

Female reproductive system

Anatomy and Physiology

The female reproductive system consists of :

- 1- Two ovaries.**
- 2- oviducts (salpinx, uterine tubes, fallopian tubes) (2oviducts).**
- 3- Uterus which consists of uterine horns, uterine body and cervix.**
- 4- Vagina.**
- 5- External genitalia.**

Ovaries (single Ovary): as the testes are paired organs that serve both gametogenic and endocrine functions, the ovaries of the normal XX embryo are formed under the influence of the X chromosome. Shape of the ovary depends on:

- 1- Species: cow, sheep and goat have almond to oval shape, in the sow is berry shape, in the mare, kidney shape, in bitch and cat is oval slightly flattened.
- 2- Stage of estrous cycle (presence of follicles and corpus luteum).
- 3- Nutritional status .
- 4- Number of parturitions .
- 5- No. of ova at the ovulation (monotocous as cow, polytocous as cat).

Location of ovaries: its located in the lumbar region in abdominal cavity to the lateral side of the inlet of pelvic cavity and it is supported by a part of broad ligament called Mesovarium , ovary found in sac formed from fuse of mesovarium and mesosalpinx called ovarian bursa.

Histologically the ovary consists of two parts cortex and medulla, medulla consists from connective tissue and blood , nerve supply. While cortex covered with layer of cuboidal germinal cells(germinal epithelium) and under this layer founded different types of follicles which are:

- a- Primordial follicles.
- b- Growing follicles.
- c- mature follicles (graafian follicles).

In mare the cortex uncovered with layer of germinal epithelium, this layer restricted to ovulation fossa only.

In cows and ewes 50-65% of ovulations occurred in right ovary. Due to the location of left ovary close to rumen which affected by heat.

In mare 60% of ovulations occur in left ovary due to the location of right ovary close to caecum.

Functions of ovaries:

- 1- Producing of ova that fertilized by active sperm to form zygote and embryo.
- 2- Endocrine function: produce hormones as estrogens, progesterone and relaxin.

Oviducts (usually 2): oviduct is a tortuous organ of small diameter (0.5 cm), are paired convoluted tubes extend from ovaries to uterus, and consist of three parts:

- a- Infundibulum (funnel shape) located at the ovarian end and has fingers to capture the ovum and moving it to oviduct under hormonal control. Infundibulum enveloped the whole ovary in lab animals, while it enveloped the ovulation fossa only in mare.
- b- Ampulla: it is the site of fertilization (union of sperm with ova).
- c- Isthmus. which opens into uterus.

The lumen of oviduct consists of three layers:

1-epithelium layer have two types of cells

- a- Columnar epithelium that has cilia
- b- Non ciliated glandular cells secreted fluids under hormonal control.

2-muscular layer that has involuntary movement.

3-serosa layer.

Functions of oviduct:

- 1- Transport of sperm and ova to the site of fertilization in ampulla through cilia of columnar cells and fluids secreted by glandular cells.
- 2- Capacitating of sperm before fertilization.
- 3- Survive early embryo by incubating zygote 3-7 days under hormonal control.
- 4- Regulation of passage of sperm from uterus to oviduct and transport early embryo from oviduct to uterus at proper time through isthmus.

Uterus : it is a remarkable organ that can be enlarged and extended due to change of its size with the number of parturitions and advance of gestation period, in domestic animals consists of two horns , body and cervix.

In bitch , cat, and sow it is called bicornuate uterus and has Y shape, in these animals the horns are long and convoluted while the body is short. In mare , cow, and ewes uterus is called bipartite. In these animals there is a septum that separates the two horns with a prominent uterine body (the mare has the largest).

Location of uterus: in bitch, cat and sow, it is located in the abdominal cavity, while in cow, ewe, goat and mare , it is located in the pelvic cavity. But with advance of gestation period it moves to abdominal cavity. Uterus is connected with body by a broad ligament.

Histologically uterus consists of three layers which are:

- a- Endometrium.**
- b- Myometrium.**
- c- perimetrium.**

Functions of uterus:

- 1- Passage of sperm during mating or copulation.
- 2- Survival of zygote by secretion of uterine milk from uterine glands located in endometrium during early gestation period.
- 3- Implantation and placentation of embryo.
- 4- Plays an important role in parturition process by contractions of myometrium under hormonal control.
- 5- Hormonal role as release of PGF₂ alpha from endometrium to regress the corpus luteum on the ovary and begins a new estrous cycle.

Cervix: it is a doorway to uterus, it is a Physiological barrier that separates uterus from external environment, it has a muscular wall enable it to close the passage way during gestation and relaxing during mating at estrus to allow passage of the sperm and passage of fetus at parturition.

Cervix has a tall columnar epithelium and glandular cells(**Goblet cells**) which have a vital role in secretion mucus that facilitates the passage of sperm, depends on the stage of estrous cycle (amount, viscosity). During mating there is abundant thin mucus, but during luteal phase and gestation period, is scant sticky mucus (cervical seal barrier to protect embryo during pregnancy).

Vagina: it is a copulation organ, and capable to extend and serve as depositon site and passage for semen during mating and fetus during parturition.

The epithelium lining of vagina changes due to the influence of ovarian hormones, hence under estrogen hormone epithelium became stratified and squamous , whereas at mid cycle and under progesterone hormone vagina has low cuboidal cells.

External genitalia: consist of Vulva, Clitoris, Commissures, Perineum, and Vestibule .

Vulva: Consist of the labia majora and labia minora. Provides anatomical closure to vagina so as to minimize entry of foreign materials into vagina.

Clitoris: is embryological homologue to penis in male and consists of erectile tissue, it is highly innervated and very sensitive to the tactile stimulation.

Commissures: Dorsal and ventral are the sites of the union of the labia.

Perineum: Area surrounding the vulva and anus. Can be torn during a difficult parturition.

Vestibule: Common duct for urine and fetus during parturition. Also functions to stimulate penis during copulation. Within vestibule there are Bartholins glands which secrete lubricating mucus that facilitates copulation.