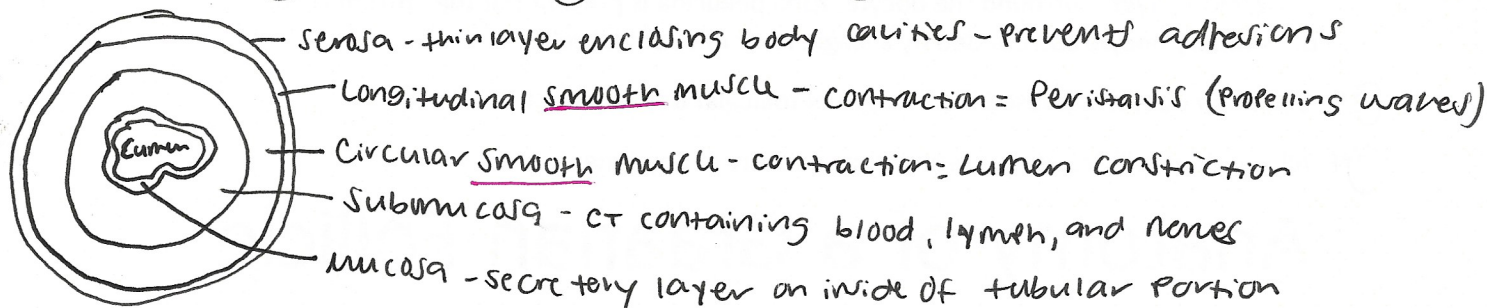


SI Test Prep Exam 1 (Ch 2,7, and 8)

Nerves and Hormones control EVERYTHING in the body.

What are the 4 distinct layers of tissue found throughout the female reproductive tract? Draw and label them.

- ① Serosa ② Muscularis ③ Submucosa ④ Mucosa



What stage of gamete production is arrested in oogenesis?

Meiosis I (Meiosis II is completed @ fertilization)

What is special about the peritoneum?

Rectum + uterine horns sink into peritoneum to form broad ligament

Describe the 3 parts of the broad ligament and their functions.

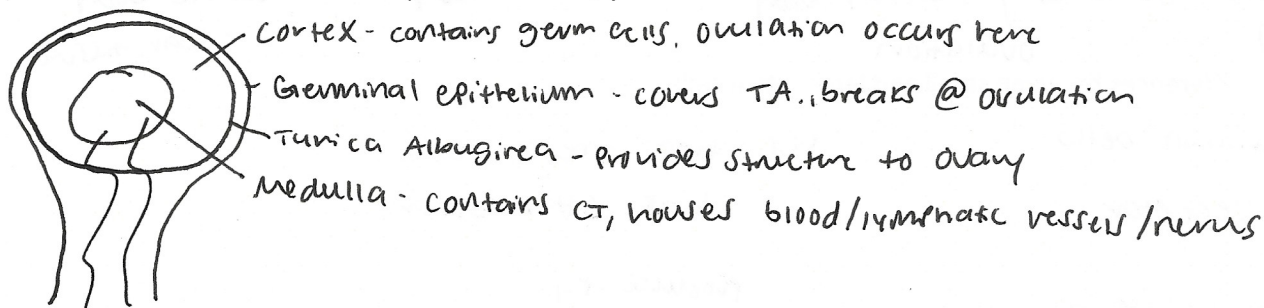
- ① Mesovarium: supports ovaries
② Mesosalpinx: supports oviducts
③ Mesometrium: supports uterus

Describe the endocrine and exocrine functions of the ovary:

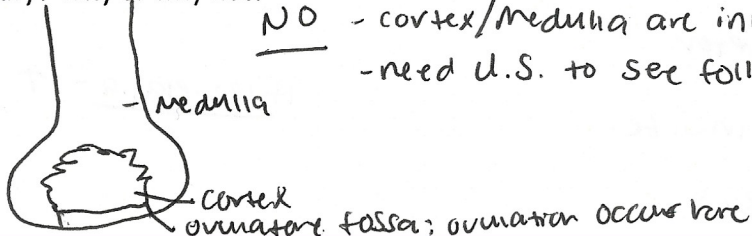
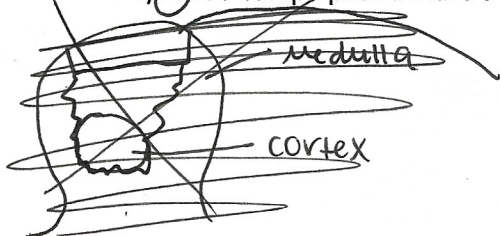
Endocrine: (hormone directly to blood) Follicle produces E_2 , CL produces P_4

Exocrine: (product to tissue) Sex cell (oocyte) production

Describe the anatomical parts of the ovary:



T/F: You can palpate a mare's ovary? Why or why not?



NO - cortex/medulla are inverted
- need U.S. to see follicles/CL

cortex
ovulatory fossa; ovulation occurs here

Match the term with the correct definition:

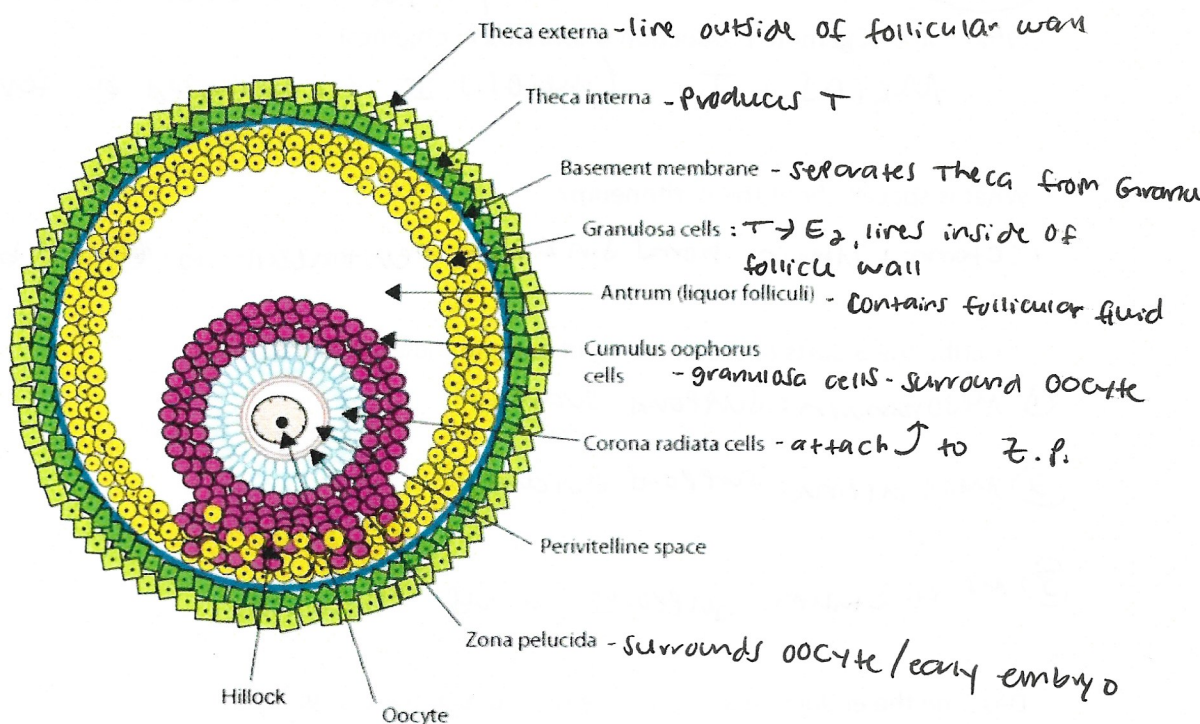
A Primordial follicle C Secondary follicle D Primary follicle B Antral Follicle

- Primary oocyte surrounded by a single layer of squamous cells, smallest follicle in cortex
- Antrum is present, consists of an oocyte, follicular fluid, granulosa cells, theca interna and externa
- 2/more layers surround the oocyte, zona pellucida is present but the antrum is not
- Primary oocyte surrounded by a single layer of cuboidal cells

☐ T/F: a primary oocyte is housed in all stages of follicular development

☐ T/F: All stages of follicles are present within an ovary at any time

Anatomy of a Graafian Follicle



List and describe the structures on the ovary:

Preovulatory dominant follicle $\rightarrow$ Corpus Hemorrhagicum $\rightarrow$ Corpus luteum $\rightarrow$ Corpus Albicans
 (Basement membrane degenerates by collagenase) $\uparrow$ "bloody body" "yellow body" "white body"
 ovulation "scar tissue"

Explain the differences between small and large luteal cells

LLC: from granulosa cells

NO LH receptor

produces P_4 , relaxin, oxytocin,

has $PGF_{2\alpha}$ receptor

Hyper trophy - T in size

"troph size"

SLC: from theca cells

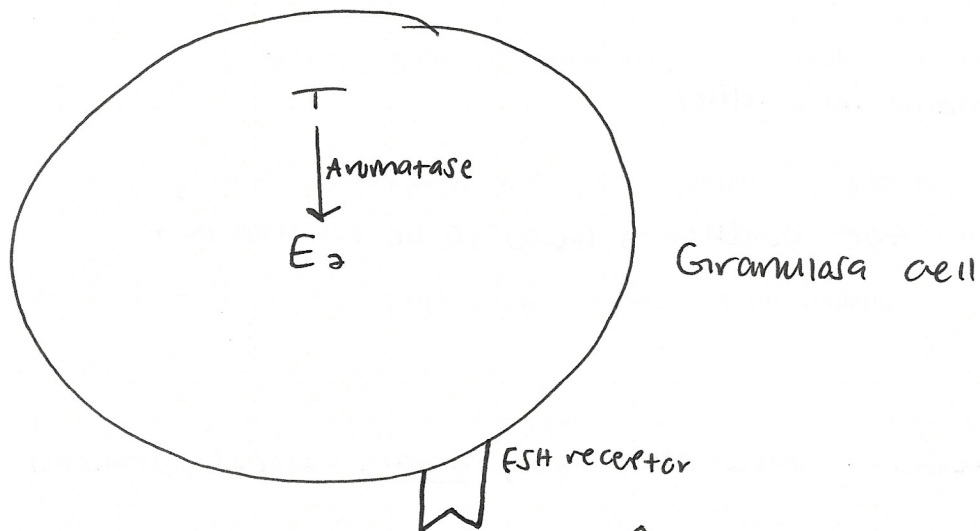
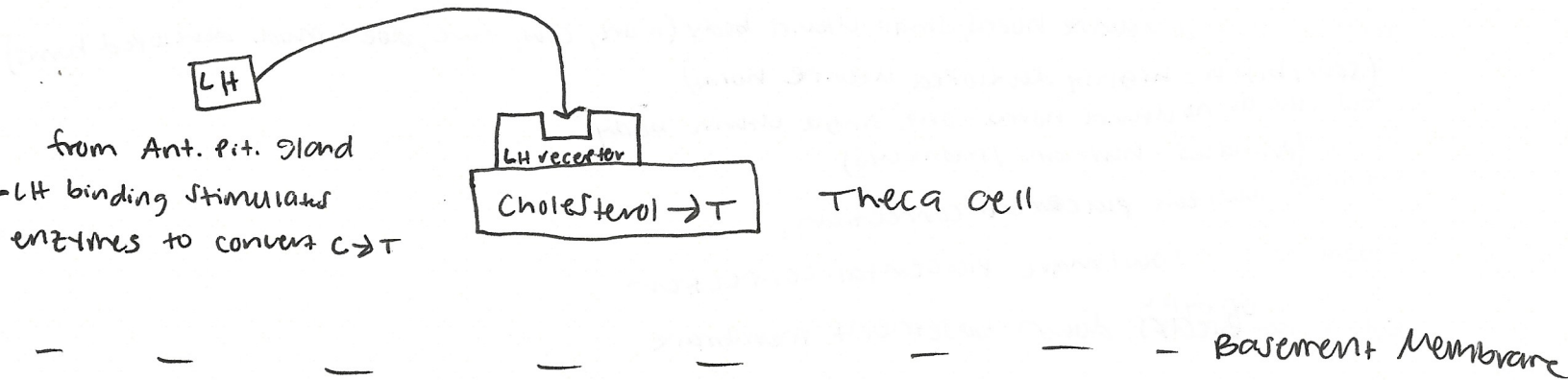
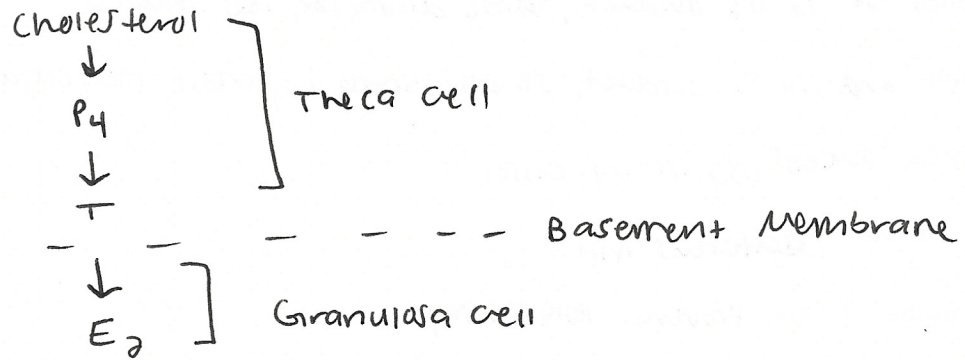
has LH receptor

produce P_4

Hyperplasia - T in #

Draw the 2-Cell/2- Gonadotropin Theory:

Big picture:



from Ant. Pit. Gland

- FSH binding stimulates production of Aromatase

Define the following:

Ampulla- 1st 1/2 of oviduct, large diameter, less muscle

Isthmus- 2nd 1/2 of oviduct, small diameter, more muscular

Fimbria- "sweeper" egg in by cilia

Infundibulum- "catcher's mit"

Uterotubal junction- prevents polyspermy

Ampullary Isthmic junction- site of fertilization

Bicornate uterus- 2 uterine horns, small uterine body (mare, cow, ewe, doe = mod. developed horns)
(sow/bitch = highly developed uterine horns)

Simplex uterus- no uterine horns - one single uterine body
(primates = humans/monkeys)

Caruncles- cow/ewe placental connection

Endometrial folds- sow/mare placental connection

Collagenase- ^{enzyme} breaks down basement membrane

Aromatase- enzyme that converts $T \rightarrow E_2$ in gran. cells

T/F: A mare's unfertilized oocyte will be washed out into the uterus?
remains in oviduct

What is the fate of an unfertilized oocyte for cows, sows, ewes, and does?

passes from oviduct $\rightarrow$ uterus to be washed out

T/F: Semen is deposited into the uterus for mares and pigs

Describe the layers of the uterus and how they relate to the 4 layers of tissue within the rest of the tract:

① Perimetrium: outer most layer, serosa - blocks adhesions

② Myometrium: muscularis layer - smooth muscle - expulsion of fetus/sperm transportation

③ Endometrium: mucosa/submucosa - point of placental attachment, uterine glands = secretions for embryo development

Describe the differences between cervical mucus under the influence of Estrogen and Progesterone

E_2 : thin/watery = favor sperm motility

P_4 : thick/viscous

Sialomucin = low viscosity, aids w/ forward movement

Surfactomucin = high viscosity, sperm washed out, cervical seal of pregnancy

- stimulates uterine milk for embryo to survive on within first few days

Match the type of cervix with the species

	Sow	Cow	Ewe	Mare
Annular rings		cow, ewe		
Longitudinal/cervical folds				mare
Interdigitating pads	sow			

Define the following terms:

Estrous: from one ovulation to the next

Estrus: when female is receptive to male "standing heat"

Polyestrus: repeated estrous cycles throughout year

Seasonal Polyestrus: period of anestrus induced by length of day (light)

Monoestrus: only one period of sexual receptivity

Anestrus: female does not display estrus

True: doesn't cycle due to insufficient hormonal stimuli

Apparent: ~~female doesn't cycle due to~~ failure to recognize heat

List types of anestrus: Physiological (gestational/lactational), Nutritional, Environmental

What do kisspeptin neurons communicate with?? GnRH neurons

Hormone:	Synthesis:	Site of Action
GnRH	Hypothalamus	A pit. gland
FSH	A. pit. gland	Granulosa cells
LH	A. pit. gland	Theca/Luteal cells
Estrogen	Granulosa cells	Hypothalamus
Progesterone	CL, placenta	Hypothalamus
PGF2a	uterus	CL/ovary
Testosterone	Theca cells	a lot...

Feedback Signals:

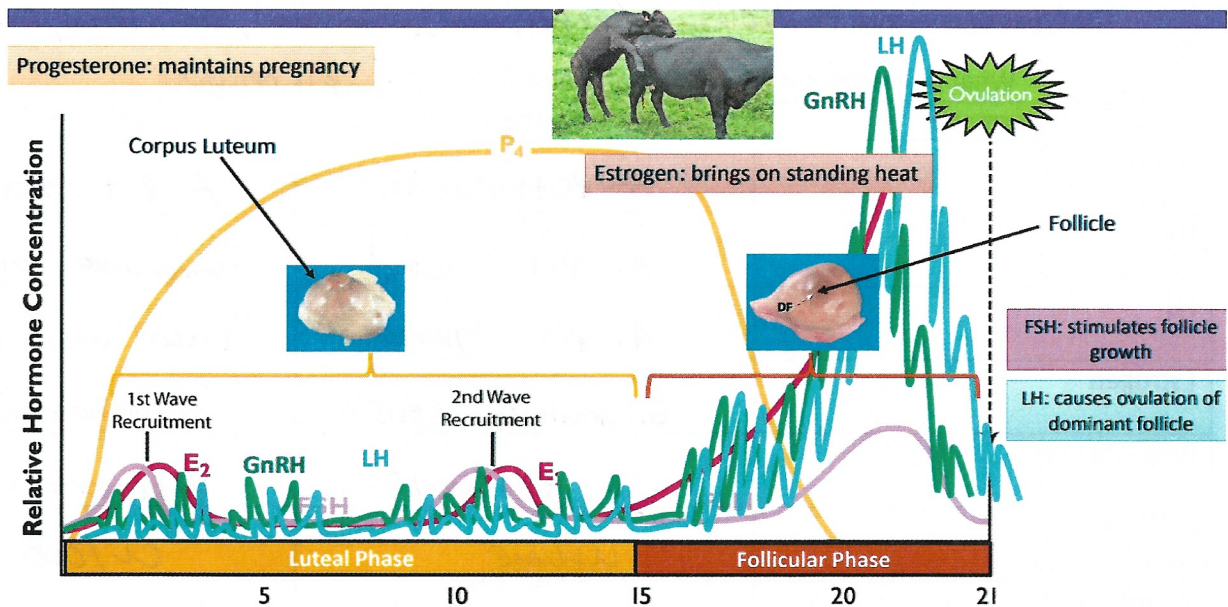
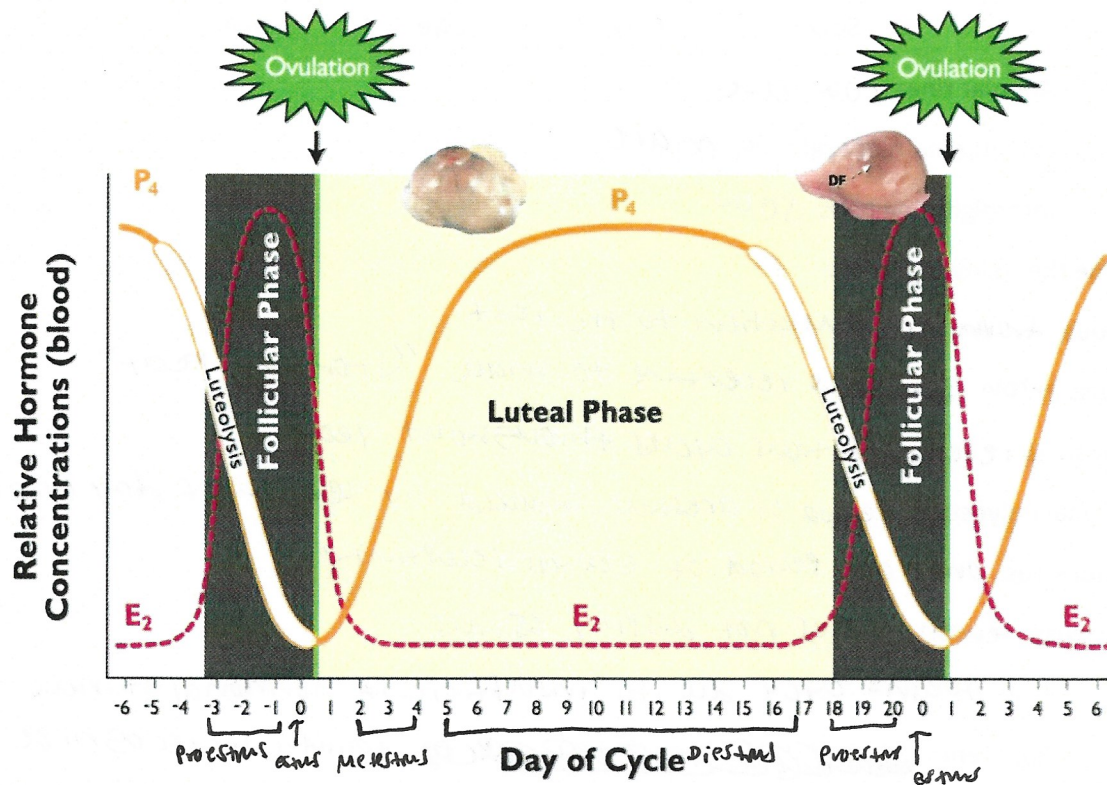
Positive feedback: stimulus continues until goal is reached

E2 → Hypothalamus = more GnRH = More LH/FSH

Negative feedback: stimulus prevents/inhibits the same stimulus = decrease in stimulus

Progesterone increases = LH/FSH to decrease

A follicular wave begins in response to which hormone? Is sustained by which hormone?



Bovine Estrous Cycle:

Luteal Phase: Period from ovulation to CL regression. Under stimulation of P_4 80% of the cycle

metestrus Stage: day 2-4, $E_2 \downarrow$ due to ovulation, P_4 slowly $\uparrow$ overtime due to CL $\rightarrow$ CL, $\uparrow$ uterine secretions, $\downarrow$ muscle contractions

diestrus Stage: 10-14 days total, days 5-17, longest stage of estrous cycle, CL reaches maximum size, high P_4 levels prevent final follicle development = $\ominus$ feedback

- ends when CL is destroyed

* 1^o ovarian structure = CL

1^o hormone = P_4

Follicular Phase: Period from regression of CL to ovulation. Under stimulation of E_2 . 20% of the cycle

Proestrus Stage: lasts 2-5 days, days 17-20, CL death = $\downarrow P_4$ = final follicular development (3rd follicles mature for ovulation)

$E_2 T = T LH/FSH = (+)$ feedback

* 1st ovarian structure = follicle

1st hormone = E_2

mucus, muscle motility, uterine gland growth

Estrus Stage: day 21/0, "standing heat"

high E_2 = GnRH surge = LH surge = ovulation

Behavior: ↑ locomotion/vocalization, mounting

What are the 3 effects of the environment on the female?

① Photo Period: long day breeder = Horse
short day breeder = Sheep, Goat, deer

② Temp: heat/cold shock

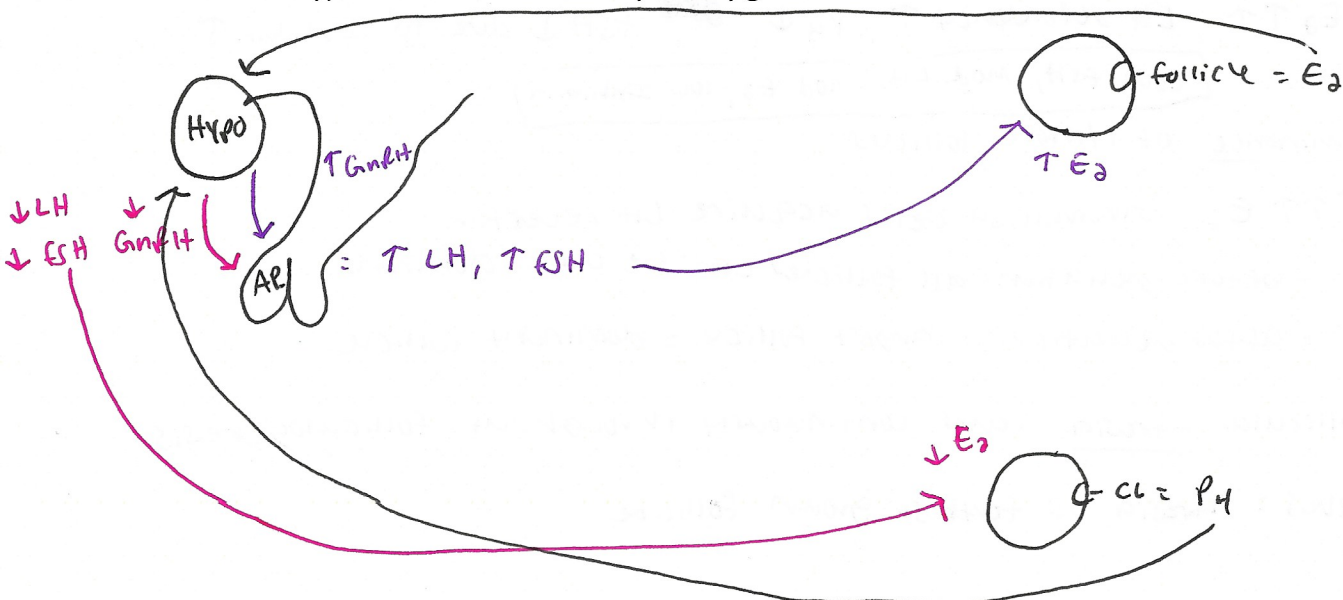
③ Moisture: control nutrients = seasonal changes in feed availability

Menstrual Cycle vs Estrous Cycle:

Event:	Menstrual Cycle:	Estrous Cycle:
Follicular phase	50 % of cycle	20 % of cycle
Ovulation	Middle of cycle	Beginning and end of cycle
Luteal phase	50 % of cycle	80 % of cycle
Fertile period	Up to 6 days before ovulation	24 hr or less
Endometrial sloughing	After luteolysis	NONE
Luteolysis	Ovarian PGF2a	Uterine PGF2a
Sexual Receptivity	Uniform throughout cycle	Well defined
Menopause	Well characterized	more described

Average length of estrous cycle: Cow- 21 days Poly. Sow- 21 days Poly. Ewe- 17 days Seas Poly. Mare- 21 days Seas. Poly

Draw the hypothalamus and anterior pituitary gland and show how different hormones affect these structures:



Describe the GnRH tonic and surge centers:

Tonic center: "drip from faucet" = episodic pulse pattern - 2 nuclei
drives early follicular growth
- independent on gonadotropins

Surge center: Surge of GnRH is signaled by $E_2 \uparrow$, $P_4 \downarrow$

T/F: follicular dynamics occur continuously throughout the entire estrous cycle.

In goats, sheep and horses - dominant ovulatory sized follicles develop in sequential waves during both the follicular and luteal phases of the cycle

In swine, primates and rodents - dominant ovulatory follicles only develop during the follicular phase of the cycle

What are the 5 events of folliculogenesis?

- Primordial - 30 follicles
1. Initiation/progression of pre-antral follicles - gonadotropin independent
- bulk of follicle's life is spent in the pre-antral stage
 2. Recruitment of small antral follicles - enter gonadotropin dependent stage
- FSH $\uparrow$ = promotes antral follicle growth
- $\uparrow E_2$
High FSH + Low LH + Low E_2
 3. Selection of growing cohort (group) of recruited antral follicles
- first to get LH receptors "win"
- $E_2 \uparrow$, LH dependency $\uparrow$, $P_4 \downarrow$, ~~FSH~~ FSH $\downarrow$ due to Inhibin $\uparrow$
Low FSH, Mod. LH, Mod E_2 , low Inhibin
 4. Dominance of 1/more follicles
- $\uparrow \uparrow \uparrow E_2$, Granulosa cells acquire LH receptor
- before deviation - all follicles can be come dominant
- after deviation - largest follicle = dominant follicle
 5. Follicular Atresia occurs continuously throughout folliculogenesis
waves = atresia of furthest grown follicle
- FSH dependent
- All 30 follicles develop from tonic levels of FSH/LH
- LH dependent

T/F: The dominant follicle can only reach ovulatory status during the follicular phase?

Needs LH surge and $\uparrow E_2$

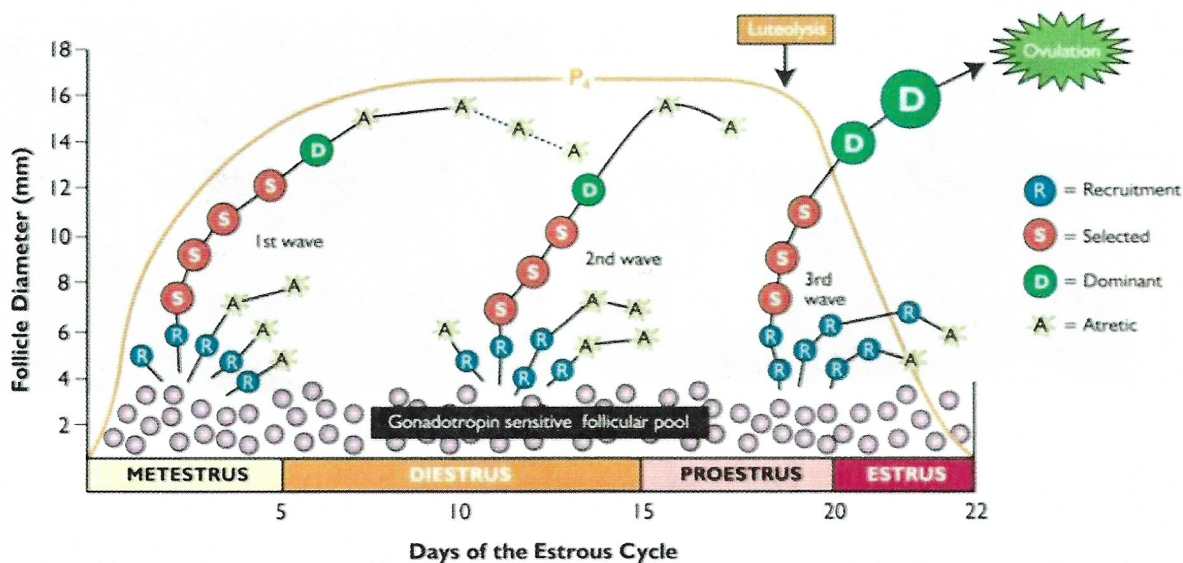
What happens with the LH surge reaches the dominant follicle?

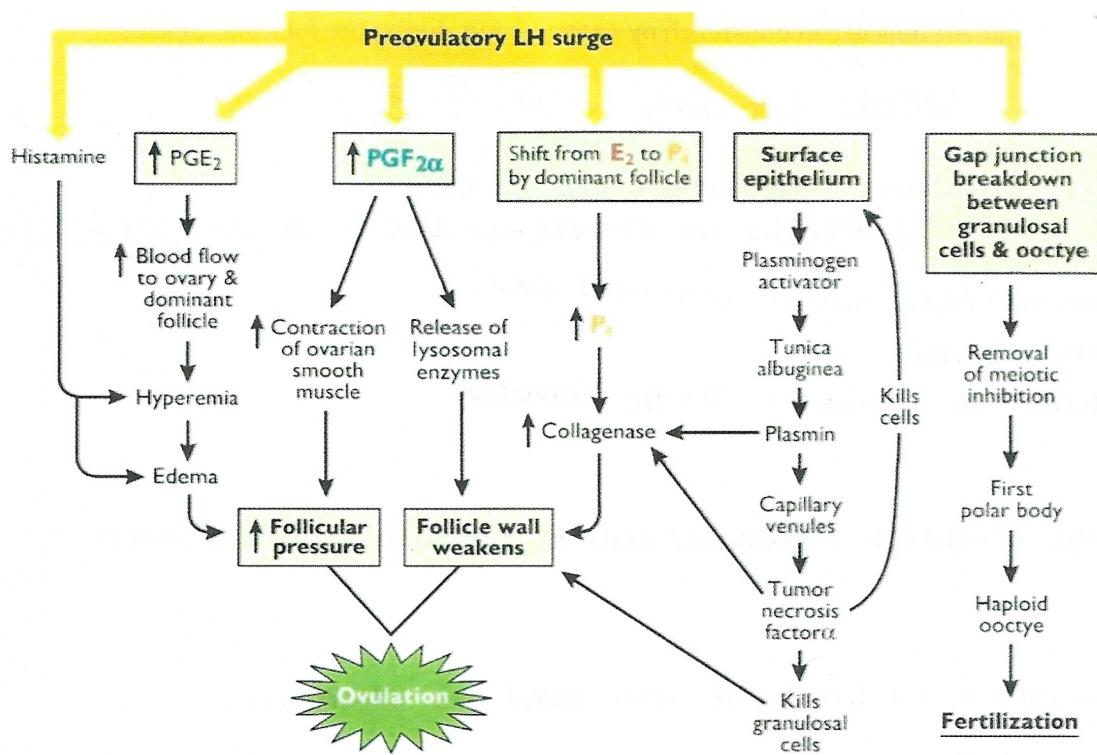
- ① Resumption of meiosis in oocyte - LH surge breaks down gap junctions (between EP/oocyte) to remove meiotic inhibition
- ② Separation/expansion of cumulus cells
- ③ Follicle rupture
- ④ Expulsion of cumulus oocyte complex

- LH surge stimulates cumulus cells to produce hyaluronic acid = COC expansion

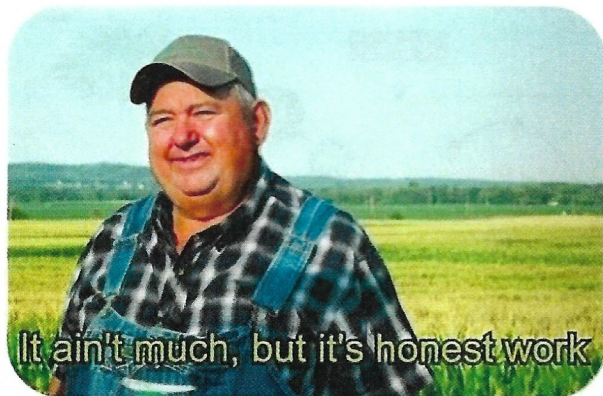
Events triggered by LH surge that lead to ovulation:

- Edema = swelling
- Hyperemia = Histamine and PGI_2 drive $\uparrow$ in blood flow
- Dominant follicle - angiogenic factors in follicular fluid
- P_4 production prior to ovulation (theca cells start 1st, granulosa cells start later once they acquire LH receptor) $\uparrow P_4 = \uparrow$ collagenase
- $PGF2\alpha$ and PGI_2
- Proteases made - used to get oocyte out.

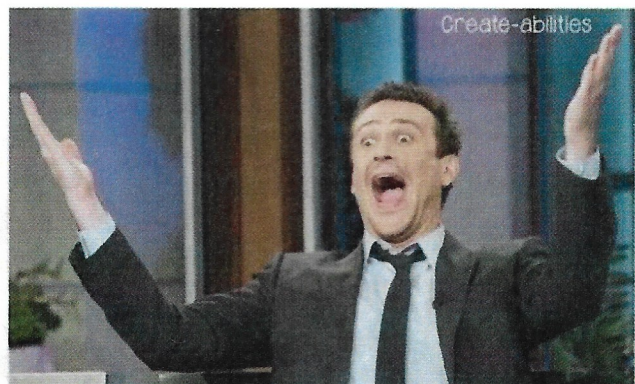




when you win at kahoot in class, but fail all your exams



When you catch students using strategies you have taught them.



Study hard. You're all going to do GREAT!!!