

# **The Male Dog**

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## **Anatomy**

The paired testicles are the primary organs for male reproduction, producing the male gametes (spermatozoa) and steroid hormones (androgens and estradiol). The testes differ from the ovaries in that all the potential gametes are not present at birth. Germ cells in the male undergo continual cell divisions, forming new spermatozoa throughout the reproductive life of the dog.

The descent of the testicles in the dog often occurs during fetal life, so puppies are born with their testes in the scrotum; although it may take up to 8 weeks after birth in some individuals. Usually we wait until 6 months of age to give a definitive diagnosis of cryptorchidism (one or two undescended testicles). It is not recommended to use cryptorchid dogs for breeding because it is thought to be a genetic disorder and can be passed on to the offspring.

Thermoregulatory control of the testicles is complex and involves the scrotum, cremaster muscle (muscle that changes the distance from the testis to the body) and pampiniform plexus (veins and arteries providing blood supply).

The size of the testicle is very variable and is related to the body mass of the animal. In an average 15Kg dog, the testicles will be 3 x 2 x 1.5cm.

The dog only has one accessory sex gland: the prostate.

The penis possesses a bone; this allows the male to achieve intromission before he gets a full erection. The penis is divided in two parts (based on location and erectile tissue): a) bulbus glandis, erectile tissue surrounding the os penis (bone) and the urethra and b) the pars longa glandis, erectile tissue dorsal and longitudinal to the os penis and urethra only.

## **Puberty**

There are many definitions of puberty in the dog; some authors define it as the moment when spermatozoa first appear in the semen, or when behavioral changes occur and the male attempts to copulate with females. It usually occurs between 5-8 months of age (depending on the breed). Usually puberty is earlier in small breeds than in large ones.

## **Sexual Maturity**

Do not confuse puberty with fertility. Puberty does not coincide with sexual maturity. In very young dogs semen is low in numbers and quality. Usually breeders will wait to use their dog for breeding until they are 12-15 months (In giant breeds 15-24 months).

## **Spermatogenesis**

Spermatozoa are synthesized in the testicle under the influence of male hormones. This stage is known as spermatogenesis. Spermatogenesis takes around two months.

## **Semen Evaluation**

### **Collection**

Semen is obtained by manual ejaculation, using a plastic cone, a funnel or an artificial vagina. The collection can be facilitated by the presence of a bitch in heat. If that's not possible a swab from a bitch in heat or commercial pheromones can be used.

The dog will ejaculate in three fractions, only the second fraction will be sperm rich.

### **Visual Evaluation**

First we measure the volume of semen collected and check for any evident abnormalities (color, appearance etc.).

### **Sperm Count**

Total sperm number can be determined by direct count using a hemocytometer (slide with grid to count cells under the microscope), a densimeter (will estimate the amount of sperm based on the reflection of the light through the sample), a CASA (computer assisted sperm analysis) or nucleocounter (will count the actual sperm cells).

The minimum amount of sperm recommended for breeding is 150-200 million. For most breeds the average sperm count is higher than that and often exceeds 900 million per ejaculate.

### **Motility**

Defined as the percentage of sperm displaying normal progressive movement (advancing in a straight line). A sample is considered to have good motility if it has over 60 or 70% progressive motility.

### **Morphology**

The sperm structure is made up of a head, a midpiece and a tail. Abnormalities in shape are evaluated under the microscope using a stain or a wet mount. A satisfactory sample should not have more than 20-30% morphologically abnormal sperm.

**Normal Semen Quality in the Dog** (Canine and Feline Theriogenology, Johnston et al., 2001)

	Fraction 1	Fraction 2	Fraction 3	Total Ejaculate
Volume	0.5-5	1-4	1-80	2.5- >80
Color	Clear	Opalescent	Clear	Opalescent
Concentration (10 <sup>6</sup> /ml)	-	4-400	-	4-400
Sperm per ejaculate (10 <sup>6</sup> /ml)	4	300-2000	-	300-2000
% Progressively motile sperm	-	>70%	-	>70%
%Morphologically normal sperm	-	>80%	-	>80%

**Semen Handling and Shipping**

The preparation of chilled semen consists of collection, dilution of the semen in appropriate media (extender), packing and protecting the extended semen in a cooling box or special container and shipping it out to the bitch.

Shipping semen will allow breeding to a stud dog that lives on the other side of the country (or even in another country) without the need of traveling the bitch. The diluted chilled semen can be viable for several days.

Semen needs to be handled very carefully; changes in temperature, exposure to light or any spermicidal agents (water, soap, detergents etc.) will affect the quality of the sample and finally the success of the insemination.

This technique (Artificial insemination with chilled semen), when carried out under good conditions will have excellent results, similar to that obtained using fresh semen.

**Cryopreservation**

For long term storage, semen freezing is used. This technique is especially valuable when a stud dog has a high genetic value, as his semen can be used after his fertility has declined or after his death. A breeder should plan ahead and save semen while the dog is young and fertile.

The semen is obtained by standard collection, the ejaculate is then prepared following strict protocols to finally freeze and store at very low temperatures (196°C/-320°F) so sperm can be kept virtually forever.

When using frozen semen for artificial insemination, the semen should be deposited in the uterus for optimum results (transcervical or surgical insemination).