General Functions of the Female Reproductive Tract

- Transport sperm
- Produce oocyte
- Facilitate fertilization
- Provide environment for embryo and fetus
- Give birth to fetus
- Recycle to become pregnant again
- Provide nutrients to young

Supportive Tissues

BROAD LIGAMENTS

A. Support Reproductive Tract in Abdomen
B. Three Parts:
   1. Mesovarium — supports ovary
   2. Mesosalpinx — supports oviduct
   3. Mesometrium — supports uterus

I. VULVA and POSTERIOR VAGINA
(Figures 2-5 to 2-, 2-9)
A. External Genitalia of Female
B. Labia

Consists of two labia, which form commisure
1. Labia minora
   a. Inner folds
   b. Homologous to sheath
   c. Small in farm animals
2. Labia majora
   a. Outer folds
   b. Homologous to scrotum
c. Externally visible

C. Clitoris

1. homologous to penis
2. large in mare
3. highly innervated by nerve endings
   ✓ Highly sensitized area
   ✓ May contribute to conception rates in cattle when cows inseminated artificially

D. Vestibule (posterior vagina)

1. region common to reproductive & urinary systems
2. stimulates male for copulation (Not present in humans)
3. passage for fetus during parturition
4. Parts:
   a. Hymen — embryonic remnant
      (1) Mullerian duct — reproductive tract
      (2) urogenital sinus — vestibule
   b. External urethral orifice — opening of urethra
   c. Suburethral diverticulum — blind pocket
      presence of suburethral diverticulum (sow & cow)
      -may block urine from entering uterus. Vestibular glands

• Posterior Vagian has no or limited glands, low degree of secretion and it changes with the stage of the estrous cycle
  1) Bartholin’s glands
  (2) in vestibule wall
     (a) secrete at estrus
     (b) lubricate vagina
     (c) related to Cowper’s glands?
Ib. Tubular Structure if the Female Reproductive Tract.

1) Tunica serosa (perimetrium)
   a. Outermost layer
   b. Connective tissue
2) Tunica muscularis (myometrium)
3) Tunica mucosa  (Endometrium)
   a. Consists of mucosa and sumucosa

II. ANTERIOR VAGINA

A. Female Copulatory Organ
   1. Site of semen deposition — cow, ewe, doe, human
   2. Different epithelium (simple columnar)
   3. Luminal epithelium (near the cervix) is secretory (mucus)
   4. pH is acidic (5.7) – Bacteriostatic 5. stimulates glans penis of the bull

B. Structure
   1. Length
      a. Cow = 35-30 cm
      b. Ewe, doe, sow = 10-15 cm
   2. Outer layer
      a. Tunica serosa
   3. Middle layer
      a. Circular muscle
      b. Longitudinal muscle
   4. Inner mucosal muscle
      a. Stratified squamous epithelium

C. Mucosa Responds to Hormones
   1. High estrogen
      a. Epithelial cell growth
      b. Cornified (dead) cells — lack a nucleus
      c. Increase in leukocytes (WBC)
      d. Estrus detection in rodents
D. May contain a large crypt (pocket) called *fornix vaginae*
Fornix vagina is absent in the sow

III. THE CERVIX
(Figures 2-20, 2-21)

A. Structure
1. Technically part of the uterus
2. Thick-walled & inelastic
3. Anterior continuous with uterus
4. Fornix -- blind sac formed by cervix protruding into vagina
5. Annular rings
   a. Found in cow, ewe, doe — act to seal uterus
6. Histology
   a. Tunica serosa — outer layer
   b. Middle layer — mostly connective tissue; some smooth muscle
   c. Inner layer — secretory epithelium secretes mucus; few ciliated cells

B. Functions
1. Isolates the uterus from the external environment a. Annular rings
   (1) cow: 3-4 rings
   (2) doe: 5 rings
   (3) ewes: 6-7 rings
   b. Cervical mucus — flows into vagina
   c. Cilia — beat toward vagina
2. Passage for sperm
   a. Sows & mares — site of sperm deposition
   b. Sperm reservoir
      (1) sperm held in cervix
      (2) sperm long lived in cervix
      (3) provides slow sperm release — increases chance of fertilization
   c. Sperm selection — heterologous inseminations
d. mucus and anatomy of cervix act as a sperm filter in some species

Prevents large numbers of sperm from reaching oviduct in cow and ewe

3. Responsible for isolation of the conceptus (fetus) within uterus from external environment
   a. Cervical plug (cervical seal)
      (1) formed during pregnancy
      (2) formed from mucus
      (3) liquifies at parturition

C. Cervical Mucus
   1. Properties:
      a. Biochemical and physical properties of the mucus changes during the estrous cycle:
         Hormones change properties:
         (1) high progesterone — thick, viscous mucus
         (2) high estrogen — thin, watery mucus
   2. Lubricant at parturition
      a. Cervix expands due to fetal pressure

D. Species Differences
   1. Cow, ewe, doe — annular rings
   2. Sow
      a. Funnel-shaped
      b. Allows penis to enter
      c. Difficult to pass pipet
   3. Horse
      a. Longitudinal folds
      b. Allows penis to enter
      c. Relatively easy to pass pipet

IV. THE UTERUS
(Figures 2-7 to9, 2-16,2-117)
A. Divided into Two Parts
   1. Uterine horns (2)
      a. Size varies with uterine type
      b. Cow, ewe, sow, doe — 80-90% of total length
      c. Small in horses
      d. Absent in humans
      e. At junction form uterine body
   2. Uterine body
      a. Area common to both sides of female tract

B. Structure
   1. Tunica serosa (perimetrium)
      Outer serous layer continuous with peritoneum - blocks adhesions
      a. Outermost layer
      b. Connective tissue
   2. Myometrium
      a. Middle layer of muscle
      b. Contains 3 layers:
         (1) two layers longitudinal muscle
         (2) one layer circular muscle
   3. Endometrium
      Provides point of placental attachment and glands provide secretions
      for embryo development (Estrogen and Progesterone)
      a. Innermost layer
      b. Highly secretory
      c. Simple glands

V. UTERINE FUNCTIONS
   A. Nourish the Embryo -- makes histotrophe or uterine milk
   B. Site of Implantation (Figure 2-17)
      1. Exchange with maternal system through the uterine wall (placentom)
C. Sperm Transport
   1. Primarily muscular contraction
   2. Sperm move faster than can swim

D. Expulsion of the fetus and Fetal Placenta
   1. Muscles of myometrium contract during parturition
   2. Responsiveness of myometrium varies with hormonal state

E. Control of estrous cycle and luteolysis
   1. Communicates with the ovary as to presence of embryo -- determines the life of the CL
      a. Secretion of prostaglandin F2α in the absence of the fetus and regression of the corpus luteum

VI. TYPES OF UTERI
(Figure 2-15)
A. Duplex
   1. In rat, rabbit, guinea pig
   2. Have 2 cervices — one for each horn
   3. No embryo migration possible

B. Bicornuate
   1. In cow, ewe, sow, doe
   2. Large uterine horns
   3. Small uterine body
   4. In cows, ewes, & does — external fusion makes body appear large

C. Bipartite
   1. In horse
   2. Small uterine horns
   3. Large uterine body

D. Simple
   1. In humans and primates
   2. Large, pear-shaped uterine body
   3. Non-existent horns