

Fertility and Infertility in male animals

Examinations of male animals are made for two main purposes: either to ascertain whether normal fertility can be expected from the animal, or for the diagnosis of infertility. The requirements are a history of the animal, a general examination, a detailed examination of the genital tract, observation of copulation, and collection and evaluation of semen.

REPRODUCTIVE EXAMINATION

Requires physical examination of the genital system, observation of the response of the animal to an oestrous female, observation of mating and the collection of semen. When examining the contents of the scrotum, the temperature, size, texture, resilience and evenness of the testes and epididymes should be determined. The testes should be freely movable within the scrotum. The vasa deferentia should be palpated throughout the scrotal neck and (particularly in rams) the presence or absence of vasectomy scars confirmed. The spermatic cord should be palpated up to the level of the inguinal ring for the presence of abdominal contents (scrotal hernia) or abnormalities of spermatic vasculature. Measurement of scrotal circumference is useful in animals with a pendulous scrotum, while, in the stallion, measurement of the width of the testes by calipers or ultrasonography is similarly valuable. Likewise, ultra-sonography of the testes of stallions and dogs to visualise fluid-filled structures within their substance is proving to be a valuable additional examination. Scrotal circumference of yearling bulls should exceed 30cm, while mature bulls should be over 36cm for beef breeds and over 38cm for most other breeds. Scrotal circumference of mature rams depends upon body weight; values over 28cm are acceptable for smaller breeds, and over 34cm for larger breeds. Scrotal circumference of rams is highly dependent upon season, with a 25–35% change in size occurring between the non-breeding and breeding seasons. After palpation of the preputial part of the penis, exteriorization of its free part where possible, palpation of the sigmoid flexures and palpation of the prepuce and preputial orifice, such of the internal genitalia as are within reach should be palpated per rectum. In the bull and stallion, all accessory glands can be palpated thus, but they are generally out of reach to a digital examination of the ram. In smaller dogs, digital examination of the prostate is possible, but radiography, which is essential when prostatic disease is suspected, is required in any case for examination of the prostate in larger dogs.

Libido testing

Observations of bulls' mating behavior suggested that serving capacity tests might be a predictor of bulls' fertility.

REPRODUCTIVE ABNORMALITIES OF MALE ANIMALS

Classically been divided into two main classes, namely conditions causing failure of normal service (*impotentia coeundi*) and conditions causing failure of conception after normal service (*impotentia generandi*). The first group can be further divided into, firstly,

conditions causing an unwillingness to mount and, secondly, conditions that prevent normal copulation from occurring, despite normal libido.

Conditions causing a lack of libido

Inability and unwillingness to copulate is it caused by genital pathology, but also it can result from intercurrent disease, management, age, maturity or season.

Maturity, age and experience

Young or of advanced age. The age of the sire must be considered in relation to the normal time at which its species (and breed) exhibits puberty. Where immaturity is suspected as the cause of low libido. Hormone therapy has been suggested, giving large doses of human chorionic gonadotrophin (hCG) (5000–10 000 IU) or gonadotrophin-releasing hormone (GnRH), in an attempt to stimulate libido through the production of elevated testosterone concentrations. Unwillingness to copulate can also result from poor service management. Slippery floors, roofs that are too low, females that are too big and stockpersons that are insensitive in their handling of their charges can all contribute to unwillingness to copulate. Dogs, which are frequently transported before mating, can also have stress-induced impairment of libido.

Locomotor dysfunction

Most lesions affecting locomotion impair ability and willingness to copulate. Lesions of the back and hindlegs, lesions of the joints of the hind limbs, foot lesions are probably of greatest significance. Interdigital growths, any lesion of the trunk affects ability to mate. The lumbodorsal fascia may rupture, producing the so-called condition of 'honeymoon back'. As bulls age, progressive deposition of new bone occurs around the intervertebral joints, causing several related syndromes of incapacity. Fractures typically occur at the moment of ejaculation. Abnormalities of gait are a further cause of inability to mate.

Failure to copulate

Include failure of the penis to become turgid (i.e. failure of erection), abnormalities of erection that prevent intromission, and lesions of the penis and prepuce that prevent protrusion of the penis.

Failure of erection

Erection is achieved by the action of the ischiocavernosus muscles pumping blood into the corpus cavernosum penis (CCP). Two main classes of abnormalities occur: those that allow blood to leak from the CCP so that it is not blind-ending, and those that prevent normal access of blood to the CCP.

Abnormal venous drainage of the CCP.

This condition is most commonly seen in young bulls, which are presented with normal libido, eager to mount but never achieving erection or intromission. Diagnosis of the condition can generally be made on clinical signs and history alone.

Occlusion of the longitudinal canals of the penis.

Congenital absence or acquired blockage of these canals therefore prevents erection. In young bulls, the condition is diagnosed by observation of mating behavior, when the penis remains flaccid despite considerable ischiocavernosus activity.

Rupture of the corpus cavernosum penis.

This is a relatively common and potentially serious condition of bulls. It also occurs sporadically in rams. The condition has many names, including rupture of the CCP, ruptured penis, fractured penis and broken penis. Surgical treatment of such cases is best confined to evacuation of the haematoma.

Abnormalities of erection

Persistence of the penile frenulum.

Protruded or causes the protruded penis to be deviated ventrally. Transecting the frenulum after ligating the frenular blood vessels gives a good prognosis for the recovery of breeding ability. Persistence of the penile frenulum has also been occasionally reported in dogs.

Congenital abnormalities of the penis preventing protrusion.

Failure of these developmental changes can result in failure of normal erection.

Deviation of the penis.

Ventral deviation of the penis, often referred to as 'rainbow'. Such defects can be congenital, but can also arise from injuries to the penis that result in scar formation within the tunica.

Lesions of the prepuce

Adhesions between the peripenile tissues can arise from localized trauma, hemorrhage and/or abscessation in and around the prepuce. Infection of the penis (balanitis) or prepuce (posthitis).

Preputial injuries.

Pathological eversion of the prepuce is associated with aplasia or hypoplasia of the retractor muscles of the prepuce, eversion of the preputial mucosa is followed by acute inflammatory changes that cause local hyperaemia and oedema. Many variations of surgical procedure have been described to remove the effete and fibrosed preputial tissue.

Balanoposthitis

Infections of the penis and prepuce are common in the dog, bull and ram, occasional in the stallion, and rare in the boar and cat. Treatment is symptomatic, and consists of sexual rest and infusion of oily suspensions of antibiotics into the prepuce.

Other conditions of the penis and Prepuce

Phimosis. Phimosis indicates a stricture of the preputial orifice that prevents the penis from being protruded. And may arise from the injuries described above. It may also be a congenital defect.

Paraphimosis. Inability to withdraw the penis into the prepuce results from congenital or acquired strictures of the prepuce, paralysis of the penis and, occasionally, from balanoposthitis. The condition is most common in the dog and the stallion, but is also reported occasionally in most domestic species. Treatment must aim to reduce oedema, prevent trauma to the penile integument and provide support for the penis until it can be returned to the prepuce. Where the condition fails to resolve, amputation of the penis may become necessary.

Strangulation and necrosis of the penis. Strangulation may occur as a consequence of paraphimosis or as a result of constriction of the penis by hair or maliciously placed objects. This condition is seen most commonly in ram or wether lambs that have been growing very rapidly on diets that contain a high proportion of concentrate feeds, but it may occur in any male sheep.

Penile neoplasia. Single, pedunculated lesions can sometimes be removed during coitus, but most tumours require careful removal with the bull very heavily sedated or under general anaesthesia. Cryotherapy of the affected area usually prevents further recurrences, while administration of an autogenous tissue vaccine markedly reduces the incidence of recurrences. Penile tumours are also common in the horse. The use of chemotherapy has also been advocated. Penile papillomata also occur in the dog but, unlike those of the bull.

Miscellaneous conditions of the penis. Complete avulsion of the preputial mucosa from its attachment to the glans penis is an occasional injury of bulls.

Conditions causing failure of ejaculation

The ejaculation reflex is impaired and those in which localized pain makes the animal unwilling to ejaculate. The former conditions generally occur when some damage has occurred to the neural pathways between the glans penis and the spinal cord.

Conditions causing failure of fertilization

Fertilization failure, despite normal copulation, generally characterizes diseases of the testis (including abnormalities of spermatogenesis), epididymis and accessory glands.

Conditions affecting the testis and epididymis

Cryptorchidism. Cryptorchidism occurs when the normal process of testicular descent is perturbed, such that one or both testes fail to complete their descent into the scrotum. Spermatogenesis is generally markedly impaired or absent in testes that are not scrotal, due

to high intratesticular temperature. Animals that have a single cryptorchid testis are usually fertile. Where both testes are cryptorchid, the ejaculate is either aspermic or very severely oligospermic. Testosterone secretion is unaffected by a cryptorchid position, so the libido of affected animals is normal.

Testicular degeneration. The seminiferous epithelium of the testis is highly susceptible to damage. Testicular degeneration occurs in response to raised intratesticular temperature, toxins, endocrine disturbances and infection. Many of the causes of testicular degeneration do not manifest themselves in infertility immediately, due to the protracted time taken for spermatogenesis. There is therefore normally a lag interval, which may be of several weeks, between the time at which the testis is damaged and the time at which effects upon semen quality are first noted. Raised temperature in the testis can itself emanate from many causes. Many animals exhibit a period of relative infertility during and after high summer temperatures. In the bull for some AI studs to provide air-conditioned accommodation for the sires to limit summer maxima of temperature. In rams, raised scrotal temperature can result from excessive amounts of wool over the scrotum, or from leaving animals unshorn during the summer. Excessive deposition of fat in the scrotum, such as occurs in rapidly grown bulls and rams, can prevent heat loss from the scrotum and result in infertility. Local inflammation to the scrotal skin or other structures in the scrotum can also raise the testicular temperature sufficiently to impair spermatogenesis. Finally, prolonged pyrexia, such as occurs with systemic infections, can cause testicular damage, although short periods of illness are unlikely to be detrimental. Heavy metal or radiation contamination are well recognized causes of testicular damage, but many other materials have been implicated at various times. Clinical signs of infertility and oligospermia usually supervene 4–8 weeks after the onset of the cause of the degeneration. Ejaculate volume is usually unaffected, but the number and motility of spermatozoa fall, while the proportion of sperm exhibiting abnormal morphology rises.

Orchitis and epididymitis. Orchitis ranges from a mild infection of the testis, scarcely distinguishable from testicular degeneration, through to gross suppurative or necrotic destruction of the organ. Orchitis can arise from a primary infection or by haematogenous spread of bacteria into the testis superinfecting pre-existing traumatic viral or parasitic damage. Ascending infection from the urinary tract is postulated, but haematogenous spread seems more probable. Orchitis is more commonly unilateral than bilateral and may involve the epididymis. The testis may become grossly enlarged. A systemic pyrexia may occur. If bilateral orchitis occurs, the prognosis for future breeding is hopeless, and castration should be performed as soon as it is safe to do so. Epididymitis can also occur as a primary infection or by spread from an infected testis. The general signs of epididymitis are similar to those of orchitis: namely, heat, swelling and pain of the affected organ. Any inflammation of the epididymis causes obstruction of the single, highly convoluted tube of which the organ is composed, so a loss of function normally ensues. Unilateral epididymitis therefore results in reduced fertility, whereas bilateral obstruction results in sterility.

Testicular hypoplasia. Incomplete development of the germinal epithelium of the seminiferous tubules, due to inadequate numbers of germinal cells within the testis. Mild cases may exhibit moderate oligospermia or poor sperm morphology, but severe cases may be aspermic. Castration and (for meat animals) slaughter for recovery of the carcass value should be recommended.

Testicular neoplasia. Rare in the bull, ram and boar and, although common in dogs, rarely presents as a cause of infertility. Interstitial cell tumours are the most common tumour of the dog, and are recorded occasionally as incidental findings in aged bulls. The tumours may become necrotic or haemorrhagic, whereupon affected dogs may exhibit lameness, pain, crouching or hunching. If the tumour is unilateral, the contralateral testis is generally markedly atrophied. The tumours can become very large, so that their removal may be quite difficult to achieve.

Aplasia of the mesonephric ducts.

Absence of parts of the epididymis. In the bull, the condition is probably inherited. Absence of the head or tail of epididymis can be determined relatively easily by careful palpation of the scrotum, but the medially sited epididymal body is rarely palpable. Oligospermia occurs if one epididymis is aplastic, aspermia if both are affected. Aplasia of the vas deferens is less common. In bulls, the condition may sometimes be diagnosed by rectal palpation. As with epididymal aplasia, unilateral aplasia usually does not affect fertility, whereas sterility is the consequence of bilateral lesions.

Lesions of the accessory glands

Vesicular glands. Infection of the vesicular glands (seminal vesicles) is relatively common in bulls. Incidences range between 0.2 and 9%. Diagnosis of the condition can be confirmed by rectal palpation of the vesicular glands, which are characteristically enlarged, tense and painful during the acute phase, or lobular, fibrous and sometimes shrunken in the chronic phase. Treatment is sometimes possible if the disease is noticed in its earliest stage, by the administration of very large intravenous doses of bacteriocidal antibiotics. In bilaterally infected animals, the prognosis is hopeless. No treatment should be attempted in animals infected with *Brucella*; instead the bull should be slaughtered.

Prostate. Prostatic disease is rare in species other than the dog, in which prostatic infection and hyperplasia are common. Prostatitis and prostatic hyperplasia often occur together, the prostate undergoing a diffuse or local suppurative reaction, with a tendency to abscess formation. Prostatic hyperplasia is a common age-related change, with the gland forming numerous small, or a few large, cysts. Prostatitis may be treatable with broad spectrum antibiotics, whereas hyperplasia, being androgen-dependent, is best treated by the administration of oestrogens or by castration.