

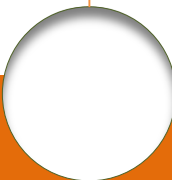
Artificial Insemination

Female reproduction organs



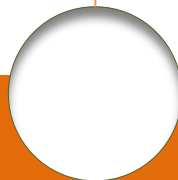
Female reproduction organs

- Gonads – ovaries
- The female tubular genital tract – oviducts, uterus, vagina, vulva



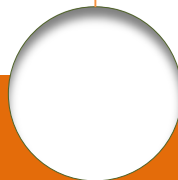
Function

- **Oocytes production - gametogenesis**
- **Hormone production**
- **Mating**
- **Developing new individuals inside mother (fertilized oocyte, fetus)**
- **Parturition**



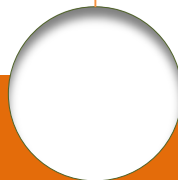
Ovaries

- **Development of oocytes**
- **Hormone production – estrogens, progesteron**
- **Size and location varies with the species**
- **Rectal palpation only in Bo and Eq**
- **When puberty is reached the size and form is periodically changing by structures – CORPUS LUTEUM (CL) and follicles**
- **Connected to uterus by ligaments, mesovarium**



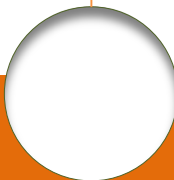
Ovaries

- **Mares – 7 cms**
- **Cows – plum shape**
- **Swine – bumpy, raspberry shape**
- **Queen, Bitch – depends on a cycle time**



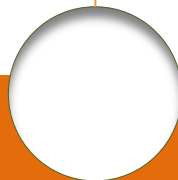
Ovaries

- **Marrow – in the middle, vessels, nervs**
- **Cortex – follicles with oocytes in different stage of development**
- **Follicles**
 - **primary – some come to end, some develop to secondary ones, growing, oogonia covered by numerous cells**
 - **tercial (Graaf) follicle ovulatin**



Ovaries

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Before birth

Meiotic Events

Follicle Development in Ovary

Childhood

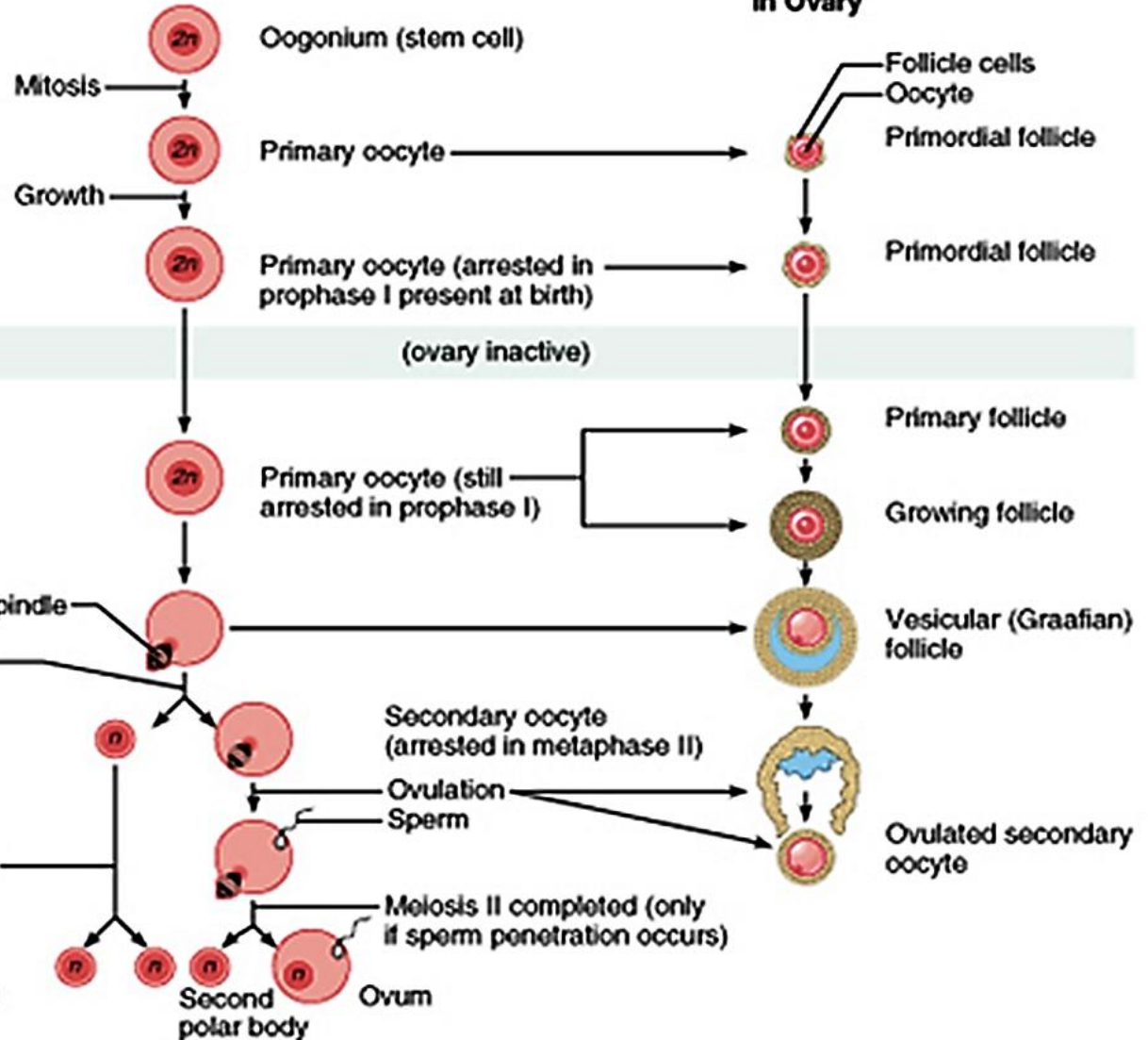
Each month from puberty to menopause

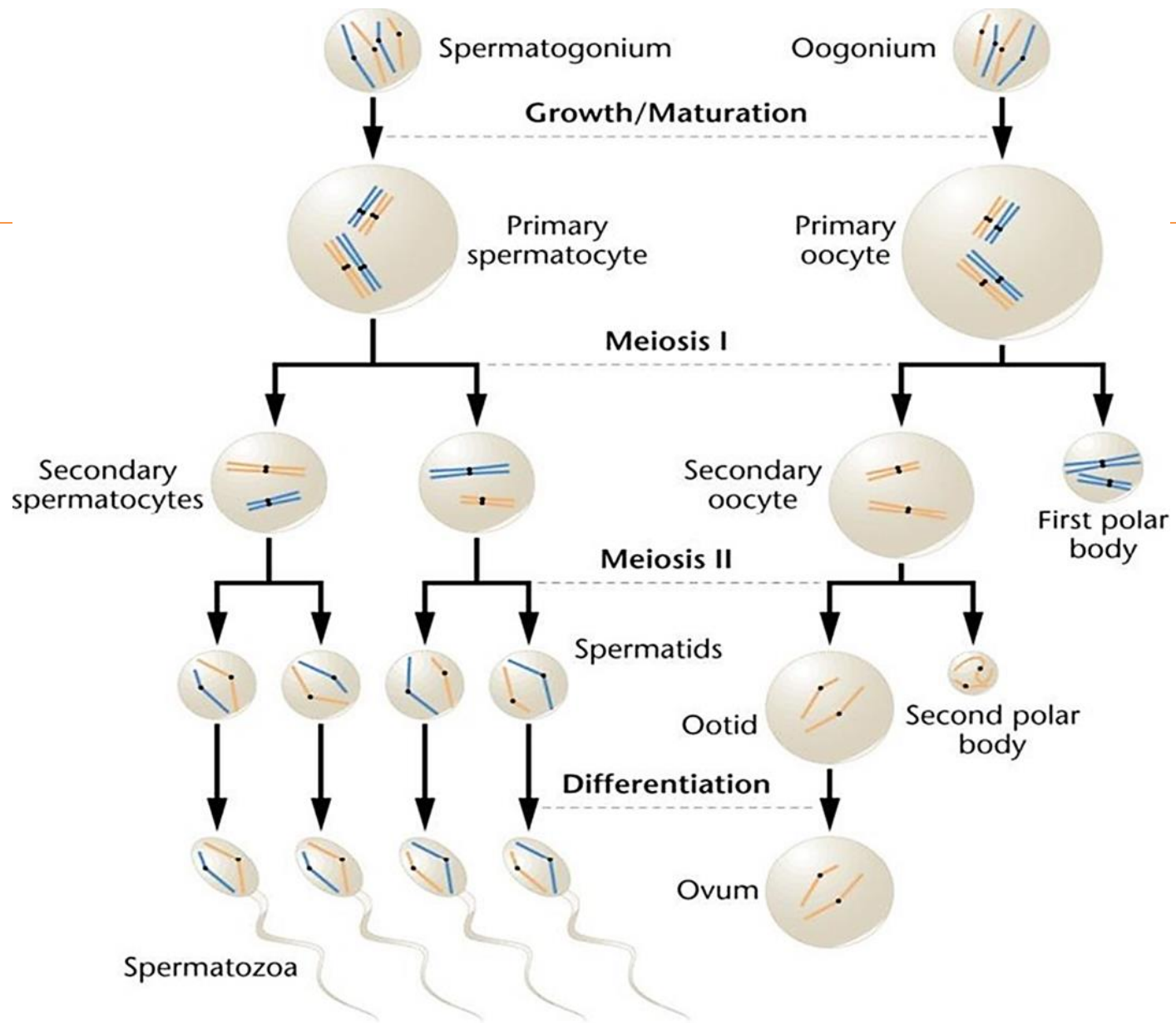
Melosis I (completed by one primary oocyte each month)

First polar body

Melosis II of polar body (may or may not occur)

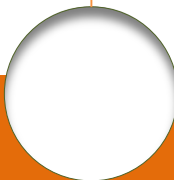
Polar bodies (all polar bodies degenerate)





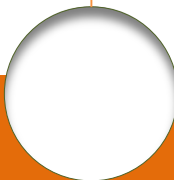
Graaf follicles

- **Cow – 2cms**
- **Mare – 5 cms**
- **GF – theca externa, theca interna cells – hormone production**
- **GF ruptures in ovulation and oocyte is released with the fluid to ampula and then to oviductus**
- **More GF ovulates in multiparous species**
- **Artificial influence of numerous GF**



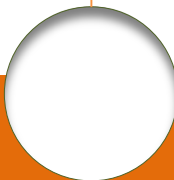
Corpus luteum

- After ovulation CL develops in the hole after ruptured follicle as a scar
- Progesteron production
- If the female doesn't get pregnant CL regresses
- If pregnant CL stays, grows, called CORPUS LUTEUM GRAVIDITATIS
- Progesteron protects pregnancy, later uterus (placenta) takes the same role



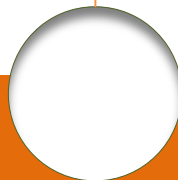
Follicles and CL

- **FSH (folliclestimulating hormon) is responsible for development of follicles and synthesis of estrogen by theca cells**
- **A certain estrogen level in blood is reached, LH (luteinizing hormone) is released from pituitary gland**
- **This is called LH peak – triggers ovulation and development of new CL**
- **Increased number of luteal cells increases also progesterone level**

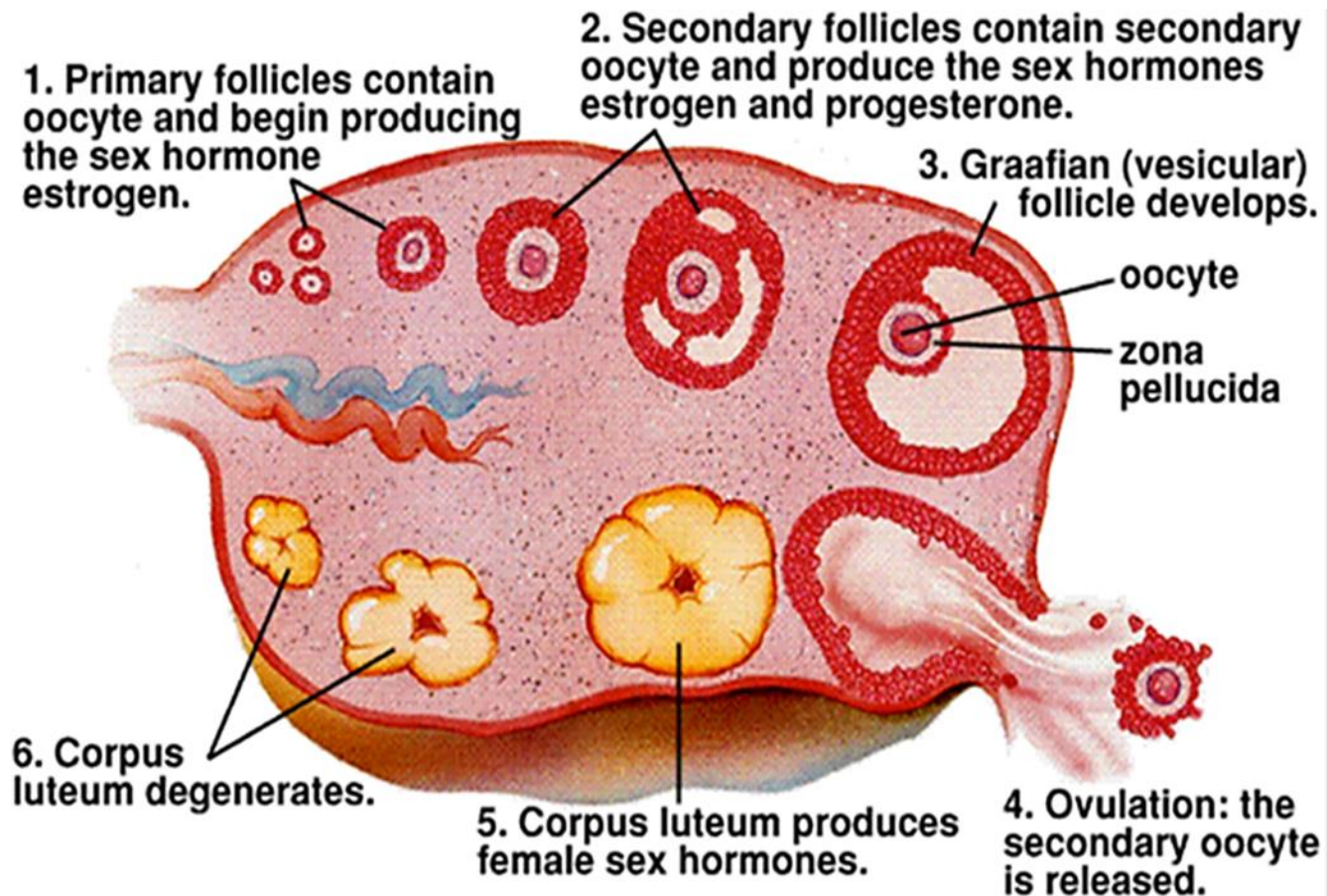


Follicles and CL

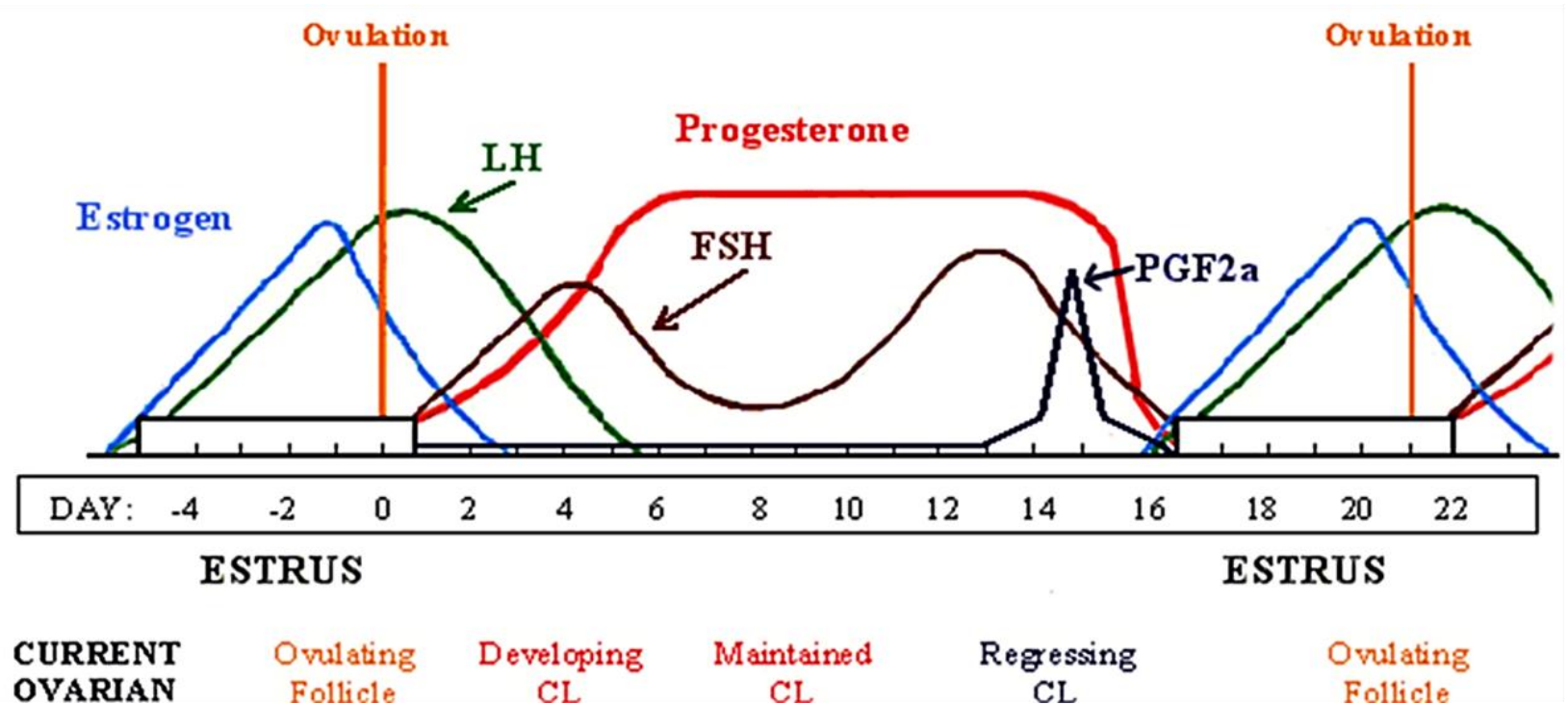
- In nonpregnant, polyestrous females CL is terminated by endogenous prostaglandin F₂α from the uterus
- As the CL regresses a new follicle develops
- Estrous cycle is continuous after puberty unless interrupted by pregnancy, season or lactation
- Hormonal changes can be monitored by ELISA of hormones in blood, milk or urine



Anatomy of ovaries

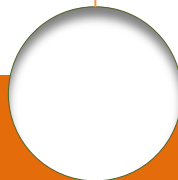


Hormonal levels in graph - horse



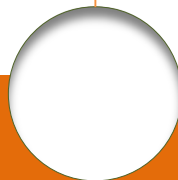
Oviductus

- **Mullerian ducts – origin**
- **Motility in epithelias – moves the zygote to the uterus**
- **Place of fertilization**
- **Ampulla to catch the oocyte**



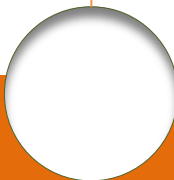
Uterus/Hystera

- **Cavity organ for development of zygote and fetus from fertilized eggs**
- **Provides first nutrition (uterine milk) for zygote**
- **NIDATION – settling down of zygote, if close to a vessel it can cause bleeding**
 - **Body**
 - **Horns**
 - **Cervix**



The types of uterus

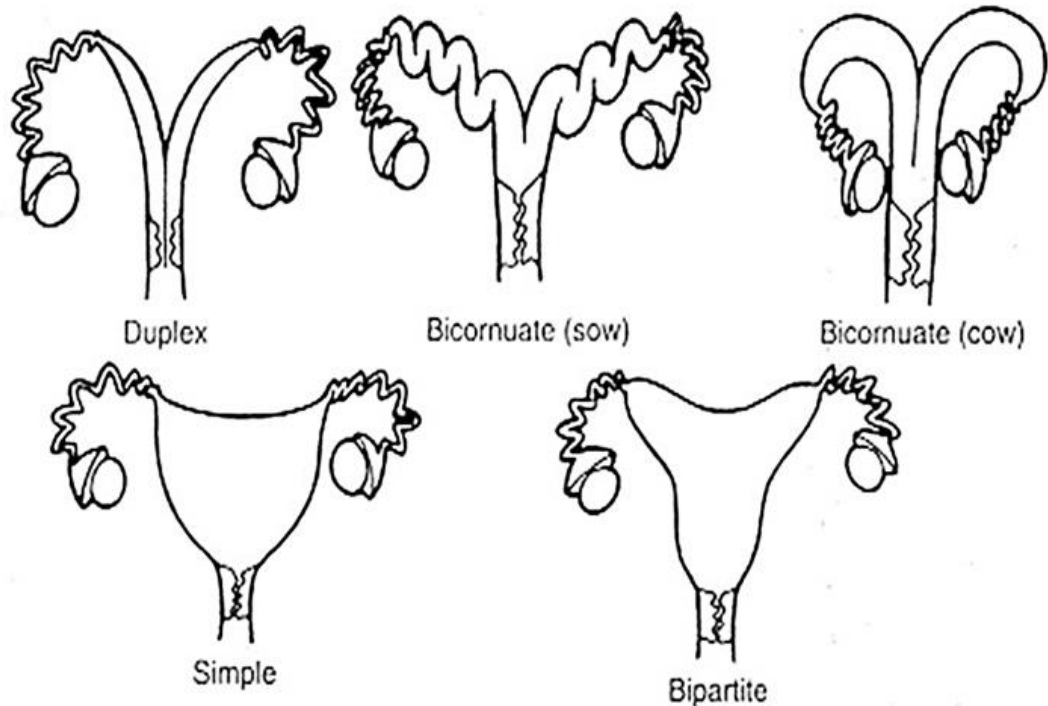
- **Uterus duplex** – in rabbits, two horns, two enters in cervix to horns, no body
- **Uterus simplex** – two horns
 - Divided – medial septum, in Bo, Sus, Car
 - Not divided – no medial septum, in horses



The types of uterus

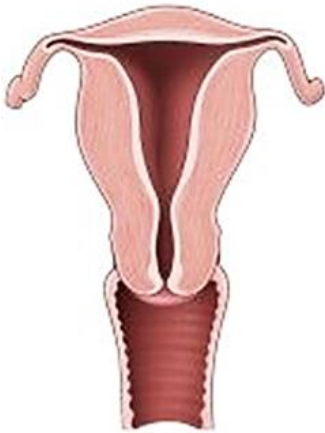
**There are four main forms of uterus in mammals.
They are:**

- **Duplex**
- **Bipartite**
- **Bicornuate**
- **Simplex**



Congenital Müllerian Anomalies

Normal uterus



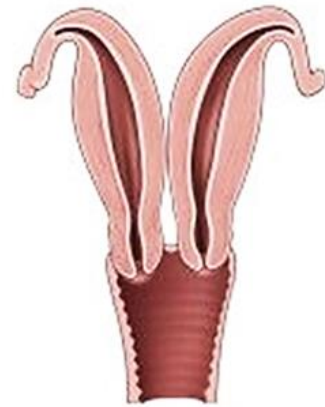
Class I: Uterine hypoplasia and/or agenesis



Class II: Unicornuate uterus



Class III: Uterus didelphys



Class IV: Bicornuate uterus



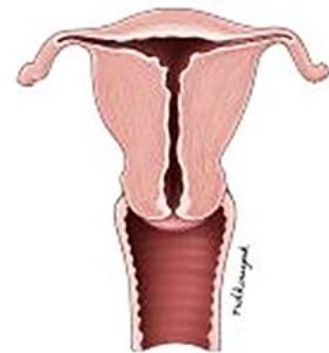
Class V: Septate uterus



Class VI: Arcuate uterus

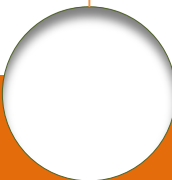


Class VII: Diethylstilbestrol (DES) drug related



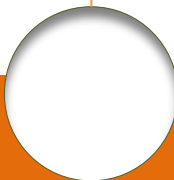
Uterus

- **Hanging on wide ligaments – lig. latum uteri**
- **Cervix and body in sterile female situated in pelvic cavity**
- **The horns in abdominal cavity**
- **The length of horns is specific to each species, dependent on number of fetus(es)**



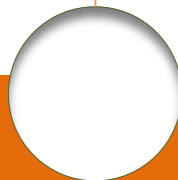
Cervix uteri

- **Constantly closed**
- **Physiologicaly open during heat or parturition**
- **Protective barrier against ascending infections which can cause infertility (mating, parturition, puerperium)**
- **Vaginal portion of the cervix – only in Bo, Ho**

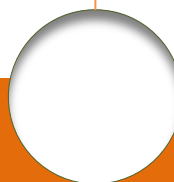


Uterine structure

- **3 layers**
 1. **External – peritoneum and ligaments**
 2. **Medial – MYOMETRIUM – smooth muscle cells circular and longitudinal directions**
 3. **Internal – ENDOMETRIUM – numerous glands, longitudinal folds, in Rum called CARUNKULES (80-120, sterile female – 1cm, pregnant – fist size), connection with chorion**



Uterine structure

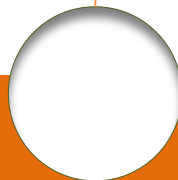


Uterus

- **Arteria uterina – blood for uterus, oviductus and ovarium**
- **Vena uterina contains PGF2alfa from uterine mucose**
- **a. uterina turns a lot around v. uterina and delivers PGF2alfa to CL, luteolysis**

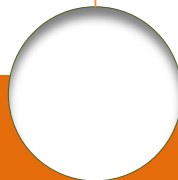
Vagina

- **Copulating organ**
- **For inserting penis**
- **The middle segment of the birth canal**
- **From the cervix to the vulva**
- **Situated below the rectum and above the bladder**
- **The vaginal wall is folded, smooth muscles are circular and longitudinal**



Vaginal vestibulum

- **Mucosal glands – lubrication, easier insertion of the penis**
- **Urethral orifice in ventral aspect**
- **HYMEN – the boarder between vestibulum and vulva, different embryonic origins (Muller tubules and ectoderm)**



Vulva

- The last segment of the birth canal
- The pathway for ascending infections
- Two lips, ventral and dorsal connection
- CLITORIS – developmental rest of the penis basis, the same structure



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