

Preventing Fading Kitten Syndrome in Hairless Peterbald Cats

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Abstract

Newborn hairless Peterbald kittens have a very high mortality rate, rarely surviving to one month of age. Since the early days of the breed, breeders have not attempted to breed born-hairless sires and dams together because all of the kittens will be hairless, with few surviving to adulthood. Even in litters from heterozygous parents, it is unusual for more than one hairless kitten to survive.

Several potential causes of fading kitten syndrome in Peterbald cats are identified. A new 7-step protocol has been developed to address all of the potential causes of fading kitten syndrome. This protocol has been used successfully to breed a hairless sire, CelestialBlue Eureka, with a hairless dam, CelestialBlue Mimsy. All four hairless kittens in this litter have survived to four months of age, and there is every expectation that they will reach adulthood and live normal lifespans.

This is the first time a litter of born-hairless Peterbald kittens has achieved a 0% mortality rate since the origin of the Peterbald breed.



Litter of four hairless Peterbald kittens at one month of age

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Introduction

The Peterbald is a rare breed of hairless housecat that originated in St. Petersburg, Russia, in 1994. It is the result of a cross of the hairless Donskoy (Don Sphynx) with Oriental Shorthair cats. Siamese cats were subsequently allowed as outcrosses. The result is an intelligent and affectionate hairless cat with a long, elegant, tubular body, large, low-set ears and a triangular head with a blunt tip.

The Peterbald breed has five main coat types:

Two copies of the Peterbald genes

- Born hairless

One copy of the Peterbald genes

- Flock (very short coat that appears hairless from the distance)
- Short Brush (short-haired rough coat, very rare in U.S.)
- Brush (long-haired rough coat)

No copies of the Peterbald genes

- Straight (normal short-haired coat)

The Peterbald gene is a hair-loss gene, so it is possible for Peterbald cats to lose their coats as they mature, especially in conjunction with puberty and other changes in the hormonal milieu. Cats who are born hairless are referred to as born-hairless to distinguish them from coated cats that subsequently lost their coats.

The International Cat Association (TICA) accepted the Peterbald breed in 1997 and recognized it for championship status in 2005. The brush-coat variety of Peterbald cat was accepted for championship status in 2008. Today, the Peterbald breed is recognized by nine cat registries, including ACFA, CASA, FIFE, LOOF, REFR, SACC, SFF, TICA and WCF. There are more than 60 established Peterbald breeders worldwide.

The Donskoy was the result of a spontaneous mutation discovered in St. Petersburg, Russia, in 1993. The creation of the Peterbald breed demonstrated that the Donskoy/Peterbald hair-loss gene is dominant, unlike the Canadian Sphynx hairless gene, which is recessive. Although the Canadian Sphynx gene has been identified [1], work on identifying the Peterbald gene(s) is ongoing [2].

During the early days of the Peterbald breed, breeders tried breeding born-hairless sires and dams, but encountered a very high perinatal mortality rate. Since then, breeders have avoided breeding born-hairless sires and dams together. Accidental hairless-hairless breedings continue to demonstrate very high mortality rates.

Symptoms of Fading Kitten Syndrome

Fading kitten syndrome refers to a failure of a kitten to thrive. It usually results in death within 2-3 days of the onset of symptoms in the absence of supportive measures.

The primary symptoms of fading kitten syndrome in Peterbald cats are weight loss and/or a failure to gain weight, dehydration, low blood glucose, lethargy, weakness, slowed respiration and low body temperature.

Low birth weight is not predictive of fading kitten syndrome. Both coated and hairless Peterbald kittens typically weigh 60-80 grams (2-3 ounces) at birth, about half the weight of newborn kittens from other breeds, and gain 7-14 grams (0.25 to 0.50 ounces) a day. However, if a kitten does not gain weight, it may be a sign of occult infection, such as pneumonia. By the time a diagnosis can be confirmed, the kitten will have already died. If treated with antibiotics, however, the kittens often recover and begin gaining weight within a week.

In some cases, the kitten will show signs of dehydration, such as low skin turgor and pale gums, and soon will become emaciated. Vomiting is rare. Dehydration is often secondary to other symptoms.

These symptoms are followed by profound lethargy and decreased activity. The kitten may sleep away from the mother and the rest of the litter. The respiratory rate slows and body temperature (as measured non-invasively by an infrared camera) decreases.

Neonatal Isoerythrolysis Insufficient Explanation

Neonatal isoerythrolysis, which is often cited as a cause of fading kitten syndrome, [3, 4, 5, 6, 7] is not a likely cause of fading kitten syndrome in Peterbald cats.

During the first few days after birth, kittens ingest colostrum, which contains antibodies that protect the kitten from disease. When there is a blood type incompatibility between the mother and the kittens, the antibodies can attack the kitten's blood cells, leading to anemia and sudden death. Blood type incompatibility most often occurs when the mother has type B blood. When a father with type A blood is bred to a mother with type B blood, most of the kittens will have type A blood, since type A blood is dominant. The colostrum from a mother with type B blood will contain a high concentration of anti-A antibodies, which can kill kittens with type A blood.

Blood type incompatibility is generally not an issue with Peterbald cats, however, because Peterbald cats have only type A blood. This is also the case for Oriental Shorthair and Siamese cats, the most common permitted outcrosses.[7] The Donskoy, which is also an allowed outcross, may be a potential source of type B blood, due to outcrossing with European Shorthair cats. However, most Peterbald breeders no longer outcross with the Donskoy, since Peterbald breeders focus on an oriental look for the breed and do not need Donskoy as a source of the hair-loss gene.

If blood type incompatibility were a potential cause of fading kitten syndrome in Peterbald cats, the prevalence of type B blood is rare enough that it could not explain the high frequency of fading kitten syndrome in Peterbald cats, nor why the problem appears to be isolated to hairless kittens.

Potential Causes of Fading Kitten Syndrome

Fading kitten syndrome may be due to the contribution of several different causes, as opposed to a single dominant cause. There are several hypotheses concerning possible causes of fading kitten syndrome, including genetics, inadequate thermal control, maternal neglect, difficulty nursing, improper supplementation, infection and exposure to chemical toxins.

The greater prevalence of fading kitten syndrome among hairless kittens, who are homozygous for the Peterbald gene, suggests the possibility of genetics as a cause. Inbreeding and line breeding was common in the early days of the breed, and continues today among some breeders. Some current pedigrees, for example, show signs of brother-sister, mother-son and father-daughter breeding, and a distinct lack of genetic diversity.

Without fur to insulate their bodies, hairless kittens may use more of the calories they consume to maintain body heat. This leaves fewer calories available for growth and may leave the kittens more susceptible to disease. Indeed, in litters with both coated and hairless kittens, the coated kittens grow faster than the hairless kittens and are better able to compete for the mother's milk.

Maternal neglect may be a contributing factor. The mother may frequently dislodge the kittens by getting up, by stretching and by grooming the kittens as they nurse. The mother may also avoid lying with and warming the kittens. Inexperienced mothers may not properly care for their kittens, sometimes even fearing them. One queen, for example, did not instinctively uncover the kittens' faces after birth, potentially causing them to suffocate, if the breeder had not been present to assist. Another queen sat on one of her kittens, killing it.

Sometimes the kittens fail to root and nurse normally. Even when placed at a nipple and helped to latch, the kitten may be easily dislodged by more aggressive littermates or movement of the mother. The lack of a transition from fur to bare skin on a hairless mother may be a contributing factor that makes it more difficult for the kitten to find the nipple and latch. Hairless kittens often have short, broken whiskers, which may affect their ability to root. It is also possible that the kittens are not getting enough milk when they nurse.

Interventions, such as supplemental feedings, may sometimes contribute to fading kitten syndrome. If supplementation is done improperly, the kitten may aspirate the milk replacer and develop pneumonia.

Other infections may also contribute to fading kitten syndrome. The most common infections include strep G and mycoplasma.² But other infections may include bartonella, bordetella, chlamydia, campylobacter, feline herpesvirus type 1, calcivirus, FeLV, FIV, coronavirus, staph infections and feline panleukopenia virus. Even when an infection is transient, it can cause a decrease in blood glucose levels and lower body temperature.

Environmental toxins can also contribute to fading kitten syndrome.

² Experienced breeders frequently report Group G Streptococcus as a possible cause of fading kitten syndrome. See also http://vetbook.org/wiki/cat/index.php/Streptococcus_spp.

The 7-Step Protocol

To prevent fading kitten syndrome in Peterbald cats, the author developed a 7-step protocol that provides supportive therapy and prophylactic treatment to address *all* of the potential causes of fading kitten syndrome.

Application of this protocol resulted in the first successful breeding of a born-hairless with a born-hairless queen. There were no stillborn kittens. All four kittens in the litter have survived to four months of age.

Temperature Control

The entire kitting room was turned into an incubator, maintaining an ambient environmental temperature of 90 degrees Fahrenheit (32 degrees Celsius). The temperature was reduced to 85 degrees Fahrenheit (29 degrees Celsius) when the kittens were one month old.

The temperature was maintained by a Lifesmart Medium Room Infrared Heater, which is thermostat controlled. Temperature was confirmed with an independent thermometer. The heater was located as far from the kitting cages as possible, to prevent potential hot spots. Instead, it provided thermal support by warming the circulating air in the room.

Other options considered included small animal incubators, Snuggle Safe Microwave Heating Discs and electric heating pads. Incubators were abandoned after a trial run caused one queen to get burns on her ears and head, due to design flaws in the incubator. Although the heating discs radiate a safe level of heat for 12 hours, the discs are too small to allow the kittens to nurse while resting on the heating discs. Heating pads are larger, but may make it more difficult for the kittens to move off of the pads if the temperature is too hot. Also, one of the queens figured out how to turn up the temperature on the heating pad, leading to a risk of burns.

Humidity Control

The kitten room was maintained at 45%-50% humidity using a Vornado Ultra3 Whole Room Ultrasonic Humidifier, which is controlled by an electronic humidistat. Humidity support was discontinued at one month of age. To avoid coating surfaces with mineral deposits, distilled water should be used instead of filtered water.

Light Control

Normally, kittens open their eyes within 7-14 days of birth. Peterbald kittens, especially the hairless kittens, can be born with their eyes open or open them within a few days. The less fur a kitten has, the sooner its eyes open. Ophthalmic eye ointment is often necessary during the first week to prevent blindness and conjunctivitis.

The author discovered that keeping the kittening room dark during the first two weeks eliminated the need for ophthalmic eye ointment. It also eliminated the “squinty eye” problem that is common among adult hairless Peterbald cats.

Installing a dimmer switch and dimmable 2700 Kelvin LED light bulbs allowed control over the light intensity. When the author was in the kittening room, the dimmer switch was used to set the light at a very faint level.

Even though the kittens open their eyes early, they appear to keep their eyes closed when the room is dark.

Supplemental Feeding

Even when the kittens appear to be nursing well, they can benefit from supplemental feeding. Kittens are supplemented with Kitten Milk Replacer (KMR) at room temperature, using a 1.0 mL (1 CC) needleless syringe. During the first week of life, supplementation occurs every 2-3 hours, one syringe-full of KMR per 100 grams (3.5 ounces) of body weight.

After supplementation, the kittens are then latched onto the mother to nurse. Supplementation seems to stimulate appetite, leading to more consistent nursing.

Supplementation continues through the fifth week of life, but the frequency gradually decreases to three times a day, in the morning, afternoon and evening.

Improper supplementation technique can cause aspiration of the KMR, leading to pneumonia. To reduce the likelihood of aspiration of the KMR, kittens are supplemented on the left side of the mouth. Initially, kittens are held vertically, not on their backs. When the kittens are able to stand on their own, they are supplemented in a standing position. Feeding occurs very slowly, placing one drop of KMR at a time on the kitten’s tongue, to trigger the swallowing reflex, which also reduces the likelihood of aspiration. (For newborn kittens, it may be necessary to place a drop on the kitten’s lips so that the kitten licks it off and swallows. Later the kittens will let the droplet be placed directly on their tongues.)

Leftover KMR may be refrigerated. However, since ingestion of cold KMR can lower the kitten’s body temperature and cause an ileus, the KMR must be warmed before use. Since KMR will congeal if microwaved, there are two approaches to warming the refrigerated KMR. One is to microwave a bowl of water and place a cup containing the KMR in the bowl until it reaches room temperature. The other is to microwave unflavored Pedialyte and mix it with the refrigerated KMR until the KMR reaches room temperature. The latter technique was most often used because of the added nutritional benefit.

The kittens begin to transition from hand-feeding to drinking from a bowl after the third week. The process involves supplementing them over a bowl of KMR and gradually moving the syringe lower and lower, closer to the bowl. Eventually, the kittens learn to lap from the bowl. After several days practice lapping from the bowl, the KMR can be mixed with wet food, forming a slurry. Some kittens take longer to learn to lap from a bowl. Others transition directly to eating wet food. Most of the kittens continue nursing during this transition period.

An added benefit of supplementation is that it makes the kittens friendlier and more socialized, with outgoing personalities.

Inbreeding Coefficient

To avoid potential problems caused by inbreeding, an inbreeding coefficient is calculated for every possible pairing. The sire and dam were chosen because they have an inbreeding coefficient under 10% and no evidence of line breeding, based on a six-generation pedigree.³

Infection

Kittens should be weighed daily. Any failure to gain weight is likely a sign of infection and should be treated with antibiotics. The author treats with Clavamox, not Amoxi drops, as the bacterial infections appear to be resistant to Amoxi drops.

Whenever any kitten needs to be treated, the author treats the entire litter prophylactically, as the infection can easily spread to other kittens. Even if the other kittens are resistant, they can serve as a source of re-infection.

Clindamycin or azithromycin may be used to treat Strep G. Queens may also be prophylactically treated with Convenia, which appears to reduce the incidence of Strep G among the kittens.

Environmental Toxins

To minimize the opportunity for environmental toxins, the author isolates the queens and kittens to a dedicated kitting room with custom-built three-story kitting cages built by CD&E Enterprises. Queens are placed in the kitting cages about two weeks before the due date.

The interior of the kitting cage is cleaned daily with hot water and disposable paper towels. Bedding material is washed with hypoallergenic detergent in a high-temperature sterilization cycle.

When surface sterilization is necessary, household bleach is used at a 1:10 dilution. Sterilization occurs mainly between litters, so there is no exposure of the mother and kittens. The bleach is poured on a paper towel that is used to apply it to the surface, instead of spraying it. The bleach remains on the surface for 10 minutes, after which it is wiped up with paper towels. The surface is then wiped again with water and paper towels.

Otherwise, caustic chemicals are not introduced into the kitting room, to avoid the introduction of environmental toxins.

³ Cat registries normally supply a five-generation pedigree. Since the sire and dam were the result of breeding the author's own lines, the author had a six-generation pedigree available.

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