without this trait for breeding. When breeders do use LaPerms with tail tip faults for breeding they should place all kittens displaying the trait on the non-active register.

Tail tip faults, especially mild ones, can be very difficult to detect in kittens and may not be evident at the age when kittens go to new homes, so it is not always possible for the breeder to be aware.

This kind of tail tip fault is thought to be a dominant trait with variable expression and indeed the expression is so variable that some cats with very mild faults may go unidentified. However, if the trait is dominant then a kitten with a tail tip fault will have at least one parent with it too.

If two cats with tail tip faults are bred together there will be a smaller probability of kittens being born without the trait and some of the kittens may be homozygous for the trait.

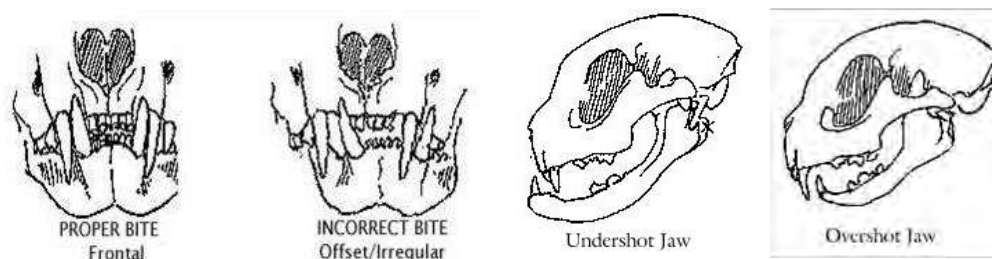
Breeders should get used to palpating the tail tips of kittens to ascertain whether any have the fault. The tail tip should be held very gently between the tips of the thumb, index finger and middle finger, as if holding a pen. The fingers should then be very gently moved up and down the tail tip to feel for kinks or bumps. A kink may sometimes only be felt in a kitten as the fingers are pushed downwards towards the body and the tail tip shows an inclination to bend in a particular direction. This must be done very gently as the tail tip of a kitten is delicate and if it is pinched, twisted or bent permanent damage may result.

### **Eye Problems**

Colourpoint cats can be more prone to squints (strabismus) or eye tremors (nystagmus). LaPerms with these traits should not normally be bred from because the propensity towards displaying these traits is thought to be hereditary. Some cats may only show signs of nystagmus when stressed, such as during visits to veterinary surgeons or cat shows.

### **Bites**

Incorrect bites are occasionally seen in LaPerms; although they are not a serious fault in the breed. Breeders should monitor their cats and kittens regularly and carefully to ensure that any LaPerms with this anomaly are not bred from.



### **Umbilical Hernia**

A bulge or soft swelling at the navel (umbilicus) caused by protrusion of abdominal contents through the navel.

### **Inguinal Hernia**

A bulge or soft swelling in the groin area caused by protrusion of abdominal contents through the inguinal canal. (This is less common and more difficult to detect than an umbilical hernia.)

### **Testicular Defects**

<b>Unilateral Cryptorchid</b>	a male with two testicles; one descended into the scrotal sack, the other undescended
<b>Cryptorchid</b>	a male with testicles which have not descended into the scrotal sack
<b>Monorchid</b>	a male having only one testicle



## **BREED NUMBERING**

In 2014 the GCCF adopted the EMS (Easy Mind System) for breed numbering. This simplified system with standardised breed, colour and pattern codes for all breeds was devised in 1990 by Dagny Dickens and Eva Minde and first adopted by FIFe, with other registries following.

EMS codes used by LaPerm breeders are as follows;

LPL LaPerm Longhair

LPS LaPerm Shorthair

### **COLOURS**

a blue	k caramel tortie
b chocolate	m caramel
c lilac	n black
d red	o cinnamon
e cream	p fawn
em apricot	q cinnamon tortie
f black tortie	r fawn tortoiseshell
g blue tortie	s silver/smoke
h chocolate tortie	w white
j lilac tortie	

### **PATTERNS**

#### **WITH WHITE**

- 01 van
- 02 harlequin (high white)
- 03 bicolour (used as default for cats “with white” including tortie & white)
- 09 minimal white/white spotting gene

#### **SHADED & TIPPED**

- 11 shaded
- 12 tipped

#### **TABBY PATTERNS**

- 21 unspecified tabby (used for all tabby pointed cats or for cats with 01/02 white where pattern unknown)
- 22 classic/marble/blotched tabby
- 23 mackerel tabby
- 24 spotted tabby
- 25 ticked tabby

#### **OTHER PATTERNS**

- 31 Burmese colour restriction
- 32 Tonkinese colour restriction (Darker Points)
- 33 Himalayan (pointed)

Examples:

LPL f 22	Tortie Classic Tabby Longhaired LaPerm
LPS as 11	Blue Silver Shaded Shorthaired LaPerm
LPL bw 33	Chocolate Point & White Longhaired LaPerm

## The old breed numbering system

Prior to the adoption of EMS codes LaPerms were given breed codes from the old GCCF system. These breed numbers are still seen on old pedigrees and registrations so people involved with the breed will still need to be able to understand them. Under the old system, the LaPerm breed number was 80, followed by L for a Longhaired LaPerm or S for a Shorthaired LaPerm. This was followed by a space, then numbers from Series 1, some of which are also followed by additional numbers or letters from Series 2 or series 3.

80L = Longhaired LaPerm

80S = Shorthaired LaPerm

### Series 1

14	Blue eyed white	30	Spotted*
14a	Orange eyed white	31	Bi-colour*
14b	Odd eyed white	31w	Bi-colour more white than colour*
14c	Green eyed white	36	Smoke*
15	Black*	39	Tipped*
16	Blue	40	Colour Pointed/Siamese coat pattern**
17	Cream		
18	Silver tabby (classic pattern)*	43	Shaded (as in Orientals)*
19	Red tabby (classic pattern)	44	Mackerel tabby*
20	Brown tabby (black) (classic pattern)*	45	Ticked tabby*
21	Tortoiseshell (black)*	73	Pewter
22	Tortie and White*	74	Golden
28	Blue-Cream/Blue tortie	75	Silver Shaded*

NB: \* = uses series 2      \*\* = uses series 3

### Series 2

a	blue	k	cinnamon
b	chocolate	m	cinnamon tortie
c	lilac	n	caramel
d	red	fn	apricot
e	tortie	p	caramel tortie
f	cream	r	fawn
g	blue-cream/blue tortie	y	fawn tortie
h	chocolate tortie	s	silver/smoke
j	lilac-cream/lilac tortie		

Letters excluded from the above list denote the following:

q	Burmese colour restriction. (NB In LaPerms Burmese Colour Restriction can also be expressed with the number 27, which is used like a series 1 number and without the addition of the letter q, (e.g. 80L 27 Brown Burmese Colour Restriction LaPerm LH)
t	tabby
v	variant
w	and white
x	The Burmese/Siamese coat pattern when occurring in cats other than the Tonkinese breed and described officially as "Darker Points", used with the number 27, (e.g. 80L 27x Brown Darker Points LaPerm LH)

### Series 3

1	Black/Brown/Seal	18	Blue-Cream/Blue Tortie Tabby
2	Blue	19	Chocolate Tortie Tabby
3	Chocolate	20	Lilac-Cream/Lilac Tortie Tabby
4	Lilac	21	Cinnamon
5	Red	22	Cinnamon Tortie
6	Tortie	23	Cinnamon Tabby
7	Cream	24	Cinnamon Tortie Tabby
8	Blue-Cream/Blue Tortie	25	Caramel
9	Chocolate Tortie	26	Caramel Tortie
10	Lilac-Cream/Lilac Tortie	27	Caramel Tabby
11	Seal Tabby	28	Caramel Tortie Tabby
12	Blue Tabby	29	Fawn
13	Chocolate Tabby	30	Fawn Tabby
14	Lilac Tabby	31	Fawn Tortie
15	Red Tabby	32	Fawn Tortie Tabby
16	Tortie Tabby	33	Apricot
17	Cream Tabby	34	Apricot Tabby

### EVALUATING KITTENS FOR BREEDING

Breeders should make rational decisions on which kittens to retain for future breeding, or allow on the active register, based on a range of different factors. Animal breeding scientists use evaluation systems to calculate Estimated Breeding Values, or EBVs for animals. Cat breeders can use similar methods in a less formal way in order to evaluate kittens and make comparisons which can help to inform decisions.

There is a risk that breeders will make selections based on too limited a range of factors. The following should be taken into consideration;

- Closeness to the standard of points
- Number and severity of faults
- Temperament
- Health
- Development
- Co-efficient of Inbreeding
- Generational Level
- Parental/familial breeding history
- Fit with breeder's breeding goals
- Breeder's intuition

Breeding evaluation scoresheets are available from the BAC for breeders to use to make assessments of their kittens. (See appendix 3)

### MENTORING

All new LaPerm breeders should start under the guidance of a mentor, who is an experienced breeder and has already bred a number of litters of LaPerms. This is especially important for novice breeders with little or no prior experience of cat breeding, but support should also be available to breeders who may have experience of other breeds but are new to the LaPerm breed. If a new breeder does not have a mentoring relationship with the breeder of their cat a mentor will be identified through one of the clubs represented on the LaPerm BAC.

All breeders are strongly recommended to participate in ongoing education and development about cat breeding through participation in appropriate discussion forums, seminars and cat clubs.

## **BAC RECOMMENDATIONS**

The BAC recommends that breeders re-read this breeding policy, as well as the general GCCF Breeding Policy, the LaPerm Registration Policy, the LaPerm Standard of Points on at least once a year.

Breeders will be encouraged to take advantage of any relevant official scheme, which may be devised by the BAC to test the soundness of the LaPerm breed.

It is recommended where the colour of a cat is in question a DNA test, (where such a test exists), be arranged.

LaPerm breeders are encouraged to work closely with other like-minded breeders to improve the LaPerm breed whilst maintaining a diverse gene pool.

The BAC would also advise breeders that by importing a LaPerm from another registry there is a possibility that the pedigree may be the result of a non-GCCF approved outcrossing programme. If you are considering doing this then contact the LaPerm BAC for advice and guidance.

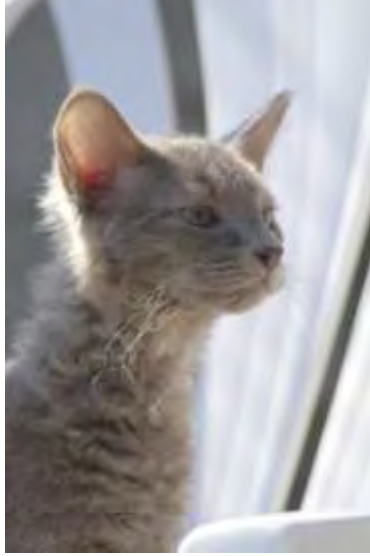
The BAC further recommends that any breeder wishing to import any LaPerm onto the GCCF register (either from overseas or from another registry within the UK), obtains a copy of the pedigree and forwards this to the BAC for checking before agreeing to purchase the cat/kitten if they are in any doubt about whether it complies with the current registration policy.

Please note that any cat or kitten found to not confirm to the GCCF LaPerm Registration policy may, together with any registered progeny, be transferred to the GCCF Reference Register with no progression.

Breeders are urged to observe the GCCF Code of Ethics and the recommendations of the GCCF, and the advice of their own veterinary surgeons regarding cat welfare, the importance of neutering, health, inoculations etc.

The BAC recommends that breeders should think carefully before selling any LaPerms on the active register, taking into consideration the purchaser's experience, and that no kitten should be sold on the active register to a breeder new to the breed without ensuring that a mentoring relationship is in place, either with the breeder of the kitten or another suitably experienced breeder.

For further reading on cat genetics and breeding practices breeders are advised to refer to: "Robinson's Genetics for Cat Breeders & Veterinarians" by Vella, Shelton, McGonagle and Stanglein, published by Butterworth & Heinemann.



This breeding policy was last updated in January 2014

**LAPERM BAC  
GUIDANCE NOTES ON OUTCROSSING FOR LAPERM BREEDERS**



**INTRODUCTION**

The LaPerm breed started from one individual cat, Curly, in 1982. As with the other rex breeds this meant that in order for the breed to develop and progress outcross matings had to take place. Curly chose her own mates from amongst the barn cats on the farm where she lived leading to the natural development of a small colony of LaPerms which were then used as the basis for a formal breeding programme.

Outcrossing with non-pedigree cats and with a select list of approved outcross breeds has been used to further develop the breed and establish sound foundations across the world. A good LaPerm breeding programme focuses on selecting matches between LaPerms of good type whose attributes and pedigrees will complement each other, while using outcrossing wisely to maintain a steady input of new blood that will safeguard the health and vitality of our cats.

The early development of the breed in all countries where the LaPerm was introduced has included a phase where outcrossing was used frequently to develop a sustainable gene pool. It is important that outcrossing continues to take place from time to time in order to maintain a diverse, healthy gene pool, as this will enable us to breed kittens with low inbreeding coefficients.





Without outcrossing a small, closed gene pool would lead to inbreeding depression. The signs that a population is suffering from inbreeding depression are reduced fertility, small litters, reduced resistance to infection, small size, reduced life expectancy etc. The highest possible number of generations needs to be taken into account in order to make an accurate inbreeding calculation.

In addition to the health benefits, outcross matings have been particularly useful in the LaPerm for improving the coats of cats, making them more stable, and improving on certain aspects of type by selecting for desirable traits. Outcrossing also has the added bonus of allowing new genes for colours and patterns (particularly those linked to recessive genes) to be brought into the gene pool and to be sustained.

However there is a risk with any outcross mating that type will be lost and that the offspring will bear too close a resemblance in type to the outcross breed. Breeders should act to avoid this as much as possible by choosing outcross cats which may not necessarily have the best type for their own breed, but have type similar to that desired for the LaPerm. Also if a LaPerm's type is not ideal it can be balanced out by deliberately choosing an outcross with a breed with different type.

The LaPerm gene for curly coat is dominant, therefore over-use of outcrossing will also add to the incidence of the straight haired gene in the LaPerm gene pool, thus giving rise to more variant kittens.

The breeds on the GCCF approved outcross list are a small and carefully selected group which all have moderate type and something to offer to the gene pool in order to maintain good diversity and contribute useful genes for attributes such as good coat texture etc. The breeds were all historically associated with the early development of the LaPerm breeding programme, dating back to decisions made by some of the early breeders. The breeds were already found in LaPerm pedigrees when the breed was first imported to the UK, so their inclusion on the outcross list was necessary to give them a valid presence in our cats' pedigrees under GCCF rules, but the breeds also which have much of value to offer in our own current and future plans to maintain good genetic diversity and guard against genetic erosion.

### **Outcross Breeds Permitted by the GCCF**

- Somali and Abyssinian
- Ocicat
- Asian Group and Burmese
- Tonkinese
- Domestic longhairs and shorthairs

Variants of these breeds are also permitted, e.g. short haired Somali Variants, Colourpoint or Classic or Ticked Tabby Ocicats.

All other breeds are listed as non-approved.

Siamese, Balinese, Oriental SH and Oriental LH may also be seen in the background of pedigrees where outcrosses to these breeds were carried out before the LaPerm's promotion to Provisional status.

The Devon and Cornish Rex outcross lists have a broad range of breeds with considerable variation in type from British Shorthair to Siamese. The LaPerm outcross list is more restrictive because the curly coat is caused by a dominant gene. This means that our F1 cats (i.e. cats with an outcross parent) are curly coated, while Devon and Cornish Rexes cannot have curly coats until F2 (i.e. cats with an outcross grandparent) which gives them an extra generation to regain good type.



It has been agreed that the LaPerm breeding programme will have a relatively limited outcross list only including cats with reasonably similar type to LaPerms.

### **HEALTH**

Health concerns should be taken into consideration when planning matings. A breeder considering an outcross to any breed on the list should make themselves aware of any health issues in that breed. Appropriate action should be taken to reduce the likelihood of introducing any health problems into the LaPerm breed.

Blood type testing of LaPerms has so far only detected blood type A, indicating that the incidence of blood type B within the breed is very rare. In order to prevent future problems of blood type incompatibility it is recommended that cats with blood type B should not be introduced into the breeding programme. Blood type should be determined by DNA test and not by blood test because the DNA test provides more information and is less intrusive for the cats.

All appropriate DNA screening for genetic diseases should be carried out prior to an outcross mating to ensure that no deleterious genes are introduced to the LaPerm gene pool.

Abyssinians, Somalis and Ocicats should all be screened clear of Erythrocyte Pyruvate Kinase Deficiency (PK Def) and Progressive Retinal Atrophy (PRA) prior to any use in a LaPerm breeding programme.

A DNA test for GM2 Gangliosidosis in Burmese is also available and should be used where appropriate.

As any other suitable DNA tests become available they should be considered.

Breeders should also have an awareness of common inherited diseases which can affect all cats, including those for which no DNA test currently exists, and their implications. Affected cats should be removed from breeding programmes and, where possible, offspring screened.

It should also be noted that the dominant white gene (W) is associated with an increased risk of deafness in all breeds. People should only undertake matings which may result in white self LaPerm kittens with extreme caution after researching the effects of the gene. Any white LaPerms used for breeding must have normal hearing in both ears certified by a BAER test. Cats with blue eyes (with the exception of those with “Turner blue eyes”) have a higher incidence of deafness than those with coloured eyes. Breeders with white LaPerms are encouraged to participate in any research programmes investigating deafness in white cats.

## **RECOMMENDED GOOD PRACTICE**

It is important that LaPerm breeders employ good practice in their breeding programmes with regards to outcrossing, including being aware of issues which specifically affect some outcross breeds and of genetic problems (including the effect of different blood types) associated with some breeds.



It is recommended that:

- ❖ Breeders should make themselves aware of genetic and other problems associated with their own breeding queens and of potential studs they may use.

Owners of LaPerm studs should ensure that they are of Type A blood group, that they are regularly tested for transmittable disease and parasites and that only tested and approved queens from approved outcross breeds are accepted for stud.

- ❖ If someone obtains a cat from an approved outcross breed with low numbers expressly for use in a LaPerm breeding programme they should try to choose

an individual which would not be used for breeding (perhaps with type not ideal for the specific outcross breed but suitable for LaPerm) or they should also consider breeding some kittens of the outcross breed. However, most outcross matings will be outcross male x LaPerm female.

- ❖ Breeders should not outcross twice in two subsequent generations unless there are valid reasons or specific goals are in mind. It is noted that until a reasonable number of good quality LaPerm studs are available across the UK, this may be difficult for some breeders.
- ❖ Owners of LaPerm studs should use their judgement in accepting queens from outcross breeds for stud and should support and advise owners of queens as to the limitations and implications of using a certain stud in the LaPerm breeding programme. This advice should include making breeders aware of the breeding policy and recommendations and also advising (to the best of their knowledge and ability) on the likely outcome of specific matings in terms of LaPerm type and how the breeder might proceed with future breeding from the F1 generation of kittens.
- ❖ Breeders should select a cat for outcrossing based on its resemblance to good LaPerm type and not whether it is a good example of its own breed. A pet quality kitten might be the best choice for an outcross.
- ❖ Breeders need to think carefully about the attributes they want in the kittens they hope to breed. For example, do you want a softer or longer coat, longer muzzle, etc? What attributes will complement those of your LaPerm?
- ❖ Breeders should not use a cat or a line as an outcross which has already been used a few times as it will not add anything new to the gene pool.
- ❖ Breeders should look at the results which others have had from using the same outcross to get an idea of what to expect.
- ❖ LaPerm Breeders should endeavour always to show respect to breeders of the approved outcross breeds by explaining to them why their breeds are used in our breeding programme and how this benefits both humans and cats.
- ❖ Breeders should undertake any required blood tests, such as for FIV and FeLV, prior to taking a queen to stud. Test results, vaccination card and registration slip showing that the queen is on the active register should be produced if requested.

## **NOTES ON BREEDS**

### **Somali and Abyssinian**

These two breeds, regarded by some organisations which recognise the LaPerm as one breed group, are generally seen as one of the most suitable choices of outcross, having been recommended by early breeders and used in many countries. Although the Abyssinian is only rarely used, its inclusion is important because the more widely used Somali and Ocicat have Abyssinians in their backgrounds. Cats with Somali or Ocicat breed numbers can have an Abyssinian parent and our registration policy needs to account for five generations. Many of the Ocicats used as outcrosses by breeders registering LaPerms with the CFA had Abyssinian parents; these cats were more popular as an outcross choice because they were Ocicat variants, having ticked coats, which give an alternative pattern option to spots for a LaPerm.



The Somali is more likely to be used than the Abyssinian as Shorthaired LaPerms are less numerous than their longhaired counterparts. However both give the same benefits of maintaining reasonably good LaPerm type as the type is very similar. The breeds also have similar dispositions, and this helps to maintain the LaPerm's affectionate and playful nature. The majority of Somali and Abyssinian lines have soft coats, without thick undercoats and the outcross therefore gives good LaPerm coat texture. An added benefit is the fact that ticking and curls make an attractive combination as the curls open the coat to show the bands of ticking

Some of the differences between the breeds which breeders should be aware of are that some Abyssinian and Somali lines are quite small and also they have a slightly different head type from LaPerms. The Somali and Abyssinian face is based on an equilateral triangle from the front, with a shallow indentation forming the muzzle (though this should not be a pinch) whereas a LaPerm has a slightly longer and broader muzzle with a pronounced whisker break. The profile also is slightly different in that the Somali and Abyssinian should have a slight nose break and the distinctive 'smile' whereas the LaPerm profile is a "straight nose with gentle convex curve and gentle nose break". The eye shape is also slightly different in that although LaPerms, Somalis and Abyssinians should have 'large, almond shape eyes' the LaPerms' eye should specifically be "slightly slanted to the bottom of the outside ear base". Finally the Somali and Abyssinian should have a level topline whereas the LaPerm's hind legs should be slightly longer than the forelegs.



#### **Asian (including Tiffanie) and Burmese**

While the Asian breed group is rare in the USA it has been used with great success in LaPerm breeding programmes in other countries, especially New Zealand. Therefore Burmese are on the list by logical extension and because they often appear within the preceding generations of Asian pedigrees. Only European Burmese are recommended and the shorter, rounder head type of American Burmese is not desirable.

The Tiffanie and Asian are good choices of outcross where a breeder wishes to obtain a softer coat texture, or more coat length or density. Colour and pattern genes are an additional



benefit but should not be a reason to choose a particular outcross.

There is some variation in type among Tiffanies and Asians and individuals should be chosen whose type is closest to LaPerm type. A short or rounded head or an overly thick coat should be avoided and the most suitable cats will have more length in the muzzle and not too deep a nose break or stop. The outcross is a good match for a LaPerm whose head type is too long or narrow, or whose coat is too harsh, wiry or sparse. Breeders should be wary for resulting kittens lacking head length or without strong muzzles. Breeders should not overuse this outcross in a line.

### **Ocicat**

The Ocicat is the most commonly used pedigree outcross within CFA. Ticked, solid or classic tabby variants were mainly used. Spotted LaPerms only have fuzzy spots because of the texture of the coat. The Ocicat outcross generally gives excellent type as the type is similar between the two breeds and the Ocicat especially has the broad muzzle desired in the LaPerm. Ocicats can be slightly larger than LaPerms so breeders should be wary of using individuals which are very large. However, if a LaPerm seems smaller than desirable, a match with a larger cat could be appropriate. Reports indicate that the male kittens in the first generation from an Ocicat outcross will be big. The Ocicat or Ocicat Variant is a good choice of outcross for someone wishing to breed Shorthaired LaPerms; however none of the kittens will be Longhaired. There should be a fair expectation of good coat texture, although the outcome for density may be more variable. The Ocicat is a relatively rare breed in the UK so breeders should check pedigrees to make sure any mating would genuinely bring new genes into the LaPerm gene pool, as the same line may already have been used, in which case a LaPerm to LaPerm mating would be just as good.

### **Tonkinese**

The Tonkinese has not been used much in the LaPerm breeding programme and the USA Tonkinese has a slightly different type to the UK Tonkinese making it less appropriate. However it is included on the GCCF outcross list by logical extension as its parent breeds are on the list and it offers a better match for type than them. The Tonkinese offers an alternative option for the SH outcross which will give reasonably good type and has the added option of interesting colour/pattern genes. Individuals should be chosen for their closeness to ideal LaPerm type. Breeders selecting kittens to retain from a Tonkinese outcross litter should avoid individuals with poor coat density or texture and those with narrow muzzles and shallow whisker breaks.



### **Domestic Longhair & Shorthair**

In the United States the most popularly used outcross has been the domestic cat or non-pedigree. This is because the breed originated from a colony of non-pedigree cats. This outcross provides the advantage of hybrid vigour and totally fresh blood lines. Cats used should be non-pedigree cats of no known or suspected pedigree ancestry, of moderate type similar to LaPerm type, with good coat texture and no faults or health problems.

Without knowledge about the cat's parentage the results of the offspring can be less predictable than breeding with pedigree outcrosses and some atavistic traits may arise.

General GCCF rules applying to all breeds place certain restrictions on the use of domestic cats as an outcross. This is because an individual cannot be shown or considered to be a pedigree cat without a pedigree recording its three preceding generations in full, with no unknown ancestors. The individual Domestic cat used as an outcross is not classed as



unknown, as it is a known, named and registered cat, but its parents are normally unknown. Therefore a LaPerm with a Domestic parent or grandparent cannot be shown because of the unknown ancestors preceding the Domestic cat are still present within a three generation pedigree. These cats are placed on the reference register. When kittens are produced with the Domestic cat in the third generation (great grandparent) and the unknown ancestors in the fourth generation they can be registered on the supplementary register and shown.

#### **Balinese, Siamese and Oriental SH and LH (of 'old style' type)**

This breed grouping was included on the initial outcross list because it had been used in some breeding programmes and appeared in some import pedigrees, and because it gave an option to add length to the body and face, reduce overly thick coats and soften the coat. This breed grouping gave an option to counteract any imbalance caused by outcrossing to other breeds in the early lines.

A Siamese cat contributed genes to the original LaPerm colony before formal breeding began. However, these breeds are not very good matches for LaPerm type and a good LaPerm should not look too Oriental. This outcross was only be used to redress imbalances. Very few matings to these breeds were undertaken, mainly using Balinese and the resulting lines were used very carefully.

These breeds were removed from the outcross list when the LaPerm was promoted to provisional status as their use was no longer required.



#### **Other Outcrosses**

No other breeds are currently approved for outcrossing by the GCCF. LaPerm breeding programmes in other countries have made use of other outcross breeds. Some experimental outcrossing has been done with other breeds with varying results.





*Drawing of LaPerm LH*

## COLOUR AND PATTERN GENES IN SPHYNX AND REX BREEDS

The Sphynx and Rex breeds have no restrictions on acceptable colours, patterns or combinations so a very large number of variations is possible. These variations are controlled by a wide and varied group of both dominant and recessive genes; consequently one cannot fully understand colour and pattern inheritance in Sphynx cats without a basic understanding of cat genetics. The lack of coat can change the appearance of colour and pattern, making it sometimes difficult to accurately identify. Although no points are awarded for colour and pattern, breeders may wish to ensure that they register cats correctly and DNA testing can be used for clarification.

All domestic cats are descended from a wild ancestor (probably either *Felis silvestris* or *Felis lybica*) a mackerel tabby patterned animal, and thus all domestic cats are of an underlying genetic tabby pattern. All cats have 19 pairs of chromosomes upon which there are many thousands of genes that govern the eventual shape, size, sex, colour, pattern and hair length of the individual animal. Over the generations a number of mutations have occurred and selective breeding has been used to isolate these to produce the various pedigree breeds we see today.

Genes normally come in pairs. Different variations of a gene are called alleles and a pair can either contain two alleles the same (homozygous) or two different alleles (heterozygous). When a heterozygous gene pair occurs it is the dominant allele which determines the cat's appearance. The recessive allele can be passed on to the cat's offspring. Dominant alleles are written with a capital letter and recessive alleles are written with a lower case letter.

Key genes influencing colours, coat length and patterns are:

### *A/a Agouti or Non-agouti*

**Agouti (A)** - the natural "wild" gene that is the basis of the tabby cat. The base agouti pattern is bands of black on a yellow background; in the cat this is overlaid with one of the tabby patterns.

**Non-agouti or "hypermelanistic" (a)** - a recessive gene mutation that turns the original "wild" tabby cat into a self by overlaying the agouti base colour with eumelanin pigment, making the whole animal appear one solid colour, although often in certain light the underlying tabby pattern may still just be discernible.

### *Mc/mc Mackerel or Classic Tabby*

**Mackerel (Mc)** – the basic striped tabby pattern that overlays the agouti base (i.e. "wild" form)

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

### *Sp/sp Spotted or Non-spotted*

**Spotted (Sp)** – this gene causes the spotted tabby pattern, breaking up the mackerel or classic pattern into elongated or rounder spots respectively.

### *T/t Ticked or Non-ticked*

**Ticked (T)** – an incompletely dominant gene which removes most of the stripe pattern leaving the ticked agouti base pattern on the body with minimal overlaying stripes on legs, chest (necklace) and face. A ticked tabby pattern can cover all three other tabby patterns.

**Wide-banding (Wb)** – this has been hypothesized either as a gene (Robinson) or more probably a group of genes (Joan Wasselhuber, who coined the term "wide-banding genes"): Widebanding works on any variety of tabby cat creating a wide band of paler base colour

pigment at the base of the hairs and pushing the darker top colour to the tips of the hairs. This creates a cat which is shaded or tipped. With the addition of the inhibitor gene the cat is silver shaded.

#### **L/i Inhibitor or Non-inhibitor**

**Inhibitor (I)** – a dominant gene that suppresses the development of pigment in the hair of the coat, typically producing hairs that are fully coloured only at the tip and have a silvery white base. It has greater effect on the lighter pigment in an agouti cat, removing the yellow colour and turning the base colour white or “silver”. In the case of a non-agouti cat the inhibitor removes colour from the base of the hair-shaft to produce a silvery white hair with a coloured tip, i.e. a Smoke. This allele appears to interact with other genes to produce various degrees of tipping, ranging from deeply tipped silver tabby to lightly tipped silver shaded tabby.

#### **L/L Short hair or Long Hair**

**Short hair (L)**- the dominant ‘wild form’ of this gene, which produces a short coat.

**Long-hair (l)** – a recessive gene mutation which produces a semi-long haired cat.

The long hair gene is present in the Sphynx gene pool, but is overridden by the Sphynx gene. Some Sphynx Variants are long haired.

#### **B/b/b1 Black or Chocolate or Cinnamon**

**Black (B), Chocolate (b) and Cinnamon (b1)** – three different alleles of this gene occur. Chocolate and cinnamon are both mutations of the basic black gene which modify black into dark brown or medium brown respectively.

#### **O/o (O/y) Orange or Non-orange**

**Orange (O)** – this gene eliminates all eumelanin pigment (black and brown) from the hair fibres, replacing it with phaen melanin, a lighter compound appearing yellow or orange depending on the density of pigment granules. The O allele is also epistatic over the non agouti genotype; that is, the agouti to non-agouti mutation does not have a discernible effect on red or cream coloured cats, resulting in these self-coloured cats displaying tabby striping independent of their genotype at this locus. This explains why you can usually see some tabby pattern on red, cream and apricot coloured non-agouti cats, even if only on the head/face. Rufus polygenes, as yet unidentified, affect the richness of the orange gene’s expression.

The sex-linked nature of this gene means that it is inherited on the XY chromosomes which determine gender. Males with one copy of the gene will be orange, while females with one copy will be torties and need two copies to be orange.

#### **D/d Non-dilute or Dilute**

**Dilute (d)** – a recessive gene which reduces and spreads out the pigment granules along the hair-shaft and turns a black to blue, chocolate to lilac, cinnamon to fawn and red to cream.

#### **Dm/dm Dilute Modifier or Non-dilute Modifier**

**Dilute modifier (Dm)** – a dominant gene which serves to modify the action of the dilute gene (it has no effect on undiluted colours), it lightens and “caramelizes” the colour turning blue into brownish-grey, lilac and fawn into pale taupe (in all three cases known as Caramel) and cream into a warmer pinkish-cream tone (Apricot)

#### **Albino Series (C, cb, cs)**

**Full Colour (C)** – the ‘wild form’ with no reduction of pigment

**Colourpoint (cs)** – this recessive allele produces cats with the colourpoint or Siamese pattern. The pigment in the coat is reduced and because it is thermo-sensitive it is only produced in the coldest parts of the body, or points.

**Burmese Colour Restriction (cb)** – this recessive allele produces cats with Burmese colour restriction. This is thermo-sensitive, like the colourpoint allele, but the reduction in pigment is

not as pronounced, so there is pigment all over the body, but with a slight darkening at the points. The reduction in pigment changes the cat's colour, causing a genetically black cat to turn sepia brown, a red cat to turn pale tangerine etc.

#### ***Combinations***

A gene pair only has two alleles, while multiple alleles of this gene exist. Any individual cat can only have two of these at once. A heterozygous, full colour cat can carry either the alleles for colourpoint or the allele for Burmese colour restriction, but never both.

If a cat's gene pair consists of one colourpoint allele and one Burmese colour restriction allele then the alleles are co-dominant and the result is an intermediate form called **Darker Points**, where the reduction in pigment on the body is more pronounced than on a cat with Burmese colour restriction and less pronounced than on a colourpoint cat.

#### ***S/s White Spotted or Non-white Spotted***

**White Spotted (S)** – this dominant allele causes the white patches on a bicolour cat. It is an incomplete dominant gene so cats which are homozygous for the allele (i.e. have two copies) have a more extreme version, referred to as 'van pattern', where white covers most of the body.

#### ***W/w White of Non-white***

**White (W)** – this dominant allele causes cats to be solid white. Occasionally white cats (especially, but not exclusively those with blue eyes) may be deaf in one or both ears. Only cats with full hearing can be used for breeding.

***Polygenes*** – these are collections of genes which modify the effect of the main dominant and recessive genes above. A build up of polygenes creates a bigger effect, for example a collection of certain polygenes increases the length and density of the long-hair gene to create the Persian, and a build-up of polygenes serves to enhance the effect of the main colour genes, turning the effect of the orange gene from the sandy colour of the ginger domestic tom to the rich vibrant red of the Red Persian, British or Asian Self. It is likely that a group of polygenes is the reason for variation in the degree of tipping in the Shaded Tabby/Burmilla, the polygenes working to create the band-width in interaction with the inhibitor gene (when present) resulting in the range of pattern from tipped to heavily shaded.

So, in summary, the genetics involved in the ideal tabby, shaded or smoke cat are complex. Not only are there many interacting genes, but genes sometimes do not express themselves fully, or conflict with one another. For example, the melanin inhibitor sometimes does a poor job blocking pigment, resulting in an excessively gray undercoat, or in tarnishing. Likewise, poorly-expressed non-agouti or over-expression of melanin inhibitor will cause a pale, washed out black smoke. Various polygenes, epigenetic factors, or modifier genes, as yet unidentified, are believed to result in different phenotypes of colouration, some deemed more desirable than others.

## **BREEDING EVALUATION**

Estimated Breeding Values or EBVs are used by animal breeders taking a scientific approach to ensure the best outcomes from breeding animals. Farmers and livestock breeders normally used EBVs to help them breed the best animals they can. Cats breeders can use an equivalent, albeit less formal, process to evaluate and compare kittens for breeding potential. Breeders should not only use type in order to make these decisions, but should take into account a range of other factors.

EBVs test how useful an individual animal would be for breeding by scoring it according to certain key criteria. It can be used as a selection tool by breeders selecting breeding animals for the next generation. Although normally used on young animals, adults can be evaluated or re-evaluated at any time.

EBVs should only be used by the breeder to inform their own decisions. It is a partly subjective measure so can't be used to compare scores between different breeders who may interpret the scoring slightly differently. There are no official scores.

Scoring should be as accurate as you can make it, but reasonable estimates can be made if all of the details are not known or not remembered.

## **SCORING**

### **SOP point score**

An honest appraisal by the breeder or cat show judge or other person well acquainted with the breed of how well the cat meets the standard of points for that breed. Although this is partly subjective, an analysis of the cat can be made with a points based score given to each section as broken down in the SOP with a total out of 100 calculated. Although scores may come out slightly differently depending on who is doing them if one person scores a whole litter it will show which kittens they feel most closely meet the SOP. Ideally two or more people should score the kittens.

*Score out of 100* \_\_\_\_\_

### **Faults**

Points should be removed for any faults listed on the SOP or in the standard list of withholding faults.

Do not remove points for variants accepted for breeding, e.g. straight coat in rex breeds.

Remove 25 points for a withholding fault and 10 points for other faults.

*Points to subtract from score* \_\_\_\_\_

### **Temperament score**

1. Reaction to unfamiliar situations, such as trips out of the home, for example to the vet.
2. Boldness, confidence and reaction to loud noises, such as vacuum cleaners or loud music.
3. How often does the kitten approach the breeder/owner for affectionate interaction, e.g. to sit on lap, be stroked, cuddled?
4. Reaction to being picked up and held (does the kitten relax or struggle?)

5. Eagerness to engage in play

Mark each of the above categories out of 10

**Score out of 50** \_\_\_\_\_

**Health score**

Has the kitten had any health problems?

Serious health problems, such as recurring, difficult-to-treat infections, surgical interventions, visual or auditory problems etc.

score 0

Moderate health problems, such as successfully treated URIs, diarrhoea, anorexia etc

Score between 1 and 24

Minor health problems only, such as short-lived digestive upsets, minor injuries etc.

Score between 25 and 49

No health problems score 50

**Score out of 50** \_\_\_\_\_

**Development score**

Has the kitten's development been normal in all areas?

When did the kitten open its eyes?

When did the kitten start coming out of the nest box?

When did kitten start to eat solids?

When did kitten stop suckling?

When did kitten start trying to use litter tray?

When did kitten become fully litter trained?

Has the kitten had a steady growth rate?

**Score out of 25** \_\_\_\_\_

**Co-efficient of Inbreeding**

The COI should be calculated on as many generations as possible, preferably back to foundation.

Over 25% score 0

20 to 25% score 10

10 to 20% score 15

0 to 10 % score 25

**Score out of 25** \_\_\_\_\_

**Generational level**

Kittens with like to like breeding in their pedigrees should produce more consistent outcomes with lower risk of undesirable atavistic type.

1. The kitten has non-approved outcross breeds within the first three generations of its pedigree (i.e. parent, grandparent and great grandparent.)  
Score 0
2. The kitten has approved outcross breeds within the first three generations of its pedigree  
Score 10
3. The kitten has only cats of its own breed (including variants) within the first three generations of its pedigree  
Score 25

**Score out of 25** \_\_\_\_\_

### **Parental Breeding History**

How many kittens were in the litter that the kitten was part of?

Were there any congenital health problems in any of the litter siblings?

Did any of the litter siblings suffer from subsequent health problems?

Has the kitten's mother had any breeding failures, such as failure to conceive after mating, Caesarian sections, still births etc?

Has the sire produced kittens with congenital abnormalities with a significant number of other queens?

Does the kittens have any parents or grandparents with notable success in breeding or showing?

**Score out of 25** \_\_\_\_\_

### **Breeding goals & X factor**

How much would the kitten contribute towards the goals of the breeder's breeding programme? For example does it display a trait, such as colour, pattern etc, or carry a gene for a trait that the breeder aims to work with?

Does the breeder feel a particular affinity or have an instinct about the kitten?

**Score out of 25** \_\_\_\_\_

**Total score out of 300** \_\_\_\_\_

**Divide by 3 for percentage value** \_\_\_\_\_%