

Animal Science 434

Reproductive Cycles in the Female

Terminology

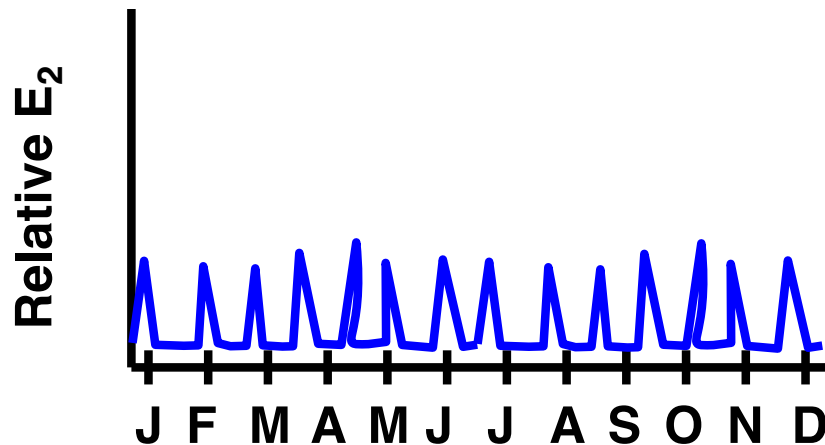
- **Estrus is a noun.**
 - **The cow is displaying estrus.**
- **Estrous is an adjective.**
 - **The length of the estrous cycle is 21 days.**
- **Oestrus and Oestrous**
 - **British and European spellings**
- **Estrus and Heat are synonymous**

Terminology (cont.)

- **Anestrus**
 - **When the female is not having repeated estrous cycles.**

Types of Cyclicity

Polyestrus



- Queen
- Cow
- Sow

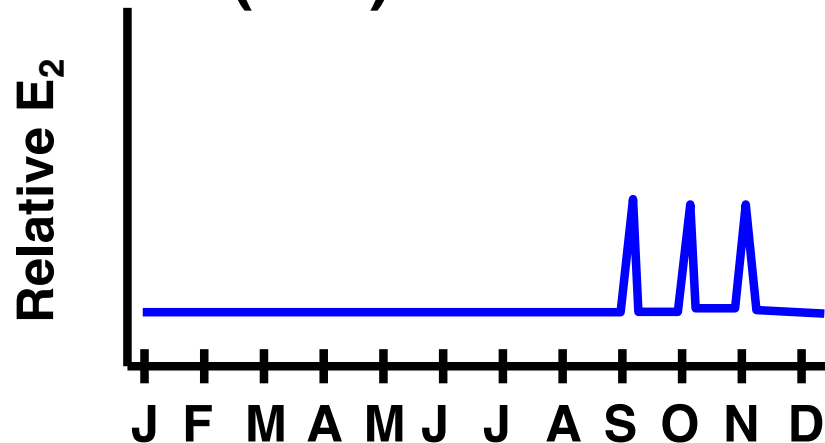
Types of Cyclicity



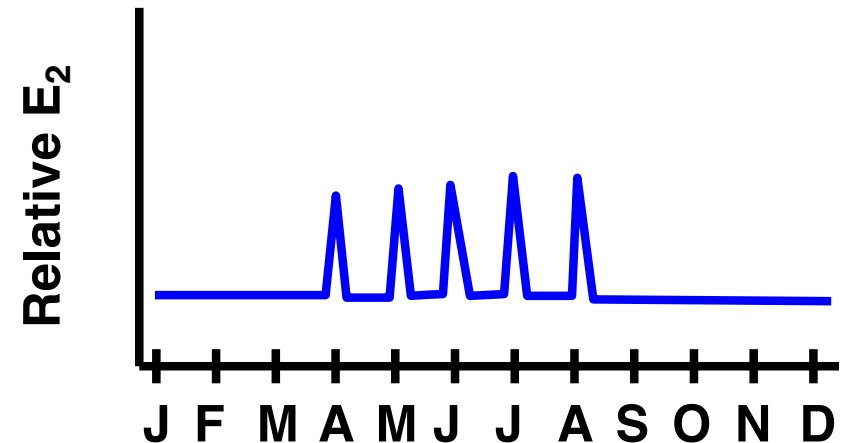
**Seasonally
Polyestrus**



**Short day breeders
(Fall)**



**Long day breeders
(Spring)**



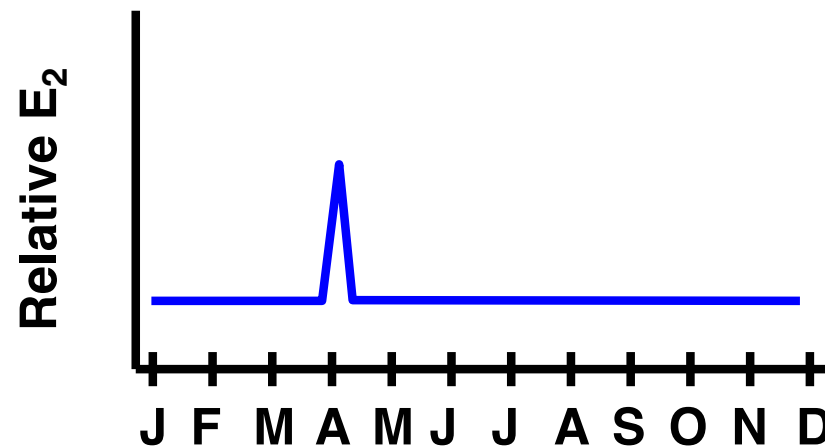
Type of Cyclicity

Monoestrus

Dog

Wolf

Bear



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

Average Reproductive Cycles

Species	Length of Estrous Cycle	Length of Estrus	Ovulation	Length of Pregnancy
Bitch	6 months	9 days	4 - 24 days after start of estrus	63 days
Queen	17 days	9 days	Induced	63 days

Quiz 9a

What type of cycle do the following species have and how long are they?

Cow -

Mare -

Canine (Bitch) -



Quiz 9a

What type of cycle do the following species have and how long are they?

Cow – **polyestrus, 21 days**

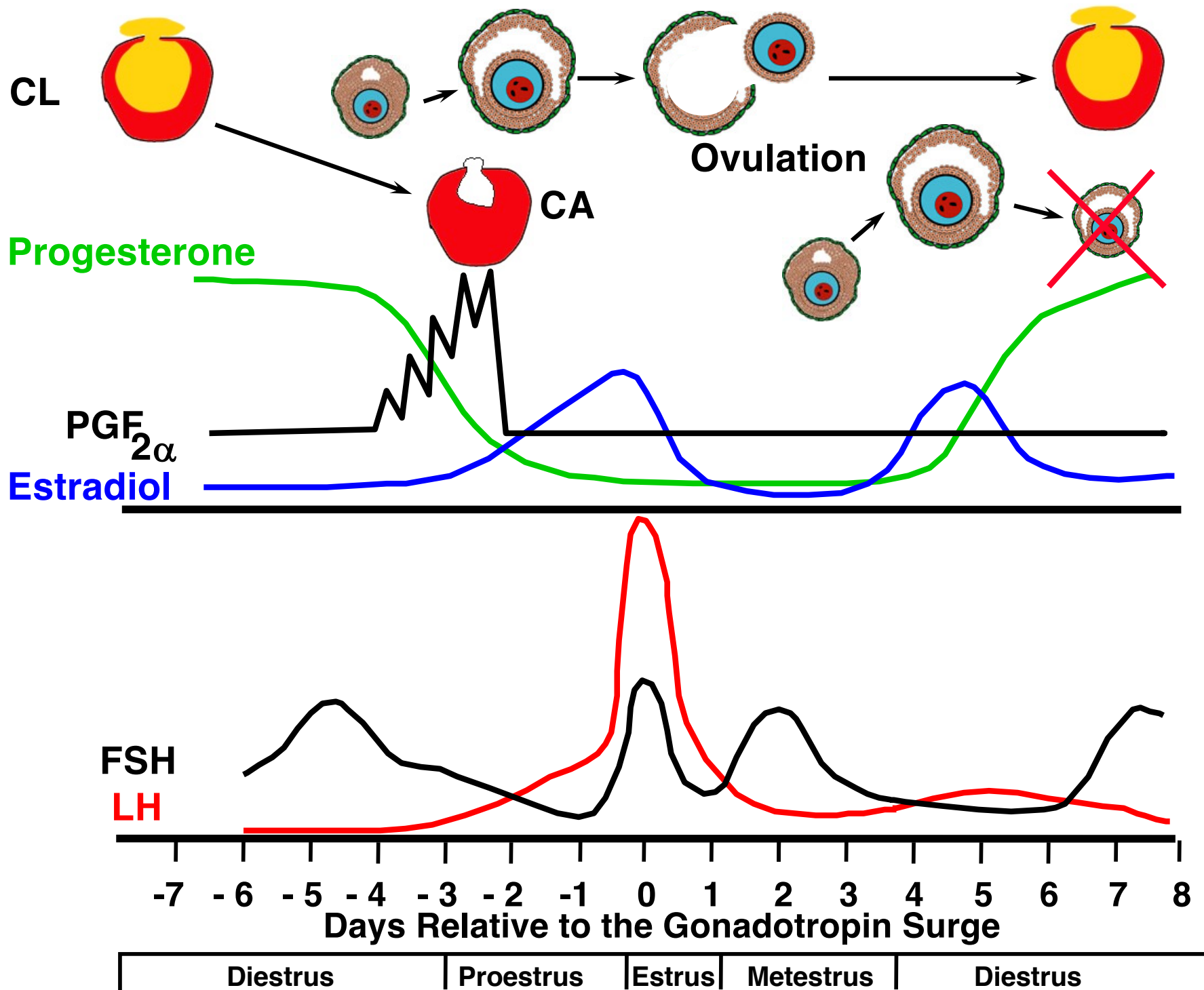
Mare – **seasonal polyestrus, 21 days**

Canine (Bitch) – **monoestrus, 6 months**



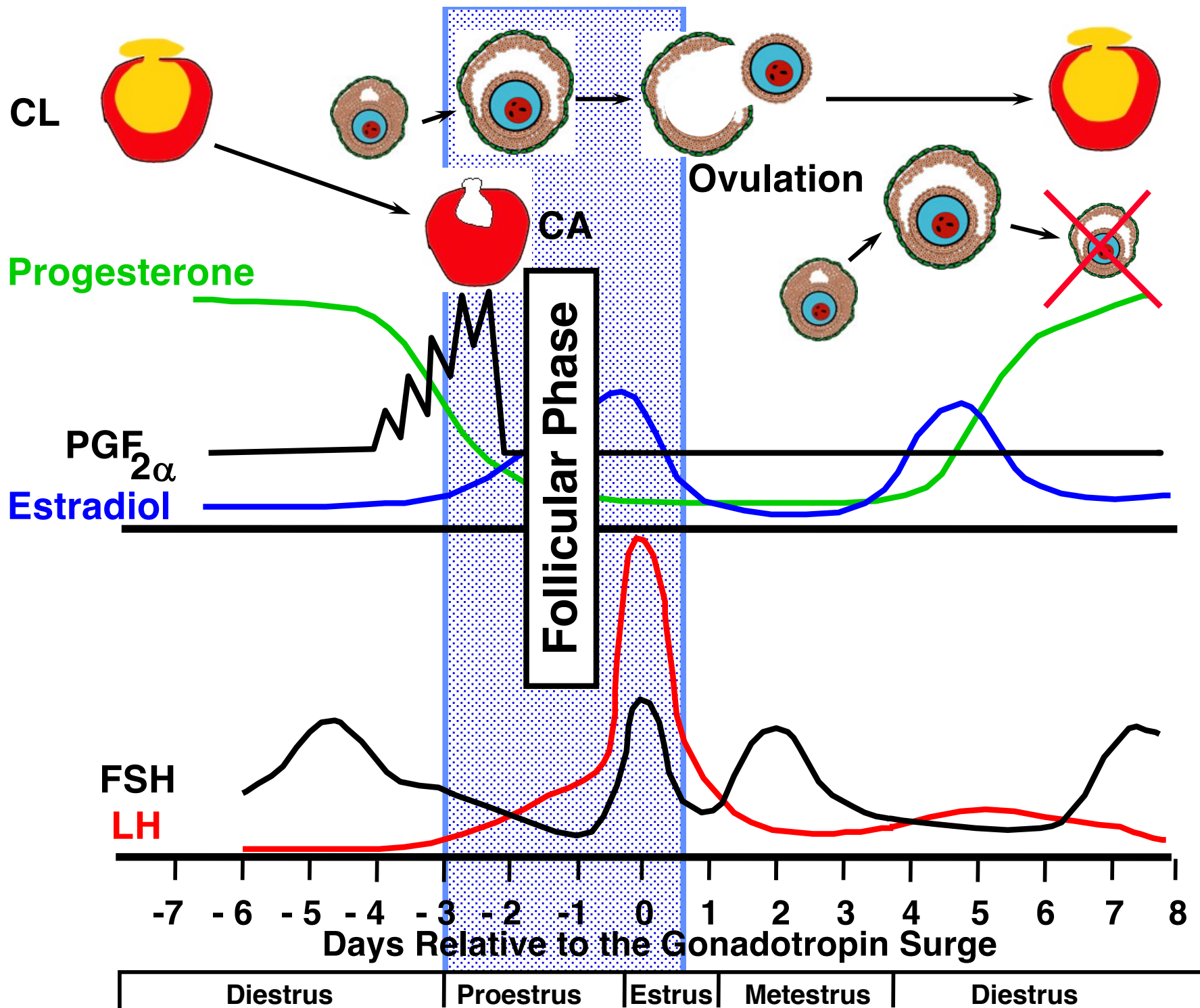
Variation in Cycle Types

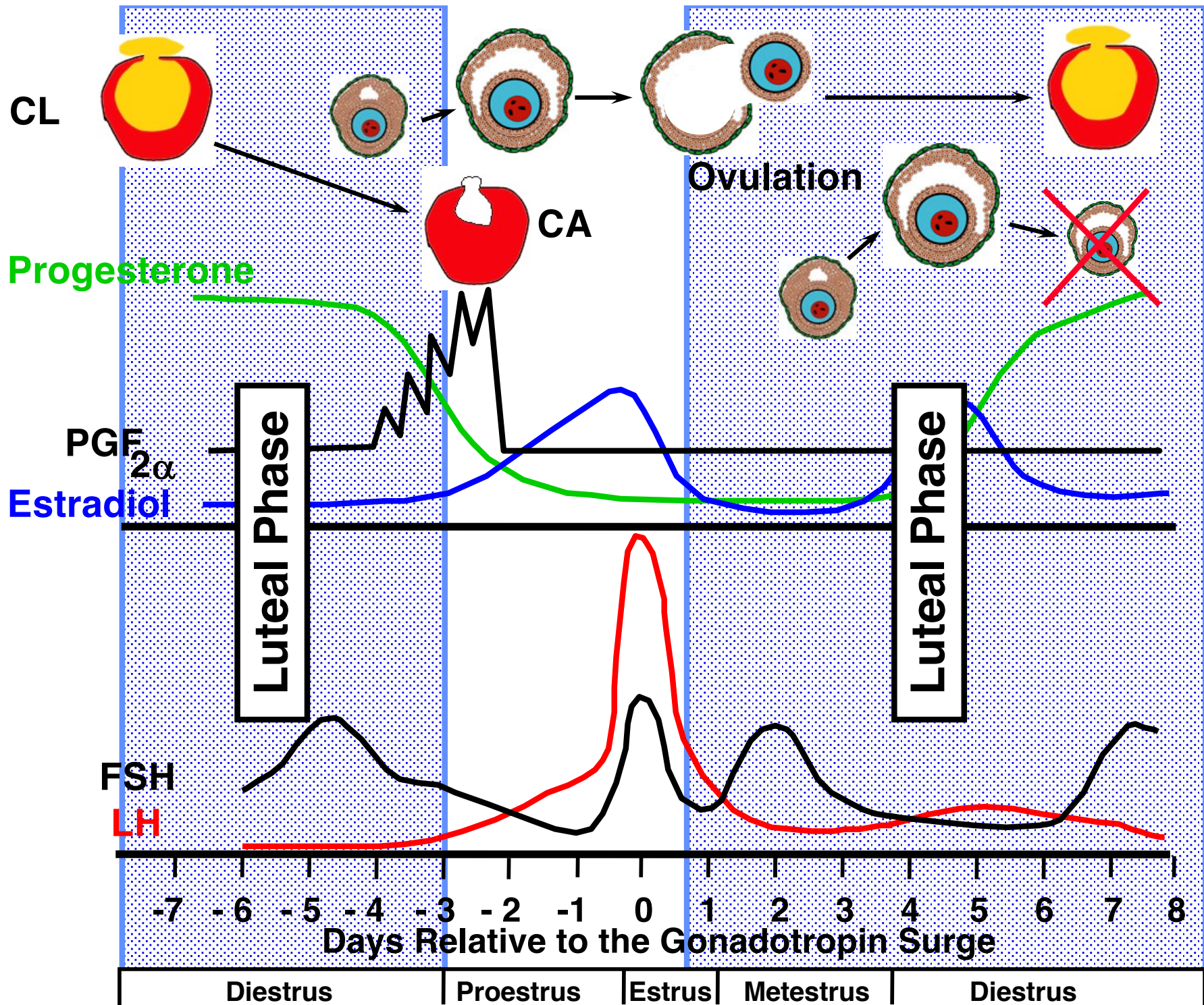
Example	Type of Cycle	Follicular Development	Ovulation & CL Formation	CL Function
Cow, ewe, sow, mare	Long	Spontaneous	Spontaneous	Spontaneous
rats, mice, hamsters	Short (4 days)	Spontaneous	Spontaneous	Induced (prolactin)
rabbit, cat, mink, ferret, otter, alpaca	Induced	Spontaneous	Induced (LH surge)	Induced



Phases of the Estrous Cycle

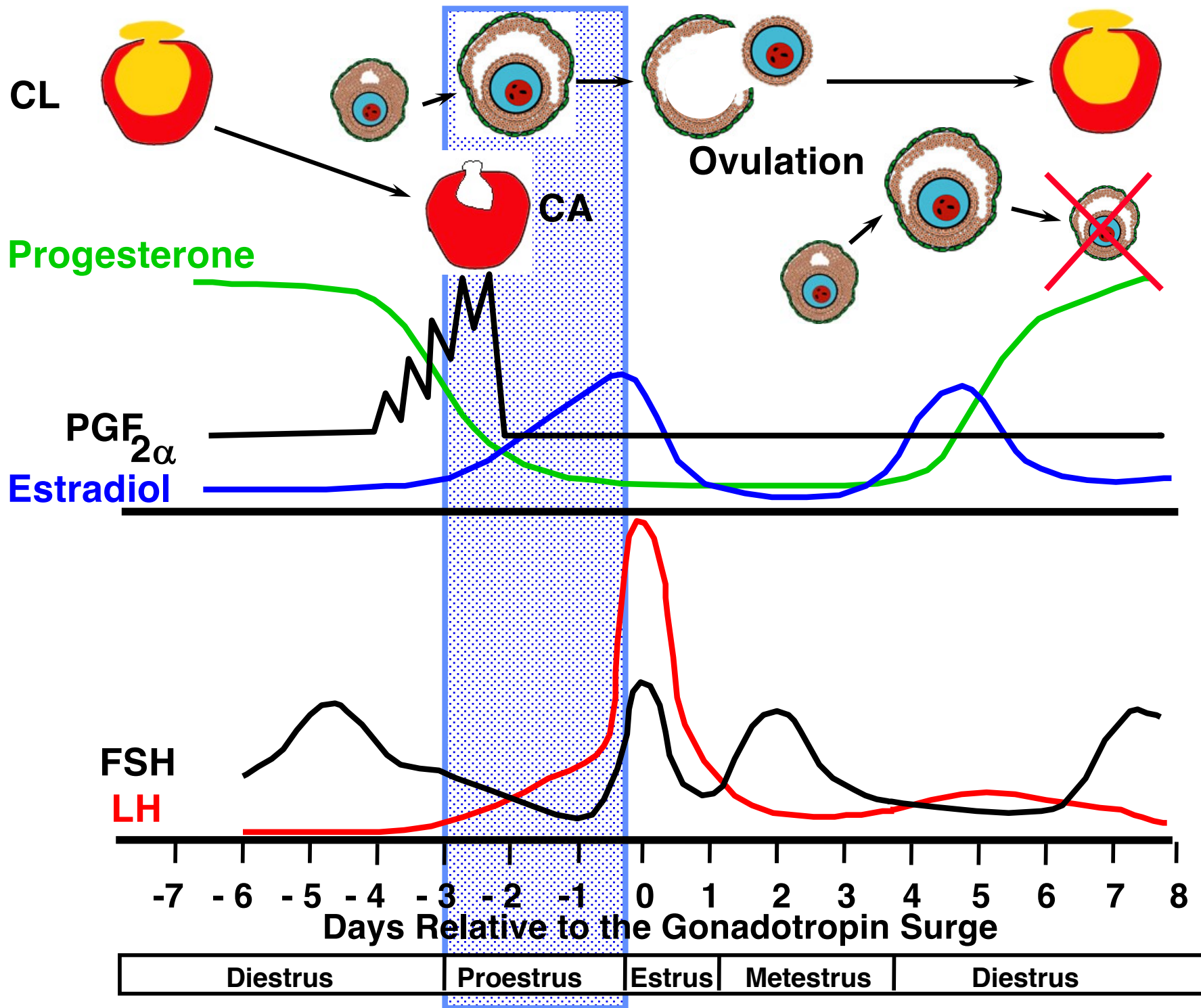
- **Follicular Phase**
- **Luteal Phase**

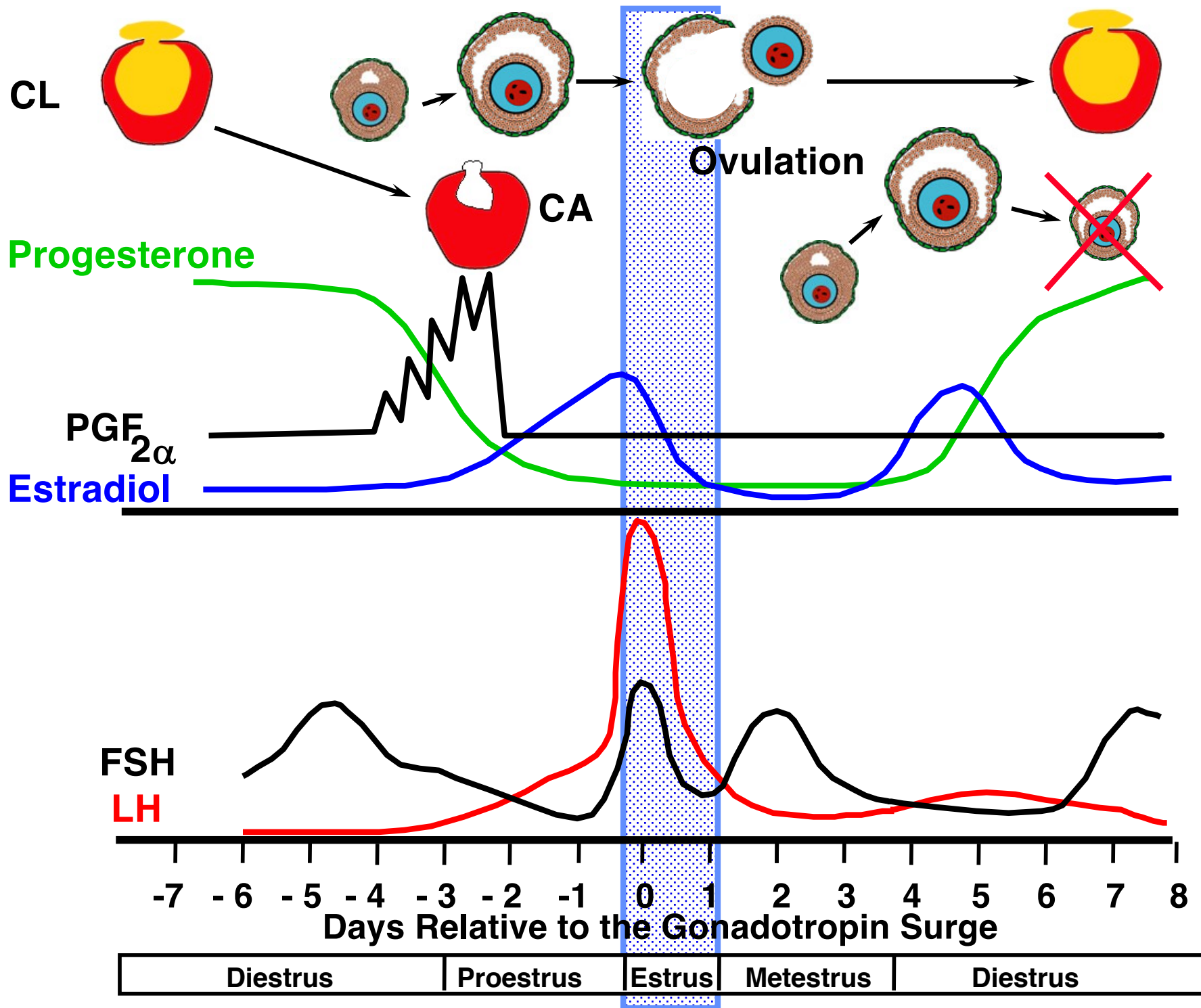


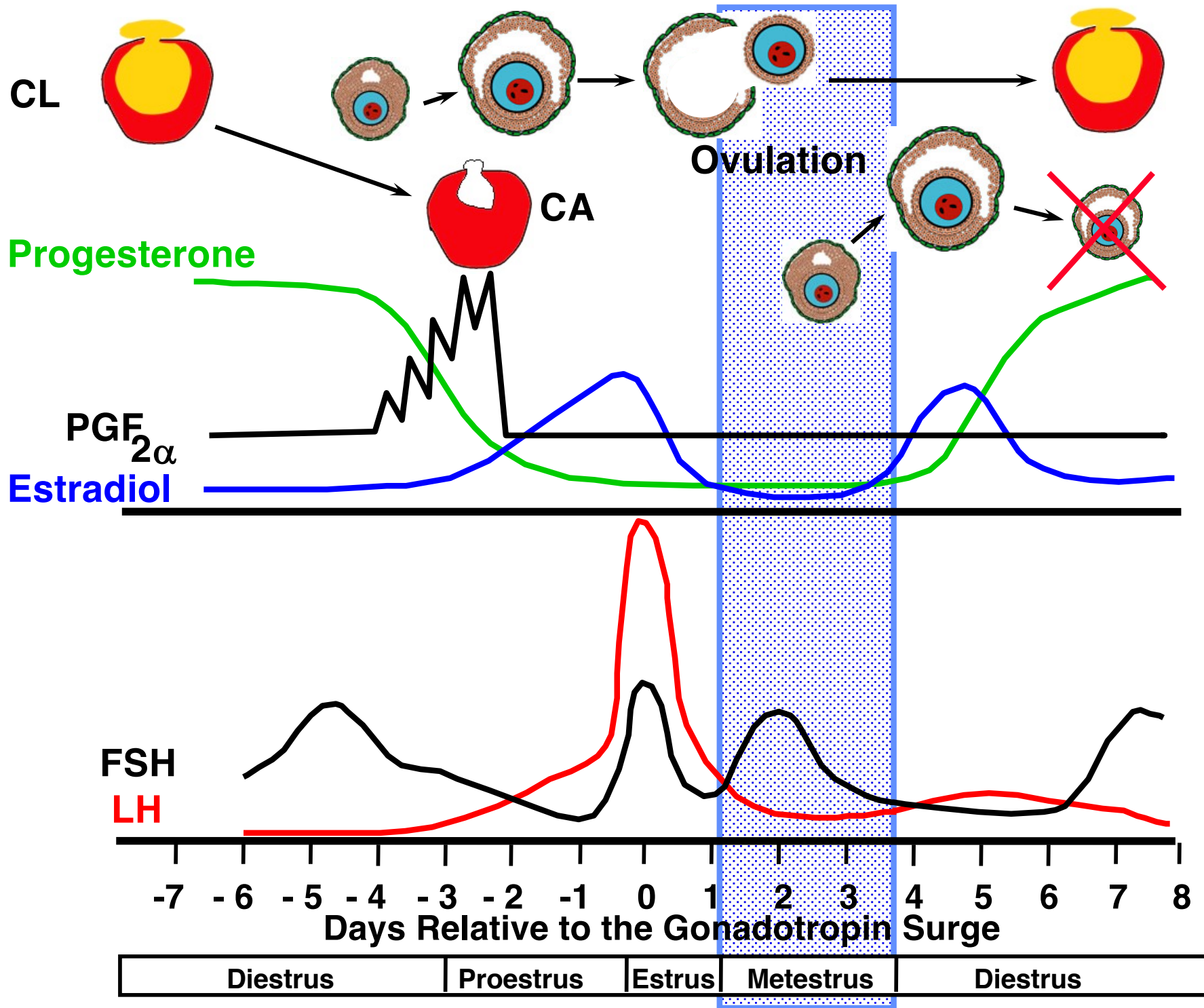


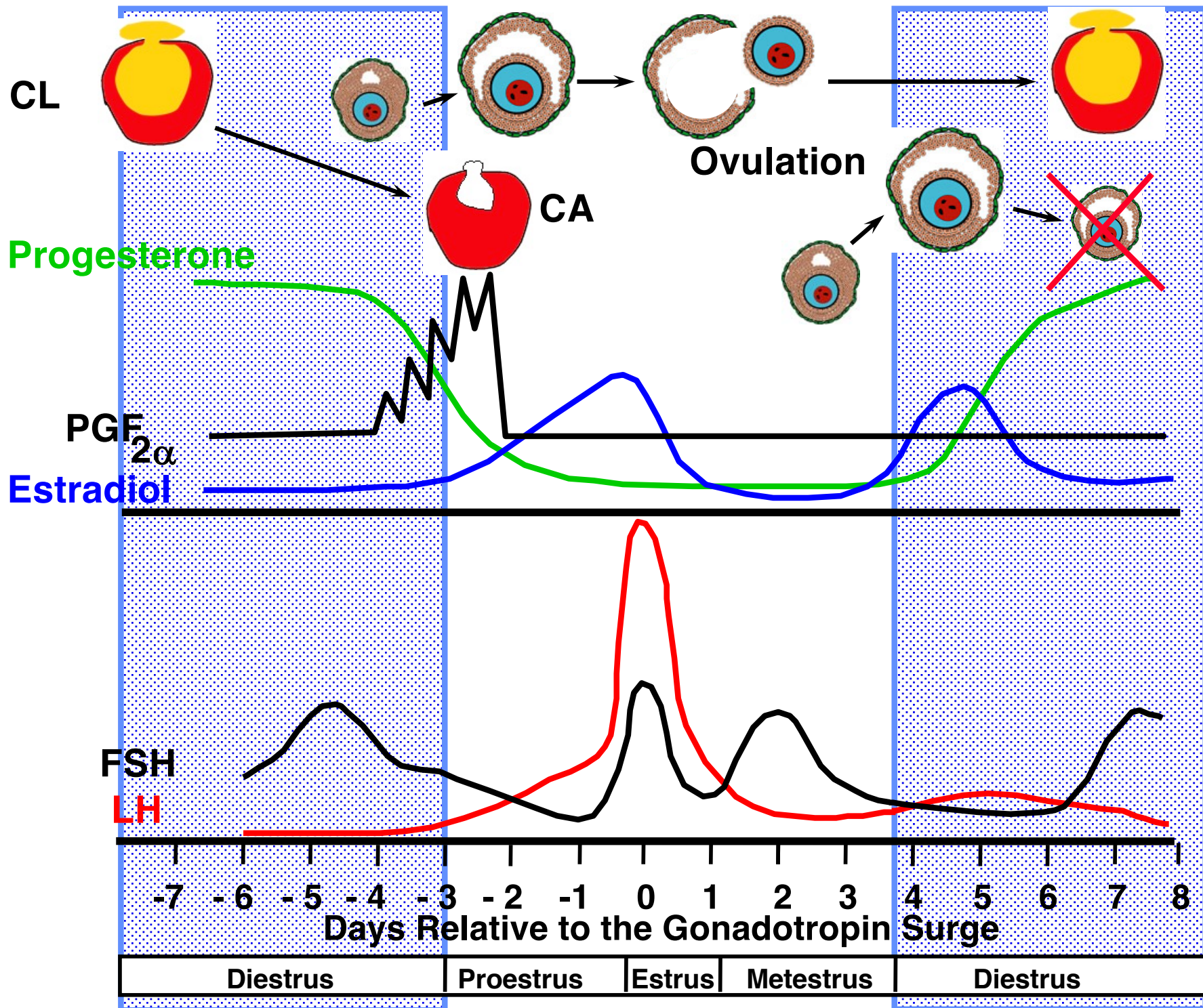
Stages of the Estrous Cycle

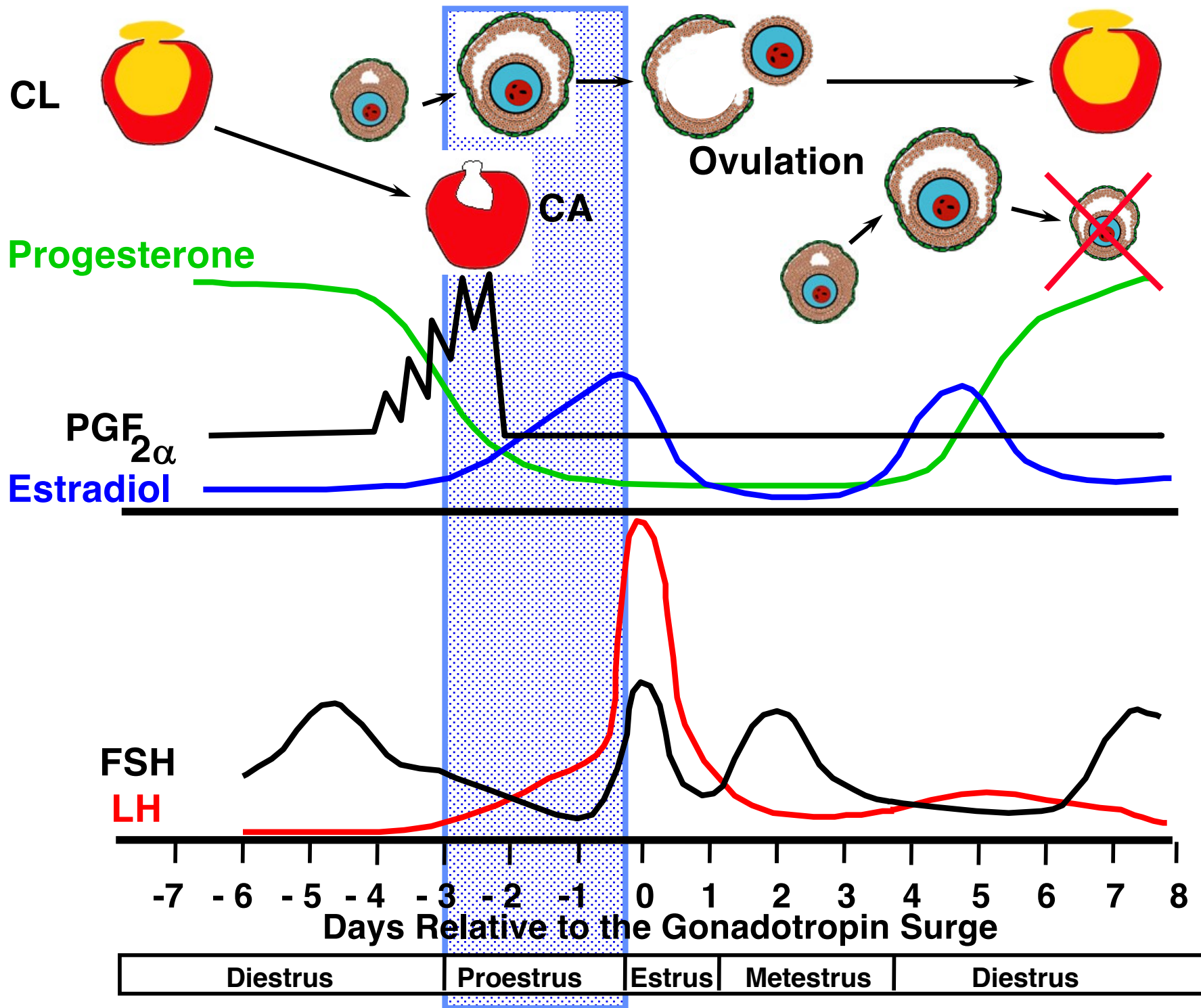
- **Proestrus**
- **Estrus**
- **Metestrus**
- **Diestrus**





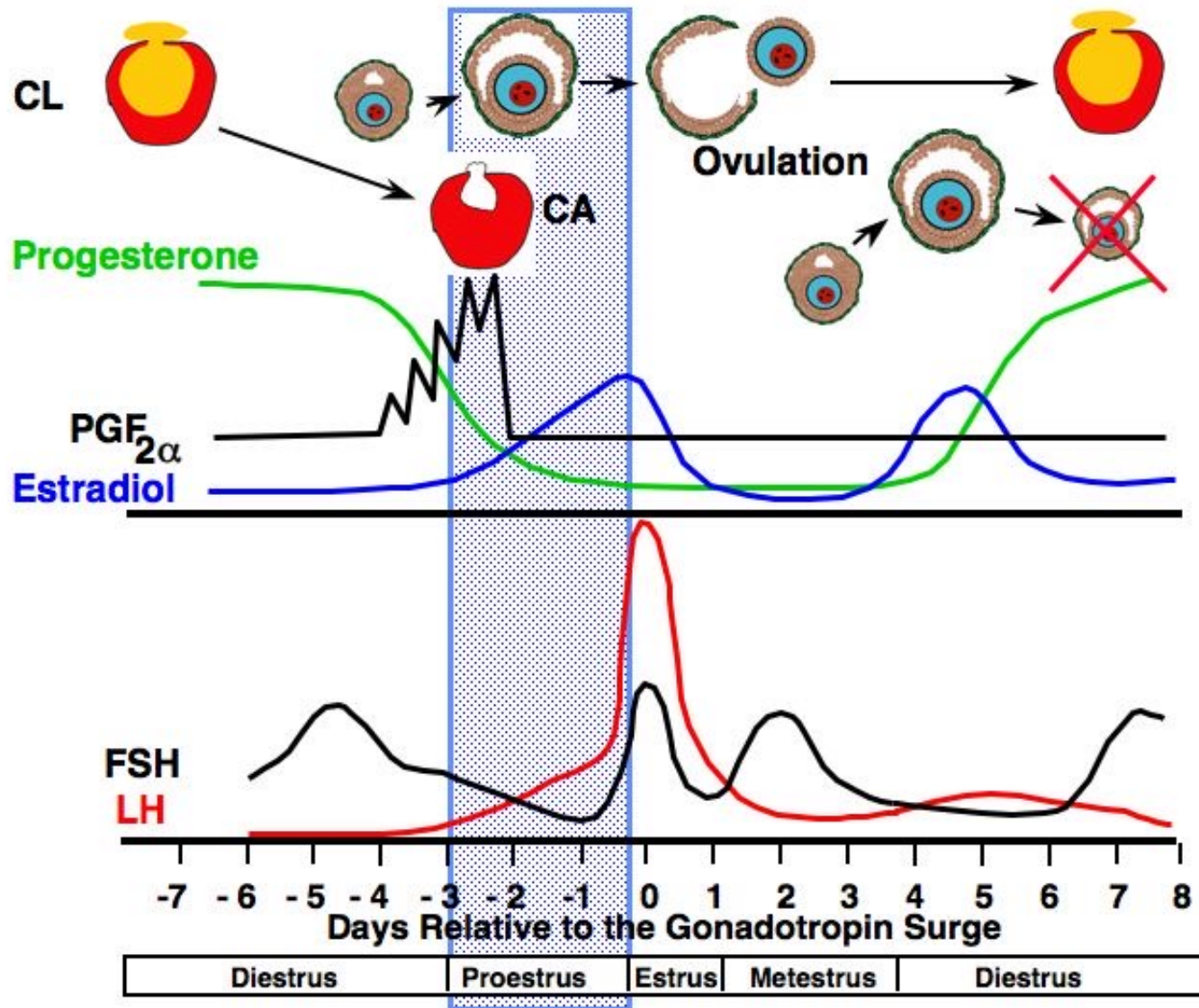




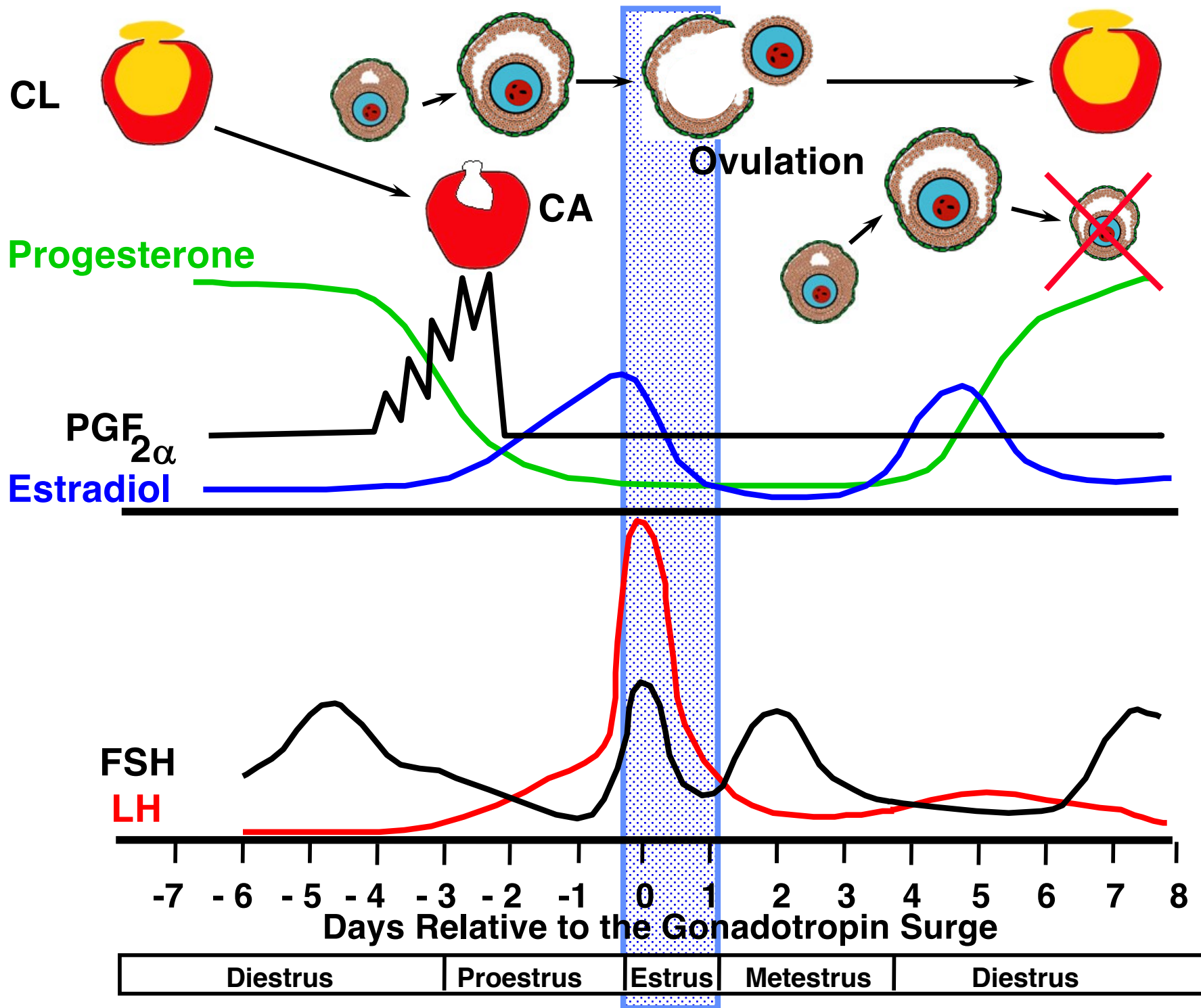


Follicular Phase

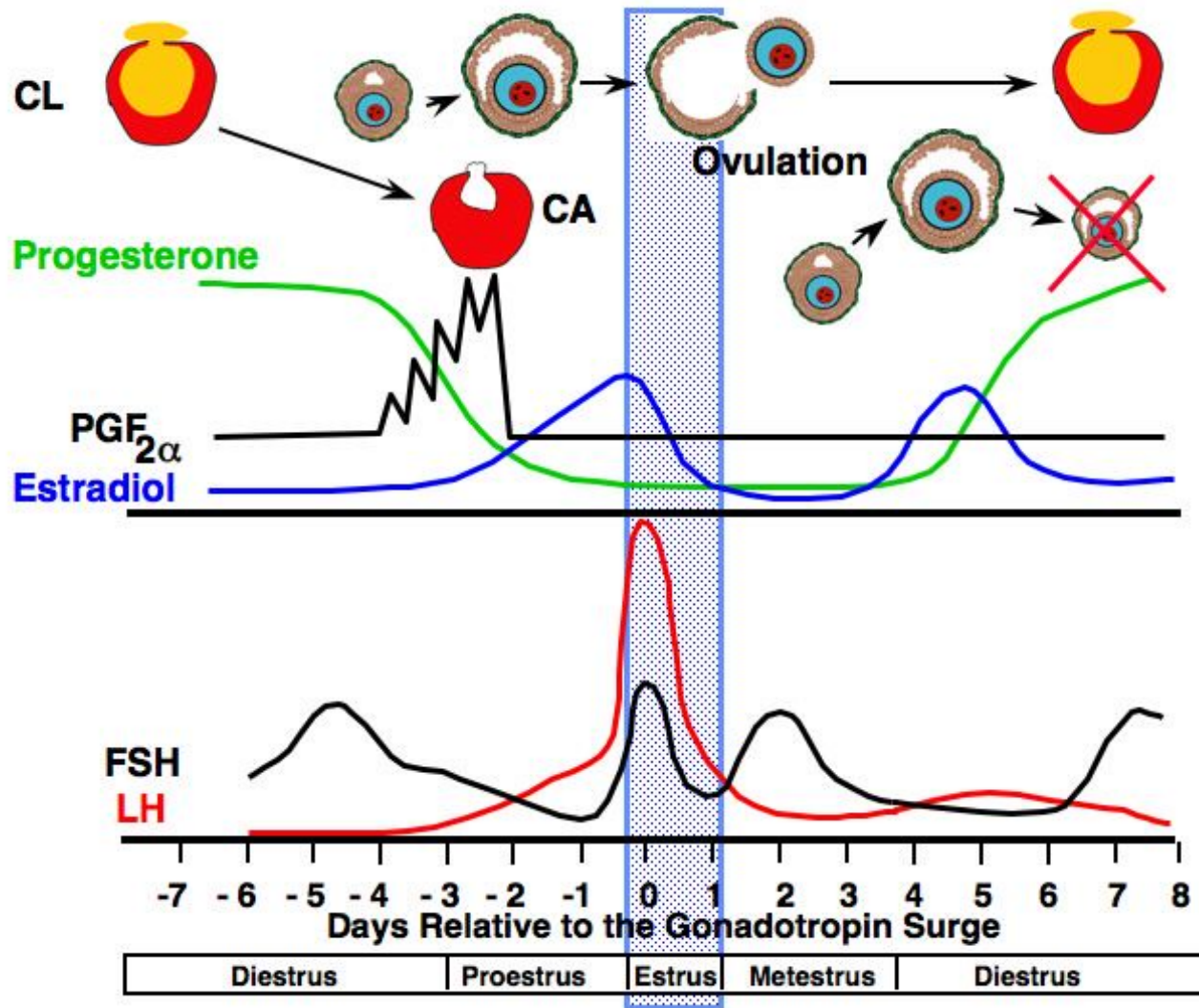
Proestrus



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

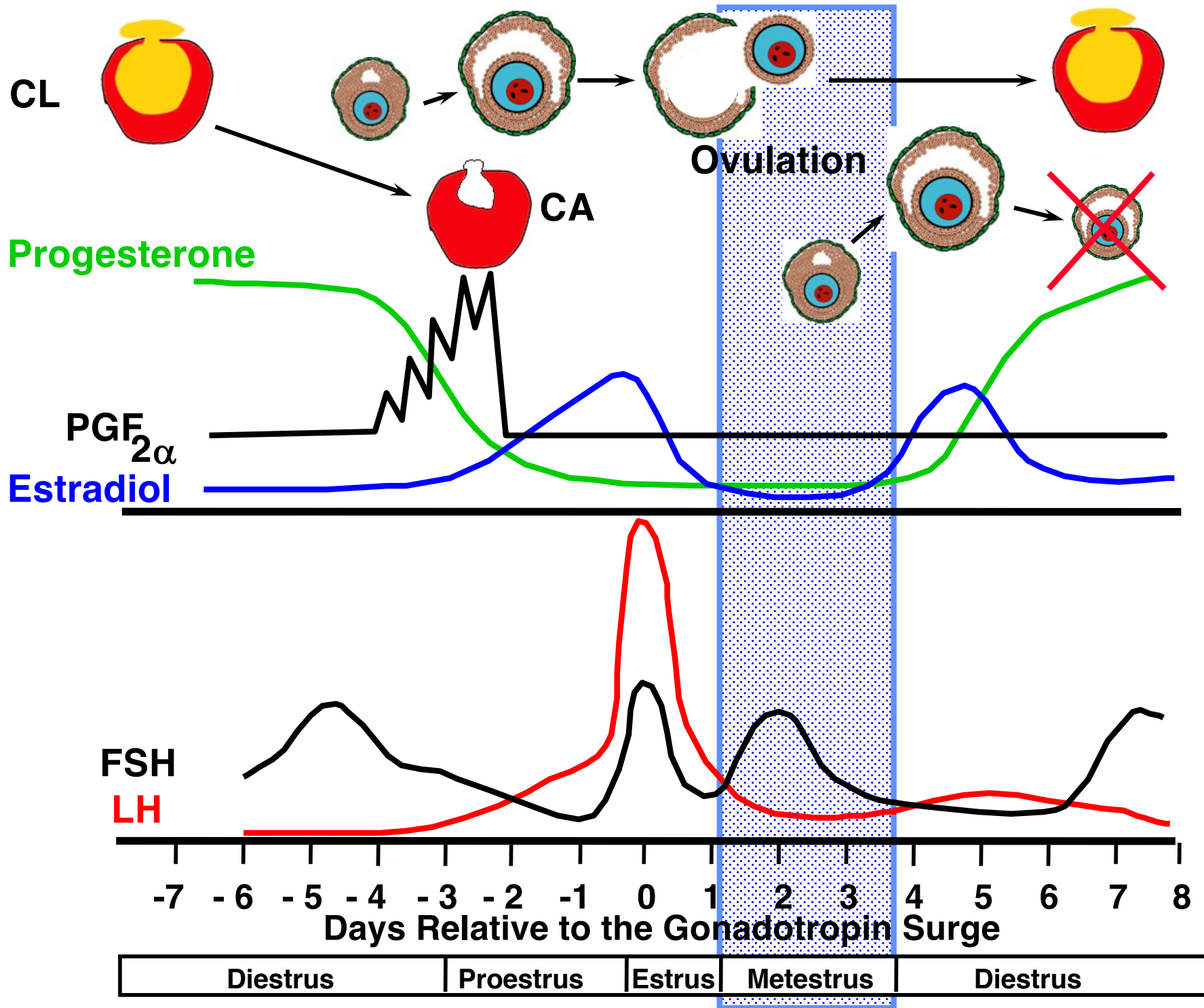


Follicular Phase



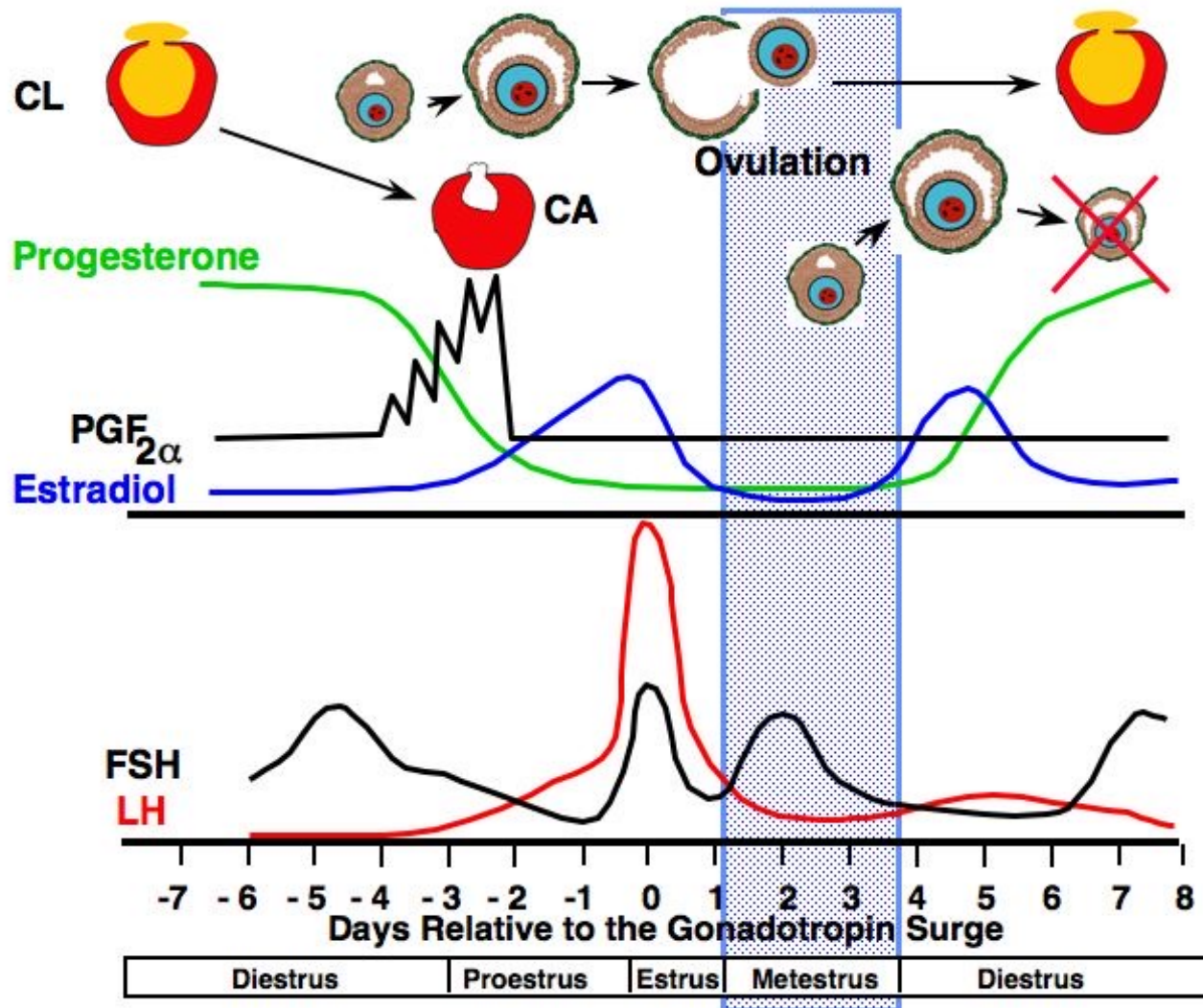
Estrus

- 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
- cervical mucus volume increases



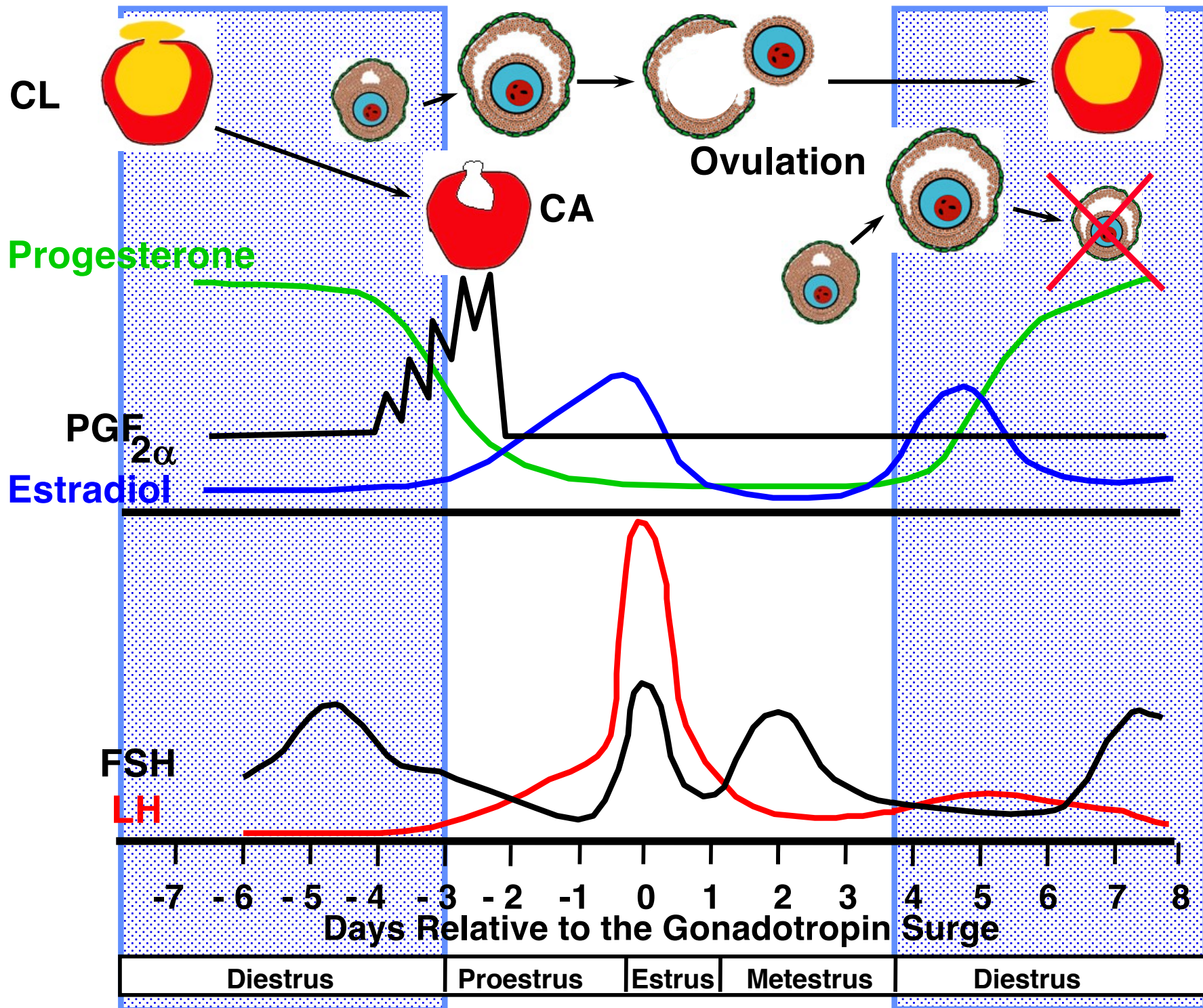
Luteal Phase

Luteal Phase



Metestrus

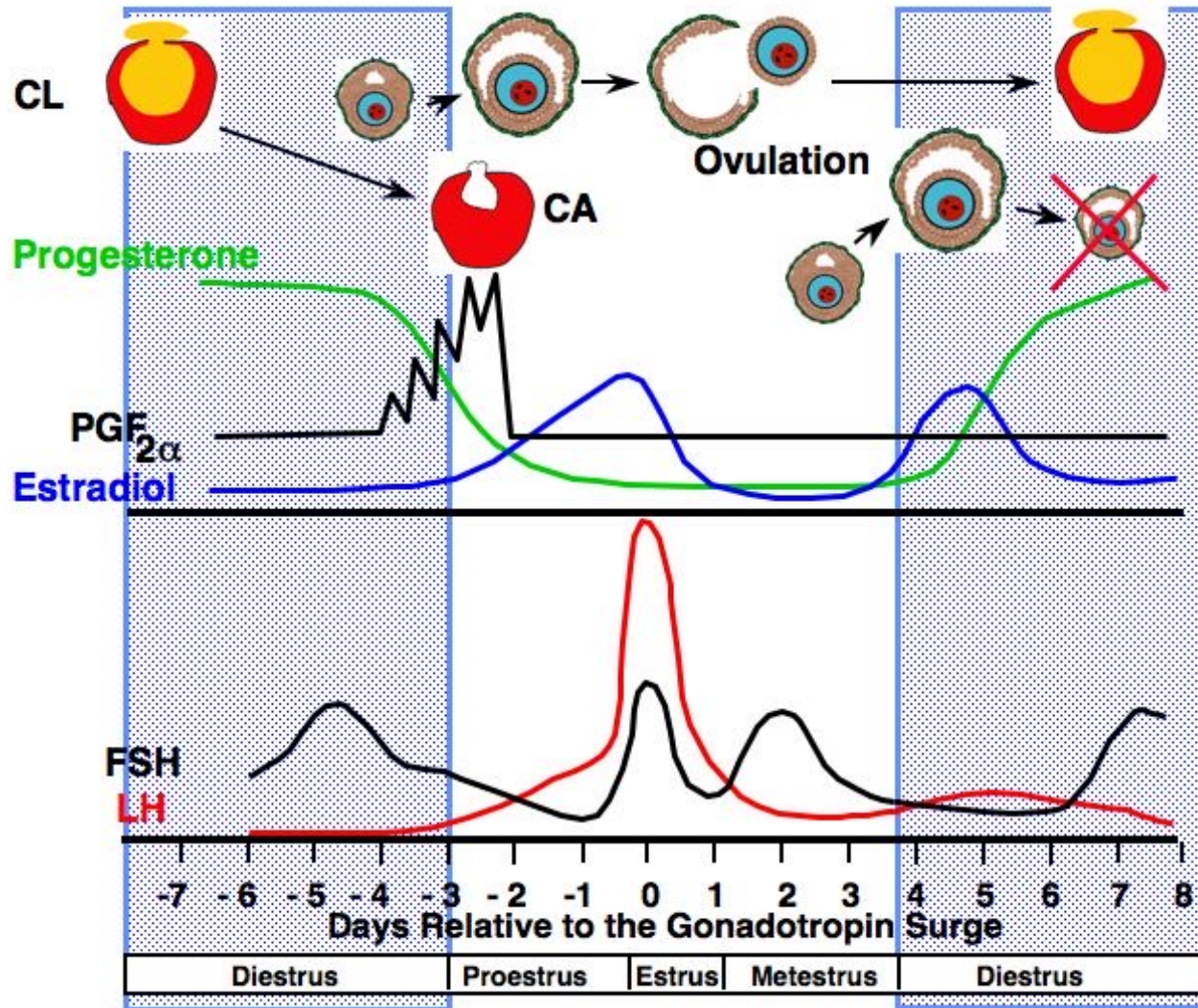
- estrogen low
- ovulation in cow
- corpus hemorrhagicum present
- uterus
 - contractions subside
 - endometrial glands continue to grow and become coiled
 - in cattle bleeding occurs
- FSH increases
 - triggering growth of follicles



Luteal Phase

Luteal Phase

Diestrus



- progesterone high
- FSH
 - Increases at some point to cause growth of ovulatory follicle
- Uterus
 - Endo-gland 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

Quiz 9b

Which stage of the estrous cycle is characterized by:

- **Preovulatory follicle enlarges**
- **estrogen increases**
- **vascularity of the female reproductive tract increases**
- **endometrial glands begin to grow**
- **estrogen levels peak**

Answer:

- a) Proestrus**
- b) Estrus**
- c) Metestrus**
- d) Diestrus**



Quiz 9b

Which stage of the estrous cycle is characterized by:

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

Answer:

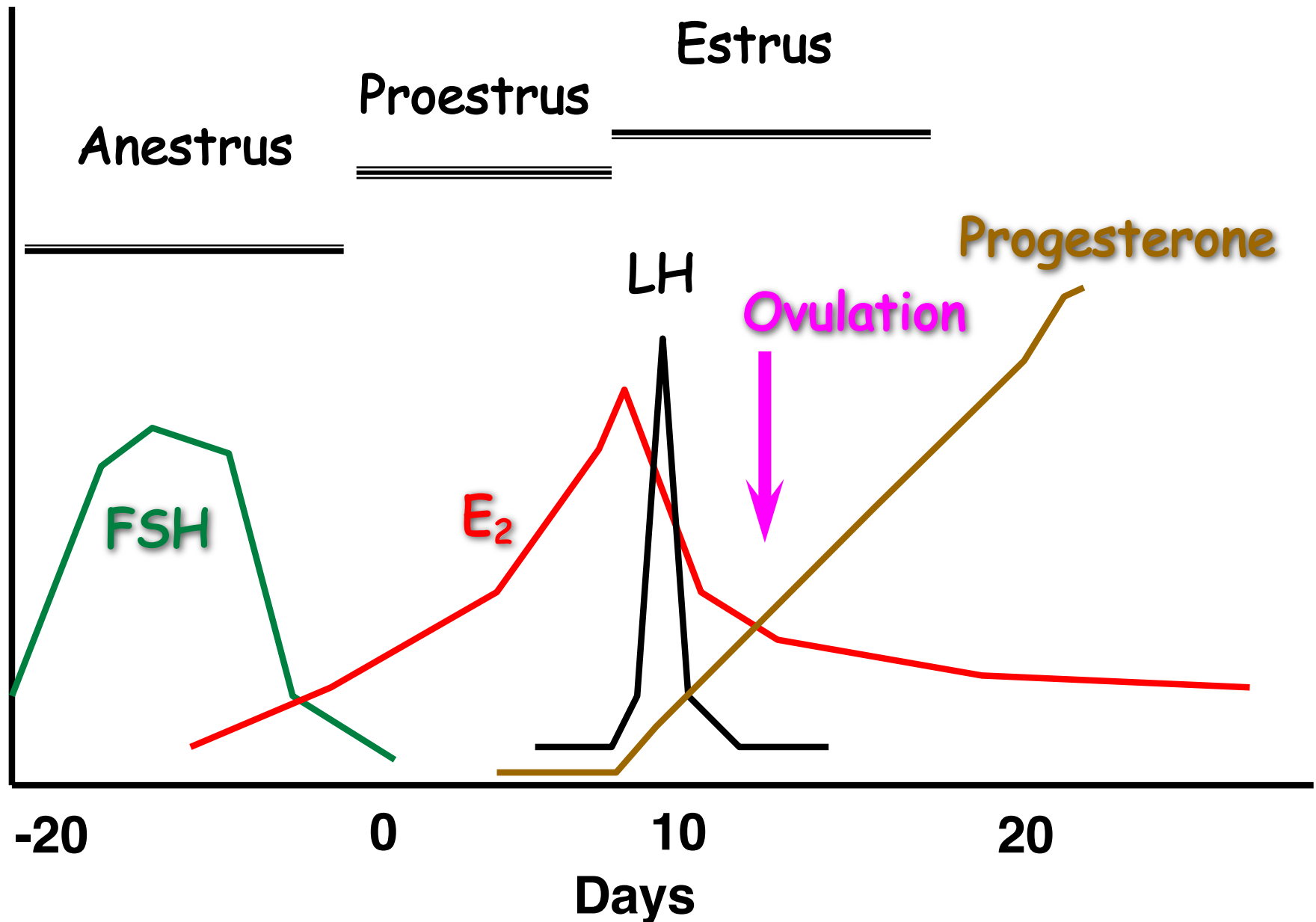
- a) **Proestrus**
- b) Estrus
- c) Metestrus
- d) Diestrus

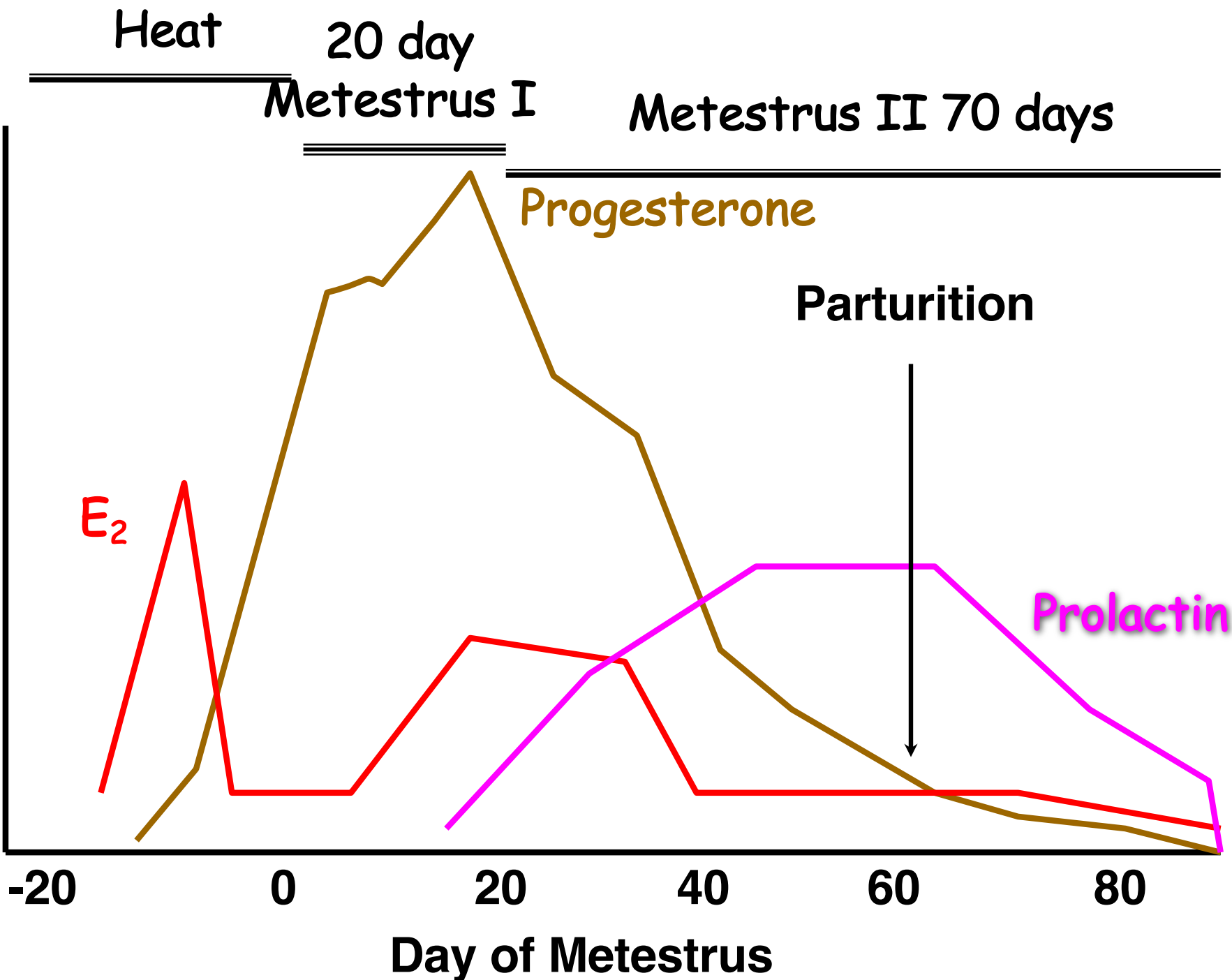


Characteristics of Estrous Cycles

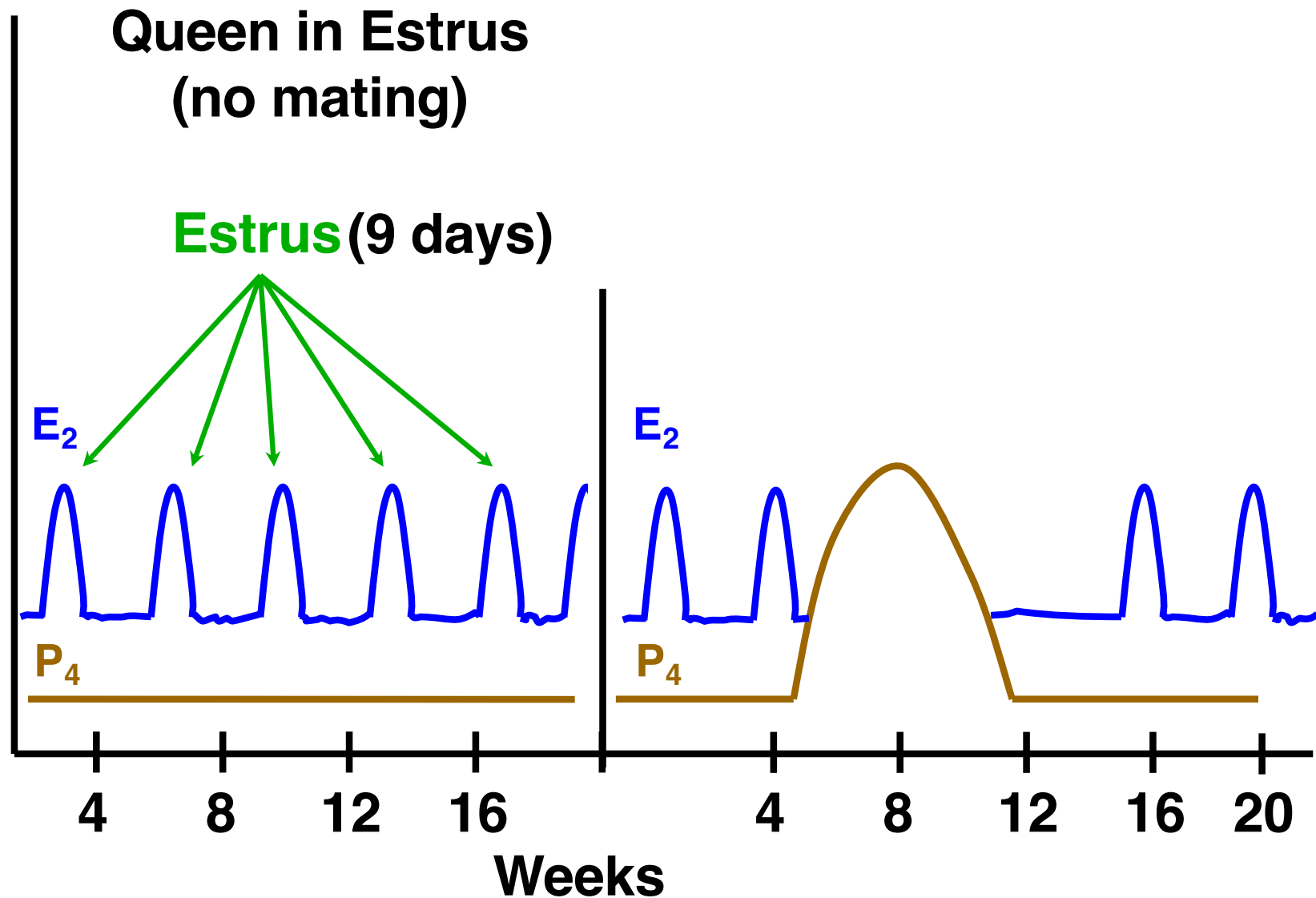
	Cow	Ewe	Sow	Mare
Estrous cycle (days)	21	17	21	21
Proestrus (days)	3-4	2-3	3-4	2-3
Estrus	12-18 hr	24-36 hr	48-72 hr	4-8 days
Metestrus (days)	3-4	2-3	2-3	2-3
Diestrus (days)	10-14	10-12	11-13	10-12

Hormonal Changes in the Bitch

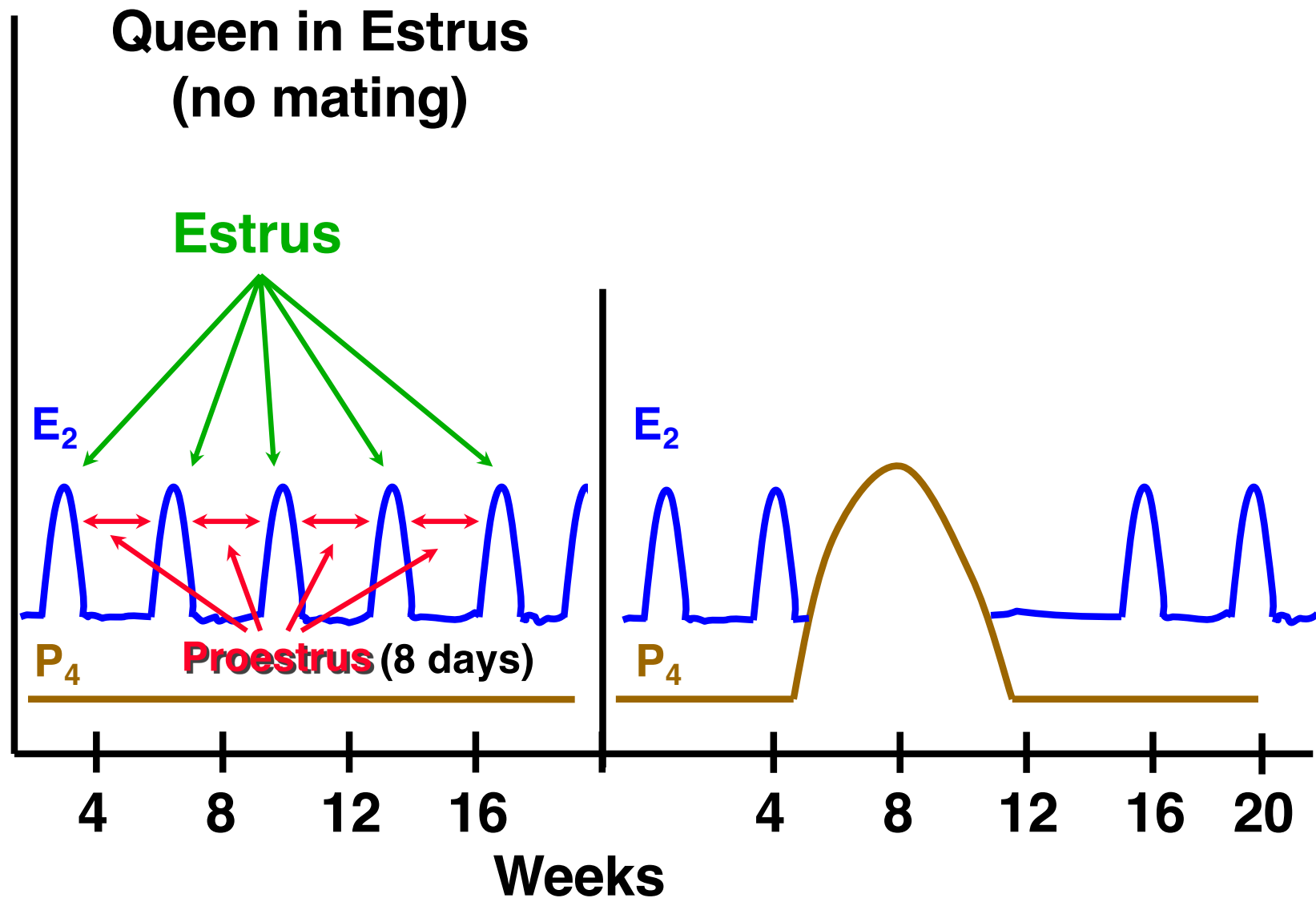




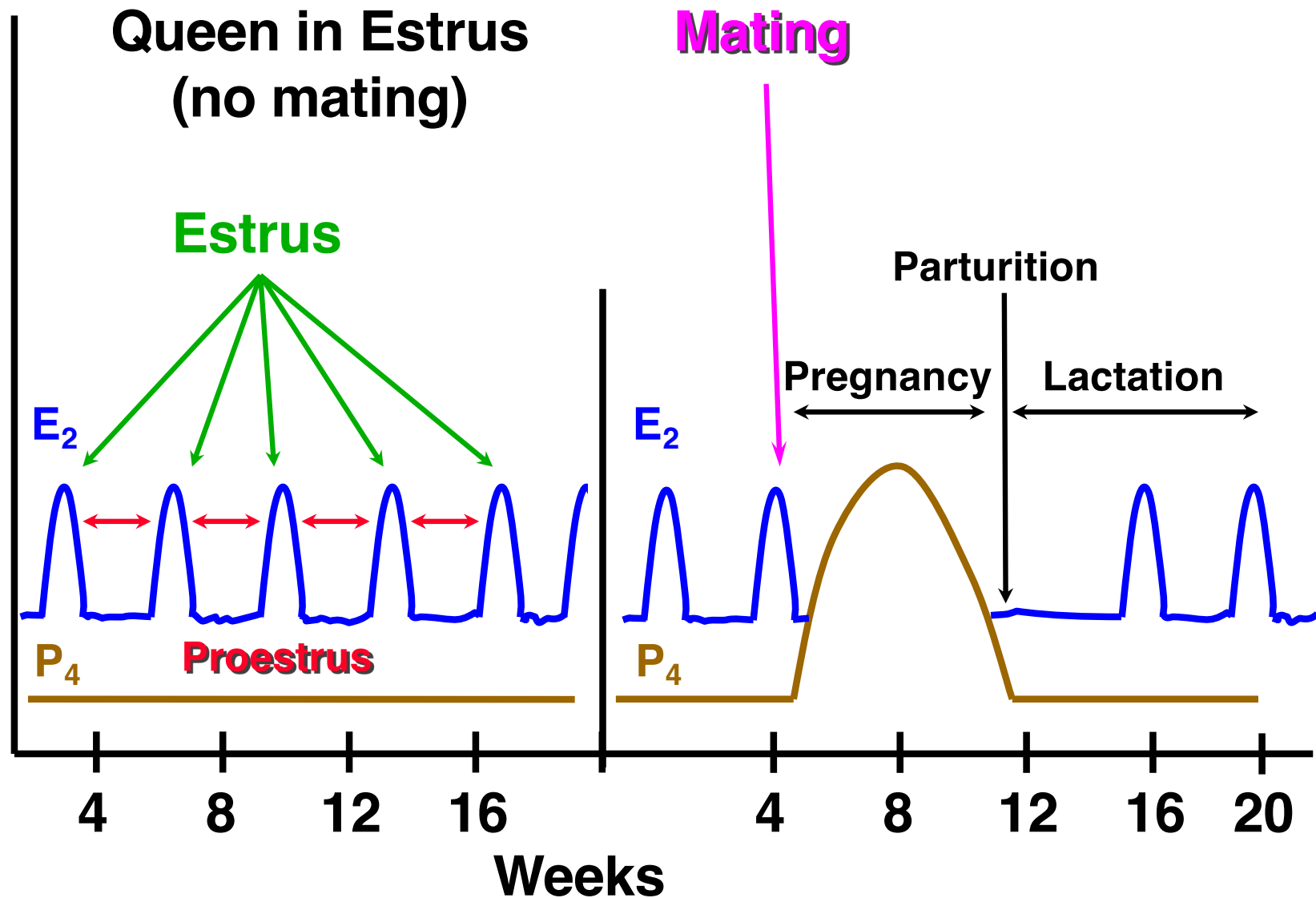
Hormonal Changes in the Queen

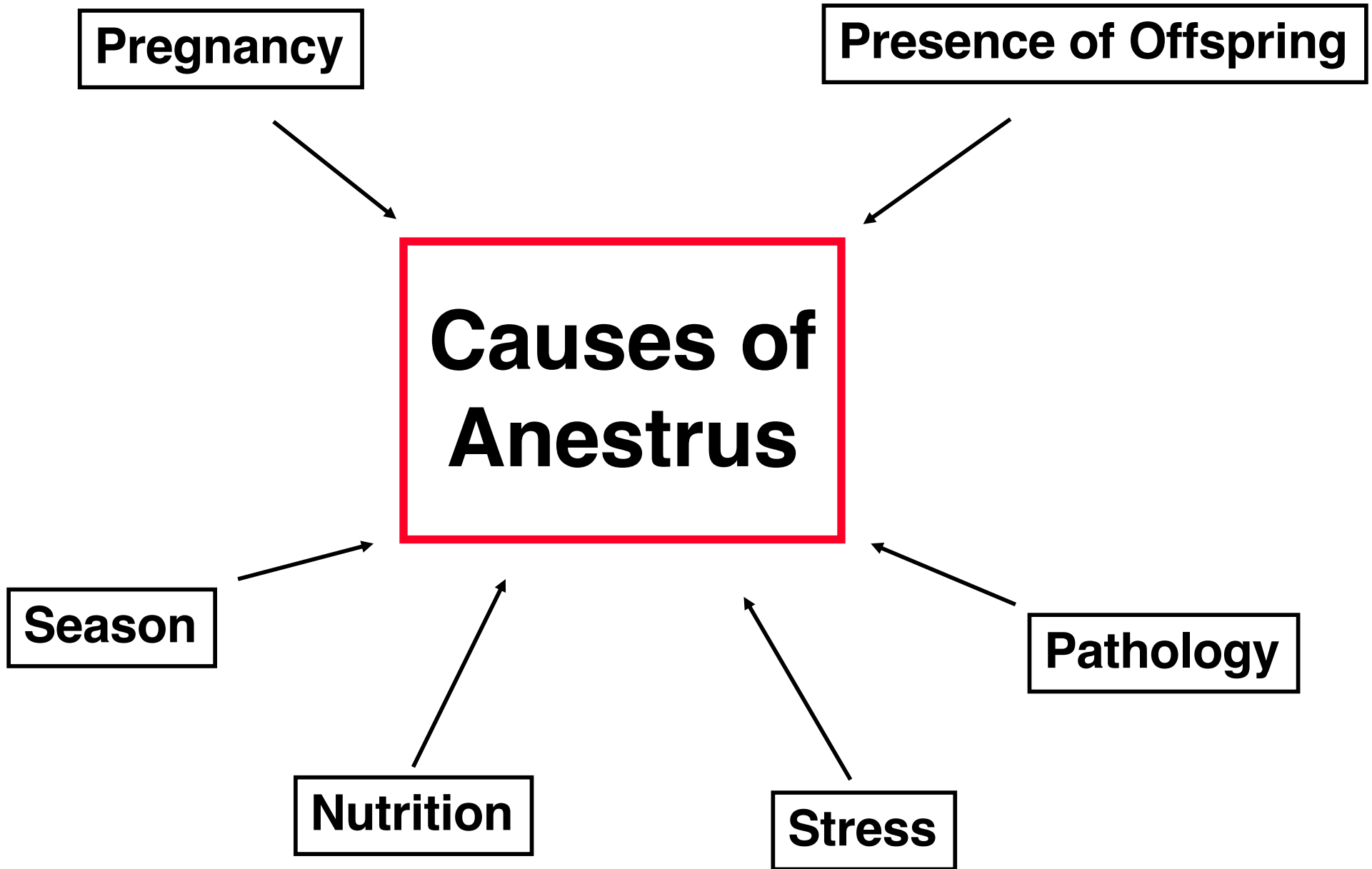


Hormonal Changes in the Queen



Hormonal Changes in the Queen





Gestational Anestrus



Gestational Anestrus

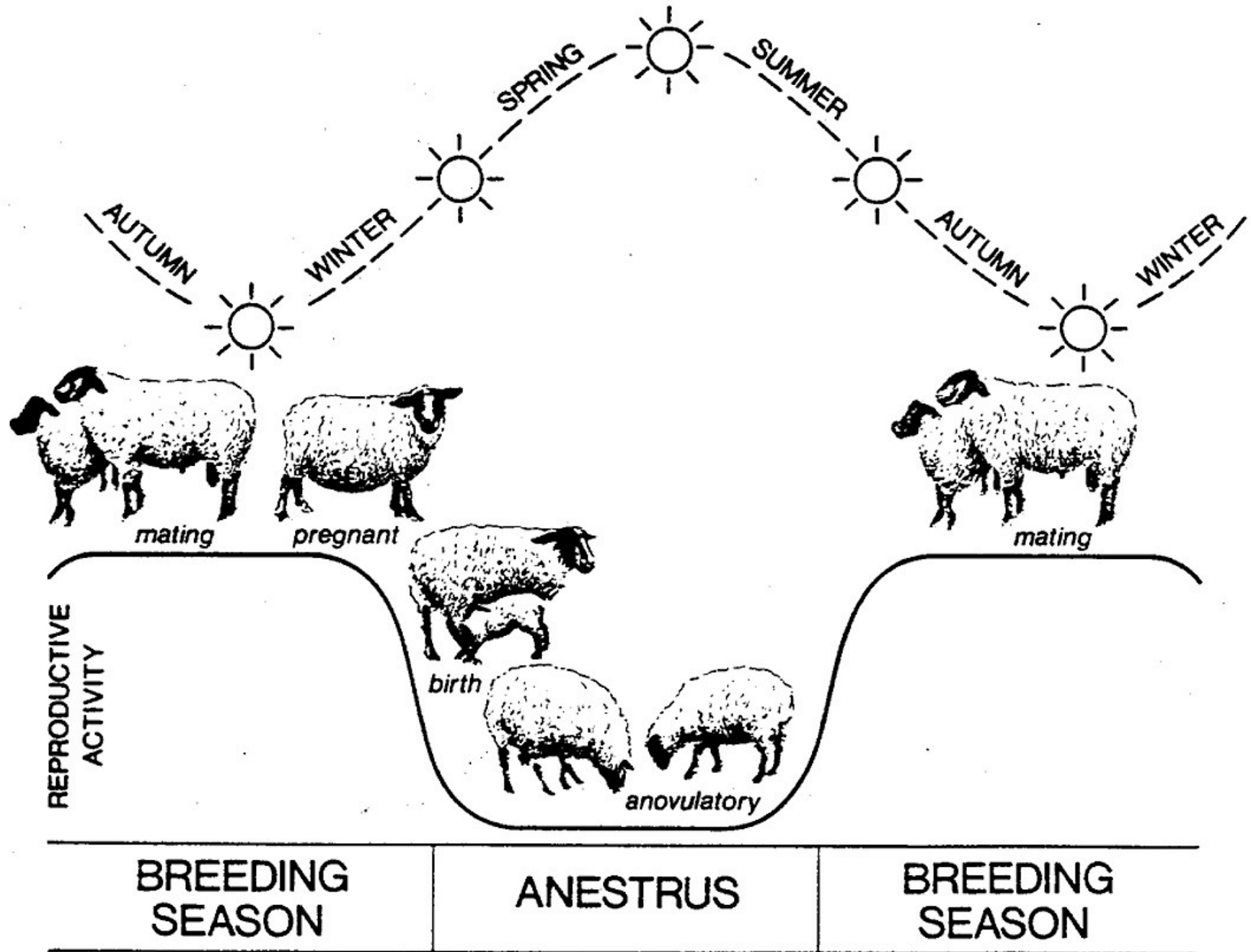
- **Progesterone during pregnancy**
 - **negative feedback**
- **After parturition anestrus continues**
 - **progesterone exposure during pregnancy**
 - **hypothalamus**
 - **Lacks estradiol positive feedback**
- **allows time for uterine involution**

Seasonal Anestrus



Horses are long day breeders!

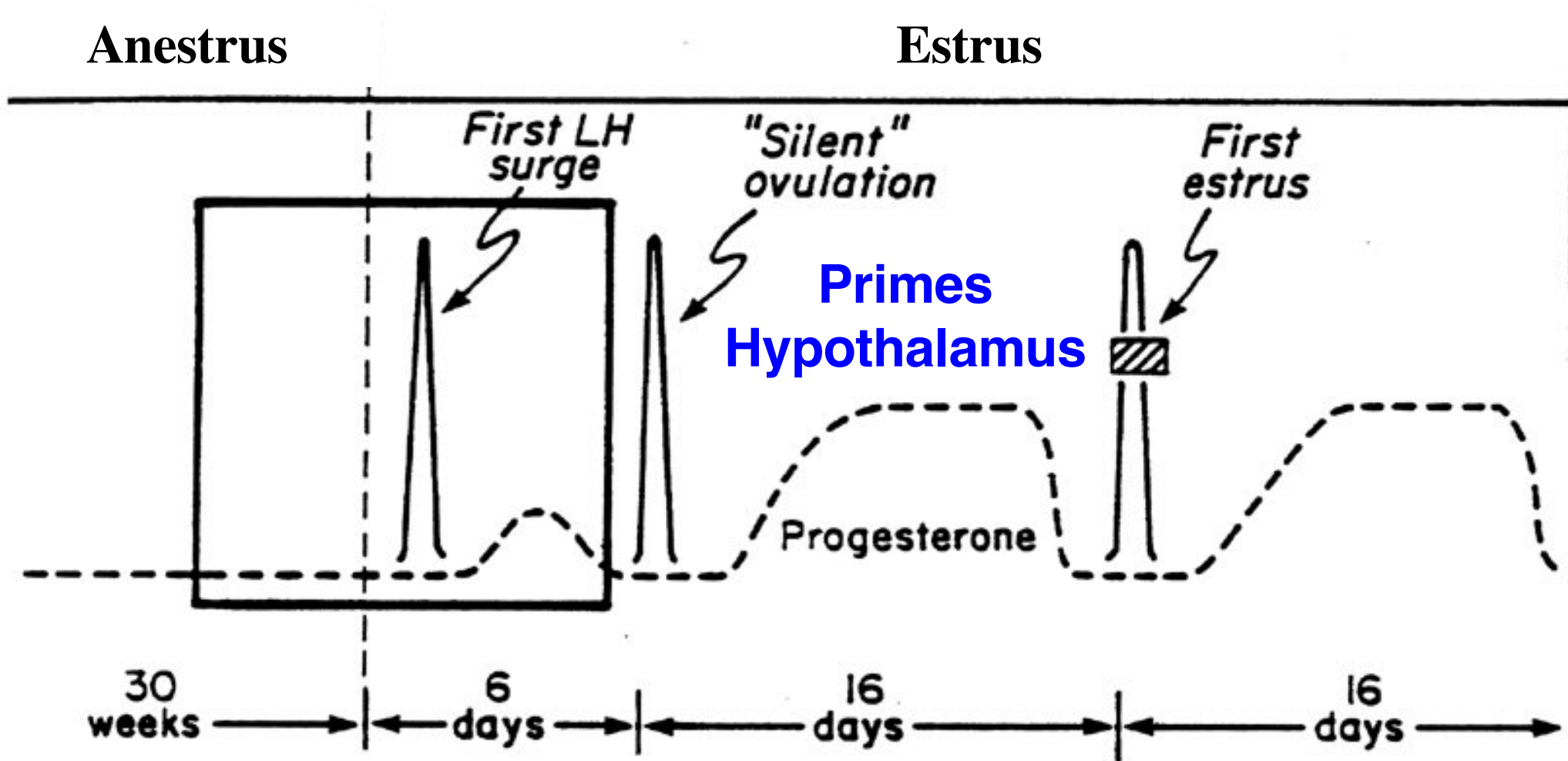
Sheep are short day breeders!



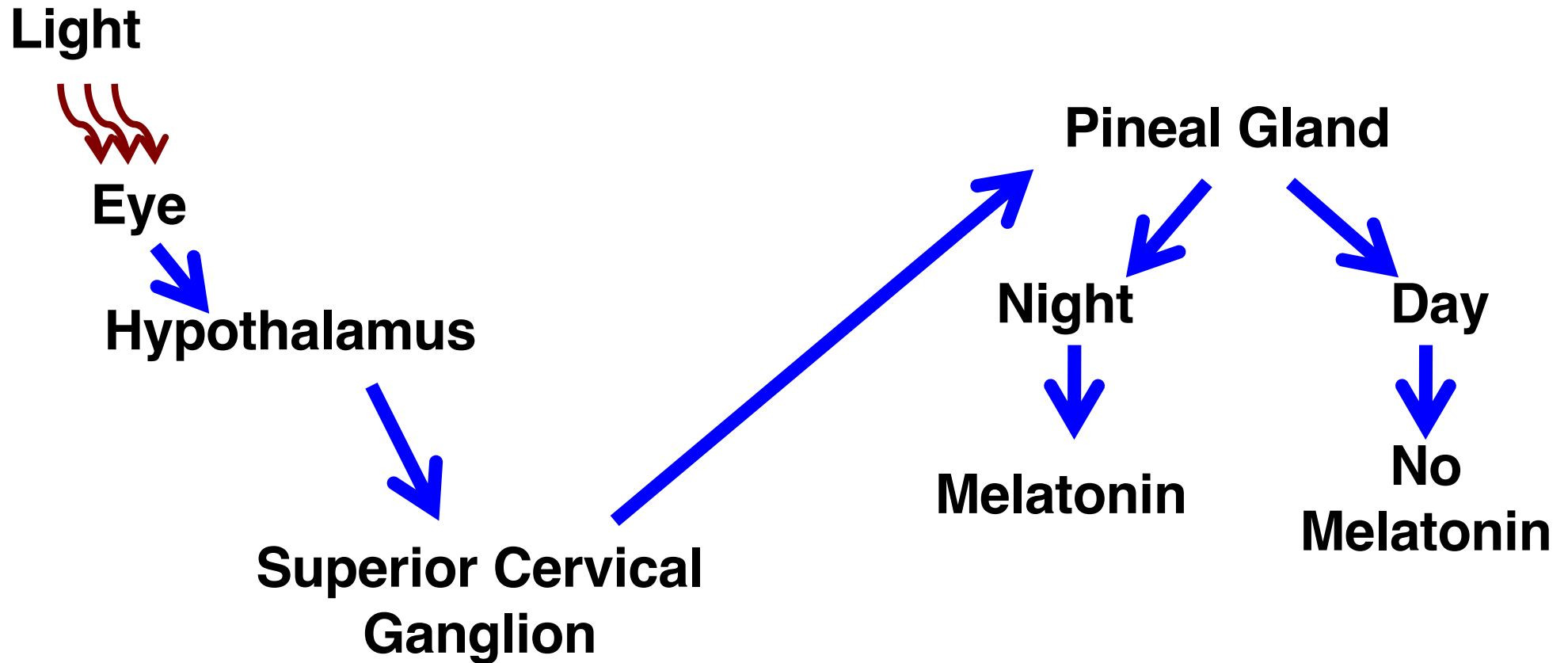
Seasonal Anestrus

- **just like entering puberty**
- **silent ovulation**

Silent Ovulation after Anestrus

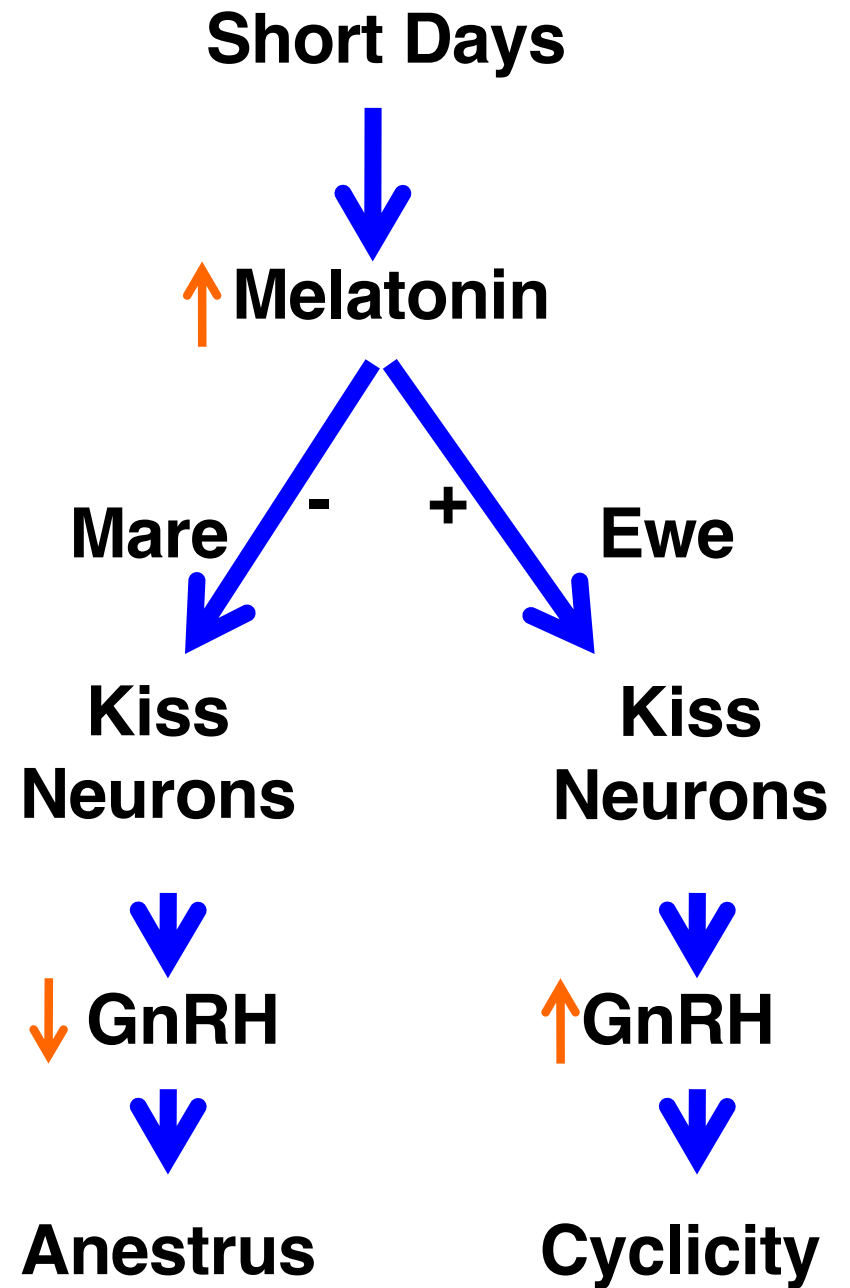
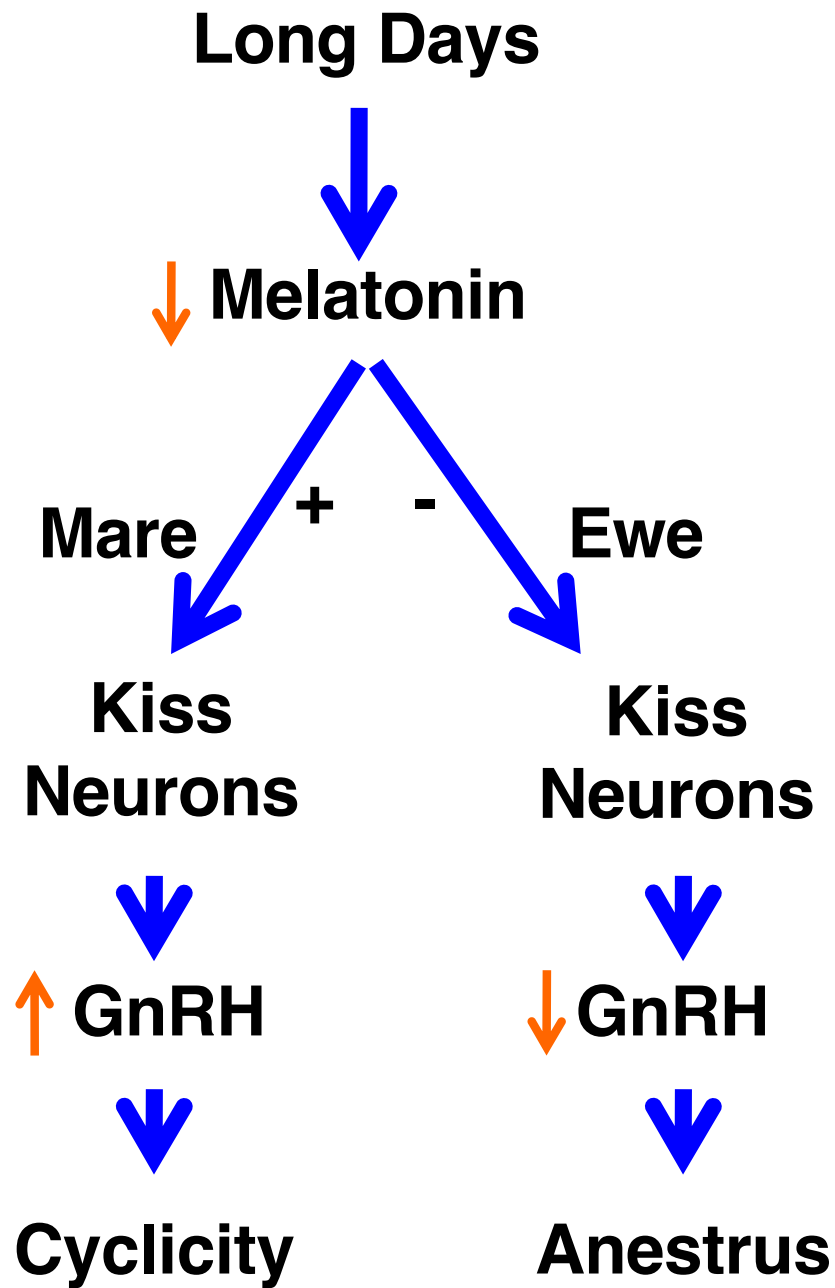


**Brain (hypothalamus) must be primed with Progesterone
To Express Estrus in Response to Estrogen**



Long Days = Short nights = low melatonin

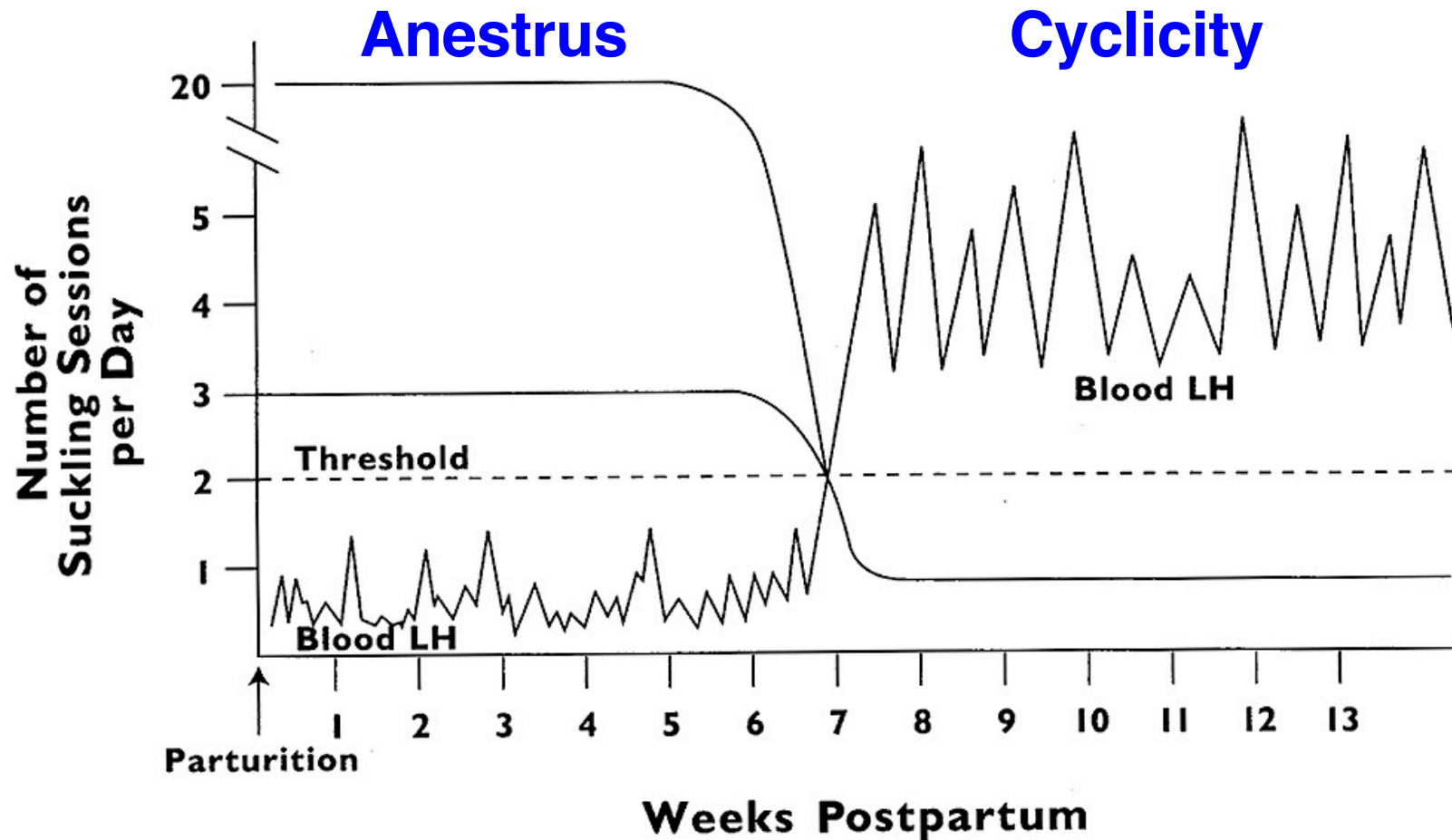
Short Days = Long nights = high melatonin



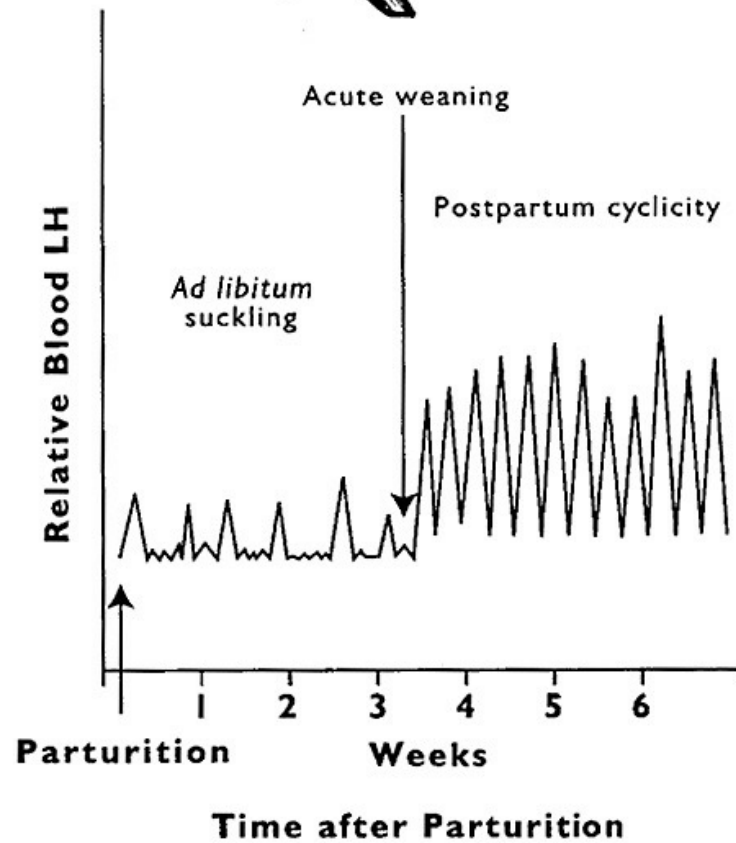
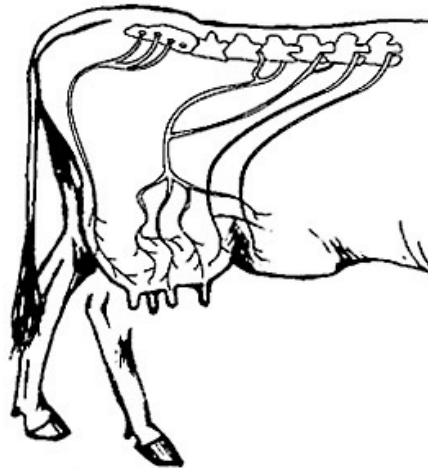
Lactational Anestrus



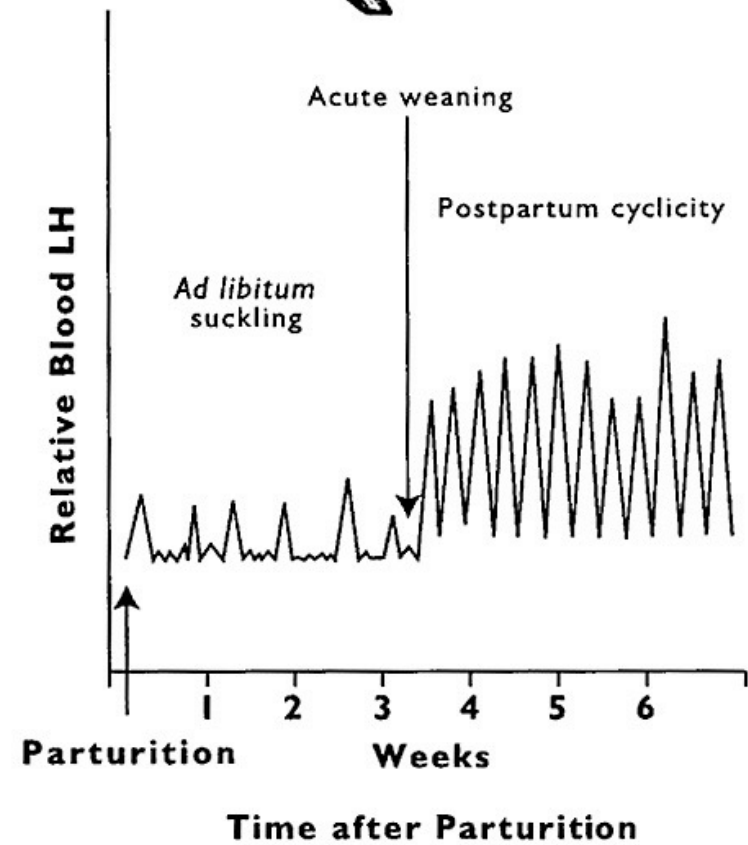
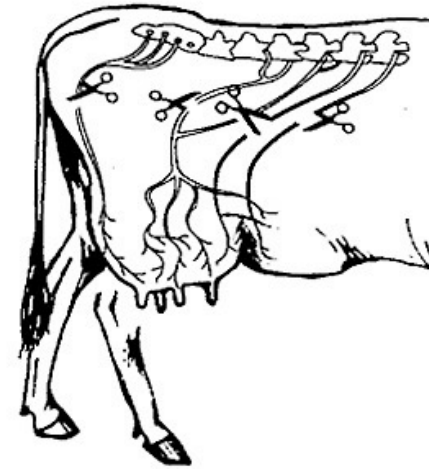
Suckling Effect on LH



Intact cow



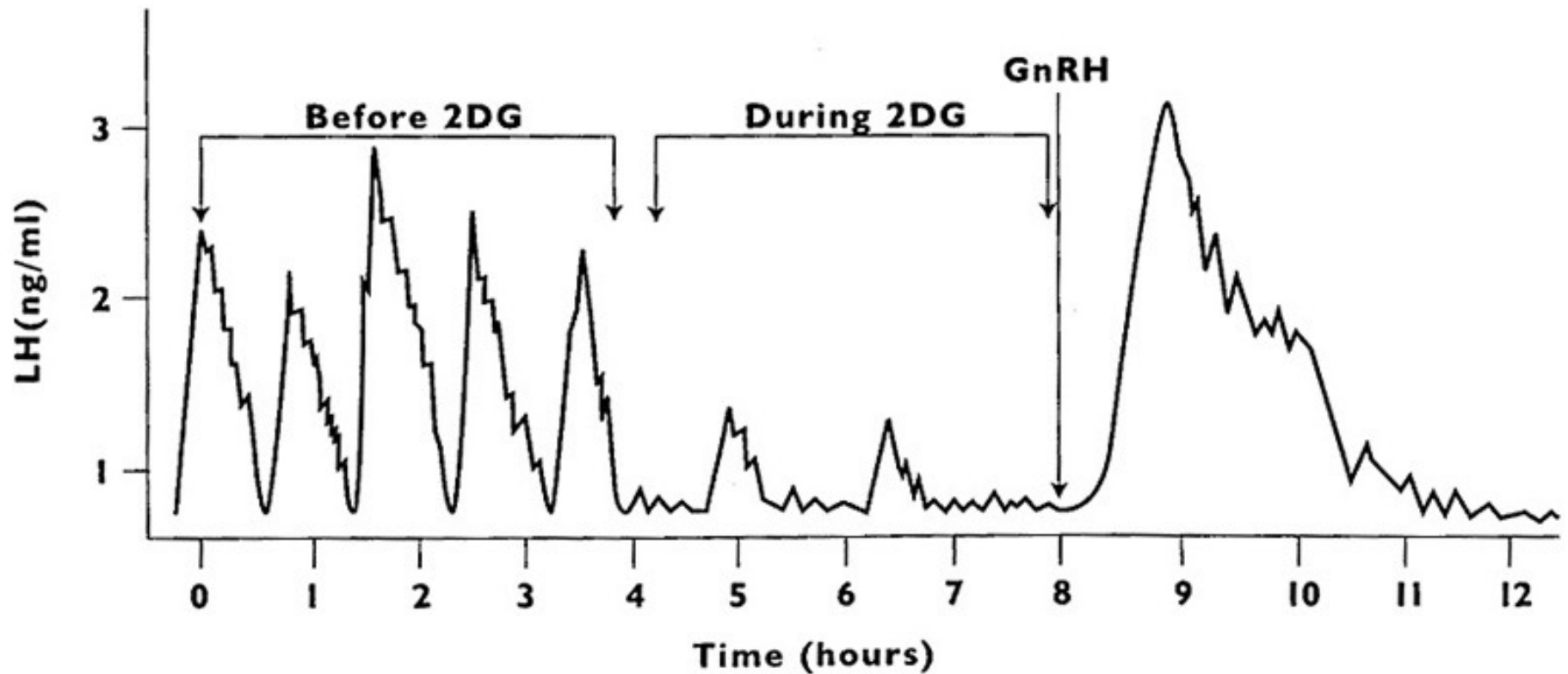
Mammary denervated cow



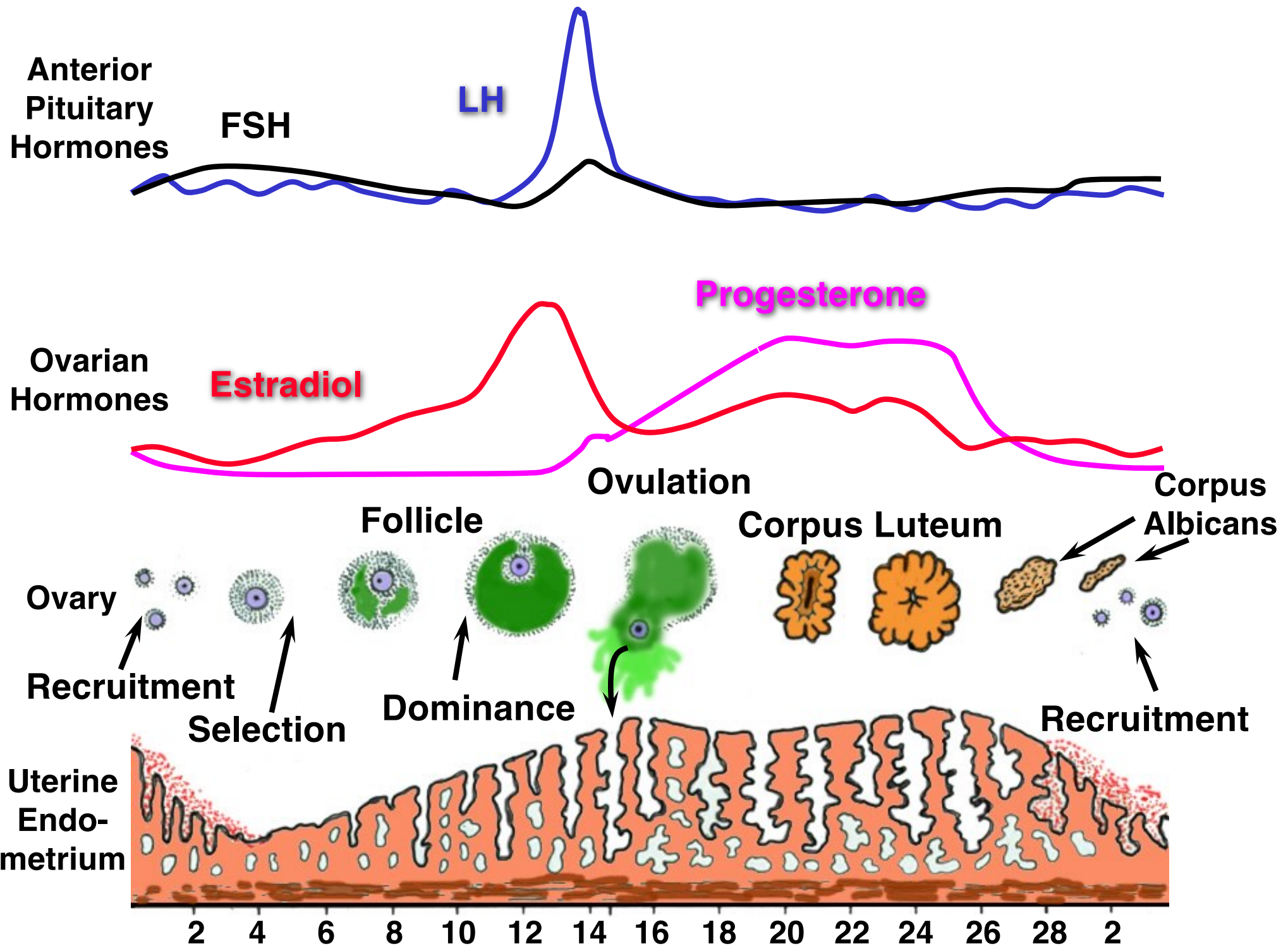
Lactational Anestrus

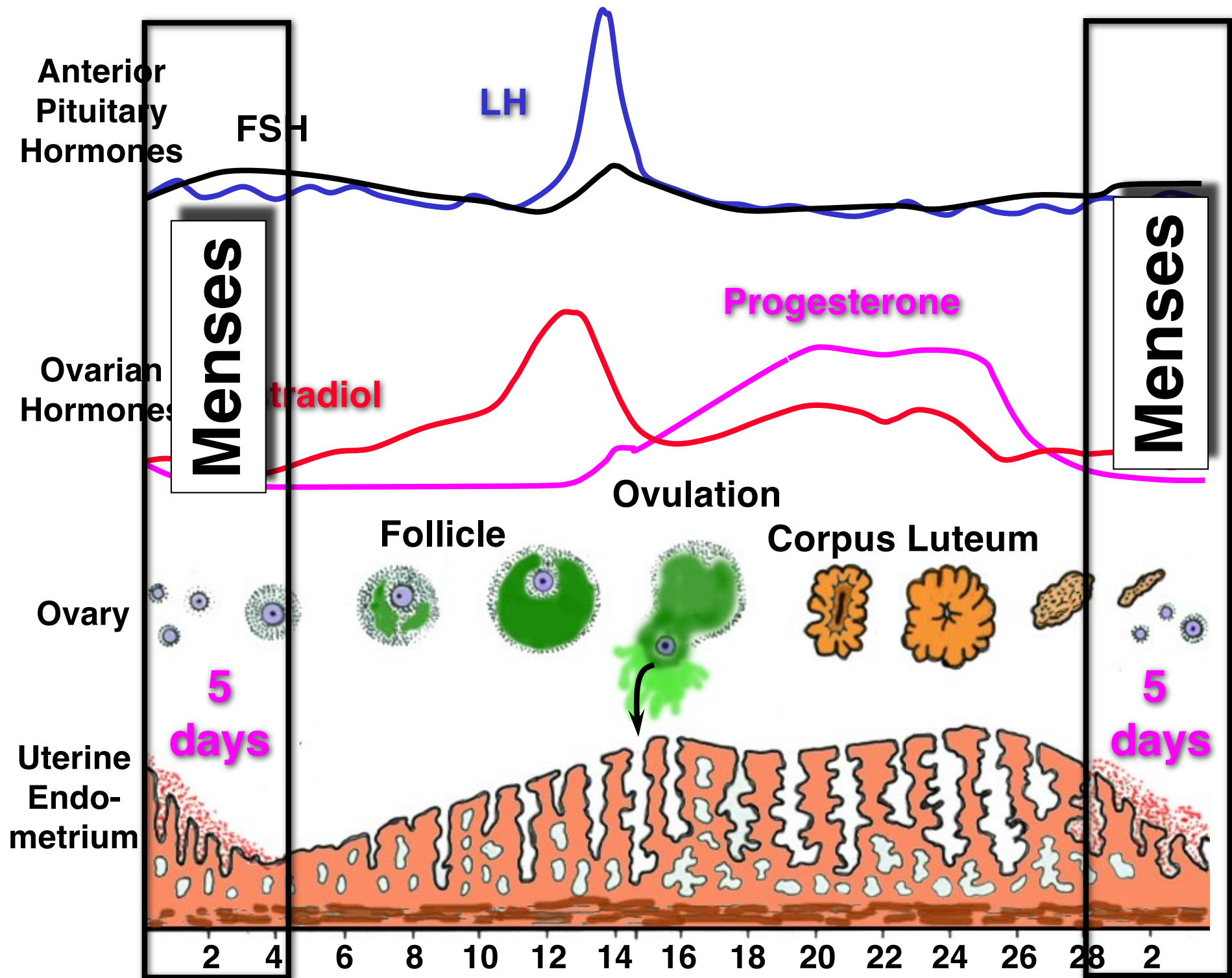
- **Suckling**
- **Other offspring factors**
 - visual encounter
 - olfactory encounter
 - auditory encounter
- **Prolactin**
 - inhibits GnRH release
 - major infertility problem in women who are not lactating

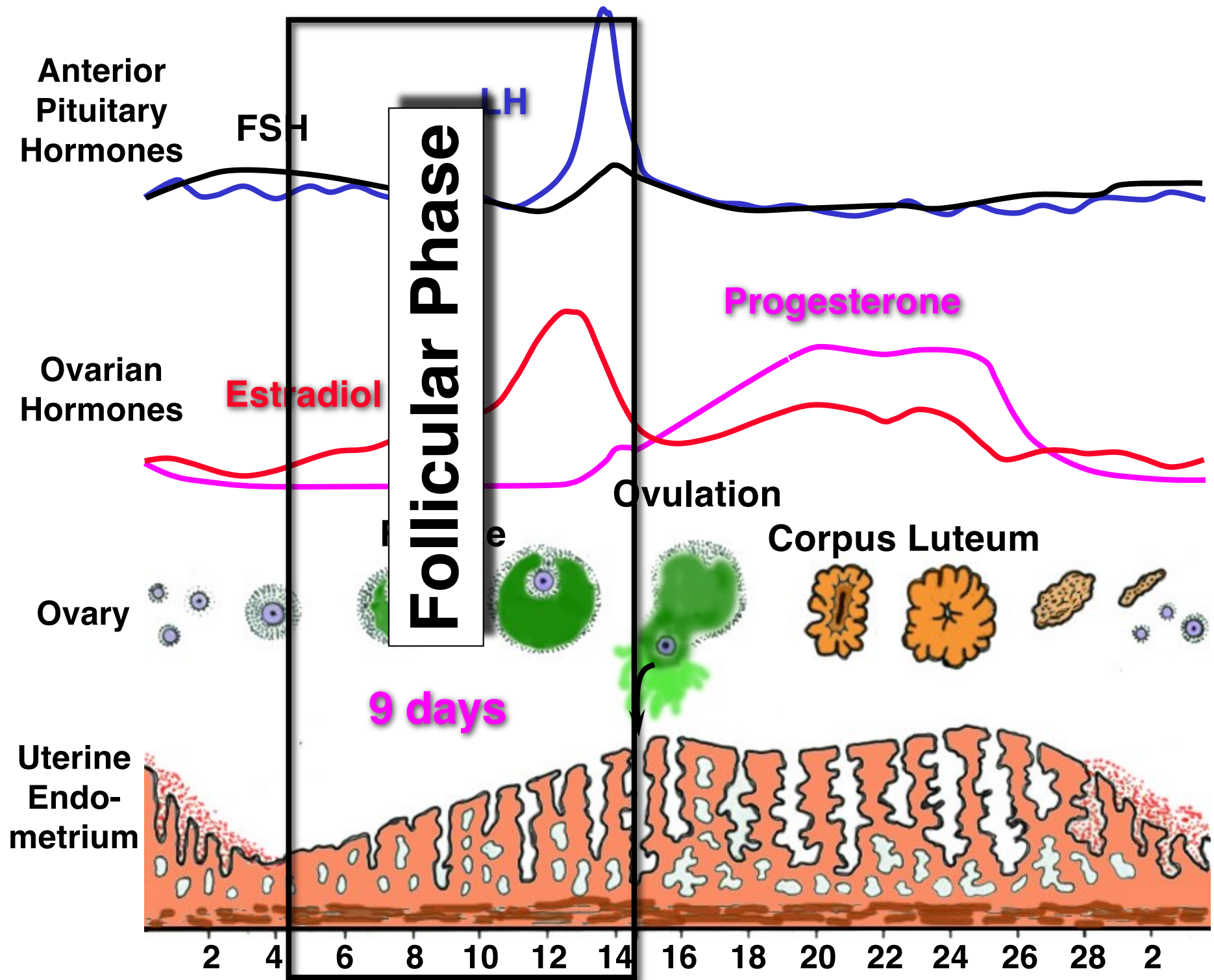
Nutritional Anestrus

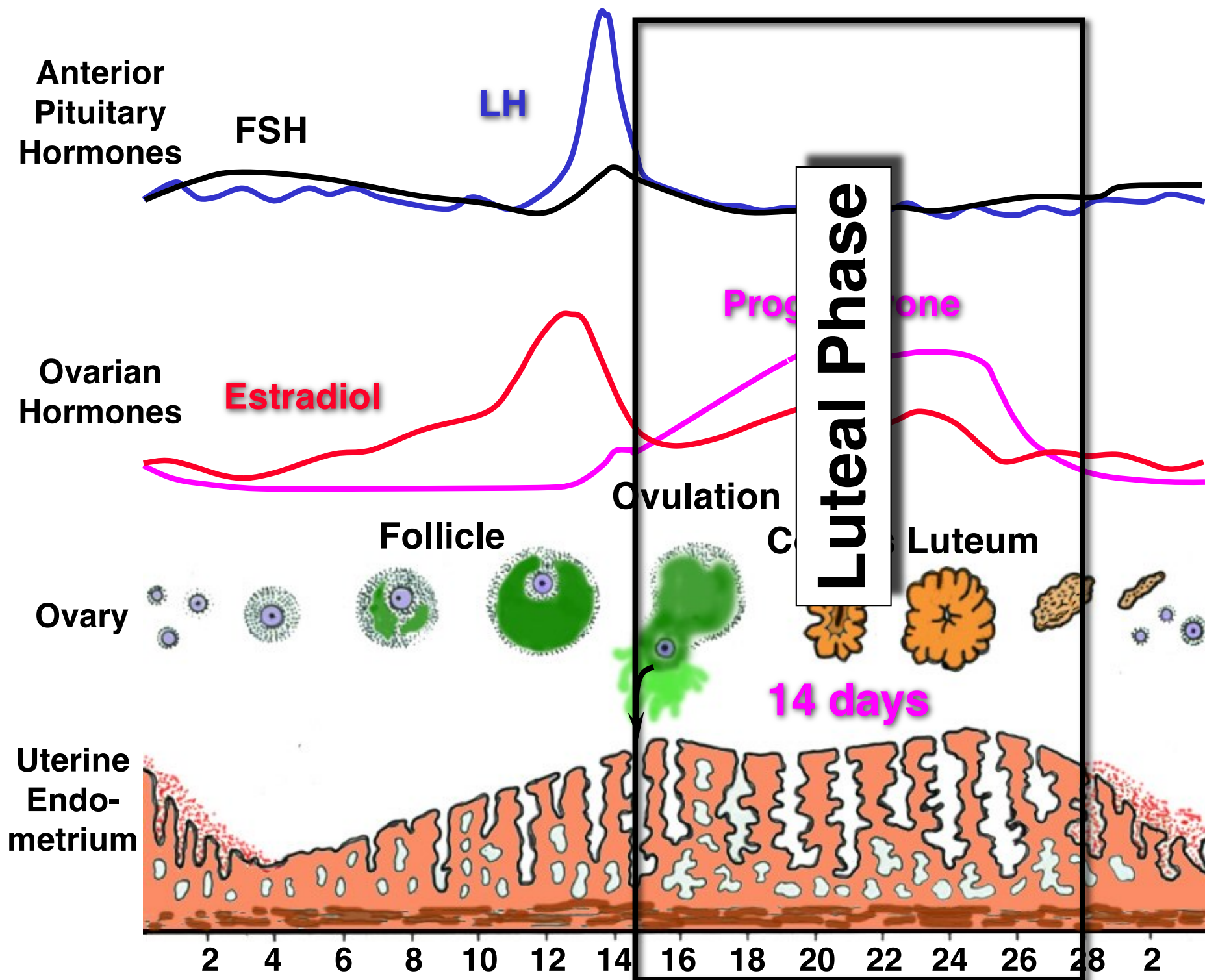


Menstrual Cycle

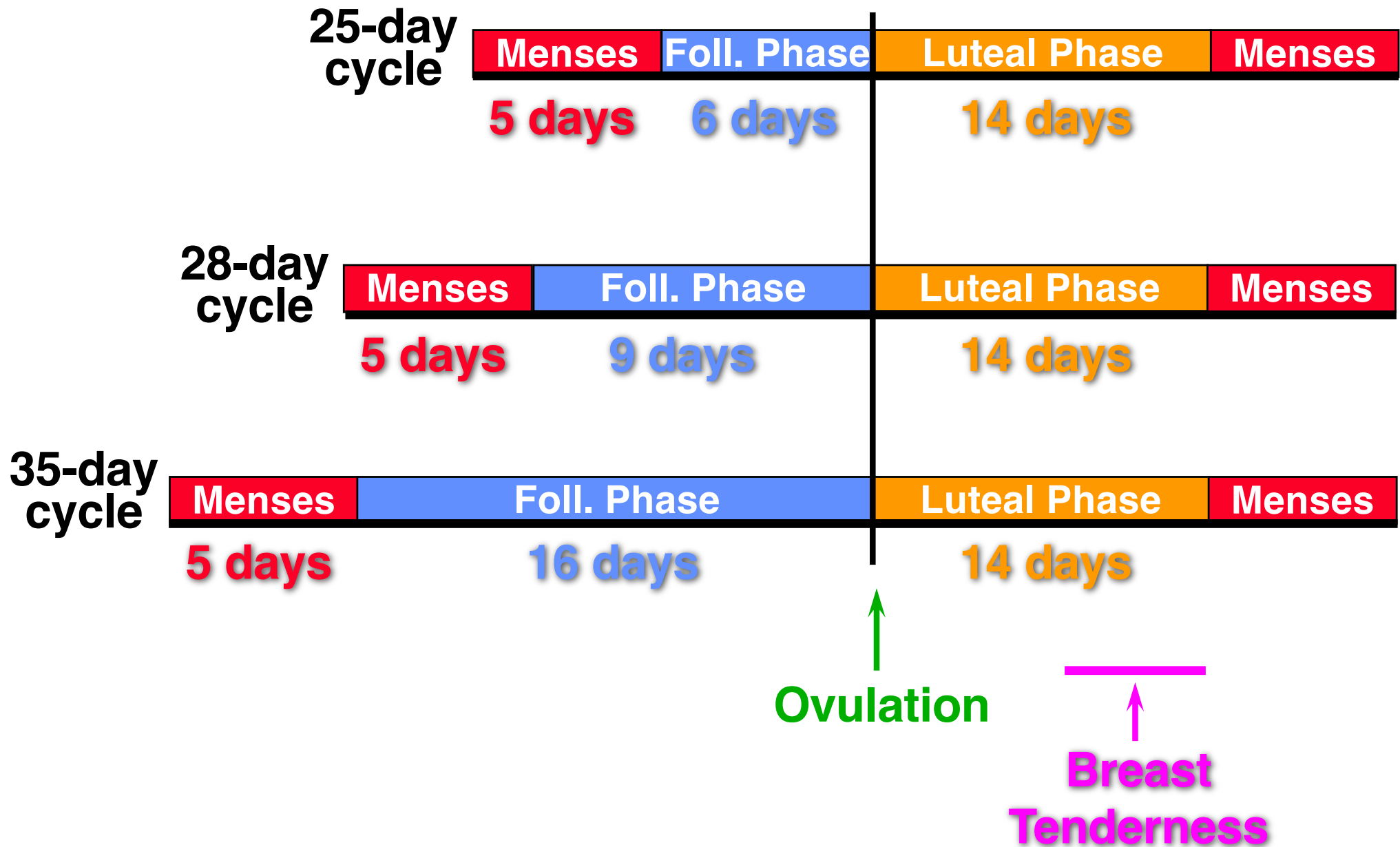








Variation in Menstrual Cycle Length



Quiz 9c

Variation in length of the menstrual cycle is usually due to the length of which phase? (Follicular, Luteal or Menses).



Quiz 9c

Variation in length of the menstrual cycle is usually due to the length of which phase? (Follicular, Luteal or Menses).

Follicular



Menstrual Cycle Length

- **AGE**

- **Length**

- ☐ 15 - 19 year olds → 35 days

- ☐ 30 year olds → 30 days

- ☐ 35 year olds → 28 days

- **Variation**

- ☐ More in teenagers

- ☐ Less in women in peak reproductive years

Influence of Lactation on Postpartum Menstrual Cycles (US and UK, 1987)

- **Not Lactating**
 - **50% cycling by 8 months**
 - **90% cycling by 12 months**
- **Lactating (for 24 months)**
 - **30% cycling by 12 months**
 - **70% cycling by 24 months**

Concept Tutor

MENSTRUAL CYCLES

Define

Examples

Connect

Check

MENSTRUAL CYCLES

The interval in a primate from the beginning of one menstrual flow (menses) to the beginning of the next menstrual flow. These cycles continues from puberty through menopause with interruptions during pregnancy and lactation. Normal human menstrual cycles have the following attributes:

- 28 days in length
- menses last 5 days
- follicular phase lasts 9 days
- luteal phase lasts 14 days



Primates Have Menstrual Cycles

Close Window

**Rest are extra slides not
normally used**

