Puberty and the Estrous Cycle

Animals must go through a process of sexual maturation before they are capable of producing offspring. It is important for the producer to be able to recognize when the animal has matured to the point that it is capable of reproduction. The producer also has to know when the female has entered a period of fertility and how long that period is likely to last. A lack of knowledge in these areas could be economically costly if productivity is lessened.

Puberty

Puberty is the stage of sexual maturation. In males, puberty is marked by a desire to mate and the ability to produce sperm capable of fertilizing an egg. Puberty in females involves the production of ova by the follicles, the development of the reproductive tract to give the animal the capacity to bear offspring, and a desire for mating.

While male animals are capable of breeding at any time after reaching puberty, female mammals are receptive to breeding only during specific periods, called estrus, or heat. Puberty in the female is marked by the first estrus. Therefore, it is important for breeding purposes to be able to recognize estrus.

Age of Puberty

Just as species differ in size and other characteristics, the age at which the female of each species reaches puberty varies. The age at puberty differs among individual animals within a particular species as well, dependent on factors such as nutrition, physical size, and breed. Chart 3.1 shows the age at which each species reaches puberty.

In cattle, a heifer reaches puberty between six and twelve months of age; in swine, the age at which a gilt reaches puberty ranges between four to eight months. A ewe lamb becomes sexually mature between five and nine months of age. Horses reach puberty at ten to twelve months. Sexual maturity commonly occurs in dogs at any time from six to twelve months of age but varies according to breed. Rabbits usually reach puberty at five to eight months.

In contrast to these other species, fowl do not mark puberty with estrus. They do, however, pass through a period of sexual maturation in order to reproduce. For example, chickens mature sexually at 17 to 26 weeks of age. Turkeys mature later, at 27 to 30 weeks.

Estrus

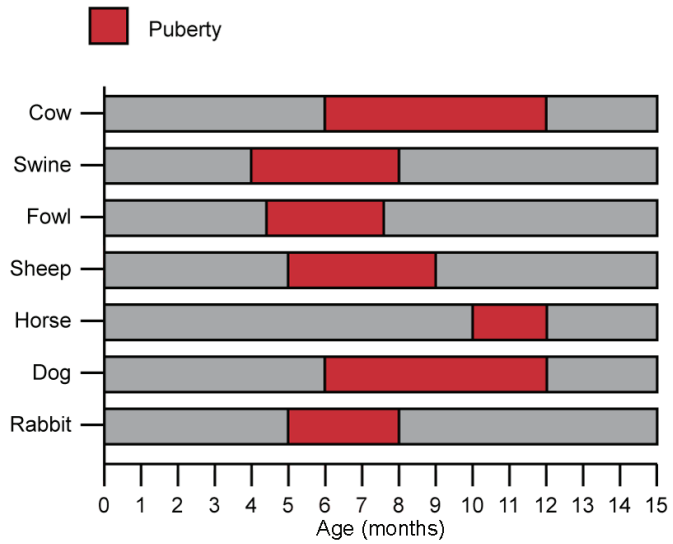
Estrus, or heat, is the period during which the female will accept the male for mating. Estrus begins at puberty and occurs at intervals during a female's life. Each interval is called an estrous cycle. The purpose of the estrous cycle is to prepare the female's reproductive tract for the release of the egg and receiving the embryo.

An estrous cycle has three phases—proestrus, estrus, and diestrus. During the proestrus phase, a follicle matures to release the egg. In the estrus phase, the female is sexually receptive to the male for mating. The egg is also released by the ovary during this phase. The last phase of the estrous cycle is diestrus. During diestrus, the reproductive tract becomes less active, until the cycle begins again with proestrus.

Variation in Estrous Cycles

Each species has a unique estrous cycle. They differ in how often estrus occurs in a year or breeding season, as well as in the length of the cycle.

Chart 3.1 - Age of Puberty in Various Species



A monoestrus animal has only one estrus in a breeding season or year. Dogs are monoestrus. They average one cycle every seven months.

Polyestrous animals are in estrus more than once a breeding season or year. Cattle, swine, sheep, horses, and rabbits are polyestrous, with estrus occurring a number of times throughout the year. Sheep and horses are different from the others in that they are seasonal breeders. In most breeds of sheep, the ewe cycles only during the fall. The time when the ewe is not cycling is called anestrus. During the breeding season, the ewe is in estrus several times. The mare usually experiences anestrus in the winter and cycles from around March until October or November. The variations in the estrous cycles of sheep and horses are triggered by changes in the length of days during the year. Decreasing daylight triggers FSH production in sheep, while increasing daylight stimulates the production of FSH in horses.

Estrous cycle lengths also differ. A cow, sow, and mare all have an average estrous cycle length of 21 days, although the ranges of possible estrous lengths vary. A cow's estrous cycle ranges between 17 and 24 days, a sow's between 18 and 24 days, and a mare's between 18 and 25 days. Sheep have an average estrous cycle length of 16 days, with a range of 14 to 20 days. Rabbits have an estrous cycle of 15 days with a range of 15 to 16 days. The length of a particular animal's estrous cycle may be altered by external factors such as the animal's environment and nutrition.

Since dogs are monoestrus, they do not have regular cycles. However, they do have reproductive events, passing through anestrus and then experiencing proestrus, estrus, and diestrus once each breeding season.

Estrus Length

Estrus is the window of opportunity for mating. The timing of breeding is important, so a knowledge of estrus length is crucial. A cow has an average estrus length of 18 hours, with a range of 10 to 30 hours. The sow has a longer estrus period. A sow is in estrus for an average of 3 days, although the period can range between 1 to 5 days. A ewe has an estrus length of 30 hours, with a possible range of 22 to 38 hours. Mares are in estrus for an average of 5 days, with a range of 1 to 10 days. Estrus in dogs lasts for an average of 9 days and a range of 5 to 19 days. Rabbits do not have a well-defined estrus period, since ovulation is stimulated by the act of mating.

A comparison of estrous cycle and estrus lengths is shown in Table 3.2.

Visual Signs of Estrus

The breeder can tell whether or not the female is in estrus by looking for visual signs, such as changes in physical appearance or behavior. These signs are triggered by the production of estrogen. The following are some of the common visual signs for each species.

Table 3.2 - Estrous Cycle and Estrus Lengths

Species	Estrous Cycle	Estrus
Cattle	21 days (17-24 days)	18 hours (10-30 hours)
Swine	21 days (18-24 days)	3 days (1-5 days)
Sheep	16 days (14-20 days)	30 hours (22-38 hours)
Fowl	-------	-------
Horses	21 days (18-25 days)	5 days (1-10 days)
Dogs	-------	9 days (5-19 days)
Rabbits	15 days (15-16 days)	not well defined

Cow – A cow in estrus may mount other females or be willing to be mounted. The cow may be nervous or become agitated. Another visual sign of estrus in a cow is frequent urination. Also, it may have a swollen, inflamed vulva from which vaginal discharges or mucus are secreted.

Sow – A sow may show all of the same visual signs as a cow when in estrus. In addition, the sow may occasionally grunt loudly. It may also assume an immobile stance, holding its ears erect.

Ewe – In contrast to the cow and the sow, the ewe shows few signs of estrus. The ewe's vulva may be slightly enlarged and secrete mucus. The best indicator is the ewe seeking the ram and standing to be mounted.

Mare – Mares exhibit visual signs such as a raised tail and a relaxed vulva with mucus discharges. The mare may also disturb other mares, be nervous, nicker, and urinate frequently. A visual sign of estrus that is unique to the mare is the winking of the vulva. Winking is when the mare lowers her pelvis and raises her tail in a submissive manner, signaling that she is ready to mate.

Bitch – The bitch will exhibit changes in behavior in the days preceding estrus. For example, appetite may decrease or increase. In addition to behavioral changes, the vulva becomes swollen. A bloody discharge that begins during the proestrus period will cease during estrus. Another sign of estrus in the bitch is a willingness to accept the male for mating.

Doe – A doe in estrus exhibits a reddish-purple, slightly swollen vulva. It also accepts the male to mate.

Factors in First Time Breeding

An important factor in successful first time breeding is choosing the appropriate time for the female to be bred. Although a female can be bred at the first estrus, doing so is not recommended because the animal may not be physically equipped for successful reproduction. The three basic factors to consider when deciding whether an animal should be bred are physical size, age, and breed.

The physical size of the animal is important. The female should have the weight and frame size to carry the offspring for an entire pregnancy. Age also plays a role in determining when to breed. An animal should be past puberty and fully sexually mature. The breed of a particular animal should also be considered. One breed may develop faster than another breed within the same species and can therefore be bred sooner.

Local feed dealers, veterinarians, and extension livestock specialists are good sources of information about how to weigh these factors to determine the correct breeding age for a specific animal.

Summary

Puberty is the period during which animals become sexually mature. In mammals, estrus is the first indication of puberty. Each species has a different puberty age, estrous cycle and estrous cycle length, and estrus length. The producer can determine whether a female is in estrus by looking for a number of visual signs. When breeding an animal for the first time, more than just the presence of estrus should be considered, however. Physical size, age, and breed are also important.

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