



# Estrus Cycle in Equine and Camels, Anestrus and its Treatment



Prepared by-

**Dr. S. K. Sheetal**

**Assistant Professor *cum* Jr. Scientist Department of  
Veterinary Gynaecology and Obstetrics,  
Bihar Veterinary College, Bihar Animal Sciences  
University, Patna-800014**

# **Estrous Cycle of Mare**

# Terminology

- "**Estrous**" or **Ostrous** → refers to the entire cycle.
- "**Estrus**" or Oestrus → refers to the "heat" stage of that cycle when the mare is receptive to the stallion
- "**Diestrus**" (dioestrus) → Period in between the estrus phases when the mare is not receptive to the stallion
- "**Anestrus**" (anoestrus) → Complete absence of estrus.

## Long Day Breeder

- The mare is a "**seasonally polyestrus**" animal → undergoes regular estrus cycles during a portion of the year (**late spring, summer and early fall**) → Not in winter.
- This is nature's way of preventing the arrival of a foal during bad weather.

# Signs of Estrus

- Vulva become large and swollen, scarlet or orange colour, wet, glossy, covered with mucous.
- Labial folds → Loose
- Vaginal mucosa → highly vascular
- Tail raised.
- Urine expelled in small amount frequently
- Clitoris is exposed by prolonged rhythmic contraction → Known as **Winking of clitoris**
- Ovulatory Cycle → 21 days
- Luteal phase = 14 days
- Follicular or estrous phase = 7 days

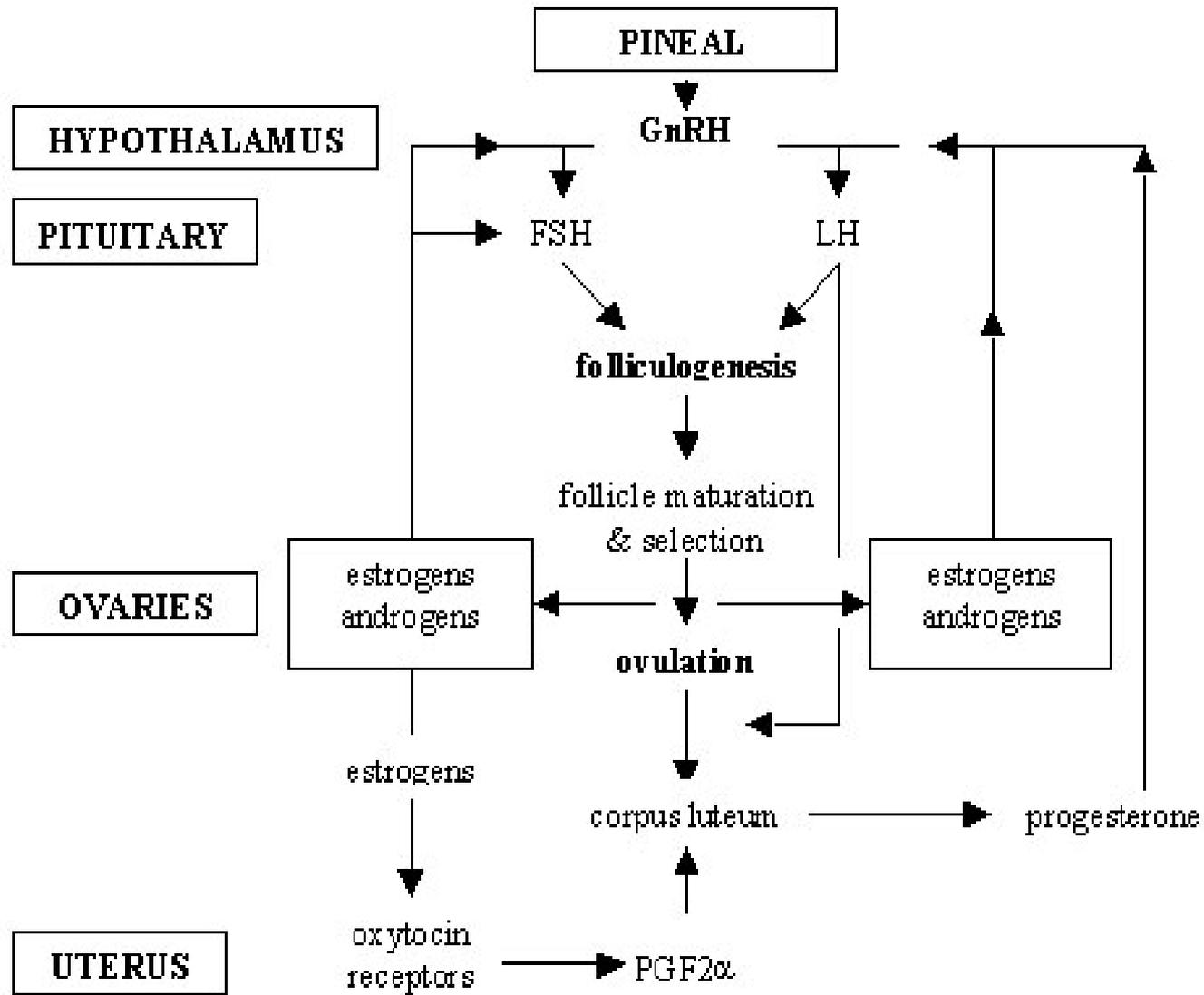
# Long Duration Estrus in Mare

It may be due to

- ✓ Ovary surrounded by **serous coat** and takes longer time for migration of follicles to reach the ovulation fossa to rupture.
- ✓ Preovulatory follicle requires longer time to reach maximal size (**due to less sensitiveness of ovary with exogenous FSH**)
- ✓ Low level of LH → delays ovulation

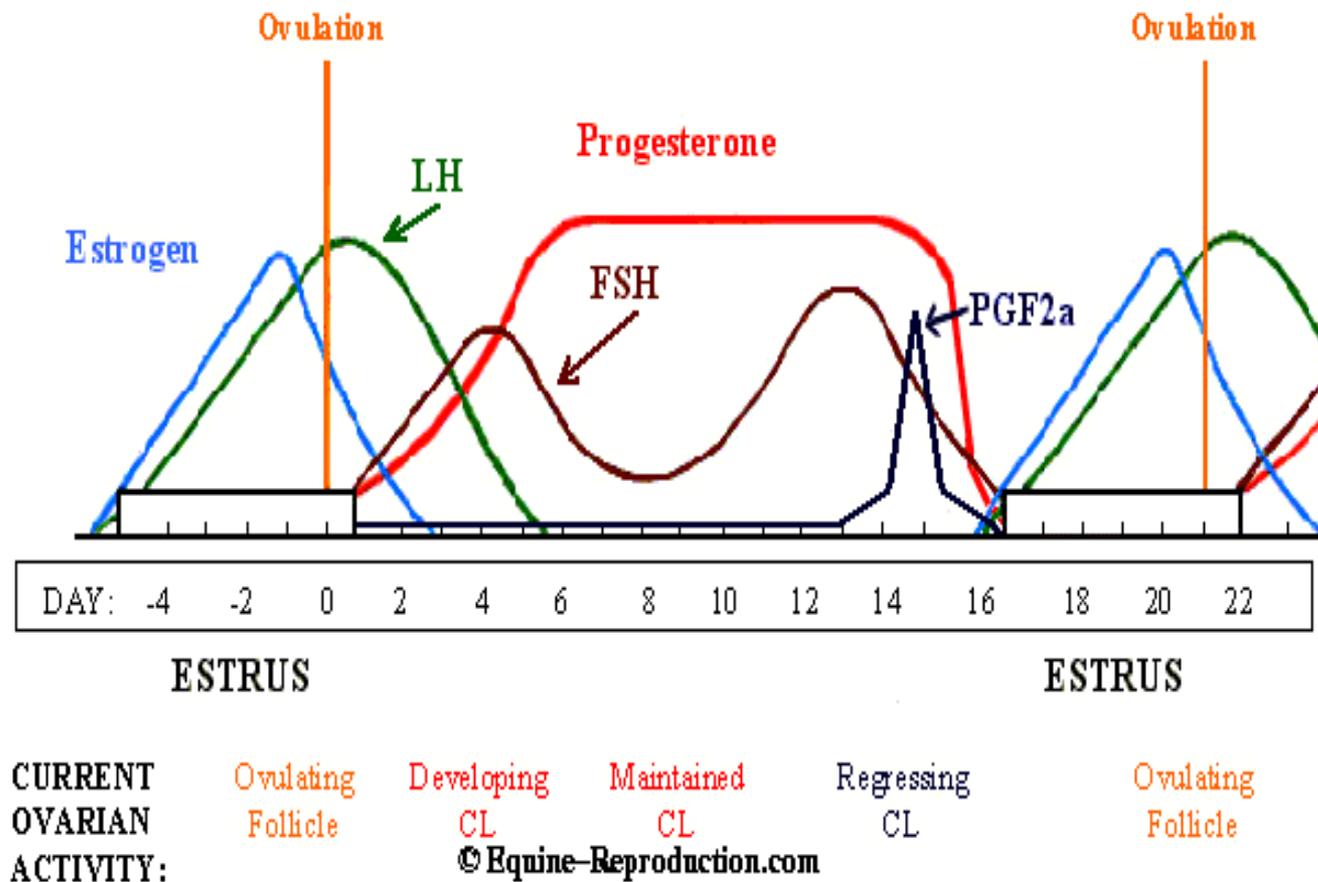
# Ovulation

- Most ovulations → days 3, 4, or 5 of estrus, **24 to 48 hours before the end of behavioral estrus**
- **Time of ovulation is more closely related to the end than to the onset of estrus.**
- CL maximum size = 14<sup>th</sup> day
- Fertilized ova transported in the uterus
- **Unfertilized ova trapped in the isthmus of oviduct for several months.**
- **Unfertilized eggs may be retained in the oviduct of pregnant and non pregnant mares up to 7 months**



# **Hormones Active during the Estrous Cycle of the Mare:**

# A Brief Sequential Overview of the Regular Estrous Cycle



# Gonadotropin Releasing Hormone (GnRH)

- Secreted by the hypothalamus of the brain.
- **Light (natural or artificial)** → Stimulation of the pineal gland → reduction of melatonin secretion → allows GnRH secretion by the hypothalamus → FSH, LH secretion.
- The exact mechanism of decreased melatonin production and increased GnRH level is not known.
- In anestrus mares GnRH is released in a pulsatile manner with long period between secretions, → undetectable blood level.
- Estrous mares secretion is continuous.

# Follicle stimulating hormone (FSH) and Luteinizing hormone (LH)

- LH → lowest during the mid-luteal phase of estrous, rising only a few days before the onset of estrus to a peak usually on the day of, or shortly after ovulation.
- Duration of secretion of LH in the mare and its associated ovulatory surge → longer than in most other animals.
- FSH is in contrast to LH, thought to follow a bi-modal secretion pattern.
- **Twin-peak effect** is seen only during spring and early summer; and that it adopts a single-peak effect in later summer and fall.

# Estrogens

- There are several forms of estrogen occurring in the mare.
- Non-pregnant mare estradiol is the most active;
- Pregnant mare → estrone sulphate.
- Estradiol in the estrus mare → behavioural displays
- Estradiol → relaxation of the cervix during estrus
- Estrogen → impact negative on FSH, positive on LH.
- In the pregnant mare estrone sulphate is secreted by the fetoplacental unit (FPU). Levels rise gradually until about day 70 to 210, start to slowly drop shortly before foaling.
- Estrone sulphate in blood from about day 70 of pregnancy onwards can be used as a reliable indicator of fetal viability as its levels drop rapidly following fetal failure.

# Progesterone

- Secreted by the Corpus Luteum (CL)
- Luteal Progesterone has a positive impact on FSH and a negative impact on LH.

# Prostaglandin

- Pulsatile secretion of Prostaglandin F<sub>2α</sub> by the lining of the uterus commences if pregnancy is not detected at about day 14 post-ovulation.
- The presence of PGF<sub>2α</sub> causes the "lycing" of the CL and an almost immediate drop in circulating levels of progesterone, which permits the mare to start displaying estrus.
- PGF<sub>2α</sub> also causes a contraction of smooth muscle - which includes the uterus.

# Important points

- EC length = 21 days
- 5 days after ovulation → CL is fully functional and secreting progesterone.
- FSH action early in diestrus may produce a mid-cycle follicle that will sometimes ovulate, but more usually regresses
- Around day 13 post-ovulation the endometrium of the uterus secretes  $\text{PGF2}\alpha$  → destruction ("lycing") of CL → onset of estrus behaviour.
- The mare will display receptive behaviour (estrus) towards the stallion for 5-7 days and will ovulate in the last 24-48 hours of that display period.

# Treatment of Anestrus in Mare

- Mares are a seasonally poly-estrus with ovarian activity being related to long days. Their reproductive activity was experienced between May and October
- The regular pattern of estrus cycles relies on the delicate balance among hormones produced by the pineal gland, hypothalamus, pituitary gland, the two ovaries and endometrium.

# Treatment of Anestrus in Mare

- **Use of GnRH:**

- Injection GnRH 5 ml (20 mcg) to 10 ml (40 mcg) IM

- showed estrus behavior within 10 – 15 days of injection

- showed estrus behavior within 15 – 21 days of injection of GnRH.

- Highest response occurs in breeding season

# Treatment of Anestrus in Mare

## **Saline Infusion:**

- Intrauterine saline infusion (intra-uterine wash with 1000 ml normal saline 0.9%.) has been routinely used to induce estrus in anestrus mares.
- Anestrus mares are only affected near the beginning and end of breeding season when anovulatory heat are induced.
- Diestrus mares : Infusion between 5 & 9 days
- return to heat 4 days earlier than expected and ovulation occurs.
- Highest response occurs in breeding season

# Reproductive Cycle of Camel

# Estrous cycle in camel

- **Estrous cycle** → No luteal phase.
- During the **cycle** of 27days the ovarian activity was strictly follicular.
- Follicles matured in six days, maintained their size for 13 days and regressed in eight days.
- The waves of follicular growth, maturation and atresia occur throughout the breeding season.

# Puberty

- Time in adolescence when female gonads are capable of releasing ova.
- Age at puberty 2-3 years.
- There are many factors which are responsible for age of onset of puberty such as
  - nutrition
  - breed of camel

# Sexual Activity

- Sexual activity has been reported to start as early as 2-3 years of age.
- But they are not usually bred until 4-5 years old.
- sexual activity can continue until 20 years of age.

# Breeding Season

- Seasonal breeder
- Short day breeder or short breeding season
- Late September to March
- Both male and female are seasonal breeder
- Mating during rainy or cold season
- Outside of breeding season mating activity ceases and the ovary are inactive or only have a few, small follicles.

# Female Reproductive Cycle

- Female camel is a seasonal polyestrous animal
- Induced ovulator
- Estrous cycle 23-27 days
- Estrus duration 4-7 days
- Diesrtus 15-20 days

- Estrus cycle did not have a luteal phase
- During the cycle of 27 days ovarian activity → strictly follicular
- Follicle matured in 6 days, maintain their size for 13 days and regressed in 8 days
- The waves of follicular growth, maturation and atresia occur throughout the breeding season
- Signs of Estrus:
  - ✓ Aggressiveness
  - ✓ General restlessness
  - ✓ Straddling the hind legs
  - ✓ Swelling and discharge from the vulva

- Peripheral plasma concentration of progesterone remained  $< 1$  ng/ml throughout the estrus cycle
- Level of estrogen and testosterone increased in parallel as the follicle grew in size.
- level of estrogen 20pg/ml and 50 pg/ml testosterone/ml when small growing follicle, increased steadily to reach a plateau level of  $> 80$  pg/ml estrogen/ml and 100 pg/ml testosterone/ml
- The plateau level of hormones maintained for 15 days and then decreased steadily as the follicle regressed.

- LH concentration remains very low ( $<1\text{ng/ml}$ ) and no peaks were observed throughout the estrous cycle.
- the peak of LH begins 2 hours after copulation.
- by 4 hours after insemination, peak value of  $6.9 \pm 1 \text{ ng/ml}$  occur.
- plasma progesterone level increased to reach  $2.4 \pm 0.86 \text{ ng/ml}$  at 7 days after ovulation.

- The absence of LH surge and low progesterone level during the estrus cycle are related to the failure of ovulation and subsequent absence of a true luteal phase.
- Well developed corpora lutea only occur after successful mating

# Ovulation

- Ovulation was non spontaneous and required the stimulus of coitus.
- Ovulation occurs 30-48 hours following copulation.
- Without pregnancy there is no formation of CL.

# Treatment of anestrus In Camel

- If CL persist Give Prostaglandins injection @ 500 mcg.
- Injection GnRH given @ 5 ml (20 mcg) Intramuscular.
- Ov-synch protocols may also used to induce estrus in anestrus she camels.



*THANK YOU*