University of Mosul
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Lecture title: Female reproductive hormones

Lecturer Affiliation: University of Mosul\ veterinary medicine

Summary:

The hormones: are Substance produced by endocrine gland and acts on cells, tissues or organs at a place other than where produced.

The use of hormones is a major component of theriogenology. Hormonal preparations are utilized as reproductive managemental tools, diagnostic aids and therapeutic agents. The reproductive hormones are secreted from Hypothalamus, Anterior Pituitary, Posterior Pituitary, Ovary, Testis and Uterus.

❖ According to the chemical structure, the reproductive hormones can be divided into two classes:

1. **Class one:** Include the Protein, Peptide, Polypeptide hormones.
2. **Class two:** Include the Steroid and lipid hormones.

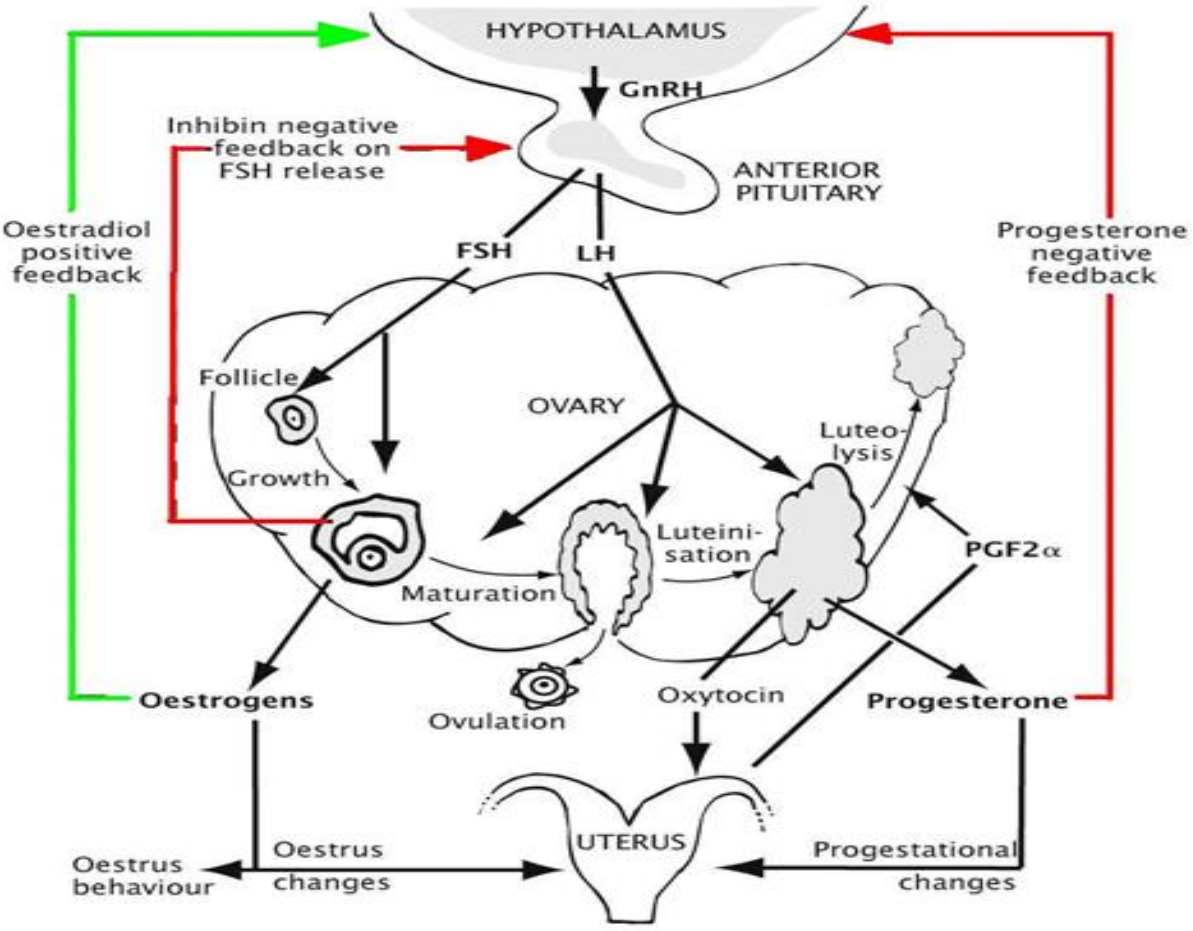
Gland	Hormone	Chemical Class	Function
Hypothalamus	Gonadotropin releasing h. GnRH	Peptide	FSH and LH release
	Prolactin releasing factor PRF	Peptide	Prolactin release
	Prolactin inhibiting factor PIF	Peptide	Prolactin retention
	Corticotrophin releasing h. CRH	Peptide	ACTH release
Anterior Pituitary	Follicle Stimulating h. FSH	Protein	1. Follicle growth 2. Estrogen release 3.Spermatogenesis

	Luteinizing h. LH	Protein	1. Ovulation 2. Corpus luteum formation and function 3.Testosterone release
	Prolactin	Protein	Milk synthesis
	Adrenocotiotropin ACTH	Poly-peptide	Release of glucocorticoid
Posterior Pituitary	Oxytocin	peptide	1. Parturition 2. Milk ejection
Ovary (Graafian Follicle)	Estrogens (Estradiol)	Steroid	1. Female sexual behavior 2. Secondary sex characteristics 3. Maintenance of female duct system 4. Mammary growth 5. Dilation of cervix
Ovary (Corpus Luteum)	Progestin (Progesterone)	Steroid	1. Maintenance of pregnancy 2. Mammary growth
	Relaxin	Polypeptide	1. Expansion of pelvis 2. Dilation of cervix
	Inhibin	Protein	Prevent release of FSH
Uterus	Prostaglandin F2α (PGF2α)	Lipid	1. Regression of corpus luteum 2. Parturition
Pineal Gland	Melatonin	Amine	Control of reproduction in seasonally breeding species
Endometrial Cups (Mare)	Equine Chorionic Gonadotropin (eCG)or Pregnant Mare Serum Gonadotropin (PMSG)	Glyco-protein	FSH-like- some LH activity Immunological protection of foal during pregnancy Formation of accessory CL in mare

❖ The hormones secreted by Placenta :

1. Human Chorionic Gonadotropin (**HCG**). it is Glycoprotein , LH-like - Involved with establishment of pregnancy in human &Support and maintain CL.
2. Estrogens/Progestins. it is Steroids, Regulate placental blood flow &Maintenance of pregnancy.
3. Relaxin. it is Protein ,Relaxation/dialation of cervix for parturition.
4. Placental Lactogens. It is glycoprotein, Stimulates mammary growth & milk secretion.

❖ Hormonal Regulation of female reproduction system



The CNS receives information from the environment of the animal (**external signals: visual, olfactory, auditory, and tactile**) and conveys this information to the gonads through the Hypothalamo-Pituitary-Gonadal axis. In the hypothalamus, endocrine neurons produce Gonadotrophin Releasing Hormone (**GnRH**). This GnRH is transported via the hypothalamo-hypophyseal portal system to the anterior lobe of the pituitary gland. Here it stimulates the gonadotrophin cells of the pituitary gland to secrete Follicle Stimulating Hormone (**FSH**) and Luteinizing Hormone (**LH**). FSH stimulates the **development of ovarian follicles**. **LH stimulates the theca interna of the follicle to synthesis of androstenedione from cholesterol. Androstenedione is converted into testosterone.** In the granulosa cells of the follicle the **testosterone is aromatized to oestradiol-17β under the influence of FSH**. At the same time, the granulosa cells also **produce inhibin**. Inhibin has a negative feedback on the FSH release from the pituitary gland, thus controlling follicle development. The **high level of LH initiates the ovulation**. After ovulation the remnants of the follicle are converted into the corpus luteum under the influence of LH. The **corpus luteum produce the progesterone**. Progesterone is essential for: the normal cycle in the cow the **maintenance of pregnancy**. It prepares the endometrium for the implantation of the embryo, and inhibits the contractions of the uterine wall. Progesterone has a negative feedback on the hypothalamus, thus decreases the secretion of GnRH, and therefore inhibits new ovulations. If the pregnancy is not occur, and at around day 16 after ovulation, the endometrium of the non-pregnant uterus will **release prostaglandin F2α**. Prostaglandin F2α is luteolytic, which means that it initiates the **regression of the corpus luteum.** As a result of the regression of the corpus luteum, progesterone

concentrations in the blood will decrease, and the progesterone block on the GnRH release from the hypothalamus disappears. This initiates a new follicular phase.