

Stud dog infertility

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Abstract

The first step in determining the cause of infertility in a stud dog is a complete medical and breeding history. Together with a thorough physical examination and semen evaluation, the problem can be narrowed down to a few specific causes. At this point, further diagnostic tests may be necessary, such as blood work, urinalysis, urine and semen cultures, ultrasound examination or even a testicular biopsy. Once a diagnosis has been made, treatment, management, and/or a specific breeding plan will have to be implemented to improve fertility.

Key words: Canine, testicle, male infertility

Introduction

Demonstration of normal fertility in the male dog requires proof of successful pregnancy and the birth of live puppies. Infertility in the male dog is defined as complete failure to impregnate normal bitches that were bred appropriately. Subfertility is defined as a whelping rate of less than 75% when bred appropriately to normal bitches. Sterility is defined as the inability to produce offspring, i.e., through lack of an ejaculate or normal sperm cells. As with any presentation of infertility, confirmation, characterization, and localization of the problem needs to be ascertained before a diagnosis can be made. A complete workup is required including the overall health of the dog, his past medical history, and his breeding history, as well as that of his relatives. Reasons for infertility can be localized to the prostate, testicles, epididymis, or scrotum. Causes are trauma, tumors, autoimmune diseases and diseases outside of the genital system, such as bladder infections, immune disorders, other tumors, and endocrine diseases (e.g. diabetes mellitus, Cushing's disease, etc.). In some cases, the stud may just be reluctant to breed or has problems with ejaculation. Depending on the cause of infertility, treatment options may be considered. **Most stud dogs presenting for infertility are not truly infertile but have perceived infertility due to poor breeding timing.** The following gives a brief summary of 1) information that you should gather before going to see your reproductive specialist and 2) the diagnostics that your specialist may be performing to diagnose infertility in the stud dog. Treatment is beyond the scope of this article but we will touch briefly on Nutraceuticals at the end of these proceedings.

Signalment

This information includes the age of the stud and the breed. In cases where there are different lines within the same breed (e.g. field trial versus show dog versus hunting dog), this information should be included.

History

A complete general medical history is vital. Previous conditions such as car accidents, overheating, seizures, infections, and allergies are among some of the disorders that can have an effect on fertility. Vaccination status, deworming protocols, nutrition, and current medications including supplements, heartworm, flea and tick preventatives may or may not have an effect on fertility but the specialist needs to know this information. Current problems should be listed such as lameness; difficulty in producing feces; exercise intolerance; and excessively drinking water or urinating. Information on kennel type and size, number of dogs present, and other animals on the premises can be helpful. If someone handling the dog is on hormone patches (estrogen, testosterone), these can have an effect on fertility in dogs. Previous medical records should be copied and brought to the appointment. Documentation of genetic testing appropriate for the breed should also be included in the medical records.

Specific reproductive history includes the age, at which the stud was first bred, how many times he was used for breeding (successful AND unsuccessful), if the bitch was timed properly (method?), how many puppies resulted, the overall health of the puppies, and the age at last breeding. It is also important to know if semen evaluations were done previously and if semen had been frozen. The history on the bitches used for breeding should include number of successful AND unsuccessful breedings, number of litters produced with other dogs, health of the litters, and current status of the bitches. Documentation of brucellosis testing of the stud is also very important. It is extremely helpful for the specialist if all of the events are written up and presented in chronological order.

Physical examination

A general physical examination should take place first. This will alert the reproductive specialist to issues that could be contributing to infertility, such as problems with vision or hearing, back pain, arthritis, hip dysplasia, or signs of endocrine disorders, such as diabetes mellitus, Addison's or Cushing's disease, heart disease, lung disease or tumors. Most veterinarians will perform a semen collection before performing a specific reproductive examination because it may be more difficult to collect semen after the prostate has been palpated, for example. The idea is to leave the most uncomfortable examinations for last. During semen collection, libido can be assessed as well as the ability to achieve an erection. Some studs require a female in heat being present and some do fine with scents. Some dogs will have trouble performing in an unfamiliar environment, especially if they have never been collected before. Multiple visits may be required. After semen collection and evaluation, the scrotum is carefully inspected and the testicles and epididymis palpated for lumps and bumps. Lesions on the scrotum may be an indication that the stud feels pain in his testicles, as he will lick the scrotum in an attempt to get at the testicles. The prostate is palpated for potential tumors or benign prostatic hyperplasia.

Semen evaluation

A semen sample should be collected (see above) and evaluated. Seminal fluid samples should be submitted for bacterial cultures. Cytologic evaluation of seminal fluid should also be performed to determine if other cells (inflammatory cells or tumor cells) are present. Alkaline phosphatase analysis of the seminal fluid can assist in determination of complete ejaculation, particularly in the diagnosis of azoospermia (absence of live sperm cells). In the event sperm cells are obtained, their motility, number, and morphology will be evaluated, along with the volume of the ejaculate to calculate total number of progressive forward motile normal sperm.

Other diagnostics

In addition to history taking and physical examination, a minimum database (complete blood cell count, blood chemistry, and urinalysis), as well as thyroid and brucellosis testing should be included. A urine sample may also be collected by cystocentesis after semen collection to evaluate for the potential for retrograde ejaculation. Ultrasound analysis of the prostate and the testicles should also be performed. Chromosomal analysis (karyotype) and analysis for the presence of the SRY (male specific) gene can be conducted, if intersex conditions are suspected. In some cases, advanced semen diagnostics are available that can directly evaluate specific parts of the sperm cells, such as the acrosome, which is crucial for fertilization. Testicular biopsies may also be necessary to properly diagnose the cause and the degree of infertility and to be able to provide a prognosis.

Causes of infertility

There are many causes for infertility, but benign prostatic hyperplasia/hypertrophy is without a doubt the most common disorder of the prostate in the intact male dog. The most common clinical signs include blood dripping from the penis and difficulty defecating (constipation or ribbon-like stools). Other disorders include infections of the testicles, epididymides, or prostate. Brucellosis is very important cause to rule out, as it can be transmitted to the entire kennel as well as to humans. Overheating has been described in several papers as a cause. The most notable case occurred when dogs were left on an

airplane in the blazing heat without air conditioning; the males that survived became sterile and never regained fertility. Trauma and neoplasia (cancers) of any of the reproductive structures can cause infertility, as can immune conditions such as the production of antisperm antibodies. Some dogs may present with testicular degeneration or atrophy. By that time, the changes may be secondary and the inciting cause may thus never be determined.

Failure to achieve an erection can be due to apprehension, psychological constraints, pain, or androgen insufficiency. The most common presentation for this is due to intact male dogs that have been disciplined their entire life for exhibiting mounting behavior. These as well as subordinate dogs may not exhibit normal breeding behavior when desired.

Failure to ejaculate in the presence of erection can be caused by lack of sexual maturity, pain, psychological factors, drug therapy (e.g., tricyclic antidepressants), or sympathetic neuropathy which can be idiopathic, secondary to systemic disease such as diabetes mellitus, or secondary to spinal cord injury. It is important to keep in mind that some experienced stud dogs will not ejaculate unless an estrous teaser bitch is present.

Causes for the failure to achieve normal copulation in intact male dogs include sexual immaturity, old age, sexual overuse, pain, psychological constraints, persistent frenulum, and idiopathic poor libido. Female factors may include aggressive females, anatomical anomalies, and improper timing.

Dogs presented with infertility but normal copulation and normal semen quality are difficult to assess as there are currently no specific tests for function of apparently normal spermatozoa in dogs. When faced with this presentation, types of breeding as well as fertility of the bitch should also be assessed. In general when evaluating historical reports in the literature, conception rate is better with copulation than artificial insemination, with a decline in the conception rate with increasing manipulation of the semen.

Infertility with normal copulation and abnormal semen quality is a more common presentation of the infertile stud. The findings can be divided as follows:

1. Azoospermia= ejaculation of seminal fluid that does not contain sperm. Determination of high alkaline phosphatase in the seminal fluid confirms complete ejaculation. One possible cause is retrograde ejaculation; the semen will be present in the urine.
2. Oligozoospermia= is a low total number of sperm in the ejaculate. The number of sperm a dog can produce daily is dependent upon the amount of testicular tissue present. Normally, greater than 300 million sperm are present in a normal ejaculate. Keep in mind that these dogs are not necessarily infertile.
3. Hematospermia= blood in the ejaculate. It is seen most commonly with prostatic disease and penile trauma during collection. Dogs with hematospermia are not necessarily infertile.
4. Teratozoospermia= decreased number of morphologically normal sperm. Normal dogs have 80% or greater morphologically normal sperm in the ejaculate. Specific morphologic defects are poorly correlated with infertility in the dog. However, some defects when seen in large numbers have been associated with infertility such as proximal cytoplasmic droplets.
5. Sperm agglutination occurs after induction of antisperm antibodies and has been reported in dogs with brucellosis. The blood-testis barrier normally protects the testicular tissue and the sperm cells from an immune response. Any breakdown in this barrier can result in the formation of anti-sperm antibodies and resultant infertility.
6. Asthenozoospermia= progressive motility less than 70% and is often associated with teratozoospermia.
7. Infection/inflammation (see orchitis/ epididymitis/ prostatitis above)

Treatment

Treatment is based on the underlying cause of the infertility. It is important to consider that the prognosis of male dogs with confirmed infertility is very guarded and one report suggested that fewer than 10% of dogs that presented with infertility returned to fertility after a diagnostic work-up and

appropriate therapy. Treatable conditions are transient insults, drug or hormone therapy, mild infection, retrograde ejaculation, and in some cases, neoplasia. Untreatable or difficult to treat conditions include genetic, immune-mediated, idiopathic degeneration, and disorders that have destroyed primary spermatogonia (the precursors to sperm cells).

Nutraceuticals

The word nutraceuticals is made up of nutrition and pharmaceutical, and are supplements that are reported to have medicinal properties. Many of the nutraceuticals contain glucosamine, docosahexaenoic acid (DHA), glycosaminoglycans (GAG), vitamin C or E, or fatty acids. The idea is to provide antioxidants and the claims range from improvement in sperm motility and in the quality of cryopreserved or chilled semen after supplementation to a decrease in proximal droplets to improved numbers of sperm cells. However, the mechanism of action has not been documented in any of the nutraceuticals on the market and the effects of many supplements on canine semen quality are currently unsubstantiated.

Summary

If faced with a stud in which infertility is suspected, all historical information should be collected before the appointment with the specialist. A general physical examination AND a reproductive examination will help narrow down the possible causes.

Supplemental Literature

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