## PROGESTERONE

1. Progestrone is the most prevalent, naturally occurring progestagen and is secreted by luteal cells of the corpus luteum, the placenta, and adrenal gland.

2. Progesterone is transported in blood by a binding globulin as for androgens and estrogens.

3. LH primarily stimulates progesterone secretion.

4. Progesterone performs the following functions:

i. Prepares the endometrium for implantation and maintenance of pregnancy by increasing activity of secretory glands in the endometrium and by inhibiting the motility of the myometrium.

ii. Acts synergistically with estrogens to induce behavioural estrus.

iii. Develops the secretory tissue (alveoli) of the mammary glands.

iv. Inhibits estrus and the ovulatory surge of LH at high levels. Thus, progesterone is important in the hormonal regulation of the estrous cycle.

v. Inhibits uterine motility.

vi. Synthetic progestagens are available to synchronize the estrous cycle of ruminants.

vii. Synthetic progestagens act by inhibiting LH secretion from the pituitary.

5. The hormone is either fed or inserted into the vagina as an intravaginal device for a period of one estrous cycle length.

6. On cessation of treatment, animals will display estrus and ovulate 48 to 72 hours later.

## ANDROGENS

1. Testosterone is an androgen produced by the interstitial cells (Leydig cells) of the testes, with a limited amount produced by the adrenal cortex.

2. Testosterone is transported in the blood by a alpha globulin designated steroid binding globulin.

3. Some 98% of circulating testosterone is bound.

4. The remaining testosterone is free to enter the target where an enzyme in the cytoplasm converts testosterone to dihydrotestosterone, which can act on the nuclear receptor.

5. The horse is a unique species because the seminiferous tubules and epididymis also produce high levels of testosterone.
6. Horsemen have known for centuries that if parts of the epididymis is left attached to the vas-deferens during castration, the gelding will look and behave like a stallion. This is because androgens are produced by the remaining epididymis.
7. Allowing part of the epididymis to remain is termed “cutting a horse proud”.
8. This high level of androgen prolongs the life of epididymal sperm in the stallion rather than acting on the secondary sex characteristics.

**The functions of testosterone**

The functions of testosterone are:

1. Stimulate late stages of spermatogenesis and prolong the life span of epididymal sperm.
2. Promote growth, development and secretory activity of the accessory sex organs of the male.
3. Maintain secondary sex characteristics and sexual behaviour or libido of the male.

4. The synthetic androgens, testosterone propionate and androstenedione, are often used to prepare teasers for the detection of estrus. These androgenised cows and ewes have the advantage of not transmitting venereal diseases.

**RELAXIN**

1. Relaxin is secreted primarily by the corpus luteum during pregnancy.
2. In some species, the placenta and uterus also secrete relaxin.
3. The main biologic action of relaxin is dilation of the cervix and vagina before parturition.
4. It also inhibits uterine contractions and causes increased growth of the mammary gland if given in conjunction with estradiol.
5. In the guinea pig, relaxin causes separation of the pubic symphysis normally occurs during parturition in this species.

**INHIBINS AND ACTIVINS**

Inhibins and activins were isolated from gonadal fluids because of their effects on the production of FSH.

Inhibins and activins are paracrine regulators whereby they modulate the endocrine LH signal.

- INHIBINS
- The gonads are the main source of inhibin and related proteins, which contribute to the endocrine regulation of the reproductive system.
- Sertoli cells in the male and the granulosa cells in the female produce inhibins.
- Inhibins are protein comprising two disulfide bridged subunits called alpha and beta units.
- In the male, inhibins are secreted via the lymph and not by venous blood as in the female.
- Inhibins play an important role in the hormonal regulation of ovarian folliculogenesis during the estrous cycle.
- Inhibins act as chemical signals to the pituitary gland on the number of growing follicles in the ovary.
- Inhibins reduce the secretion of FSH to a level, which maintains the species specific number of ovulation in both single and litter bearing species.
- By inhibiting FSH release without altering LH release, inhibins may be partly responsible for the differential release of LH and FSH from the pituitary.
- Besides the regulation of pituitary FSH, inhibin related proteins regulate leydig cell function.

**ACTIVINS**

- Follicular fluid contains a fraction that stimulates rather than inhibits the secretion of FSH.
- The proteins responsible for this activity were characterized as activins.
- Activins are potent FSH-releasing dimers (dimers of inhibin subunits, B) and are present in gonadal fluids e.g. Follicular fluid and rete testis fluid.
- These heterodimeric hormones are composed of a alpha subunit and one of two Beta subunits (BA or B B)
- Activin is a fully functional member of the growth factor.

**FOLLISTATIN**

- Follistatin is another protein isolated from follicular fluid.
- Follistatin not only inhibits the secretion of FSH similar to that of inhibins but also binds activin and neutralizes its biological activity.
- Thus it modulates the secretion of FSH