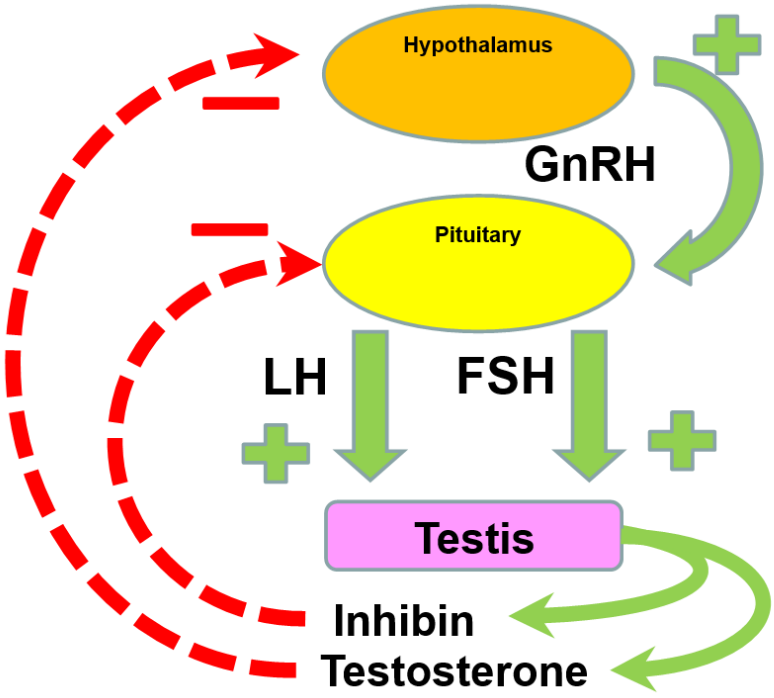
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Fifth Class
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Male Fertility - Theoretical lecture

Hormonal regulation of male reproductive system

- The hypothalamus plays a key role in triggering puberty by stimulating the pituitary gland, which stimulate the testis.
- GnRH release from the hypothalamus, stimulates the pitutary gland to release the
- FSH and LH.
- FSH acts directly on the seminiferous tubules of the testis (germ cells and Sertoli cells) to stimulate the Spermatogenesis.
- Sertoli cells produce inhibin, which has a negative feedback on FSH secretion by the pituitary gland.
- LH stimulates the Leydig cells in the testis to production of testosterone.
- Testosterone influences the Sertoli cells and is necessary for successful spermatogenesis.
- Furthermore testosterone induces morphological changes and typical male behaviour.
- Testosterone has a negative feedback on the LH secretion by suppressing the GnRH release from the hypothalamus.

LH : in the male formerly called ICSH (interstitial cell stimulating hormone).



- Prepubertal males exhibit an amplitude of LH peaks around three months of age, resulting in differentiation, growth and proliferation of Leydig cells.
- From puberty, testosterone levels begin to rise in the bloodstream and the bull begins to develop sexual organs, race characteristics and libido.

The two main functions of the testicles:

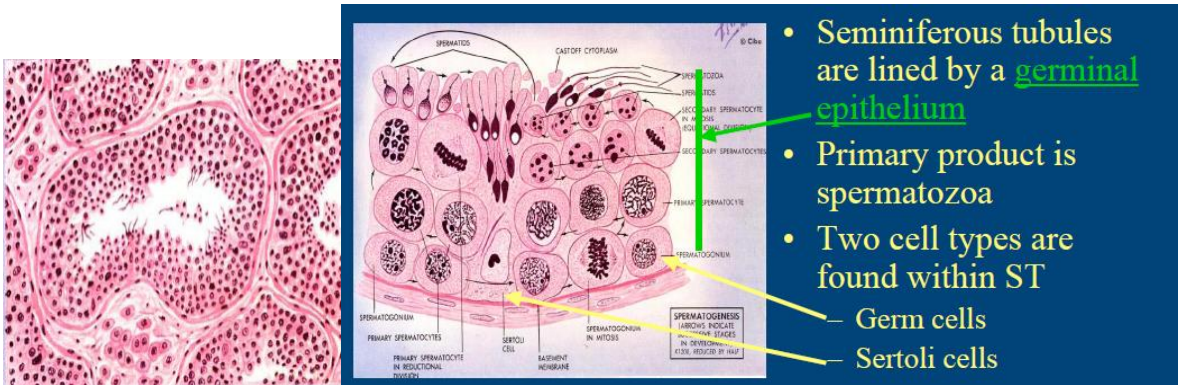
1. testosterone secretion.
2. sperm production.

The secretion of testosterone by Leydig cells, which is the hormone responsible for libido in the bull, is controlled by the action of LH (luteinizing hormone). The decrease in LH concentrations coincides with the increase in testosterone secretion.

Each pulse of LH is followed about 1 hour later by a pulse of testosterone secretion and the magnitude of the testosterone response rises with age.

Spermatogenesis

- Spermatogenesis is the process of producing sperm with half the number of chromosomes (hapliod) as somatic cells.
- occurs within the seminiferous tubule.



componets of spermatogenesis:

1. Spermatocytogenesis
2. Meiosis
3. Spermiogenesis
4. Spermiation

Spermatocytogenesis

proliferative phase (Mitotic divisions)

- Mitotic divisions of spermatogonia are occurs to produce the type A spermatogonia (several divisions).
- Type A spermatogonia are divided to produce the Intermediate spermatogonia.
- Intermediate spermatogonia are divided to produce the type B spermatogonia.
- Type B spermatogonia are divided to produce the Primary spermatocyte

Meiosis

production of the haploid gamete

- The primary spermatocytes undergo the first meiotic division to produces two secondary spermatocytes.
- Meiotic division of the secondary spermatocytes produces the spermatid

Spermiogenesis

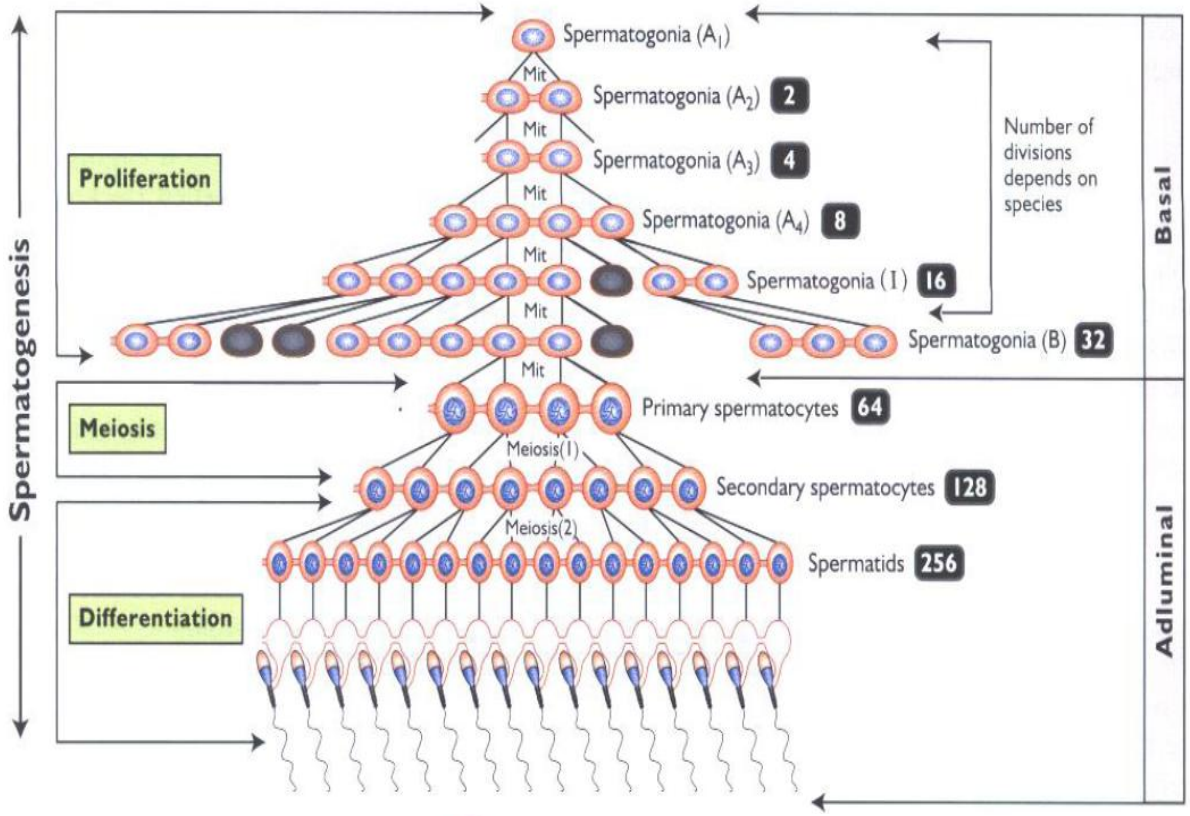
metamorphosis of spermatids
morphological conversion of round spermatid into spermatozoa without a division.

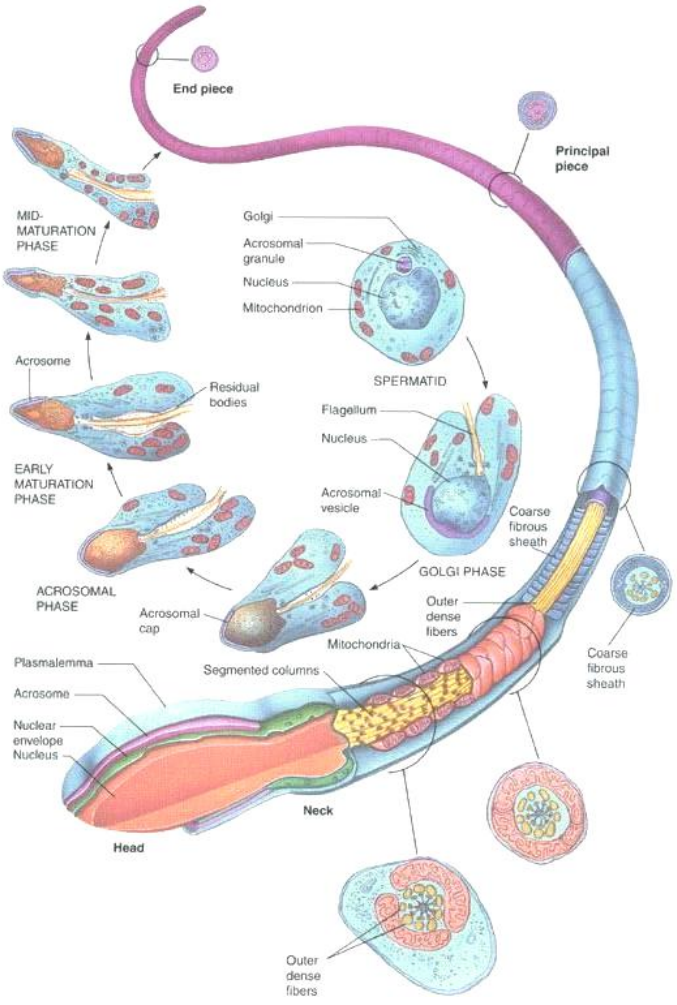
The changes which take place during are:

- the formation of the flagellum or sperm tail
- the condensation of the nuclear chromatin
- the development of the acrosomal cap

Spermiation

- release of spermatozoa from sertoli cell into lumen of seminiferous tubule.
- sertoli cell phagocytizes the remaining cytoplasm of the spermatozoa.
- only a small amount of cytoplasm is left on the neck of the sperm and it is called the cytoplasmic droplet.


Spermatogenesis
Proliferation
Meiosis
Differentiation
Spermatogonia (A_1)
Mit
Spermatogonia (A_2) 2
Spermatogonia (A_3) 4
Spermatogonia (A_4) 8
Spermatogonia (I) 16
Spermatogonia (B) 32
Primary spermatocytes 64
Meiosis(1)
Secondary spermatocytes 128
Meiosis(2)
Spermatids 256
Number of divisions depends on species
Basal
Adluminal


End piece
Principal piece
MID-MATURATION PHASE
Golgi
Acrosomal granule
Nucleus
Mitochondrion
SPERMATID
Acrosome
Residual bodies
Flagellum
Nucleus
EARLY MATURATION PHASE
Acrosomal vesicle
Coarse fibrous sheath
GOLGI PHASE
ACROSOMAL PHASE
Acrosomal cap
Outer dense fibers
Mitochondria
Coarse fibrous sheath
Plasmalemma
Segmented columns
Acrosome
Nuclear envelope
Nucleus
Neck
Head
Outer dense fibers