

## Estrous Cycle

**Estrous cycle:** Progressive alterations in the genital tract characteristic produced by changes in reproductive hormones occurs in mammalian females. Also, defined as the period from the beginning of estrous to the beginning of next estrous (the period between two cycles or two ovulations).

**Estrus period:** Period of sexual interest in female usually called "heat". Therefore:

**Estrous** = describing the action "cycle"

**Estrus** = describing the event "standing heat".

### Types of animals according to the estrous cycle

#### 1. Polyestrous animals:

The animals show continuous estrous through the year during its life such as cows and some types of ewe and buffalos.

#### 2. Seasonal animals:

a) Seasonal polyestrous: the animals show many estrous cycles during a limited season (breeding season) such as mares, she-camel, ewes, and goats. In the mares, the animals were bred in the long lighting day, but she-camels, ewes, and goats, the animals breed in the short lighting day.

b) Seasonal-monoestrous: the estrous occurs (once or twice a year) when the weather is improved with the presence of feeds such as bitches, cats, and some wild animals.

#### The cycle of women and high-class animals:

Also called "Menstruation cycle" or "Month cycle", occur in women and primates, and this cycle varies from the other animal's cycles by:

1. The follicular phase was long (about 14 d).
2. Not determined time for sexual acceptance of male.
3. Presence of “Menses” at the end of estrous.
4. There are spontaneous ovulation and formation of C. L.

## phases of the estrous cycle

### 1. Proestrus phase (Day 17-20):

Regression of the corpus luteum of the previous cycle and drop in the progesterone concentrations in circulation. The dominant follicle is selected and grows to produce gradually increasing amounts of estrogen. In late proestrus, the influence of estrogens on the reproductive tract, and the behavior of the cow can be observed somewhat.

### 2. Estrus Phase (Traditionally considered as day 0 of a new cycle):

The dominant follicle reaches its maximum growth, matures, and ovulates. Ovulation is induced by high LH concentrations (preovulatory LH peak). Estrus is also called heat and lasts on average 4-24 h. During estrus, the cow/heifer is receptive to a bull and stands for mating (standing heat).

Behavioral signs of estrus:

- ✓ Occur due to the influence of estrogens.
- ✓ Restlessness
- ✓ Drop-in milk production
- ✓ Standing to be mounted
- ✓ Presence of clear mucus
- ✓ Swelling and redness of vulva.

**3. Metestrus phase (Day 2-4):**

Estrus ends, a corpus luteum (CL) is formed, progesterone levels in circulation begin to rise.

Metestrus bleeding: (90% of heifers and not more than 45% of cows), during this time show a phenomenon known as “metestrus bleeding” (patches and streaks of blood are seen in the vaginal mucus staining the tail and perineum).

**4. Diestrus phase (Day 5-17):**

Period of maximum corpus luteum size and function, high levels of progesterone in circulation. At the end of distrust, luteolysis of the corpus luteum begins.

**lengths of estrus stages in some animals**

Type of animal	Ovulation time	Estrous Cycle	Pro	Estrus	Met	Di
Cow	After 11 h from the end of the estrus phase	21 d	3-5 d	18-24 h	2-4 d	10 d
Ewe & Doe	At 2 <sup>nd</sup> halve of the estrus phase	17 d	2-4 d	2 d	2-4 d	10 d
Mare	Before 2 d of the end the estrus	22 d	3-5 d	7 d	3-5 d	8 d

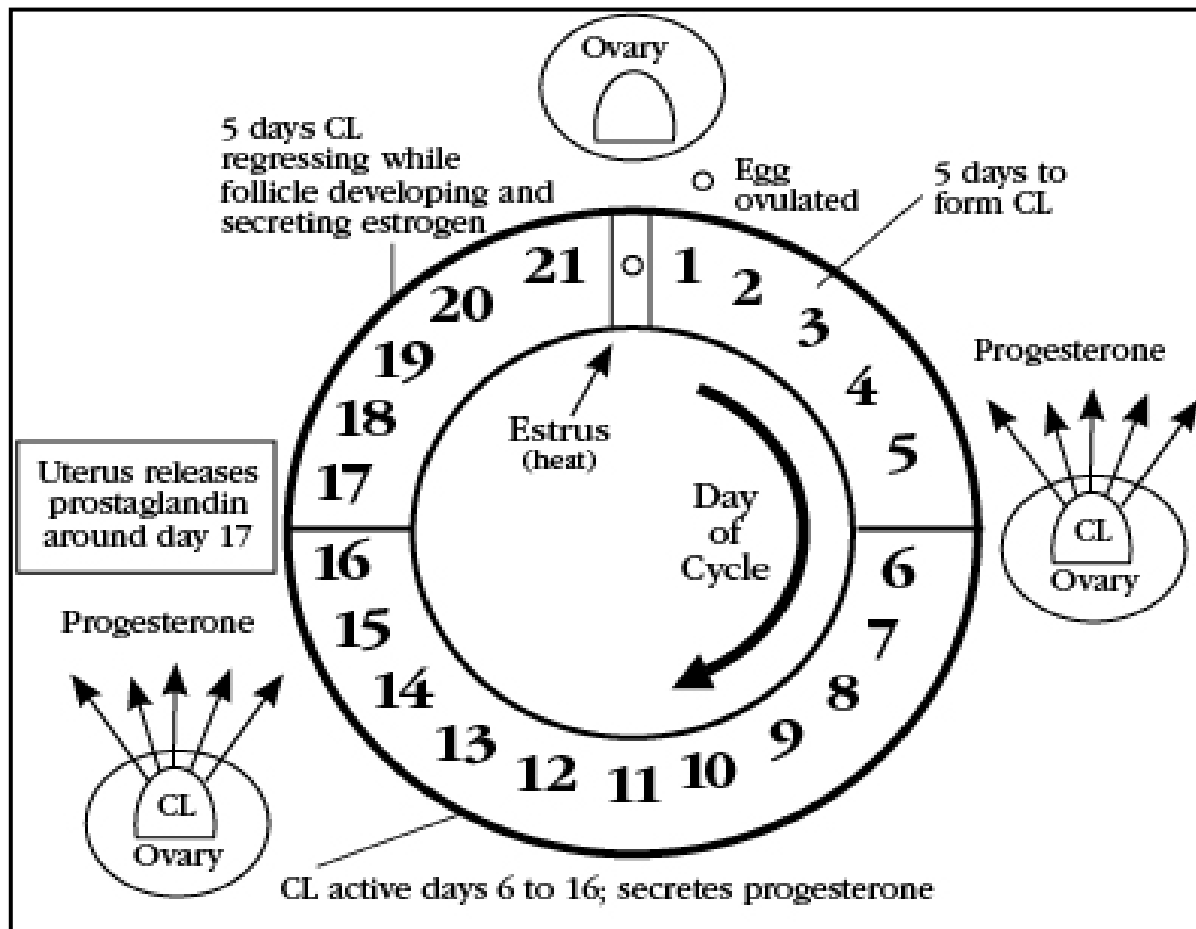


Figure 1 cow estrous cycle

## Hormonal control of the estrous cycle

When the female reaches puberty age, the hypothalamus will stimulate and produce gonadotropin-releasing hormone (GnRH). The GnRH affects the anterior pituitary gland (by neural axes) and stimulates it to produce the follicle-stimulating hormone (FSH) which causes the developing and maturation of the follicles on the ovary. The preovulatory (Graffian) follicles release the estrogen that caused stimulates the pituitary gland to produce a lot of FSH by feedback mechanism leading to an increase in the estrogen and showed the estrus signs. Then the ovary produces the other hormone called

“Inhibin” which leads to a feedback mechanism on the pituitary gland to stop the FSH to replace by luteinizing hormone (LH) which caused ovulation (positive direct relation).

After ovulation; the ruptured follicle converts to the corpus hemorrhagicum which released progesterone causing an increase in LH production to maturation the corpus hemorrhagicum and convert it into the corpus luteum, so this lead to an increase in progesterone for the maintenance of pregnancy. If the pregnancy does not occur, the CL will regression by Prostaglandin ( $PGF_2\alpha$ ) which is produced by the uterine glands in the endometrium.

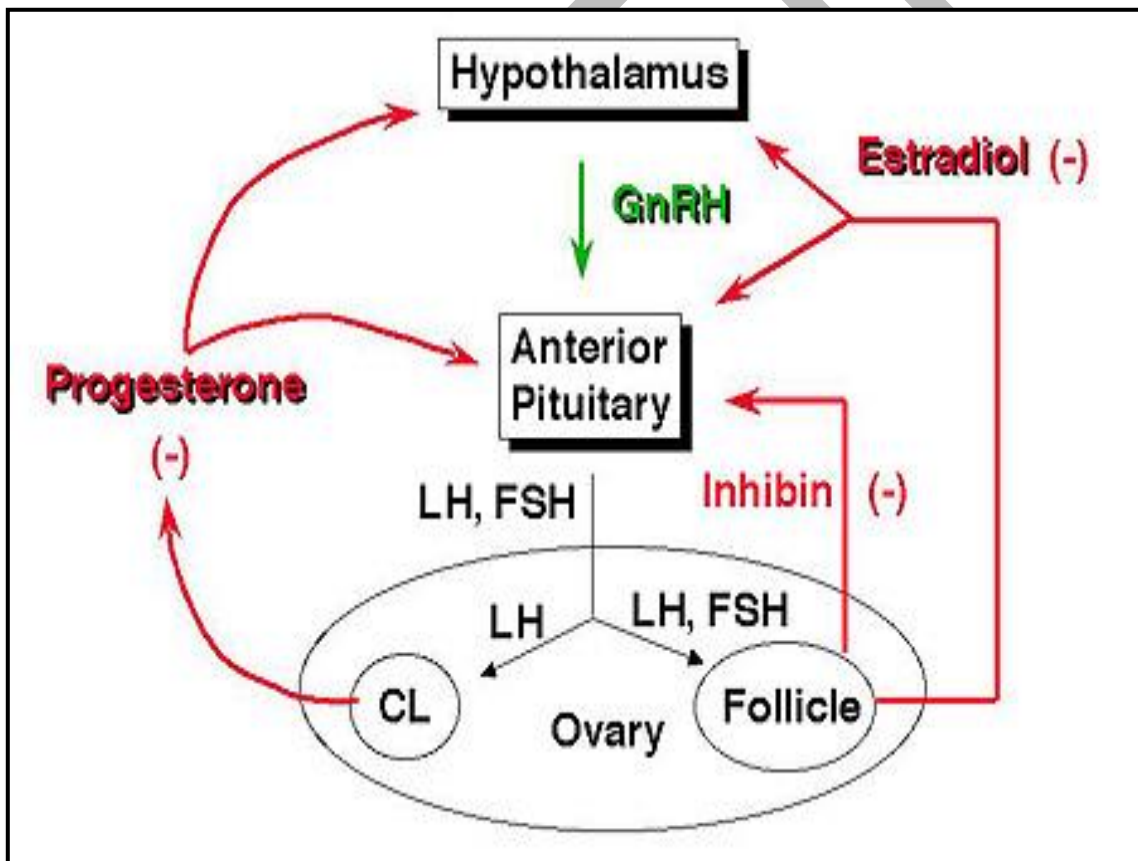


Figure 2 Hormonal control of the estrous cycle

HUSSEIN