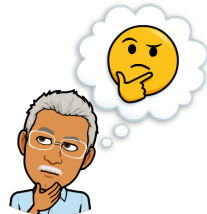


Animal Science 434 Reproductive Physiology

Puberty



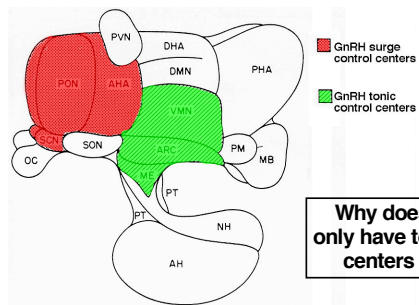
1

Development of Hypothalamus and GnRH Release Centers

Males and Females are Different!!!

2

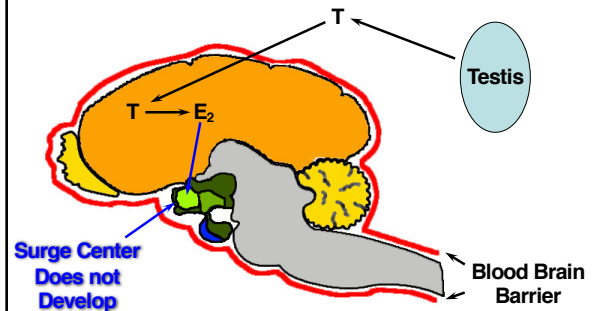
Hypothalamus GnRH Control Centers in the Female



Why does the male
only have tonic control
centers develop?

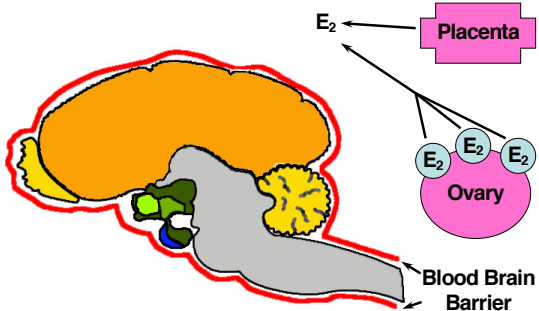
3

Male Brain Development



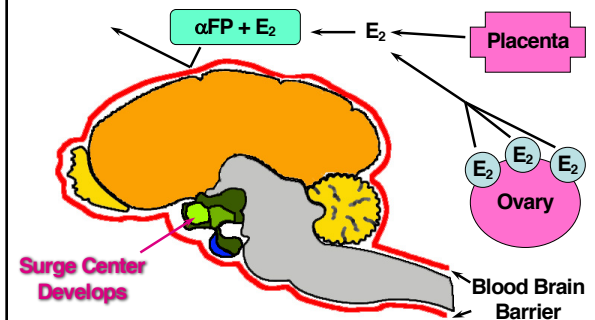
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Female Brain Development

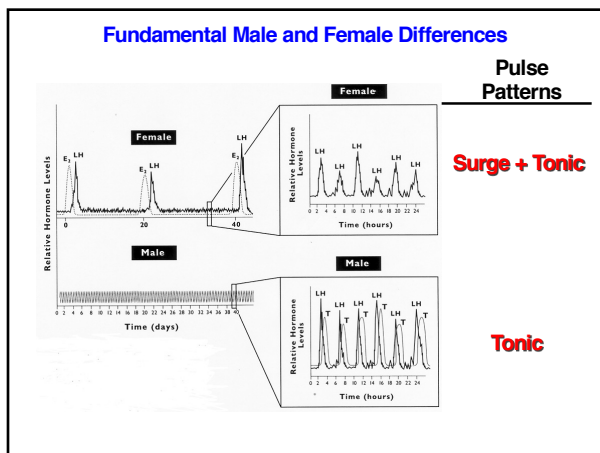


5

Female Brain Development



6



7

Puberty

- The ability to accomplish reproduction.
- Definitions in Male and Female
 - » See Textbook
- Age of Puberty
 - » See Textbook

8

Quiz 8a

Why does the hypothalamus in the male not develop a surge center?

9

Quiz 8a

Why does the hypothalamus in the male not develop a surge center?

Testosterone is secreted by the fetal testes and is converted to estrogen in the brain and then the estrogen prevents the surge center from development in the hypothalamus.

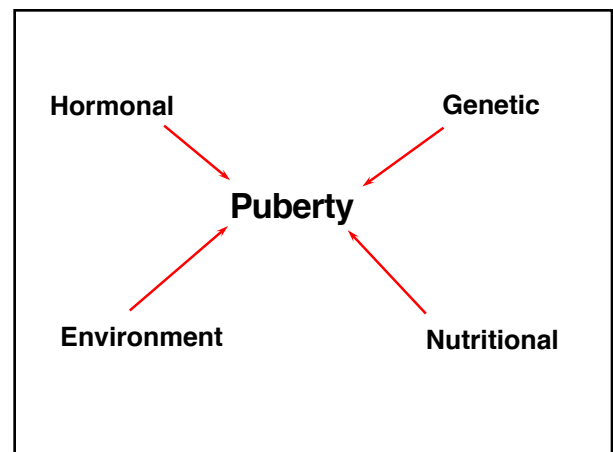
10

Quiz 8a

In the female, estrogen is secreted by the placenta and ovary. That estrogen does not reach the brain due to binding to alpha fetal protein in the blood.

The surge center does not see estrogen and therefore develops in the female.

11



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Hormonal

Role of GnRH Pulses

13

GnRH Pulses Determine Puberty

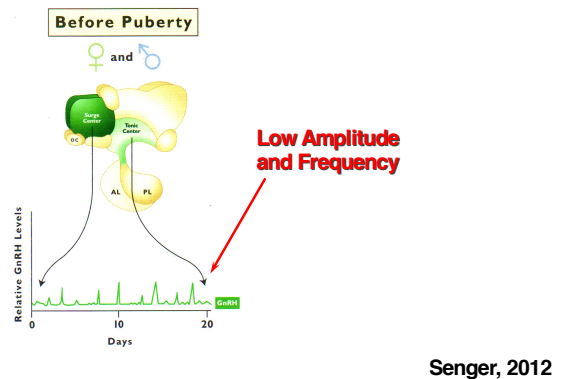
- Prepubertal period
 - » minimal GnRH release
 - » FSH and LH low
 - » minimal to no folliculogenesis or spermatogenesis
- Puberty
 - » increase in the pulse frequency and amplitude of GnRH release
 - » increase in FSH and LH pulses
 - » folliculogenesis and spermatogenesis occur

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Hormonal Changes in the Female

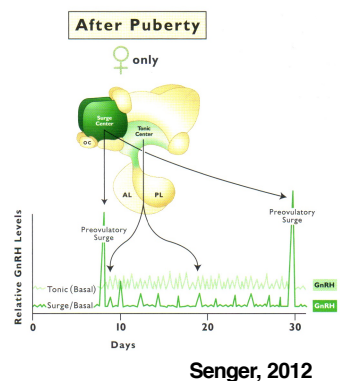
15

Hypothalamic Secretion of GnRH



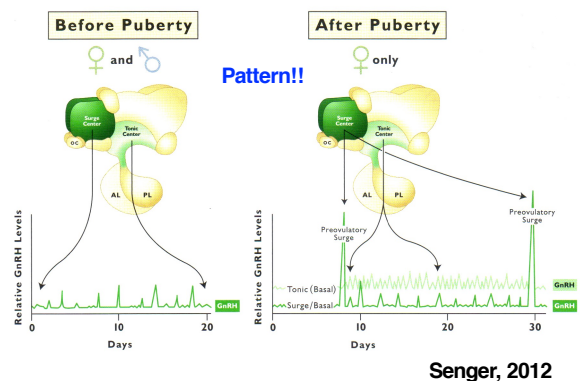
16

Hypothalamic Secretion of GnRH

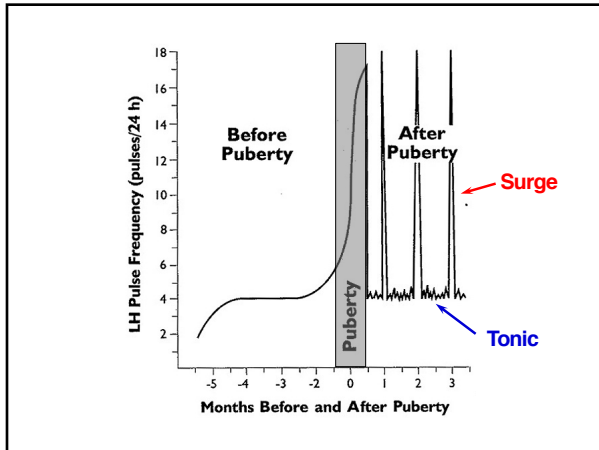


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Hypothalamic Secretion of GnRH



18

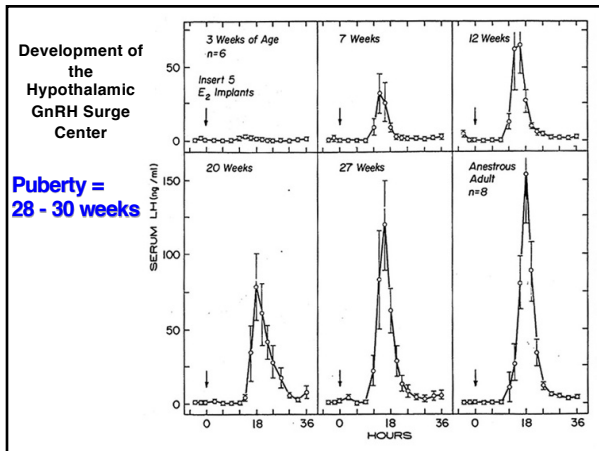


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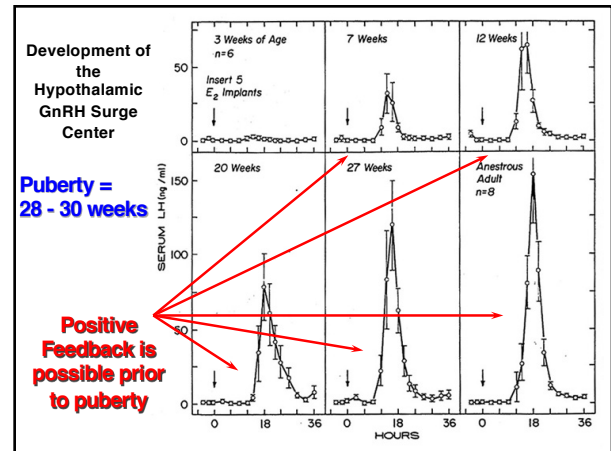
Potential Regulators of GnRH Pulses at Puberty

- Development of surge center
- Change in the feedback sensitivity to estradiol

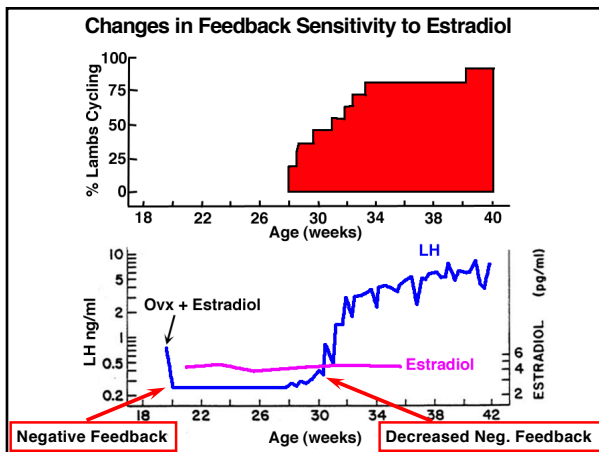
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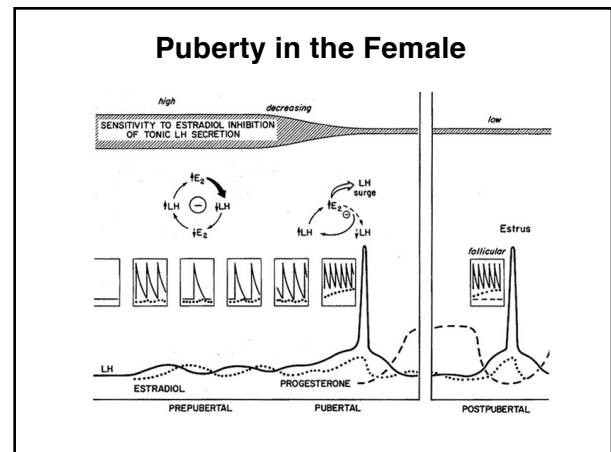
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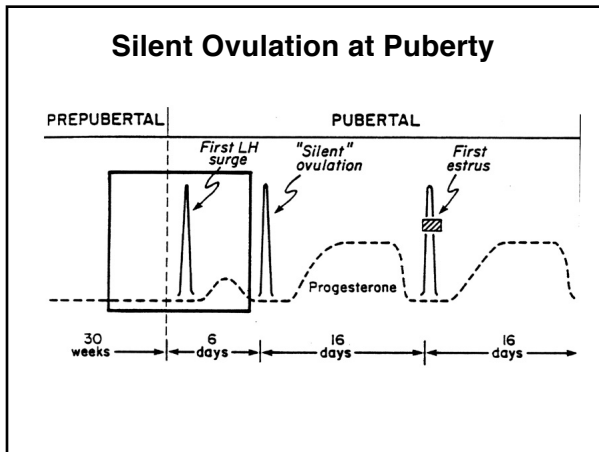
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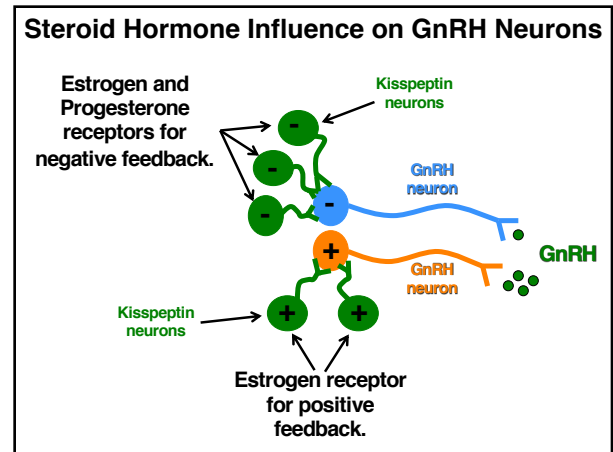
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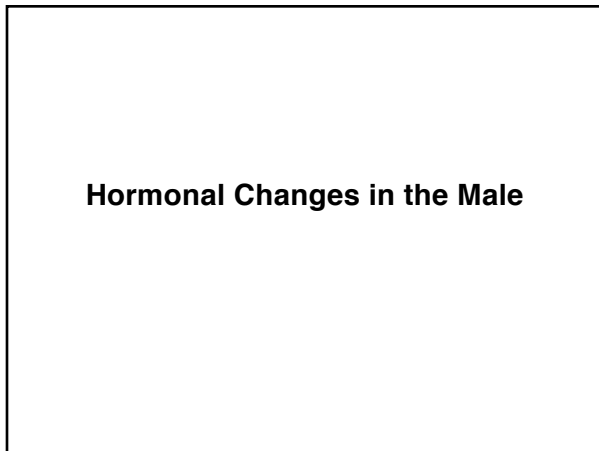
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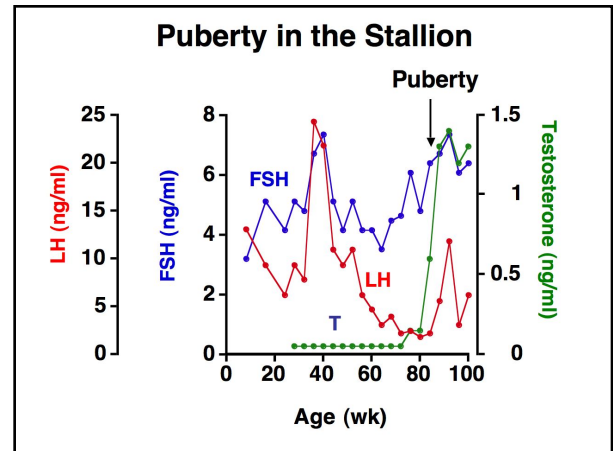
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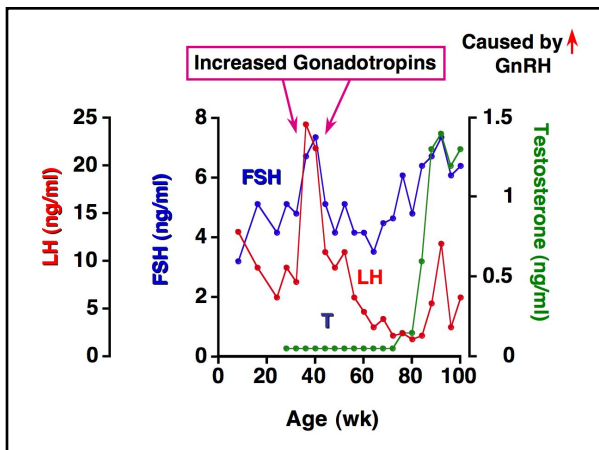
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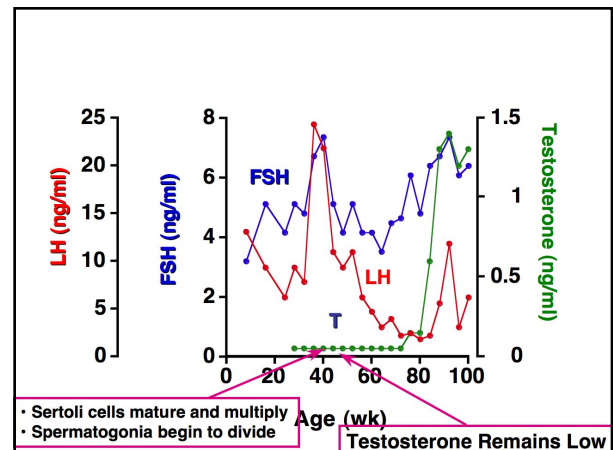
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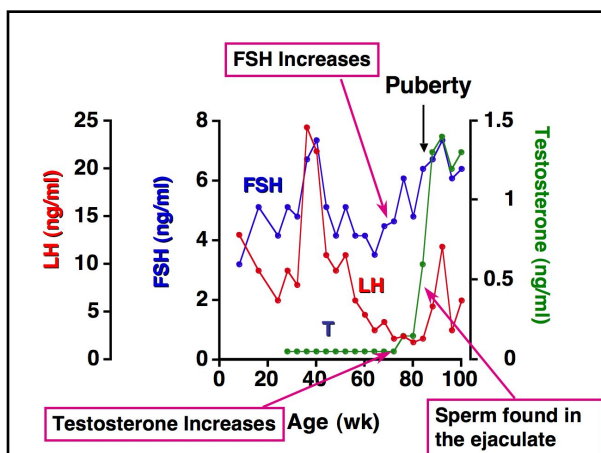
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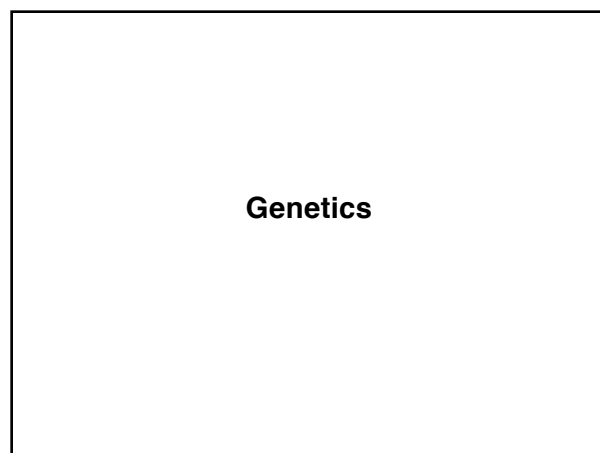
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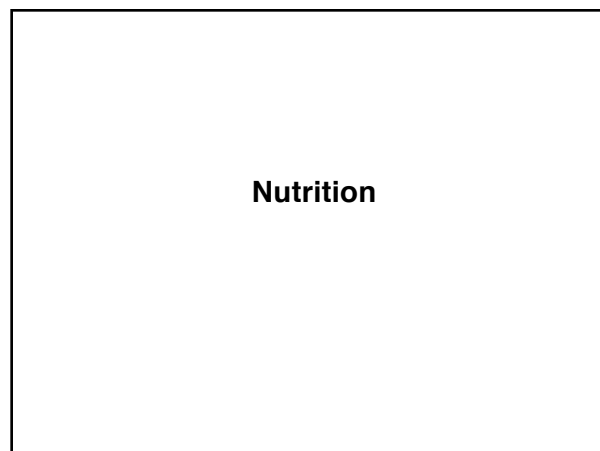


32

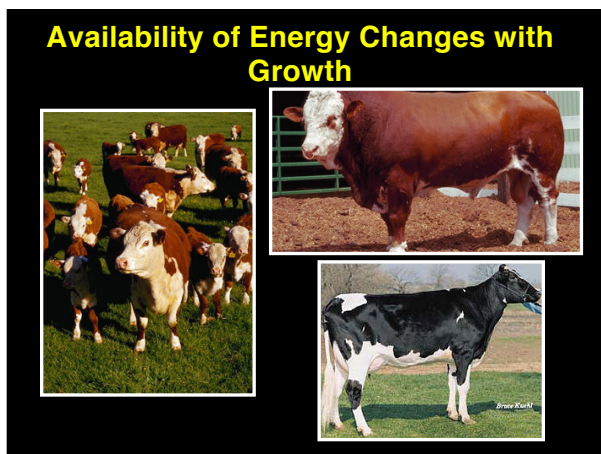
Influence of Breed on Age of Puberty

Species	Average Age at Puberty (Months)	
	Female	Male
Cattle		
Holstein	8.5	9.0
Brown Swiss	11.6	8.8
Angus	12.4	9.8
Hereford	13.0	10.8
Brahman	19.0	17.0
Swine		
Meishan	3.1	3.0
Large White	6.3	5.8
Yorkshire	7.0	6.5
Sheep		
Rambouillet	9.2	
Finish Landrace	8.6	

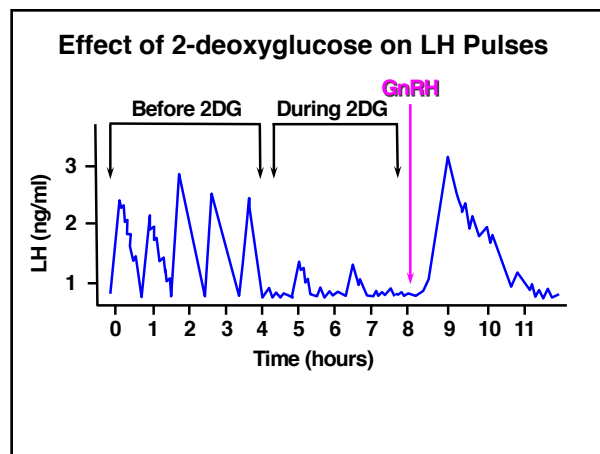
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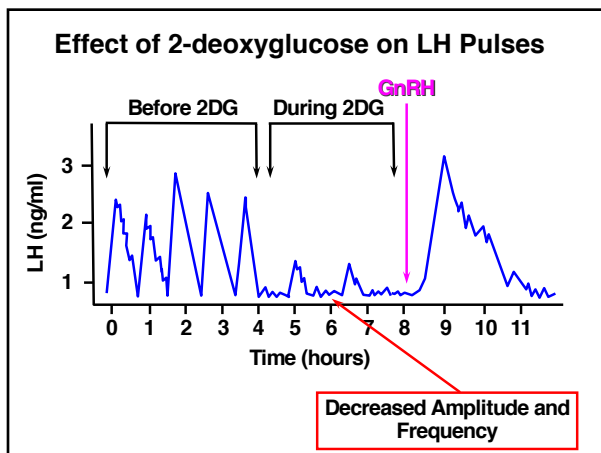
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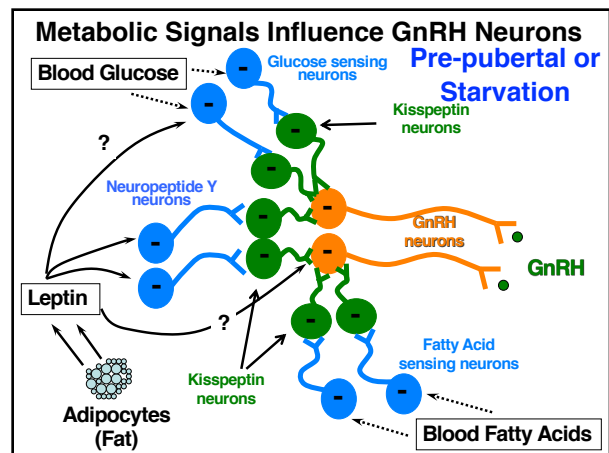
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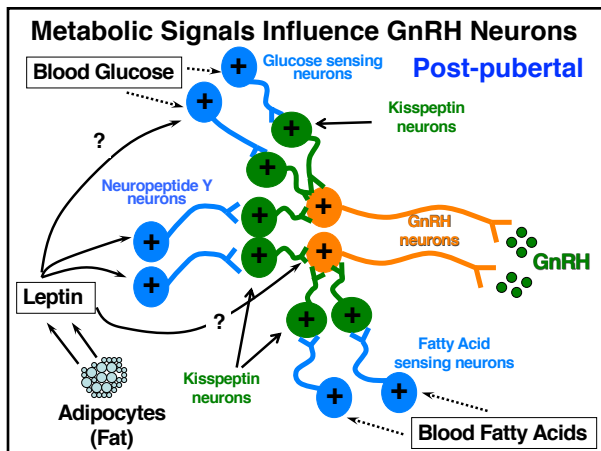
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Question 4b

Metabolic sensing neurons control GnRH release by synapsing with which neurons?

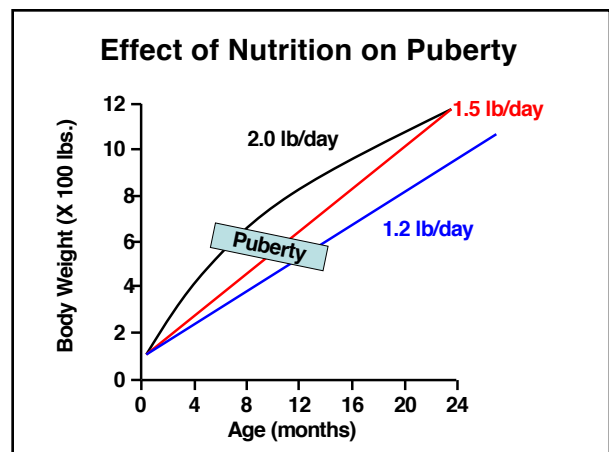
40

Question 4b

Metabolic sensing neurons control GnRH release by synapsing with which neurons?

Kisspeptin Neurons

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% Mature Weight at Puberty

Dairy Cattle	30-40%
Beef cattle	55-65%
Sheep	40- 63%

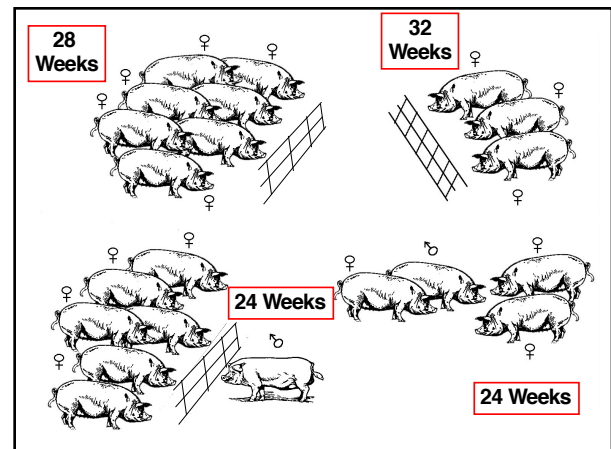
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Environmental and Social Conditions

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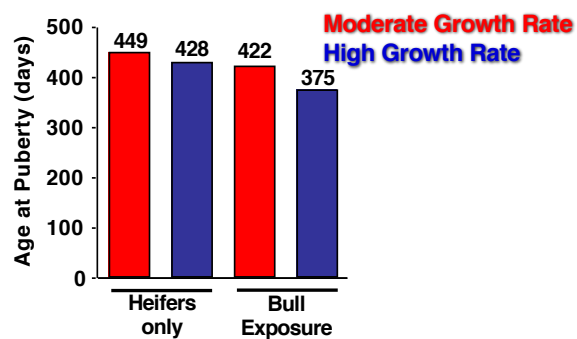
Effect of the Number of Females Housed Together and Exposure to A Male

45



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Influence of Growth Rate and Bull Exposure on Age of Puberty

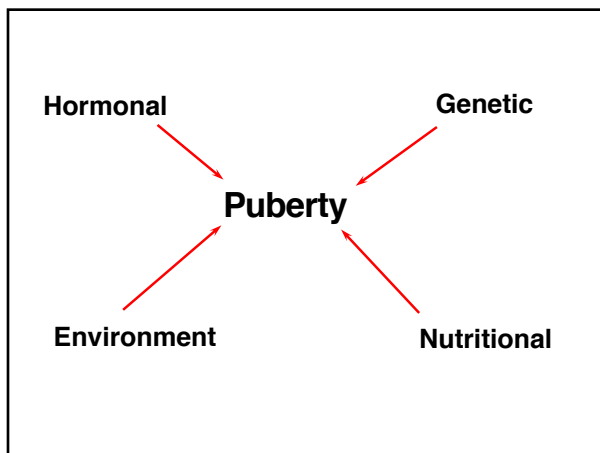


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Mechanism of Social Effects

- Pheromones
- Impacts on GnRH
 - » Nasal receptors impact nerve tracts to the hypothalamus

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Recommended Age to Breed	
• Heifer	15 months (65% mature BW)
• Bull	15 natural mating, 12 months AI, 9 - 10 months IVF
• Filly	2-3 years
• Colt	2 years (immature behavior until 3)
• Gilt	8 – 9 months
• Boar	9 months

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Quiz 4c

Can exposure to a male decrease the age of puberty in a female pig?

Cow?

Human?

51

Quiz 4c

Can exposure to a male decrease the age of puberty in a female pig? Yes

Cow? Yes

Human? Unknown

A cartoon illustration of a man with grey hair and glasses, smiling. A yellow star is next to him, and the text "GOOD JOB!" is written in a stylized, bubbly font below the star.

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