Assisted Reproduction in the Male Cat

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KEYWORDS

• Feline • Tom • Sperm collection • Electroejaculation • Cryopreservation

KEY POINTS

- Evaluation of the feline ejaculate is similar to evaluation in other species.
- A sperm sample can be obtained from most males in a clinic setting, but amount of sperm and volume obtained vary between techniques.
- Sperm cryopreservation is an excellent way to preserve genetics in valuable males; however, feline sperm perform better when appropriate ratios of extender components are used.

INTRODUCTION

Interest in the domestic cat examination, semen collection, evaluation, and use has increased in the past 10 years. Because the domestic cat can serve as a model for reproduction of exotic and endangered feline species, and as an animal model for human disease, research interest in assisted reproduction also has increased. Preserving the valuable genetics in purebred or research model catteries has increased the demand for quality reproductive management. Semen collection and evaluation are vital to diagnose and monitor progress for any reproductive problem in the tom. However, the process presents its own set of challenges unique to the cat due to the small volume and comparatively low sperm number produced in each ejaculate, as well as the decreased overall sperm quality seen in many exotic species or catteries. The demand for semen collection, evaluation, and subsequent use is growing as a way to preserve important or valuable genetic materials.

EXAMINATION

Before a reproductive examination, a good general physical examination should be performed to assess for any nonreproductive abnormality. This may include a minimum database, including blood work (complete blood count and serum chemistry). A thorough reproductive examination should consist of manual palpation of the

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testicles, assessing for size, texture, and symmetry, followed by ultrasound to assess any irregularities within the testicular parenchyma. Measurements of the testicles should be taken to compare length, width, and height of each testicle. These measurements can be used to evaluate changes in testicular volume over time. The penis should be evaluated for any discoloration, discharge, and the presence of spines. Exteriorization of the penis may be difficult without sedation, so this portion of the examination might be best accomplished just before sperm collection when the tom is sedated or anesthetized.

Sperm collection in cats presents many challenges. First, the volume and total sperm number are extremely low when compared with other domestic animals such as the dog, bull, boar, ram, and stallion. The low volume alone makes routine semen evaluation a challenge by allowing enough of the ejaculate to be used for analysis, yet preserving enough sperm for insemination or cryopreservation. When the semen volume is often less than 50 to 100 μL, care must be taken to use the smallest number of sperm or volume necessary for analysis. Another challenge is the low sperm quality often encountered with feline breeding operations. Many of the catteries are purebred, and owners may have narrowed genetic lines in hopes of producing that perfect cat. Alternatively, research colonies often breed genetically similar animals either due to lack of genetic diversity within a closed colony, or to propagate a genetic trait desired for research. Last, nondomestic cat species have limited genetic diversity, which usually correlates with poor sperm quality. This impact has been demonstrated in the cheetah and Florida panther, whose population numbers crashed to fewer than 100 individuals before rallying again. However, the lack of genetic variation in these 2 species has resulted in a high proportion of abnormal sperm within the ejaculate (up to 70% for the cheetah[1] and 90% for the Florida panther[2]). It appears that despite the high degree of teratozoospermia, however, fertility can be maintained. It has been proposed that cats experiencing decreased numbers of normal spermatozoa may have a compensatory mechanism to overcome this fault and maintain fertility by increasing the number of copulations per female to increase the number of normal sperm available in the female.[3] It has also been shown that teratozoospermic cats experience an overall decrease in apoptosis during the first 2 meiotic divisions of spermatogenesis and produce 30% more spermatids per spermatocyte than normospermic cats.[4] Although fertility is maintained in natural breeding, the challenge of teratozoospermic animals is preserving the spermatozoal cells for future breeding. Pukazhenthi and colleagues[5] showed that in wild felids the primary factor negatively affecting sperm survival following cryopreservation was poor sperm morphology (**Fig. 1**). Therefore, cats that experience a high degree of teratozoospermia present their own challenges with successful cryopreservation.

SEMEN COLLECTION METHODS

Artificial Vagina

The best representative for semen analysis is an entire ejaculate collected during a natural ejaculation using an artificial vagina. The artificial vagina (AV) for the domestic cat is most commonly constructed using an Eppendorf tube and a rubber pipette bulb, as previously reported in literature.[6] The male is allowed to mount a queen in estrus, and the AV is slid over the penis as the male is thrusting. The AV is held in place by the collector's thumb and first finger to stimulate ejaculation. A second ejaculation can be obtained 5 to 10 minutes after the first using a clean AV. If the male has been adequately trained to the AV, or a queen in estrus is not available, the male may mount a gloved arm. The advantages of using an AV are that it can be performed readily in the