

Why Puff Isn't Pregnant

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Any reputable shelter will be happy to explain to you what incredibly efficient reproductive machines cats can be, and how quickly a fertile pair can produce enough offspring to constitute a colony. The feline reproductive system appears designed by Mother Nature to maximize output, with heat cycles that can begin as early as four or five months, ovulation occurring in response to the stimulation of a breeding, etc., etc. It all should result in an abundance of kittens and generally does.

Except when it doesn't.

So where do you start when it comes to figuring out why the queen you expected to be pinking up has started to call again? Is it more likely to be the girl's fault or the boy's fault? Is there some abnormality, deficiency, or infection—on either side—that is preventing a successful combination of sperm and egg? According to *Cat Talk's* Veterinary Consultant, Dr. Noelle Giddings, infertility can affect as many as 15% of breeding cats, and the figure may be even higher in certain breeds. So, if you have had a pregnancy fail with your particular pair more than once, you probably want to involve a therio-genologist, i.e., a veterinarian who specializes in animal reproduction. However, here are some things to consider before you begin that process.

First, "Check the Connection"

With any faulty piece of technological equipment, the first thing to check is the wiring and plug. A mis-breeding follows the same principle. Emilie, a veterinary student with a special interest in theriogenology, would first ask if you actually observed the breeding. Are you positive that the male did, in fact, grab and mount the female, and

position her properly (which generally requires mutual cooperation)? Did the queen let out that unmistakable yowl, roll and lick herself frantically, and tell the tom to get out of her hair?

You may not have actually seen the breeding, only heard it (some males are shy!). Or perhaps you assumed it had taken place because they were together for a sufficient time frame and the female went out of heat. But you may not have had a compatible pair. According to Emilie, both male and female cats can show mate preference. If two cats seem uninterested in each other, try another combination before giving up on either side of the breeding. First-time breeders are often reluctant or shy, so pairing such a cat with a calmer, more experienced partner may provide the guidance it needs to get started.

Another reason the connection may not have taken place properly is the male's refusal to mate. We tend to think of our toms as "ready Teddies" but it is not always the case, especially with longhaired cats. Emilie notes that hair sometimes becomes entangled around the penis, and may wrap so tightly around it that the poor cat can neither protrude or retract his equipment. As you can probably imagine, this is very painful. You may be able to free him up for normal operations by using a non-spermicidal lubricant and gently sliding the hair off the tip of the penis. However, we are thinking you may be more comfortable referring this issue to your vet should you discover it. In some cases, surgical correction is required. In addition, be sure to monitor the dental health of older breeding males, as a dental issue such as gingivitis may stop your tom from getting a good hold on the girl's neck.

Longhair and shorthair toms alike can also suffer from low testosterone levels and may not become aroused enough to complete a breeding. If you suspect this to be the case, a vet visit may be necessary to perform bloodwork and karyotyping (checking the chromosomes). Sometimes, lack of testosterone can be medically managed with GnRH (gonadotropin-releasing hormones, which are made by the brain to activate hormone production in the reproductive organs) before breeding.¹ We'll discuss hormones further shortly.

"Connection problems" can occur on the female side as well. Emilie notes that some queens may feel nervous around dominant female housemates, especially those also in heat. These submissive queens may be in heat but hide their behavioral signs. Don't give up on her yet! Try giving her a bit of privacy with her man! Additionally, though rare, it can be possible that mating is painful because the girl's genital tract is blocked off. Often, problems related to this will show up early on, with recurring infections and frequent licking.

Although the queen can actually be stimulated to ovulate by the smell, sight, and sounds of a tom, her after-reaction is generally considered the key to a successful mating.² Her yowl and frantic licking indicate sufficient stimulation has taken place to induce ovulation. While we all know cases where one mating produced a large litter, the standard recommendation is to aim for four breedings within a heat cycle, ideally within a 48 to 72-hour period.

Why this time frame? Ovulation (i.e., the release of a mature egg from the queen's ovary) can take place anywhere from 24-36

hours after a mating. However, cats may stay in heat for as long as 19 days and can release multiple eggs during that time.³ A litter from an unsupervised breeding could, therefore, have multiple fathers. Also, many breeders believe that kittens conceived toward the end of a long breeding period may have lower birth weights and lag behind developmentally compared to those conceived at the beginning. We've found no proof that this is actually the case, but keeping a breeding within that 48-72-hour time frame certainly does no harm and makes planning for the kittens' arrival much easier.

Are Hormones Hard at Work?

Let's assume you are positive the breeding was done precisely by the book, but Puff still failed to puff up. At this point, Emilie recommends checking her progesterone level (a simple blood draw is required). Your reproductive vet can use this level to determine whether ovulation has occurred. If so, pregnancy is likely, but not guaranteed at this stage! Progesterone helps prepare the female's system for pregnancy, prevents additional heat cycles and helps prompt the growth of placentas, which will provide nourishment for the kittens. High progesterone levels mean that a female has been stimulated enough to ovulate and push a mature egg out of her ovary.² They do NOT necessarily signify that said egg has been fertilized.

So, in order to determine pregnancy, we must look to another hormone—relaxin. This is produced by the developing fetuses and placentas and shows up about 20-28 days following a successful breeding. This means that the only reliable hormone pregnancy tests are ones using relaxin, which can detect pregnancy 20-28 days after mating.² Of course, pregnancy can also be determined by other means, such as ultrasound (heartbeats show up around 28 days), palpation (a trained hand can detect "kitten bumps" at 21-25 days, sometimes sooner) or x-ray (the best way to get an approximate count of the kittens, but for dependable results, should not be used until at least 45 days post-breeding).²

But let's go back to progesterone, because too little or too much of it can prevent pregnancy even after an effective breeding. Progesterone insufficiency is a rare condi-

tion in cats. It can prevent pregnancy from progressing, and can also cause a miscarriage at around 50-58 days of pregnancy, because there is not enough progesterone present to stop the body from giving birth. Progesterone insufficiency can be treated with natural progesterone but not synthetic progestin, which can cause breast cancer, pyometra, dystocia (problems giving birth), issues with producing milk, and birth defects.⁵

Too much of a good thing and you have more problems. An overabundance of progesterone can prevent normal heat cycles from occurring and cause ovarian cysts. Emilie also warns that if the girl's human mom happens to be taking progesterone, there's a chance the cat may be picking up a minute amount, just enough to throw things out of kilter. Similar things can happen with other topical medications, such as corticosteroids or ketoconazole. If taking any of these, be sure to cover up or wash hands frequently before touching your breeding cats!

Hormones need to be properly in play on the tom's side, too. Three important hormones are involved: follicle-stimulating hormone (FSH), luteinizing hormone (LH), and testosterone. FSH stimulates sperm production, LH stimulates testosterone production, and testosterone promotes the development of male characteristics and plays a small role in sperm production. Then there's gonadotropin-releasing hormone (GnRH), which is produced in the brain and encourages production of the three male hormones (it also stimulates hormone production in females). If GnRH is administered to the male and testosterone levels increase, then it's likely the male was lacking sufficient GnRH. However, testosterone can also be present in excess, which can have the effect of shutting down production of the other two hormones. This is bad news for sperm production.² It's all part of a very delicate balance, which, when explored to this level of detail, certainly sheds new light on the perception of cats as super-efficient reproductive machines.

Could an Infection Be Involved?

We've sidestepped one of the most frequent culprits in infertility cases in order to provide you with a good understanding of how the reproductive hormones

operate. However, there are a wide variety of infections that could also be behind fertility failures. One of the first things your vet may look for is cystic endometrial hyperplasia (CEH), a condition that causes the uterine lining to thicken and become covered with cyst-like glands that leak excess fluid. It's most likely to occur in mature queens after repeated heat cycles; in fact, it's present in 80% of queens aged four to five who show up as infertile.⁷ It also occurs more frequently in certain breeds. According to a Swedish study that involved nearly 140,000 cats, the breeds most prone to CEH were Sphynx, Siberians, Ocicats, Korats, Siamese, Ragdolls, Maine Coons, and Bengals.⁶

While not an infection in and of itself, CEH impedes fertility, reduces litter size, and dramatically increases the likelihood that bacteria will invade the reproductive system. That's because the estrogen produced during heat cycles will open up the cervix in order to let in sperm. . . and if the queen is not being bred, bacteria may come marching in instead. According to Emilie, CEH can make a queen more vulnerable to pyometra, a uterine infection that can be fatal if not treated promptly. It is found in two forms: open and closed. Open pyometra often has a more successful treatment outcome because fluid is draining, but with a closed pyo, there is the risk of uterine rupture, which is a major emergency. Please note that while pyometra frequently occurs as a result of CEH, it can also occur on its own, at any time, in any whole female cat.

Several types of bacteria that are normally found in the female reproductive tract can cause fertility problems if the delicate balance of vaginal flora is upset.⁸ One of the best known is streptococcus, which can cause infections due to overgrowth. Emilie cautions that it is important to understand there are also different varieties of streptococcus that come from outside sources; the most notorious one in cat breeding circles is streptococcus canis, so called because it was originally identified in dogs. It's better known in breeding circles as "strep G," and can cause upper respiratory diseases as well as fertility issues and smaller litters. Furthermore, it has been implicated in neonatal kitten losses. Strep G can be effectively treated with suitable antibiotics, which is often done prophylactically. We suggest you consult a reproductive vet before doing this

on your own, as many different treatment protocols exist. It may also be helpful to know that a PCR test for strep G is available to breeders; see www.zoologix.com for more information and pricing.⁹

Other bacteria that can affect fertility include staphylococcus, escherichia, and e. coli. However, viral infections may be a more frequent factor in infertility cases. Feline leukemia virus (FeLV) and feline immunodeficiency virus (FIV) have the ability to hide in the body, so a cat can appear healthy but not show symptoms. Fertility in both queens and toms can be affected by these viruses' impact on the immune system. Feline panleukopenia (FP) can hide in a different way—it attacks the fetus, not the mother. Your queen may seem healthy, but

she appears infertile because she keeps losing kittens early on during her pregnancy.³

Fortunately, it is possible to test for many of these infections, and regular testing of all breeding animals is highly recommended, says Emilie, especially if they regularly leave the home environment to travel to shows and are exposed to other animals. Regular deep cleaning of queening areas and breeding animal's quarters, in combination with testing, is the best way to prevent this type of interference with your breeding agenda. Any infection that lowers the immune system increases the risk of infertility, so while those discussed here may be the most common causes, please bear in mind that other infections in other parts of the body may also have reproductive implications. It is

worth noting that given the delicate balance of the female reproductive environment, it is not appropriate to administer antibiotics without precise test results to determine what type of treatment may be necessary. The Theriogenology Service at the Cornell University Hospital for Animals can test a vaginal culture sent in by your vet; for more information, contact the Theriogenology Service at 607-253-3060.

We hope this information may have shed some light on possible causes of any fertility issues you have encountered, and that it has given you a new appreciation of the complex miracle that takes place every time a healthy kitten is born. Cats as super-efficient reproductive machines? We beg to differ!

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