Fertility and infertility in bull

The fertility of male is related to several phenomena:

1- **Sperm production**

2- **Viability and fertilizing capacity of the sperm**

3- **Sexual desire**

4- **Ability male to mate the cow**

When the male failed to exhibit any one of the above point it's called **infertility** and when the infertility absolute it's called **sterility**.

Reproductive abnormalities causing absolute or relative infertility in male animals have classically been divided into two main classes, namely:

I. Conditions causing failure of normal service
II. Conditions causing failure of conception after normal service.

I- Conditions causing failure of normal service:

This group can be further divided into,

1- firstly, conditions causing **a lack of libido** and,

2- Secondly, conditions that **prevents normal copulation** from occurring, despite normal libido.

3- Conditions causing **failure of ejaculation.**

1- Conditions causing a lack of libido:

This conditions causing an unwillingness to mount**.** Inability and unwillingness to copulate are relatively frequent presenting signs that accompany many disorders of the male reproductive system.

a- Maturity, age, experience and management.

Many animals that have lack of libido are either young or of advanced age.

Where immaturity is suspected as the cause of low libido, little can be achieved other than by the exercise of much patience and the provision of a plentiful supply of appropriately sized, oestrous females.

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.

b- **Locomotor dysfunction.** Most lesions affecting locomotion impair ability and willingness to copulate.

Lesions of the back and hind legs are clearly the most important of such incapacities amongst the large herbivores, foot lesions are probably of greatest significance.

Gross pathology of the foot, such as penetrations of the sole, separations of the white line, foot rot, foul in the foot, etc., produces pain, so that the sire is unwilling to take his weight on the foot during copulation.

2- Conditions causing prevent normal copulation :

This condition causing **Failure to copulate:** Inability to copulate is a relatively frequent cause of infertility in domestic animals.

a) 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.

Occlusion of the longitudinal canals of the penis.

Rupture of the corpus cavernosum penis.

b) Abnormalities of erection.

1- **Persistence of the penile frenulum.**

Persistence of the penile frenulum is most frequently encountered in young bulls, in which it either limits the amount of penis that can be protruded or causes the protruded penis to be deviated ventrally.

2- **Congenital abnormalities of the penis preventing Protrusion.**

Considerable growth of the penis and changes in the relationships between the penis and the peripenile tissues occur during the prepubertal period.

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

For example, failure of the penis to undergo normal growth causes a **congenital shortness** of the organ, such that normal intromission cannot be achieved. Alternatively, if such **failure of growth is confined to the sigmoid flexure**, it may be impossible to exteriorise the penis (Roberts, 1986). Similarly, **the retractor penis muscles can fail to develop**, causing inability to protrude the penis.

3- **Deviation of the penis. Ventral deviation** of the penis, it can arise through a number of underlying conditions, of which the most common is persistence of the penile frenulum. **Lateral deviation** of the penis is also often attributed to injuries to the tunica, but may arise from inadequate development of the dorsal apical ligament of the penis or congenital defects of the tunica albuginea. The most spectacular deviation of the bovine penis is the **spiral deviation**.

4- **Preputial injuries.** Pathological eversion of the prepuce ,Severe preputial adhesion in a bull, Preputial avulsion and fibrosis at the attachment of the preputial mucosa to the penis.

5- **Balanoposthitis.** Infections of the penis and prepuce.

Severe balanoposthitis can cause pain, unwillingness to mate, preputial stenosis, adhesions between penis and prepuce and peripenile adhesions.

6- **Phimosis.** Phimosis indicates a stricture of the preputial orifice that prevents the penis from being protruded. It has been recorded in most of the domestic species, and may arise from the injuries described above.

7- **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.

8- **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. It is most common in long-haired breeds of dog and long-woolled breeds of sheep**.**

9- **Penile neoplasia.** Virally induced fibropapillomata of the skin, genitalia and alimentary tract are common in young cattle. The penile integument, particularly its terminal 5 cm, is a common site for such tumours, which may be single or multiple.

3- Conditions causing failure of ejaculation.

There are a few conditions in which ejaculation does not occur, despite otherwise normal intromission and copulation. Such conditions can be broadly divided into those where the ejaculation reflex is impaired and those in which localized pain makes the animal unwilling to ejaculate.

Conditions causing failure of conception after normal service:

(Conditions causing failure of fertilization)

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

All above dysfunctions will lead to either aspermic semen (azoospermia) oligospermia (refer to semen with a low concentration of sperm) or increase sperm abnormality.

Many of the conditions causing failure of fertilization can be diagnosed by an examination of the external genitalia of the sire, but many more can only be diagnosed by semen evaluation, which is therefore an essential component of one's clinical examination.

1- Conditions affecting the testis and epididymis

a- **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, although the inhibition of spermatogenesis in retained testes means that the sperm density is often below expectation for the species. Where both testes are cryptorchid, the ejaculate is either aspermic or very severely oligospermic.

b- **Testicular degeneration.** The seminiferous epithelium of the testis is highly susceptible to damage, with a wide variety of agents causing reversible or irreversible degeneration. Testicular degeneration occurs in response to raised intratesticular temperature, toxins, endocrine disturbances and infection.

c- **Orchitis and epididymitis.**

Orchitis can arise from a primary infection or by haematogenous spread of bacteria into the testis super infecting pre-existing traumatic viral or parasitic damage.

Orchitis is more commonly unilateral than bilateral and may involve the epididymis. During the acute phase of the disease, the affected testis is inflamed, with consequent hyperaemia, heat and swelling . The testis may become grossly enlarged, up to two or three times its normal size. The testis is often very painful, so that the animal resents it being touched.

Orchitis in the associated testis can also occur following a primary epididymitis. 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.

d- **Testicular hypoplasia.** Testicular hypoplasia implies an 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 (**azoospermia**). A hereditary form of hypoplasia exists in Swedish Highland cattle.

The spermatogonia of such animals fail to develop, so the seminiferous tubules are virtually devoid of spermatogenic cells. The semen of such animals is therefore aspermic (**azoospermia**), although the Leydig cells

being unaffected, libido is normal. Diagnosis of the condition is by measurement of scrotal circumference, a value below acceptable limits for the species and breed being diagnostic. Palpation of the testes reveals one or both to be small and flabby, but regular in outline and freely movable in the scrotum. Semen analysis may reveal aspermic or oligospermic ejaculates, sometimes with markedly abnormal morphology or motility.

e- **Testicular neoplasia.** Testicular neoplasia is rare in the bull, ram and boar and, although common in dogs, rarely presents as a cause of infertility.

f- **Aplasia of the mesonephric ducts.** Segmental aplasia of the mesonephric ducts is most commonly manifested as an 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.

2- **Lesions of the accessory glands**

a- Vesicular glands. Infection of the vesicular glands (seminal vesicles) is relatively common in bulls.

The main consequence of infection of the vesicular gland is a decline in semen quality, which exhibits a decrease in motility, accompanied by elevated pH, low fructose concentrations and the presence of polymorphonuclear leucocytes. In moderate or severe cases, the semen may appear overtly purulent and may be tinged brownish, due to the presence of degenerating blood from the damaged gland. In most cases these changes in semen quality lead to a decrease in fertility. 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.

b- Prostate. Prostatic disease is rare in species other than the dog, in which prostatic infection and hyperplasia are common. Tumours and senile atrophy of the canine prostate are also rare. Prostatitis and prostatic hyperplasia often occur together, the prostate undergoing a diffuse or local suppurative reaction, with a tendency to abscess formation. Polymorphonuclear leucocytes, bacteria and blood are often found in the urine of affected animals.