

PUBERTY

Puberty marks that time in an animal's life when it attains breeding capability. The male attains puberty when androgens are produced, sperm are produced, and the reproductive organs have matured so that the penis is free of its sheath, permitting the male to serve and impregnate the female (Fig. 3–10).

Puberty should not be confused with sexual maturity, as the latter is attained at a later date when all systems are functioning at their maximum. Puberty is the time of *first* breeding potential, while sexual maturity is the time of *maximum* breeding potential.

Many definitions have been given the term puberty, and the reader should look for specific nomenclature, particularly when reading scientific literature. Some researchers consider the presence of sperm in the seminiferous tubules as an indication of puberty. Other criteria used are sperm in the epididymis, ejaculation in response to electric stimulation, erection and extension of the penis, freeing of the penis from the prepuce, and signs of sexual aggressiveness. For our purposes, we will use the definition given in the first paragraph—the age at which an animal reaches breeding capability.

The Onset of Puberty has Many Definitions in Males

As in the female, the onset of puberty in the male can be defined in several ways.

Age when behavioral traits are expressed. Generally, males of most species acquire reproductive behavioral traits (mounting and erection) well before they acquire the ability to ejaculate and produce spermatozoa. These behavioral traits are relatively easy to determine since mounting behavior and erection of the penis can be observed readily.

Age at first ejaculation. The process of ejaculation is quite complex and requires closely coordinated development of nerves, specific muscles and secretion of seminal fluids from the accessory sex glands. When development of all these components occurs, ejaculation can take place. Generally, the ability to ejaculate substantially precedes the ability to produce sufficient spermatozoa to achieve fertilization.

Age when spermatozoa first appear in the ejaculate. The male acquires the ability to produce seminal fluid and to ejaculate before spermatozoa are

available to be ejaculated. To determine precisely when the first spermatozoa are available, one must collect ejaculates at least once per week. This is relatively easy to do, since ejaculates can be collected by an artificial vagina from the boar, bull, dog, ram or stallion. After behavioral characteristics have developed and the male is willing to mount a receptive female (or surrogate female), frequent seminal collections can be made. This enables determination of the age at which spermatozoa appear in the ejaculate.

Age when spermatozoa first appear in the urine. As you have read in Chapter 3, most of the spermatozoa produced by the testes are lost in the urine during periods of sexual rest (sexual abstinence). The presence of spermatozoa in the urine clearly indicates that spermatogenesis is occurring. Frequent collection of urine is difficult in large domestic animals and requires special equipment. Therefore, this method for assessing pubertal onset has limitations.

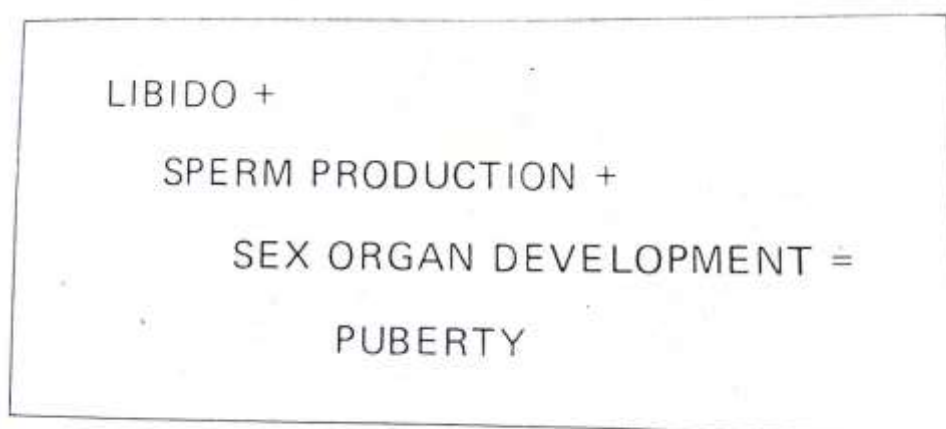


Figure 3-10 Measures of puberty.

Factors effect on age of puberty in male:

Onset of puberty and sexual maturity in the male are the gradual processes which are influenced by plane of nutrition and management, cross breeding, chronic diseases, individual differences and other factors.

Nutrition and management

Poor somatic growth and emaciation which ultimately delays the onset of puberty due to the deficient feeding of *protein*, iodine, *phosphorus*, copper, iron, cobalt.

The improved nutrition and good management starting at earlier age enhances the onset of puberty

Lack of TDN in the feed or animal get starvated leads to prevent the secretion of gonadotropic hormones by the anterior pituitary- result in failure of early puberty.

Body size and weight

Body weight plays more important role than the age for attaining puberty and sexual maturity.

If the individual animal gain less weight according to age factor, the puberty and ultimately sexual maturity will be delayed.

Gonadal growth

The scrotal circumference is directly proportional to the intensity of sex desire and spermatozoa production.

Sex desire: Depending on the available testicular surface area containing number of leydig cells - site of androgen secretion.

Spermatozoal production: Depending on the available testicular surface area containing number of seminiferous tubule - site for spermatogenesis.

At the age of puberty the diameter of seminiferous tubules is less than the diameter of the seminiferous tubules at the age of sexual maturity .

Genetic factors

- The genetic components of young bulls affect the onset of puberty and maturity.
- The larger breeds of [cattle](#) and [horses](#) have a late onset of puberty than the smaller breeds.
- The buffalo male calves appear to attain sexual maturity later than the [cattle](#)-bull calves even with good nutrition and management; probably due to genetic difference (testicular surface area of buffalo is lesser than [cattle](#)).
- The cross breeding causes early puberty and maturity.

Crossbred bulls have been shown to reach puberty at younger ages than straightbred stock.⁴ The breeding-ability age for crossbreds was 51 weeks as compared to 57 weeks for straightbreds in one experimental group. These ages are based on ability to copulate and produce potentially fertilizing numbers of sperm. The cattle involved were Hereford, Angus, Charolais, and crosses between these breeds. Another report from Texas research²⁶ showed crossbred bulls reaching puberty at 45 weeks compared to straightbred bulls at 46 weeks.

Species: Onset of puberty varies with species.

Species	Age at puberty
<i>Bull</i>	<i>9 to 12 Months (range 6-18 months)</i>
<i>Stallion</i>	<i>18 Months (range 12 to 24 months)</i>
<i>Boar</i>	<i>5 to 7 Months (range 4 to 8 months)</i>
<i>Ram and Buck</i>	<i>7 to 8 Months (range 4 to 12 months)</i>
<i>Dog</i>	<i>7 to 10 months (range 5 to 12 months)</i>
<i>Cat</i>	<i>8 to 10 months (range 6 to 15 months)</i>

Geographical location

- The geographical location for rearing of young animals affects the onset of puberty and maturity.
- If individual animal of one geographical area raised in another geographical area, the puberty will be affected adversely.

- Animals located in tropical regions are late in attaining puberty and sexual maturity.

Season

- There is a close relationship among season of birth, body weight and onset of puberty.
- Winter is favourable for sexual maturity in young bulls, used in AI.

Seasonal influences are there in sheep and buffaloes - hot season delays the onset of puberty.

Hormones

The initial hormonal stimulus begins in the hypothalamus where the gonadotropic releasing hormone (GNRH) is produced. This stimulates the anterior pituitary to secrete follicle stimulating hormone (FSH), which then acts to sensitize the testes to interstitial cell stimulating hormone (ICSH). Androgens in turn are produced by the testes. The combination of all this hormone interplay results in puberty.²³ Androgens and gonadotropins initiate spermatogenesis, androgens stimulate growth of the penis and accessory glands, and finally libido occurs. Secondary sex characteristics appear rapidly as puberty approaches and the androgen level rises.

In the male, the onset of puberty is brought about because of decreased hypothalamic sensitivity to negative feedback by testosterone/estrogen.

- If hormone (FSH and ICSH) release occurs at earlier [age](#), the puberty and sexual maturity comes earlier.
- If delay the release of hormones leads to delay in the puberty and sexual maturity.

As described earlier in this chapter, the male does not develop a surge center because the hypothalamus is completely defeminized shortly before or after birth. Thus, the male has a very simple feedback system after puberty. It involves a negative feedback loop only. You should recognize that the negative feedback in the male is due to some testosterone and mostly to estradiol because testosterone is converted to estradiol within the brain by aromatization (See Figure 6-1). In the male the GnRH neurons become less and less sensitive to the negative feedback of testosterone and estradiol as puberty approaches. This means larger and larger quantities of testosterone and estradiol are needed to inhibit the GnRH neurons. With this decreased sensitivity to the negative feedback of testosterone/estrogen, the hypothalamus can produce more and more GnRH and thus more and more LH/FSH and the male reaches puberty.

Chronic disease and debility

- Any disease which causes emaciation of individual, delay the onset of puberty and sexual maturity. Eg. FMD, John's diseases, TB, mange.
- Chronic diseases indirectly due to elevation of body temperature, disturbances of basal metabolism, thermal stress, anorexia, indigestion, stunted growth, emaciation, debility, weakness and endocrinological dysfunction affects the onset of puberty.

Sexual stimulation

- The stimulation of sensory apparatus through CNS by hearing, seeing, smelling of opposite sex, causes early puberty.
- If there is a lack of these stimulation leads to delay the onset of puberty.
- If the male and female are kept together they mature earlier.