

The estrous cycle

- **Definition**

- Sexual Puberty in the females is defined as the age at the first expressed estrous with ovulation
- Sexual Maturity in the females is defined as the age at the expressed estrous with ovulation and normal parturition

Definition

- **Estrous cycle** : reproductive cycle of female generally defined as period from one estrous to the next . It two phase
- 1- follicular phase(proestrus and estrus)
- 2- luteal phase (metestrus and diestrus)
- **Estrous** : period of sexual receptivity commonly referred to as “ heat “
- **Anestrous** : period when female does not experience cycles occurring during pregnancy , season , pathology
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Animals classified according to estrous cycle

1 - Poly estrous; cow ,sow



TYPES OF ESTROUS CYCLE

2 - Seasonal poly estrous

A- short day breeder; ewe , doe

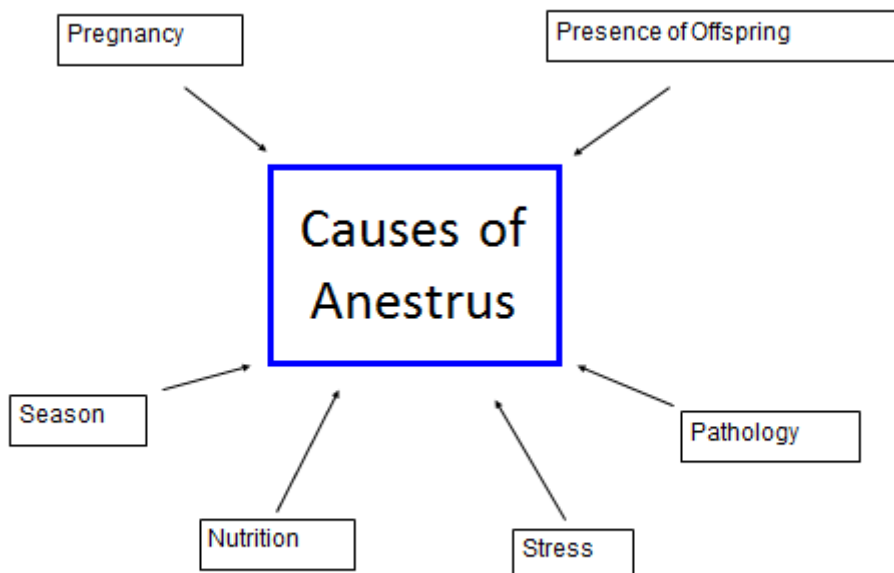


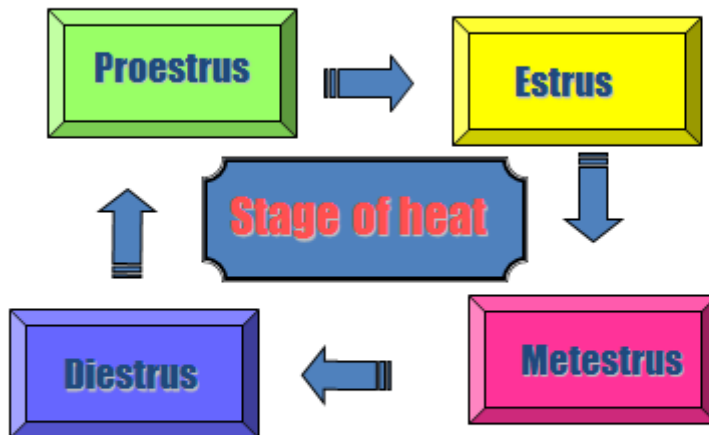
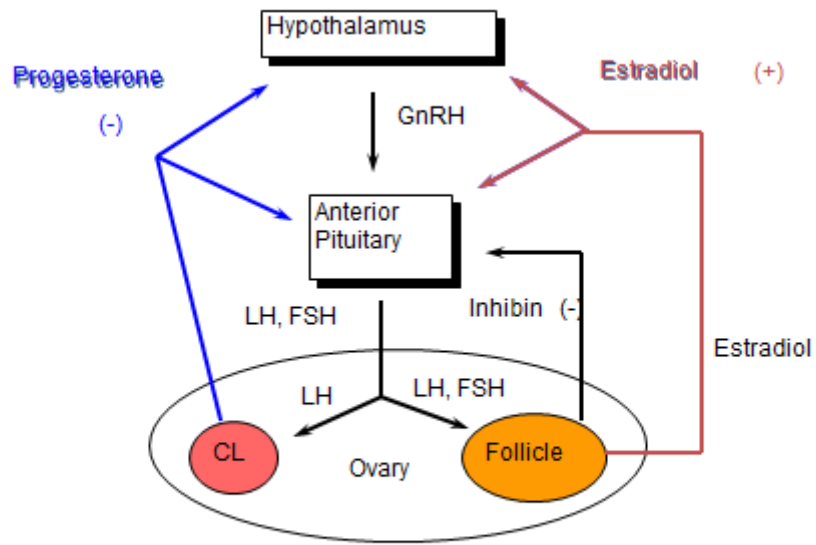
B- long day breeder; mare , queen



TYPES OF ESTROUS CYCLE

3 – monoestrous; bitch , wild animals





Average Reproductive Cycles

Species	Length of Estrous Cycle	Length of Estrus	Ovulation	Length of Pregnancy
cow	21 days polyestrus	18 hr	11 hr after end estrus	282 days
ewe	17 days seasonal (fall)	29 hr	near end estrus	148 days
sow	21 days polyestrus	48-72 hr	35-45 hr after start estrus	115 days
mare	21 days seasonal (spring) polyestrus	4-8 days	3-6 day of estrus (1-2 days before end of estrus)	335 days
Doe	21 days seasonal(fall)	30-40 hrs	few hrs after ovulation	149 days

Characteristics of Estrous Cycles

	Cow	Ewe	Sow	Mare
Estrous cycle (days)	21	17	21	21
Proestrus (days)	3-4	2-3	3-4	2-3
Estrus	12-18 hr	24-36 hr	48-72 hr	4-8 days
Metestrus (days)	3-4	2-3	2-3	2-3
Diestrus (days)	10-14	10-12	11-13	10-12

Follicular Phase

Stage of heat

A. Proestrus

- day 19 -21
- period for preparation of sexual activity

Proestrus

- FSH level increase
- follicle enlarges
- estrogen increases
- vascularity of the female reproductive tract increases
- endometrial glands begin to grow
- estrogen levels peak

Follicular Phase

Stage of heat

B. Estrus (heat, sexual desire)

- period of sexual activity, female permit mating
- duration : 6 - 30 hrs (heifer 15, cows 18hrs)

Estrus

- allows male to mount
- estrogen decreases
- LH surge occurs
- ovulation 24-48 hr after surge of LH
- uterine motility high with contractions moving toward oviduct
- sperm transport is optimal



Signs of Estrus

- Primary Sign of Estrus

- Stands immobile when mounted.
- Bellowing
- Red vulva
- Swollen vulva
- Clear mucus discharge from vulva

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Secondary Signs of Estrus

- Behavioral
 - Increased Activity
 - Walking the fence line
 - Charging
 - Butting
 - Licking
 - Sniffing
 - Flehmen posture (inverted nostrils)
 - Circling
 - Chin-resting
 - Mounting

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- **Miscellaneous Signs of Estrus**
 - Depressed appetite
 - Depressed milk production
 - Frequent Urination

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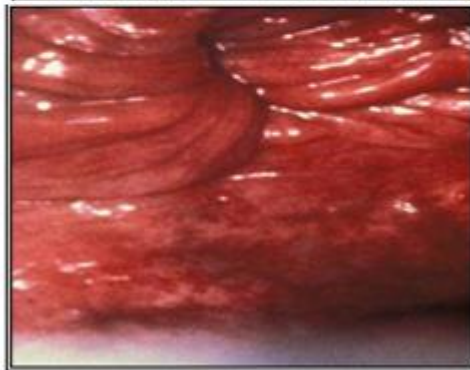
Arborization

Glassy, viscous One strand,
shiny Clear and has the
character of
Fernerization increased



Vaginal findings

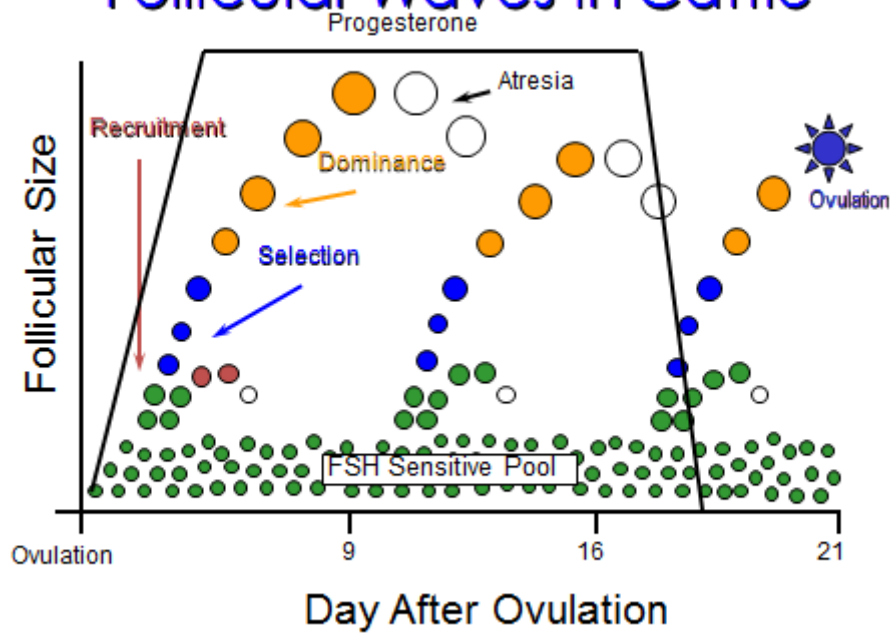
Hyperemia, congestion
Viscous, red, slightly dilated
Rose shaped external os



- **During rectal palpation**

- Uterus is turgid
- Presence of GF

Follicular Waves in Cattle



Mating Behavior (Estrus signs)

- The mare will allow the stallion to **smell and bite**.
- She will
 - **extend her hind legs**,
 - **lift her tail to the side and**
 - **lower her rump**.
 - The erect clitoris will be exposed frequently by contractions (**winking**) of the labia.
 - The **vulva will be elongate** and swollen, with the labia partly everted.
- The mare should be teased by a stallion for accurate detection.
 - Attempts to fight the stallion indicate she is not in estrus even though some other signs of estrus are apparent.



Estrous Cycle (Non-Pregnant)

- Proestrus (9 days)
 - Vulvaswollen
 - Bloody discharge
 - Attracted to male but does not mate
- Estrus (9 days, ovulation day 2)
 - Accepts male
 - Straw-colored discharge
- Metestrus or Diestrus (90 days)
 - False pregnancy
- Anestrus (5 months)
 - Sexual inactivity

Bitch

Estrous Cycle

Queen

- Pro-estrus
 - 1 - 2 days
 - Attracted to males
 - Rubs head and neck on objects
 - Vocalization, posturing and rolling
- Estrus
 - Accepts male
 - 4 - 6 days if male present, 10 days if no male
 - Ovulation 27 hours after mating (induced)
 - Affectionate to aggressive towards owners

Luteal Phase

Stage of heat

D. Diestrus (between heat)

- **day 5 - 19**
- **complete lack of sexual desire**

Diestrus

- progesterone high
- FSH
 - Increases at some point to cause growth of ovulatory follicle
- Uterus
 - secretes fluid but volume gradually decreases
 - contraction stop
 - CL regresses at the end of this period if female is not pregnant due to PGF release

Luteal Phase

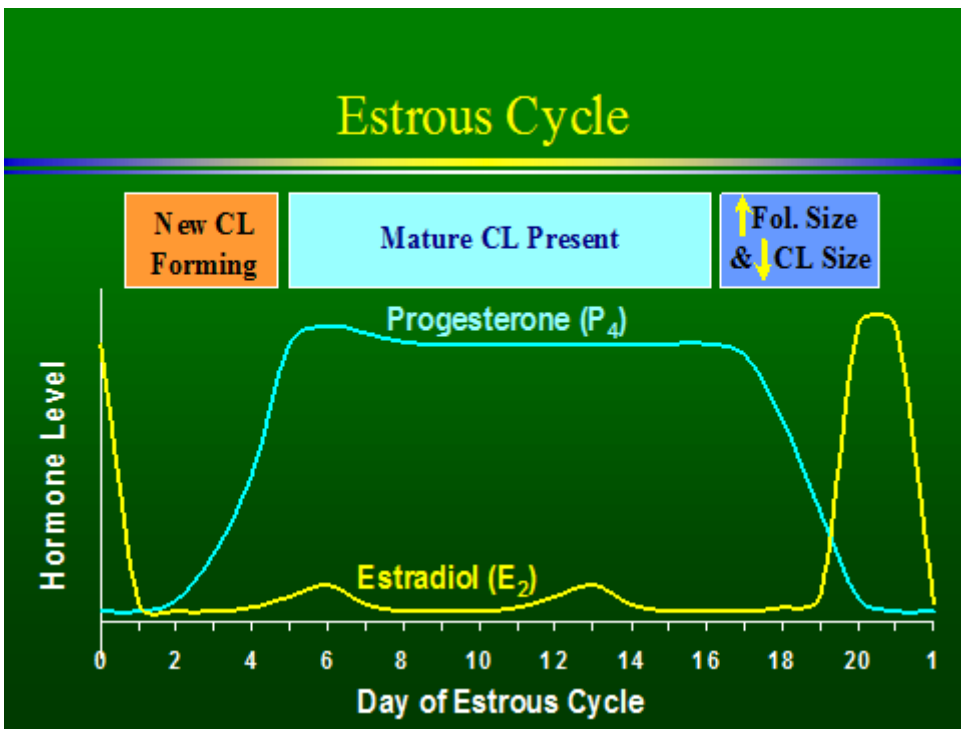
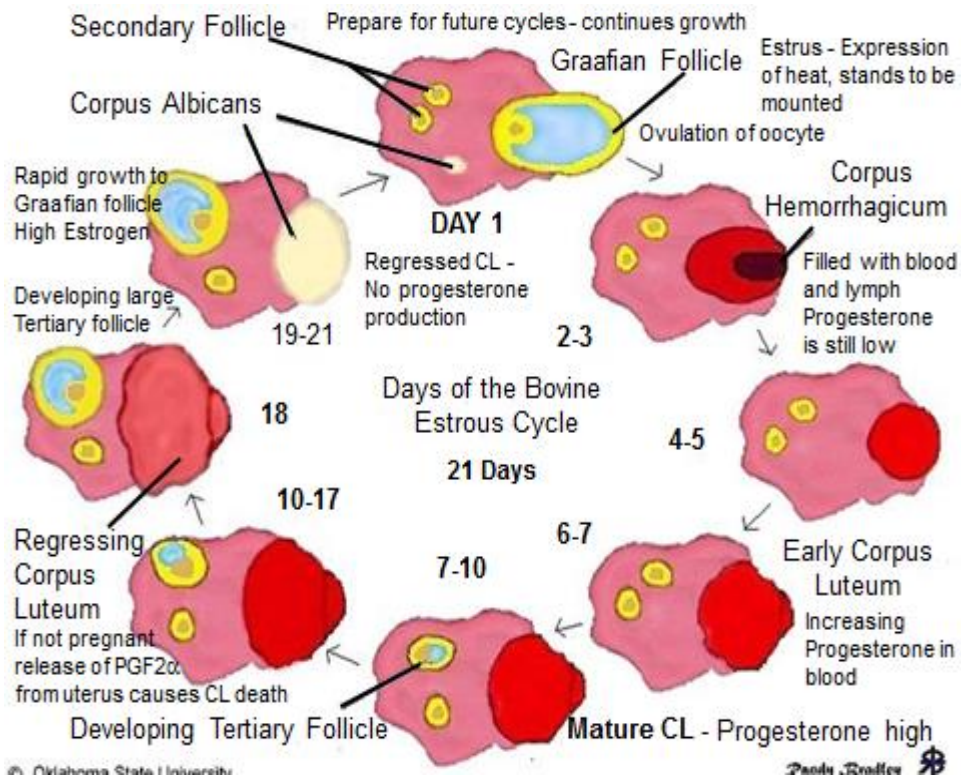
Stage of heat

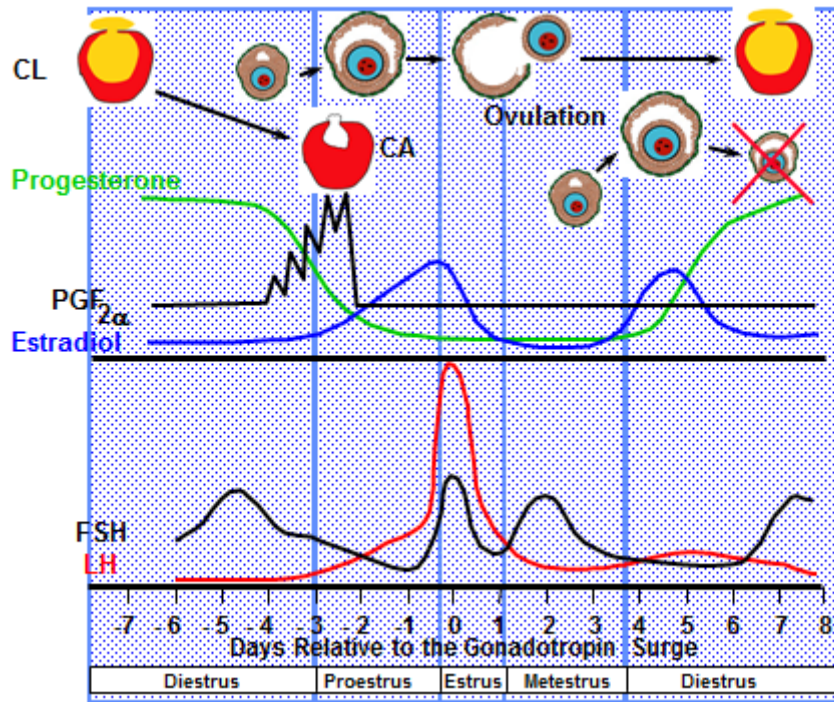
C. Metestrus (after heat)

- **day 1-5 of cycle**
- **not permit mounting**
- **50% cow , 90% heifer - metestral bleeding**
- **corpus luteum begins to develop**

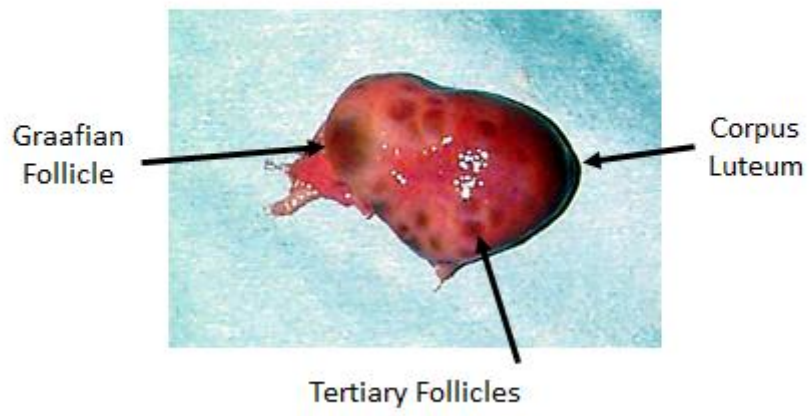
Metestrus

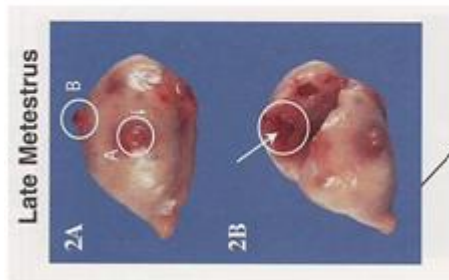
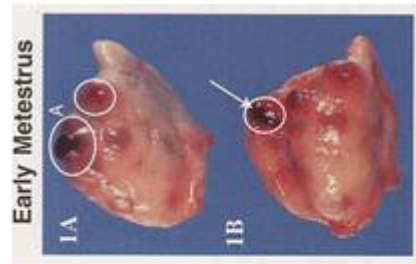
- estrogen low
- ovulation in cow
- corpus hemorrhagicum present
- uterus
 - contractions subside
 - endometrial glands continue to grow and become coiled
 - in cattle bleeding occurs
- FSH increases
 - triggering growth of follicles





Ovary - CL and Follicle



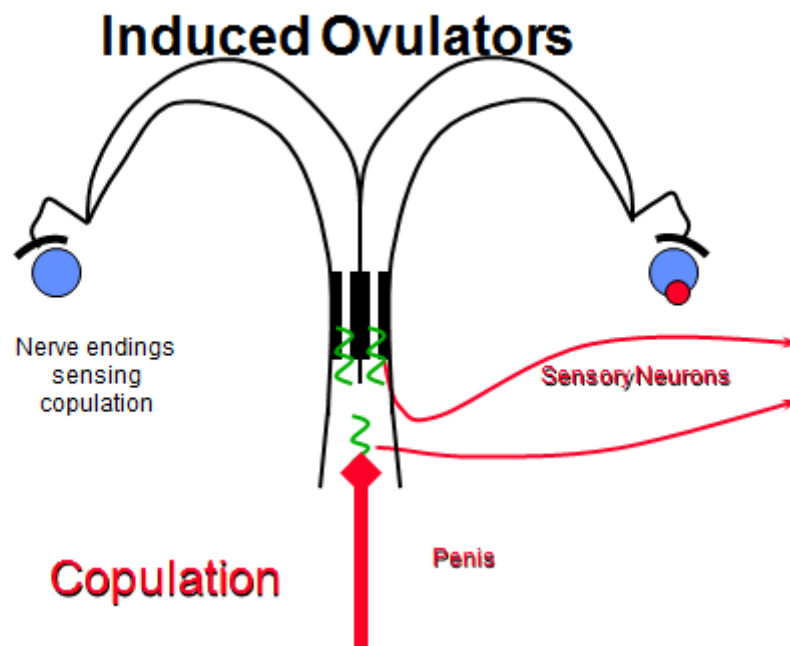


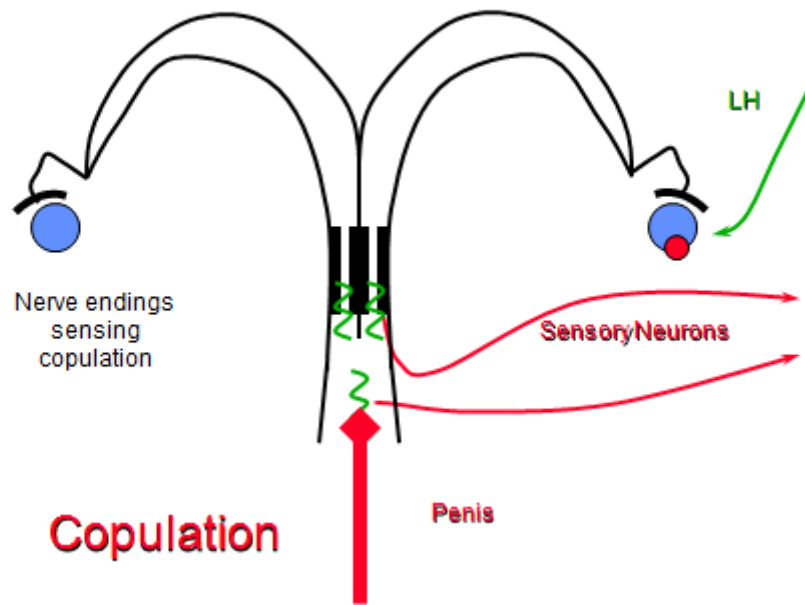
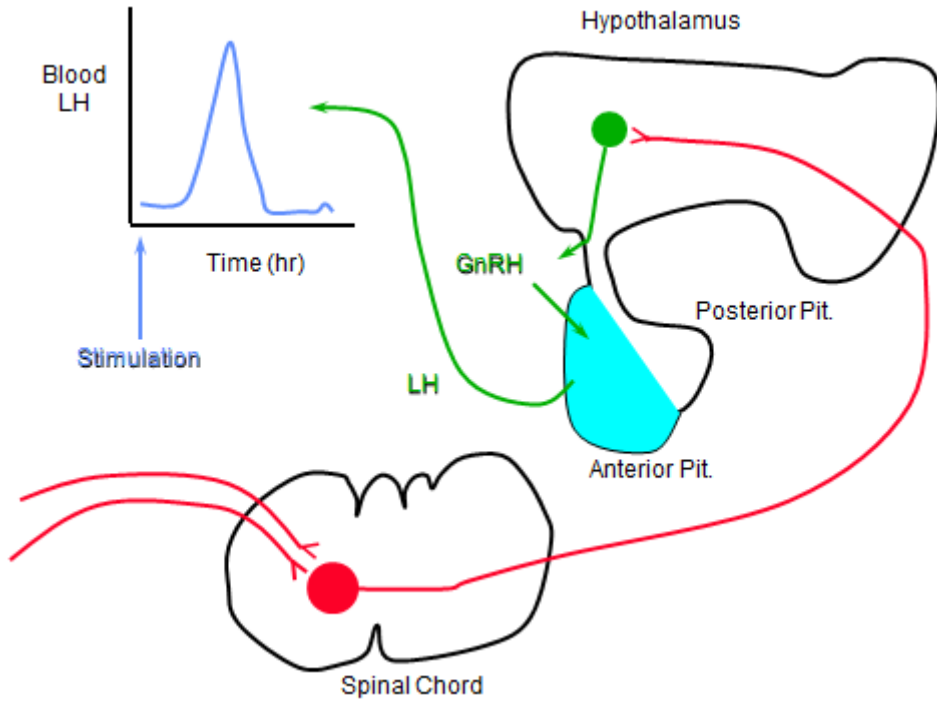
Animals induced ovulation



Spontaneous Ovulators

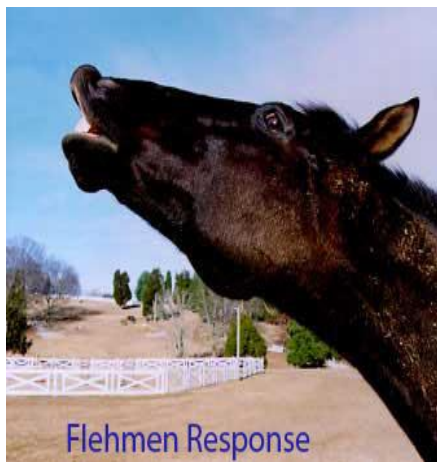
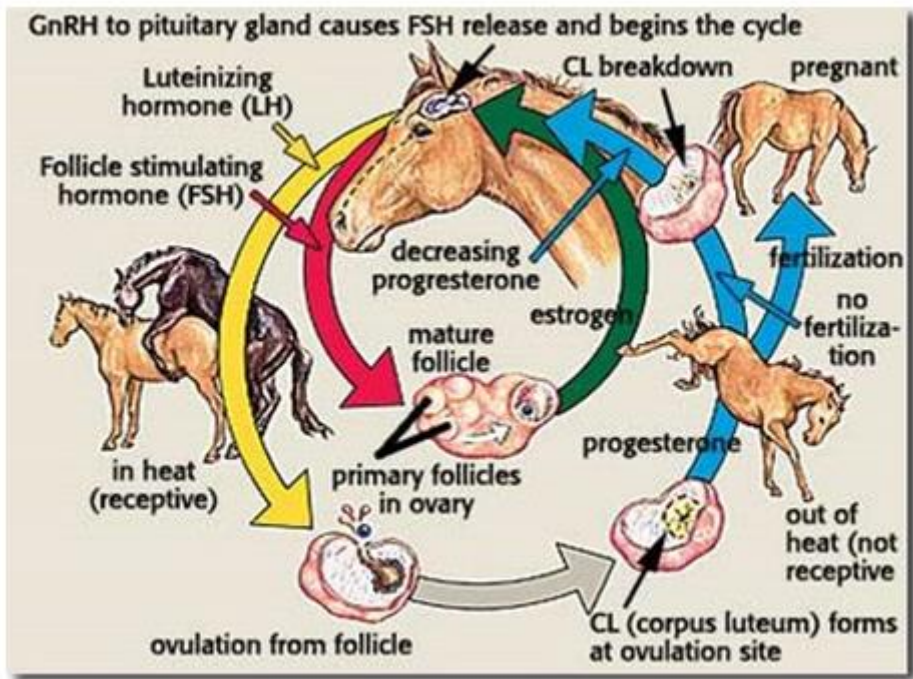
- Retain some neural control of ovulation
 - heifers can alter the timing of the LH surge by clitoral stimulation

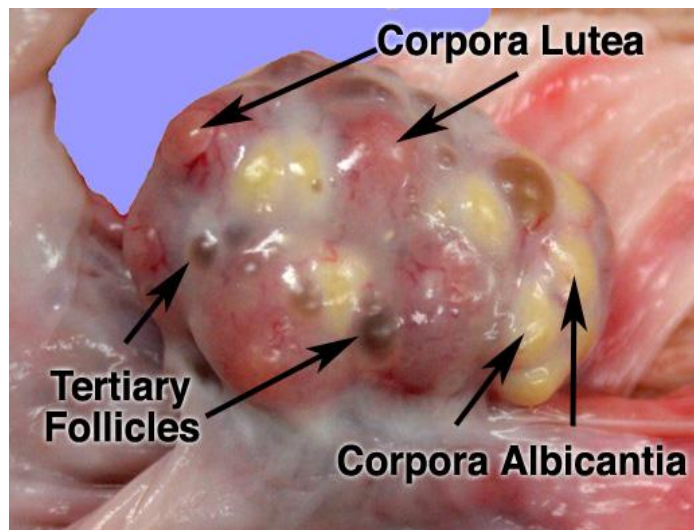
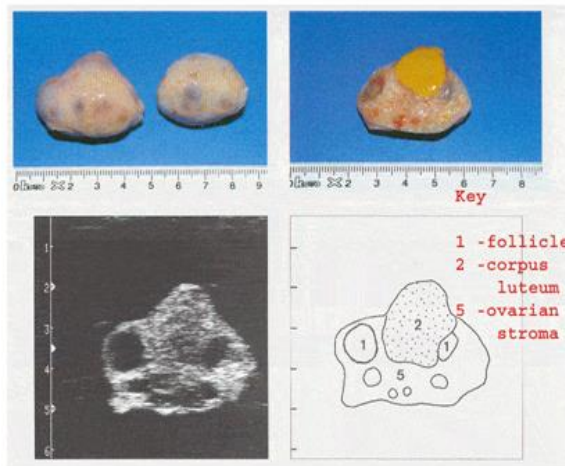


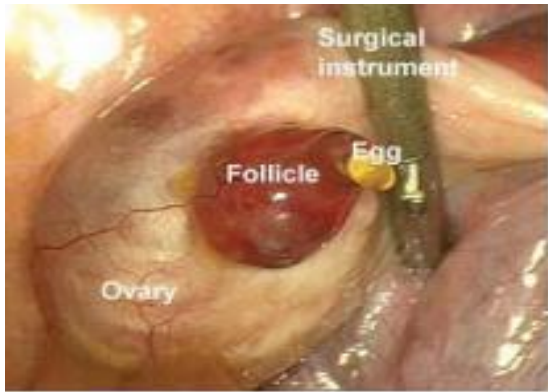


Female reproductive parameters in domestic animals

	Cow	mare	ewe	doe	sow	bitch	queen
Age of puberty (month)	10 – 12 breed difference	15 – 24 seasonal effect	7 - 10	6 - 8	5 - 8	6 - 12	5 - 12
Age of sex maturation	30	36	10	8(if born in early ears)	10	5 - 12	6 - 12
Type of estrous cycle	Poly estrous	Seasonal poly estrous	Seasonal poly estrous	Seasonal poly estrous	poly estrous	monestrous	polyestrous
Length of estrous cycle	21 day	22 day	17 days	21 days	21 days	15 -65 weeks	2 – 3 weeks (if no mated)
Duration of estrous	24 (hours)	4 -7 days	36 hours (24 -48)	18 – 36 hours	48-72 hours	9 -10 days	3 -6 days
Optimal breed time(hours after onset of estrous)	10 -16	48 -72	18 - 24	24 - 36	12 - 30	48 -96	During estrous
Time of ovulation	4 -16 after estrous	24 -48 hours before end of estrous	24 hours after onset estrous	12 – 36 hours after onset estrous	24 – 42 hours after onset estrous	1 -3 day after onset estrous	25 – 50 hours after coitus
Mechanism of ovulation	spontaneous	spontaneous	spontaneous	spontaneous	spontaneous	spontaneous	induced
Ovulation rate (number of ova)	1	1	1 -2	2 -3	10 -20	6 -8	4



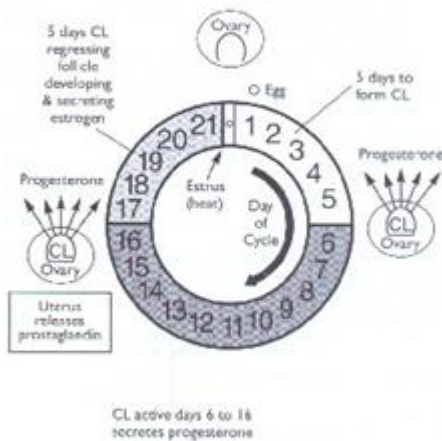




Estrous Cycle



- The ovarian changes during a typical 21-day estrous cycle in which pregnancy does not occur.
- The development and regression of the corpus luteum and of the follicles are continuous processes



This cycle of egg development in cattle is called the estrous cycle.

The cow is a non seasonal polyestrous species. Which means a cow can have multiple estrous cycles throughout the year.

Two prominent structures are present within the ovary, the follicle and corpora lutea.