

# **Siamese Breeding Policy**

Siamese Joint Advisory Committee



This Breeding Policy accompanies and supplements the Siamese Registration Policy and should be read in conjunction with that document.

The aim of this breeding policy is to give advice and guidance to ensure breeders observe what is considered “best practice” in breeding Siamese with the overriding objective of improving the Siamese cat to meet all aspects of the Siamese Standard of Points

Immediately recognisable with their pale bodies, contrasting darker points, and elegant type, Siamese are one of the most popular and one of the oldest of the pedigree cat breeds.

They should be beautifully balanced with head and ears carried on a slender neck, with a lithe, graceful body, slim legs and feet and a long tapered tail.

The exact origins are unknown, but it appears that the mutation causing Siamese restriction occurred in cats in South East Asia. They were first imported to the UK from Thailand (then Siam) at the end of the 19<sup>th</sup> Century. Unfortunately many of these cats were very short lived, which means that the number of foundation cats is probably quite small. Breeding was difficult, worms, enteritis and cat flu were major problems. Numbers gradually built up, but there were great difficulties during the Second World War. There were no shows and very little breeding resulting in a big reduction in the gene pool.

Type has changed considerably since the first imports.

Siamese have become more slender, with longer heads and larger ears of a different set.

There is a variation in type at the moment: Some breeders and owners preferring modern extreme type with others who like a more moderate cat.

The original Siamese brought to Britain were Seal Points. Blue, Chocolate and presumably Lilac Points appeared in the first litters but were considered bad Seals and were sold as pets. Lilac Points were first recognised in the descendants of an outcross to Russian Blue used to expand the gene pool after the war.

Tabby Pointed and Red series Siamese were introduced by matings with domestic cats. Caramel appears to have been in the gene pool for a long time, but cats were considered to be poor Blues or Lilacs. The gene may have been introduced with Tabby. Cinnamon and Fawn were introduced into the Oriental, and subsequently Siamese, gene pools from Sorrel Abyssinians.

The **Standard of Points** describes the ideal cat, but no cat can ever match it completely. They all have unique combinations of good qualities and faults. It gives the relative importance of the different features of the cat. Judges don't actually look at each aspect in isolation, giving marks to each one and then adding them up. They have to look at the cat as a whole and balance each aspect against the rest.

**Type:**

The standard calls for a long well proportioned, balanced head. Large ears with good width between, narrowing in straight lines to a fine muzzle, forming a balanced wedge shape with no break or pinch at the whiskers. The ears set should be neither too low nor too upright.



**Balanced Head**



**Ear set too low**



**Ear set too upright**

The head should be, neither round nor pointed, avoiding exaggerated type.



**Correct Profile**



**Uneven Profile**



**Very Weak Chin  
(suggests overshot bite)**



**Very Strong Chin  
(suggests undershot bite)**

In profile the nose should be straight, the chin strong and the bite level. The tip of the chin should line up with the tip of the nose in the same vertical line.

The eyes should be oriental in shape, slanting towards the nose, of a brilliant blue, the deeper the better.

The body should be medium in size, lithe and graceful. The legs slim with small, oval feet, the tail long and tapering. The head, body, legs, feet and tail should all be in proportion, giving the whole a well balanced appearance

Care must be taken regarding the size of the cat, as small cats can appear to have better type. This is particularly noticeable in small, undernourished kittens.

### **Coat:**

The coat should be very short and fine in texture, glossy and close lying.

### **Points Colour:**

Breeding good points colour can be difficult, perhaps more so in some colours than others. While there has been great improvement in type, colour has taken lower priority and has suffered as a result.

The specialist Siamese breed clubs give the following advice for those wanting to breed good examples of their colours:

**The Blue Pointed Siamese Cat Club:** recommended matings are blue to blue and blue to lilac.

**The Lilac Point Siamese Cat Society:** recommended matings are lilac to lilac, or lilac to warm chocolate. Caramel and tabby points should be avoided if at all possible.

Kittens are born white, and gradually develop full colour. This means that young kittens should be much paler than adults of the same colour. As this darkening continues into adulthood, the older cat can become very dark, losing contrast between points and body.

### **Eye Colour:**

Although the Standards of Points are slightly different for each variety, effectively eye colour should be the deeper blue the better. Unfortunately, once good eye colour is lost from a line it is very difficult for it to recover.

### **Temperament:**

When pursuing improvements in type or colour, breeders must not overlook the importance of temperament.

**Permitted Outcrosses:**

It is important that no obstacle be put in the way of attempts to widen the gene pool except where there are cogent reasons not to allow the outcrossing. Thus (these categories may overlap):

- Since type is what distinguishes the Siamese from any other pointed shorthair cat, outcrossing to breeds not of Oriental type is not permitted.
- As Siamese are shorthaired, outcrossing to any longhaired or semi longhaired breed is not permitted.
- In pointed cats, where a parent is silver, it is difficult to detect with certainty which of the offspring is silver, especially if the expression is low-grade. Outcrossing to Smoke and Silver Tabbies is therefore not permitted. (This might be subject to revision if a test for silver is developed)

This has implications for the Siamese registration policy: any breeds not included in the above list should be allowed by the registration policy to be in the pedigree of cats registered on the full and/or supplementary register.

## Genetic Make Up

An explanation of the genetics may be useful in understanding the make up of the Siamese.

Each cell of a cat's body (with one class of exceptions) contains 19 pairs of chromosomes, each made up of thousands of genes. Each gene has a complicated chemical structure which acts as a recipe for the construction of some chemical by the body. The exceptional cells mentioned above are the egg and the sperm, which have only one set of chromosomes - formed by the random selection of one from each chromosome pair. On mating the single set in egg and sperm combine to form the normal pairs in the single cell which is the start of an embryo, and the sets are replicated as cells divide during the embryo's development. So the offspring has one copy of each gene from each parent.

One of the pairs of chromosomes in the cat, as in most mammals, is peculiar. In the female, each of the pair is of the normal size, but in the male one of the pair is of the normal size, but one is much smaller. The normal size chromosome is called the X, the small one the Y

Many of the genes have mutated to slightly different forms, selection of these has resulted in the development of the various breeds. The variant forms of a gene are called alleles. When a particular gene pair consists of different alleles, what usually happens is that the recipe given by just one of the alleles is followed for each cell where the gene is active: this allele is said to be dominant to the other, or the other recessive to it. In this case the effect on the cat is as though the recessive was not present.

So a cat has a set of visible characteristics, but can pass different characteristics to its offspring. It is helpful to know about the ancestors of the cats when trying to predict the result of a mating. For example a black cat with a blue mother will carry dilute and so can produce blue offspring if mated to a blue, or to another carrier. But, though from the ancestry one can determine when a recessive allele must be present, one can't determine that it must be absent. Recessive alleles may be passed through many generations without showing up in the cats' appearance.

Genes which have known effects are denoted by single letters. The dominant allele is denoted by a capital, recessive alleles by lower case. If there is more than one recessive allele, the lower case letters have identifying superscripts. For example Black [B], Brown (Chocolate) [b], Light Brown (Cinnamon) [b<sup>1</sup>]

So which genes are important in Siamese?

**Full Colour [C] : Burmese Colour Restriction [c<sup>b</sup>] : Siamese Colour Restriction [c<sup>s</sup>] : Blue Eyed Albino (Recessive White) [c<sup>a</sup>]**

A series of recessive semi albino mutations which cause a reduction in the coat and eye colour as well as progressively restricting the colour to the points. c<sup>b</sup> is incompletely dominant to c<sup>s</sup>, the hybrids, c<sup>b</sup>c<sup>s</sup>, are Tonkinese which have an intermediate degree of albinism . Both are dominant to c<sup>a</sup>.

Siamese Restriction c<sup>s</sup> causes the eyes to appear blue and the production of pigment in the hair to become temperature dependant. The pointed pattern occurs because the extremities are cooler than the body. The mutation causes all colours to be paler than in the corresponding self cat.

Colour darkens with age, kittens are born white and gradually develop full colour.

A DNA test for the Siamese gene is available.

**Agouti (Tabby) [A] : Non-Agouti (Non-Tabby) [a]**

All cats are basically tabby. But the tabby pattern is concealed in the presence of non-agouti. The background of a tabby pattern is produced by the pigment-generating cells at the roots of hairs switching production of pigment on and off, giving bands of colour in the hair, while in the foreground production is continuous. Non-Agouti stops the switching, so pigment is continuously produced everywhere. You can sometimes see the ghost tabby pattern - often in kittens whose coat later clears. In the paler colours rings on tails are often evident and except in extreme cases not a problem.

A DNA test for Non-Agouti is available

**Black [B] : Brown (Chocolate) [b] : Light Brown (Cinnamon) [b<sup>l</sup>]**

The alleles of this gene alter the shape of the pigment granules deposited in hairs and in nose and pad leather. Because differently shaped granules reflect light differently, the result is a changed colour. Chocolate appears to be incompletely dominant to cinnamon: chocolate points carrying cinnamon are generally paler than pure chocolate points. Seal points or blue points can carry either chocolate or cinnamon but not both. Lilac points can also carry cinnamon. However, if a seal carrying cinnamon is mated to a chocolate then chocolate carrying cinnamon will be produced and it would look as if the seal carried chocolate.

DNA tests are available for both Chocolate and Cinnamon.

**Dense Colour [D] : Dilution (popularly Blue) [d]**

Dilution causes the pigment to be spread more thinly in the hair and this weakens the colour. It is independent of the colour genes above, so one can have black+dilution = blue, chocolate+dilution = lilac, cinnamon+dilution = fawn, or orange+dilution = cream. Cream can be blue, lilac or fawn based.

A DNA test is available.



### **Dilute Modifier (Caramel) [Dm] : normal [dm]**

As its name suggests, Dilute Modifier is thought to modify the effect of the Dilution gene d. Although it has no known effect where the Dense gene D is present. ( i.e. seal, chocolate, cinnamon and red cats) it has been suggested that it could be the cause of a general deterioration of colour.

In dilute cats expressing any of the alleles of Black (i.e. blue, lilac or fawn) it produces caramel. Though each gives a distinct colour, for historical reasons all three are given just one colour name. In dilute cats together with orange, it produces apricot.

While this is the accepted genetic basis for Caramel and Apricot, it remains a hypothesis while no discrete gene has been identified. As there seems to be fewer blue/lilac/cream cats than expected the genetics could be more complicated.

### **Inhibitor (Silver) [I] : normal [i]**

The Inhibitor gene 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 white base.

The gene has now been identified. There is as yet no test, but it is expected that one will be available shortly. It is dominant, but the expression is variable so that cats possessing the gene may not necessarily be recognised as doing so.

### **Orange (Red) [O] : non-orange [o]**

The Orange gene causes the pigment granules to become yellow. This makes the coat, paw pads and nose leather appear red in B series cats, cream in dilute cats and apricot where the DM gene is present. It does not matter which of the B series alleles is present as the appearance is almost indistinguishable. A cat which would be seal without the orange gene is called a seal based red, similarly reds can also be chocolate or cinnamon based, and creams blue, lilac or fawn based.

Orange masks the effect of non-agouti: orange series cats always appear tabby. (Apparently clear coated reds are either ticked on careful inspection, or have been carefully selected for bad tabby pattern). All orange series with one or more tabby point parents must be registered as tabby point until proven otherwise. This used to mean using a number of test matings, but can now be proved by a DNA test.

Orange is a very unusual gene: its position is on the part of the X chromosome for which there is no counterpart in the Y. So in a male cat only one of the two alleles can be present: the cat is either orange series OY, or not oY. In a female there are three possibilities, the cat can be OO orange series, oo not orange series or Oo which gives rise to the Tortie. A peculiarity of the X chromosome is that only one is active in each cell, but the inactivation of the

other happens quite late in the embryo's development, when there already very many cells, and each cell independently chooses which X to inactivate. In this case some of the pigment-producing cells O is active, in others o, giving the typical mottled appearance of the Tortoiseshell. Occasionally male Tortoiseshells appear, although they are usually sterile. They always represent a genetic anomaly. The most likely cause is the presence of three rather than two sex chromosomes (XXY Alternatively, there may be two pairs of sex chromosomes (XX and XY) with only one of the pair being present in each cell. The easiest way to understand how this could happen is development from a fusion of two fertilised eggs, but no doubt the truth is rather more complicated.

### **Piebald White Spotting [S] : Normal [s]**

A dominant gene producing white areas, Piebald White Spotting is behind Bicolour in all breeds. Expression is variable, and the homozygous [SS] state produces a larger proportion of white than the heterozygous [Ss] state. While variability of expression could, in principle, give no perceptible white at the low end, and complete white at the high end there is no evidence of this happening

Torties with Piebald White Spotting have their areas of orange and non-orange in patches rather than the usual mingled effect without white.

Piebald White Spotting should not be confused with Brisket Spotting, which gives rise to minor white spots on the underside of the body which are variable in size and irregular in occurrence. The genetics and mode of inheritance of brisket spotting are unclear but are thought to be polygenic.

Brisket Spotting can be masked by Piebald White Spotting.

### **Dominant White [W] : Normal [w]**

A dominant gene which causes a white coat, hiding all other colours and patterns. The gene also causes eye colour to be blue (but with variable expression, so non-blue and odd eyes also occur).

There is an association with deafness, particularly in blue-eyed whites. Deafness can be tested using the BAER test.

The white coat of the Foreign White is caused by Dominant White, but they have blue eyes because they are genetically Siamese ( $c^s c^s$ ).

### **Polygenes**

These are collections of genes which, although individually insignificant, have considerable effect when combined together. They modify the effect of the major genes and can alter all aspects of the cat.

Type seems to be completely controlled by a very wide range of polygenes.

Points colour is determined by major genes, but the more subtle differences are due to polygenes.

Siamese colour restriction reduces pigment causing the eyes to appear blue, but depth and intensity are polygenic.

Although Siamese are genetically short haired, the action of polygenes causes subtle differences in texture, density and length.

Unfortunately some sets of polygenes can be harmful and might be a cause of Inbreeding Depression. Each gene has little effect in itself but cumulatively can result in a gradual decline in the vigour of a breeding line.

## Breeding System

Listed above are the main genes that help define the Siamese cat through the expression of 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 Siamese breed type.

In order to ensure the maintenance of the good Siamese breed type already achieved, while allowing scope to further improve aspects of type, coat, 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 Siamese breeding programme. Cats with serious genetic faults must not be bred from.**
- **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 up on the good traits in a cat also results in doubling up on the defects; the breeding of cats with similar faults should be avoided at all costs otherwise there is a danger of fixation. (i.e. creating a characteristic which cannot subsequently be eliminated).**

Breeders must make themselves aware whether the characteristics they wish to promote or avoid, are due to a dominant gene (which will always be expressed when present) or a recessive gene (only expressed in the homozygous state i.e. where the cat inherits the gene from both parents).

The prime motive is to perpetuate the Siamese as a recognisable breed and to improve the quality of the breed as measured against the Standard

The skill in breeding lies in the choice of the individual cats and the matings to be performed between them.

## Selection

A breed is defined by its own distinctive set of characteristics, achieved and further developed by a reduction in genetic diversity This reduction is controlled by selective breeding, where the cat chosen is that which most closely approaches the breeder's idea cat. As selection alone is not very efficient in reducing diversity it is often used in conjunction with inbreeding. Some inbreeding, albeit on at a low level is inevitable in the development of a breed.

## **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, but not directly related cats. 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.

**“The more intense the in-breeding, the more careful must be the selection”.**  
**“Loss of innate genetic variability must not be too great”.**

Inbreeding should be restricted to experienced breeders with sound knowledge of pedigrees. A complete outcross every few generations is recommended. Breeders must realise that there has been considerable inbreeding in the past in the development of Siamese. This might not be apparent in 5 generation pedigrees.

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 Siamese 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 inbreeding to gain sufficient homogeneity to fix recognisable Siamese 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).

**While it is recognised that breeders do not wish to entrust their valuable breeding lines to individuals who may not operate humane and qualitatively intelligent breeding practice the GCCF would strongly recommend that breeders do not place excessive numbers of healthy good quality cats on the non-active register because they want to operate commercially restrictive practices. This could have serious future consequences in reducing the viable, active gene pool of a breed to an unacceptably low level and potentially promote undesirable practices.**

**Unavailability of female kittens on the active register discourages potential new breeders.**

## **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 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.**

No cats showing reproductive problems, or their offspring should be used for breeding for example:

- Queens which have repeatedly failed to conceive, re-absorbed, miscarried or had multiple caesareans,
- Queens which have rejected their kittens, failed to produce milk or produced fading, small, weak or abnormal kittens,
- Studs with low fertility, or siring abnormal kittens with several unrelated queens.

- **List of Genetic Anomalies known in Siamese or Orientals**

### **Amyloidosis**

Amyloid is a type of protein, and amyloidosis describes the disease that occurs when this particular protein is deposited within the body organs, mainly in the liver (hepatic) and kidney (renal) Siamese and Oriental cats are primarily subject to hepatic amyloidosis, resulting in liver dysfunction and haemorrhage from the liver. Young cats (approx 8 months – 7 years) are most commonly affected. Affected cats are often related, but the mode of inheritance and contribution of environmental factors is unknown.\*

### **Bites**

Incorrect bites are an issue in Siamese. Generally bites that are misaligned tend to be overshot, are occasionally undershot, and very occasionally slightly twisted.\*

### **Cleft palate**

Cleft palates may have an environmental cause, but some lines of Siamese appear to be over-represented.\*

### **Feline Asthma**

Feline Lower Airway disease is typified by wheezing and bouts of coughing. As asthma in humans has a hereditary component, it is speculated that there may be a hereditary component to the disease in cats, but any genetic predisposition has yet to be identified. Siamese cats seem to be over-represented.\*

### **Flat-chest syndrome**

There is good evidence that this is caused by a simple recessive gene, but it may also have a more complex genetic cause; the disorder results in a kitten with a compressed flattened rib-cage that has difficulty in breathing, etc. It can be fatal in a number of cases, depending on degree of severity. No test is available.\*

### **Heart defects**

It is believed that the majority\* of cases have a genetic origin. However there may be several genetic mutations

### **Kink**

Kinks typically result from deformities of bone and are listed as defects by the GCCF. However, they are usually only of aesthetic relevance as they cause no pain or discomfort to the cat.\*

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\* *Information from the Feline Advisory Bureau*

### **Mammary tumour**

Siamese are at increased risk of developing mammary carcinomas and affected Siamese cats tend to be younger compared to other breeds. Male cats can occasionally be affected. Tumours occur with equal frequency in all glands in cats. Single or multiple nodules associated with the gland or nipple may develop; the masses may be ulcerated, inflamed swollen or associated with discharge from the nipple.

### **Squint**

Convergent squint is seen commonly in Siamese. It is believed to be a polygenic trait with threshold character. \*

### **Thymic lymphoma**

Siamese cats are over-represented amongst cases of thymic lymphoma. Affected cats are usually young (often less than 2 years old), FeLV negative, and they typically respond favourably to chemotherapy. These cats **MUST NOT** be used for breeding. Although the mode of inheritance has not been confirmed, it is suspected to be recessive in nature.

### **Inbreeding Depression**

Inbreeding causes a potential build-up of deleterious genes.

If the genetic make up of a breed is inherently healthy then inbreeding can be quite safe. However breeders must be aware of the possibility of the problems associated with inbreeding depression:

- An increased probability of genetic defects

- A decline in the weight or vigour of kittens

- A fall in average litter size, increase in the number of stillborn or abnormal kittens

- Problems in reproductive performance

- Greater susceptibility to infections

- Increased rates of cancer in young adults.

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\* *Information from the Feline Advisory Bureau*



## Normal + Mutant Genes

Gene	Symbol	Effect
Agouti	A	Yellow band to the hairs
Non-Agouti	a	Absence of band in the hairs
Black	B	Blackish Brown hair pigment granules
Brown	b	Brown hair pigment granules
Light Brown	b <sup>l</sup>	Light brown pigment granules
Full Colour	C	Maximum production of pigment
Burmese	c <sup>b</sup>	Reduction in production of pigment
Siamese	c <sup>s</sup>	Greater reduction in production of pigment
Blue Eyed White (Recessive White)	c <sup>a</sup>	No pigment develops in the coat, the eyes are pale blue
Dense	D	Normal packing of pigment molecules
Dilute	d	Dilution of pigment granules
Dilute Modifier	Dm	Lightens hair of dilute phenotypes
Normal	dm	Normal dilute phenotype
Inhibitor	I	Inhibits production of pigment granules
Normal	i	Normal production of pigment granules
Orange	O	Converts black/brown pigment granules to yellow
Normal	o	Normal black/brown pigment granules

## Glossary of Genetic Terms used in the text

<b><i>Allele</i></b>	One of two or more alternate forms of a gene at the same site or locus in each of a pair of chromosomes, which determines alternative characters in inheritance.
<b><i>Chromosome</i></b>	The carrier of the genes in the cell nucleus.
<b><i>Dominance</i></b>	When the expression of one allele of a heterozygous pair completely hides the expression of the other.
<b><i>Dominant gene</i></b>	The allele whose expression completely hides the expression of another at the same locus.
<b><i>Expression</i></b>	The manifestation of an heritable trait in an individual carrying the gene or genes which determine it.
<b><i>Fixation</i></b>	A result of selection or inbreeding causing the genes of a group of cats to become homozygous or fixed.
<b><i>Gene</i></b>	The ultimate determinant of heredity.
<b><i>Gene Pool</i></b>	The genetic make up of a group of individual cats
<b><i>Genotype</i></b>	Genetic Constitution of a cat.
<b><i>Heterozygous</i></b>	Where members of a gene pair are different, as in Aa.
<b><i>Homozygous</i></b>	Where members of a gene pair are identical as in AA or aa.
<b><i>Inbreeding Depression</i></b>	A decline in the vigour of a breeding line probably caused by the cumulative effect of many deleterious polygenes.
<b><i>Incomplete Dominance</i></b>	Where one allele for a specific trait is not completely dominant over the other allele resulting in a combined phenotype. For example the offspring of a Burmese x Siamese mating are Tonkinese.
<b><i>Mutant Gene</i></b>	Mutant (altered) form of an original gene.
<b><i>Normal Gene</i></b>	Original gene present in the genotype of the cat.
<b><i>Phenotype</i></b>	The physical appearance of the cat or the expression of a gene.
<b><i>Polygenes</i></b>	Minor genes each with a small, cumulative effect on the expression of a characteristic. These may explain, for example, the variation in type from the round, cobby British to the long, slender Siamese.
<b><i>Recessive</i></b>	Where the effect of one allele of a heterozygous pair is not expressed.

***Recessive gene*** Allele whose expression is hidden by another at the same locus.  
Where there are multiple alleles (in the colour restriction series for example), one allele can be dominant in some combinations and recessive in others.  
Recessive genes can be hidden for many generations

***Threshold*** Build up of polygenes with no discernable effect until a tipping point results in a sudden large effect

## **GCCF Registers**

### **FULL REGISTER (REG NO. BEGINS CS)**

A cat/kitten resulting from an ideal mating to produce that breed; it can be shown, and if agreed by the breeder, it can be used for breeding.

### **SUPPLEMENTARY REGISTER (REG NO. BEGINS CSSR)**

A cat/kitten resulting from a more mixed mating but nevertheless acceptable as an example of the breed; it can be shown, and if agreed by the breeder, it can be used for breeding.

### **EXPERIMENTAL REGISTER (REG NO. BEGINS CSEXP)**

A cat/kitten of a relatively new breed which had Preliminary Status when it was registered. It can be both shown and bred from. It may or may not be eligible for Championship status depending on how far the breed has progressed since the cat/kitten was originally registered (Original registration numbers are not altered even when a breed progresses).

### **REFERENCE REGISTER (REG NO. BEGINS CSREF)**

A cat/or kitten from a mating regarded as an outcross for this breed (but not necessarily for other breeds). This cat/kitten is **NOT ALLOWED** to be shown and will not be intended for breeding except under very specifically controlled circumstances.

It is possible to progress upwards from the Reference Register with a minimum number of five suitable breeding generations. This is acceptable to a breeder with a well planned breeding programme, such as when developing a new breed, but not something that a new breeder should be considering

## References

Feline Advisory Bureau

“Robinson’s Genetics for Cat Breeders & Veterinarians” Edited Valla, Shelton,  
McGonagle & Stanglien, published by Butterworth & Heinman Press.

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