Unit B: Understanding Animal Body Systems

Lesson 6: Anatomy and Physiology of Animal Reproductive Systems

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Identify and describe the male reproductive organs in mammals.
2. Identify and describe the female reproductive organs in mammals.
3. Identify and describe the male and female reproductive organs in poultry.

List of Resources: The following resources may be useful in teaching this lesson:

Gillespie, J.R. *Modern Livestock & Poultry Production,* 6th Edition. Albany, NY: Delmar. 2002. (Unit 10)

Baker, M. & Mikesell, R.E. *Animal Science Biology and Technology.* Danville, IL: Interstate Publishers, Inc. 1996. (Chapter 5)

Recommended Teaching Time: 3 hours

List of Equipment, Tools, Supplies, and Facilities:

Writing surface
PowerPoint Projector
PowerPoint Slides
Transparency Masters
Paper for flashcards
Scissors
Sample reproductive tracts if available

Terms: The following terms are presented in this lesson **PowerPoint Slides 2 and 3.**

Alimentary canal
Bladder
Cervix
Clitoris
Cloaca
Copulation
Cowper's gland
Epididymis
Fallopian tubes
Follicles
Funnel
Gamete

Gestation
Infundibulum
Isthmus
Labia majora
Labia minora
Magnum
Mucosal cells
Ova
Ovary
Oviducts
Papilla
Parturition
Penis
Prostate gland
Scrotum
Semen
Seminal vesicles
Sheath
Sperm
Spermatozoa
Testicles
Testosterone
Urethra
Urine
Uterine horns
Uterus
Vagina
Vas deferens
Vulva
Zygote

Interest Approach: Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Ask students the following question" "If we are going to raise goats, sheep, chickens or cows on our school farm, why is it important to have a clear understanding of the reproductive parts of these animals?" Students should come up with a variety of reasons why they need to know about the anatomy and physiology of animal reproductive systems. After a brief discussion of the student responses ask them, "If these are the reasons why it is important to have a clear understanding of the anatomy and physiology of animal reproductive systems." "What do we need to know about the anatomy and physiology reproductive systems of animals?" Develop a list of topics the students think should be discussed. These list of topics should relate to each of the objectives of this lesson plan. Summarize the list of topics developed by the students and begin the lesson with Objective 1.

Summary of Content and Teaching Strategies

Objective 1: Identify and describe the male reproductive organs in mammals.
Anticipated Problem: What are the major reproductive organs in male mammals? What are the functions of those organs?

I. To have a successful livestock operation, a producer must have an understanding of the functions of the various reproductive organs. In most cases, a livestock operation will have only a limited number of males available for breeding. **By raising their hands, ask students how many of them have male livestock at home. Ask students why only a few males are kept on a farm for breeding.** The male reproductive system contains several interconnected parts that must all work together in order to have successful mating. Some of the major organs found in the male mammal reproductive system are: **PowerPoint Slide 4.**

Tell students that they will be making flashcards for each of the parts of the male reproductive system. Recommend that they use the same color of paper for the male parts, and a different color for the female parts. To make the flashcards, divide a piece of paper into 8 equal parts and cut out each section. On the front of the card put the reproductive part such as "testicles". On the back, have students write the definition and draw the part if helpful.

A. Testicles—The ***testicles*** produce ***sperm***, the male sex cells also called ***spermatozoa***. They also produce a hormone called ***testosterone*** that causes the appearance and behavior of the animal to be masculine. There are two testicles present in male mammals. **PowerPoint Slides 5 and 7.**

B. Epididymis—The ***epididymis*** is the storage site for sperm cells. These cells enter the epididymis from the testicle to mature. Sperm become able to fertilize a female's ***ova*** or female sex cell, as it travels through the epididymis. There is a separate epididymis attached to each testicle. **PowerPoint Slides 6 and 7.**

C. Scrotum—The ***scrotum*** is a two-lobed sac that contains and protects the two testicles. It also regulates the temperature of the testicles, maintaining them at a temperature lower than body temperature. When the environment temperature is low, the scrotum contracts, pulling the testicles toward the body and its warmth. When the environmental temperature is high, the scrotum relaxes, permitting the testicles to drop away from the body. Maintaining the correct temperature is critical in that being too hot or too cold can affect the production and vitality of sperm. **PowerPoint Slide 8.**

D. Vas Deferens—The ***vas deferens*** is essentially a transportation tube that carries the sperm-containing fluid from each epididymis to the urethra. **PowerPoint Slide 9.**

E. Urethra—The ***urethra*** is a large, muscular canal extending from the urinary bladder. Both semen and urine move through the urethra to the end of the penis. **PowerPoint Slide 10.**

F. Accessory Sex Glands—There are several glands that add volume and nutrition to the sperm-rich fluid coming from the epididymis. **PowerPoint Slide 11.**

G. Seminal vesicles—The ***seminal vesicles*** open into the urethra. They produce a fluid that protects and transports the sperm. **PowerPoint Slide 12.**

H. Prostate gland—The ***prostate gland*** is near the urethra and the bladder. It produces a fluid that is mixed with the seminal fluid. **PowerPoint Slide 12.**

I. Cowper's gland—The ***cowper's gland*** produces a fluid that moves down the urethra ahead of the seminal fluid. This fluid cleans and neutralizes the urethra. This helps protect the sperm as they move through the urethra. The mixture of the seminal and prostate fluid and the sperm is called ***semen***. **PowerPoint Slide 13.**

J. Penis—The ***penis*** deposits the semen within the female reproductive system. The urethra in the penis is surrounded by spongy tissue that fills with blood when the male is sexually aroused. This causes an erection that is necessary for ***copulation***, or mating to occur. The sigmoid flexure (found in bulls, rams, and boars) and the retractor muscle extend the penis from the ***sheath***, a tubular fold of skin. Horses and other mammals do not have a sigmoid flexure. The blood that fills the spongy tissue when sexual arousal occurs causes erection. **PowerPoint Slide 14.**

During lecture on this topic, make sure students get all information needed copied on flashcards. Also, use PowerPoint Slides 15, 16, 17, 18, and 19 as well as TM: 6-1 and TM: 6-2 to show students exactly where each part is located. Be sure to draw these on the writing surface and reference them often.

Objective 2: Identify and describe the female reproductive organs in mammals.

Anticipated Problem: What are the major reproductive organs in female mammals? What are the functions of those organs?

Ask students how many of them have livestock at home? How many have ever assisted with a birth? Why was it important to understand the female reproductive system?

II. Like males, female mammals have a complex system of organs that make up the reproductive system. It is important that those interested in animal production be familiar with these various organs and their functions. Some of the major organs that make up the female reproductive tract are: **PowerPoint Slide 20.**

Just as before, tell students that they will be making flashcards for the female reproductive parts. Tell them to use a different color that used for the males.

A. Ovary—The ***ovary*** produces female gametes. A ***gamete*** is a sex cell that can unite with other sex cells. These are called ***ova*** or eggs. A female mammal will typically have two ovaries. The ovaries also produce the female sex hormones estrogen and progesterone. Within each ovary there are hundreds of tiny ***follicles*** or cavities. The ova are produced in the follicles. Each ovum is the largest single cell in the body. **PowerPoint Slide 21. Ask students why the ovary is important for reproduction. What is it similar to in the male reproductive tract?**

B. Oviducts—The ***oviducts*** are two tubes that carry the ova from the ovaries to the uterus. The oviducts are also called the ***fallopian tubes***. The oviducts are close, but not attached to the ovaries. The funnel-shaped end of each oviduct that is close to the ovary is called the ***infundibulum***. At ovulation the follicle ruptures, releasing an ovum that is caught by the infundibulum. After copulation, sperm move through the uterus to the oviduct. Fertilization of the ovum occurs in the upper end of the oviduct. The ***zygote***, or fertilized egg cell, moves to the uterus about two to four days after fertilization. **PowerPoint Slide 22.**

C. Uterus—The ***uterus*** of mammals is a Y-shaped structure consisting of the body, two uterine horns, and the cervix. The size and shape of the uterus varies among the various species. The upper part of the uterus consists of the two ***uterine horns*** that develop into the oviducts or Fallopian tubes. Mammals that normally produce large numbers of offspring at each breeding have relatively large horns and a small body. Those species that

normally produce single offspring or twins have smaller horns and a larger body. In most species pregnancy normally occurs in the uterine horns. In horses however, pregnancy normally occurs in the body of the uterus. In all species, the fetus grows within the uterus, where it remains until ***parturition*** or birth. The ***cervix*** is the lower outlet of the uterus. It is composed primarily of connective tissue that constitutes the gateway between the uterus and the vagina. Like the rest of the reproductive tract, the cervix is lined with ***mucosal cells***. These cells make significant changes as the animal goes from one estrous cycle to another and during ***gestation*** or pregnancy. **PowerPoint Slide 23.**

D. Vagina—The ***vagina*** serves as the female organ of copulation at mating and as the birth canal at parturition. It is the passage between the cervix an the vulva. The lining is moist during estrus and dry when the animal is not in estrus **PowerPoint Slide 24.**

E. Bladder—The ***bladder*** collects the liquid waste, which is called ***urine***. The urine passes through the urethra to the vagina. The urethra attaches to the floor of the vagina between the cervix and the vulva. The bladder is not considered part of the reproductive tract in females. **PowerPoint Slide 25.**

F. Vulva—The ***vulva*** is the external opening of the reproductive and urinary systems. The exterior, and visible part of the vulva, consists of two folds called the ***labia majora***. The ***labia minora*** are two folds located just inside the labia majora. **PowerPoint Slide 26.**

G. Clitoris—The ***clitoris*** is the sensory and erectile organ of the female. It is located just inside the vulva. The clitoris develops from the same embryonic tissue as the penis in the male and produces sexual stimulation during copulation. **PowerPoint Slide 27.**

During lecture on this topic, make sure students get all information needed copied on flashcards. Also, use PowerPoint Slides 28, 29, 30, and 31 as well as TM: 6-3 to show students exactly where each part is located. Be sure to draw these on the writing surface and reference them often.

Objective 3:

Identify and describe the male and female reproductive organs in poultry.

Anticipated Problem: What the major male and female reproductive organs in poultry and their functions?

Ask students to identify what type of livestock animal you have not discussed yet. Once they name poultry, lead into objective 3.

Just as before, have students make flashcards for the poultry reproductive tract.

III. The reproductive systems of poultry are similar to that found in mammals with a few differences. A basic description of the reproductive systems of male and female poultry follows.

A. The reproductive system of the male poultry includes the testicles, which are held within the body cavity rather than in a scrotum. The testicles produce the sperm and seminal fluid. **PowerPoint Slide 32.**

1. The vas deferens carries the seminal fluid and sperm cells to the cloaca.
2. The ***cloaca*** is the enlarged part where the large intestine joins the end of the alimentary canal.
3. The ***alimentary canal*** is the food-carrying passage that begins at the mouth and ends at the vent.

4. The ***papilla*** is the organ in the wall of the cloaca that puts the sperm cells into the hen's reproductive tract. **PowerPoint Slides 33 and 34.**

B. The reproductive system of female poultry has two ovaries and two oviducts. The right ovary and oviduct do not function. Only the left ovary and oviduct produce eggs. The ova produced in the ovary develop into egg yolks. The oviduct of the chicken has five parts: **PowerPoint Slide 35.**

1. Funnel—The ***funnel*** receives the yolk from the ovary. The sperm cells that the chicken receives from the male are stored here.
2. Magnum—The ***magnum*** secretes the thick white of the egg. It takes approximately three hours for the thick white to be placed around the yolk in the magnum.
3. Isthmus—The yolk and thick white move from the magnum into the ***isthmus***, where two shell membranes are placed around the yolk and thick white. This process takes approximately 1¼ hours. **PowerPoint Slide 36.**
4. Uterus—In the uterus, the thin white and the outer shell are added to the egg. The egg remains in the uterus about 20 hours.
5. Vagina—From the uterus, the egg moves into the vagina. The egg stays here only a short time after which it is laid. It takes about 25 to 27 hours for a chicken to produce one egg. **PowerPoint Slide 37.**

During lecture on this topic, make sure students get all information needed copied on flashcards. Also, use PowerPoint Slides 34 and 38 as well as TM: 6-4 and TM: 6-5 to show students exactly where each part is located. Be sure to draw these on the writing surface and reference them often.

Review/Summary. Use the student learning objectives to summarize the lesson. Have students explain and locate each part of the male, female, and poultry reproductive tract. **PowerPoint Slide 39.**

Application. Contact a local veterinarian or butcher to ask if preserved samples of reproductive tracts would be available for use in your class. Ask students to identify the various organs.

Evaluation. Evaluation should focus on student achievement of the objectives for each lesson. Various techniques can be used, such as performance on the application activities. A sample written test is attached.

Answers to Sample Test:

Part One: Matching

1 = a, 2 = e, 3 = c, 4 = g, 5 = h, 6 = d, 7 = b, 8 = f

Part Two: Completion

1. cowper's gland
2. vulva
3. papilla
4. scrotum
5. vagina
6. isthmus

Part Three: Short Answer

See lesson content for scoring this question.

Sample Test 6-1

Name_____

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

a. Cloaca
b. Van deferens
c. Fallopian tubes
d. Uterus
e. Ovary
f. Follicles
g. Funnel
h. Testicles

_____ 1. In poultry, the enlarged part where the large intestine joins the end of the alimentary canal.

_____ 2. Produces female gametes.

_____ 3. Two tubes that carry the ova from the ovaries to the uterus.

_____ 4. Receives the yolk from the ovary.

_____ 5. Produces sperm and a hormone called testosterone.

_____ 6. A Y-shaped structure consisting of the body, two uterine horns, and the cervix.

_____ 7. A transportation tube that carries the sperm-containing fluid from each epididymis to the urethra.

_____ 8. Tiny cavities found in the ovaries.

Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

1. The _____ _____ produces a fluid that moves down the urethra ahead of the seminal fluid that cleans and neutralizes the urethra.
2. The _____ is the external opening of the reproductive and urinary systems.
3. The _____ is the organ in the wall of the cloaca that puts the sperm cells into the hen's reproductive tract.
4. The _____ is a two-lobed sac that contains and protects the two testicles.
5. The _____ serves as the female organ of copulation at mating and as the birth canal at parturition.
6. The yolk and thick white move from the magnum into the_____.

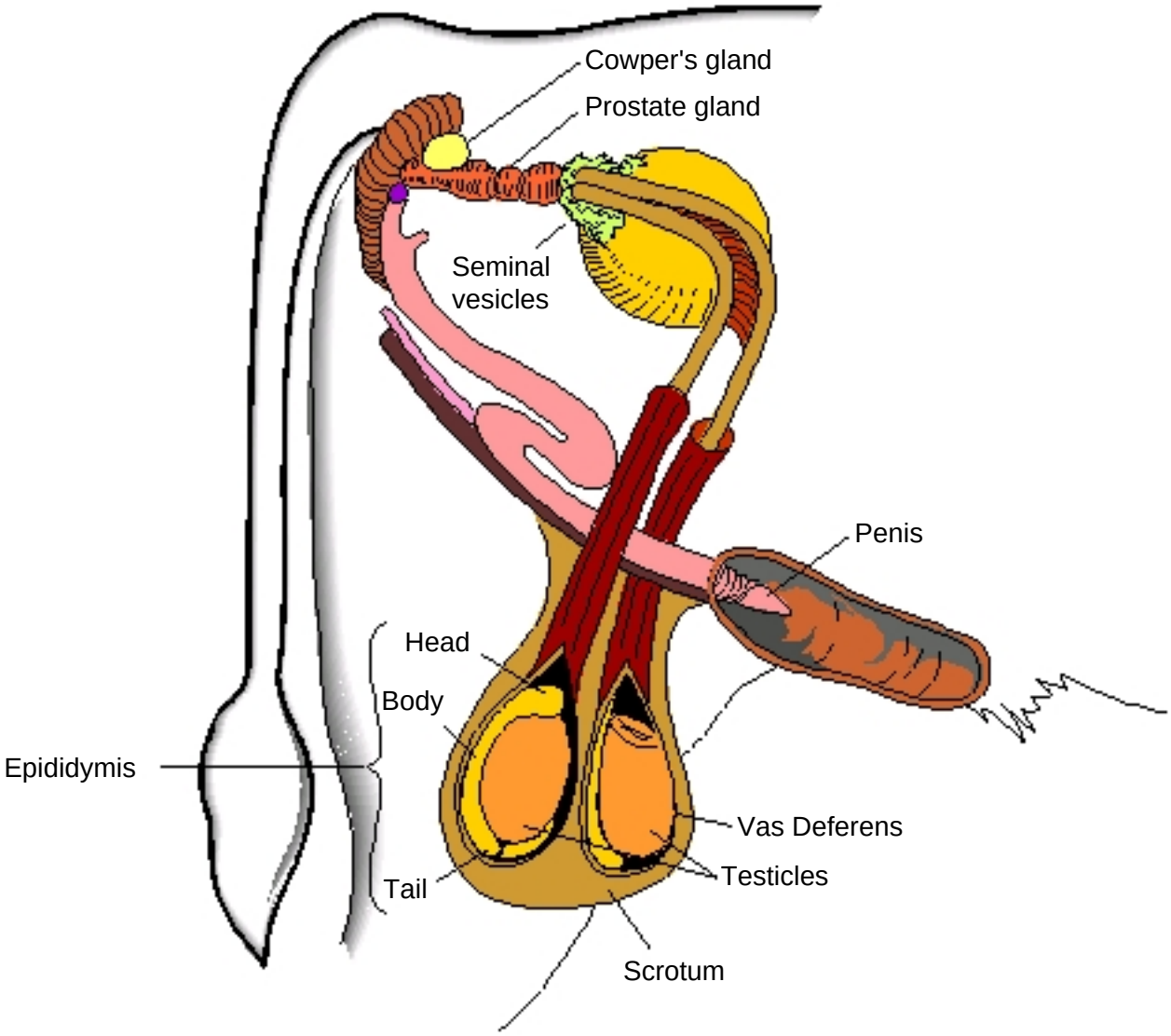
Part Three: Short Answer

Instructions. Provide information to answer the following question.

Discuss the similarities and differences between the reproductive tracts of mammals and poultry.

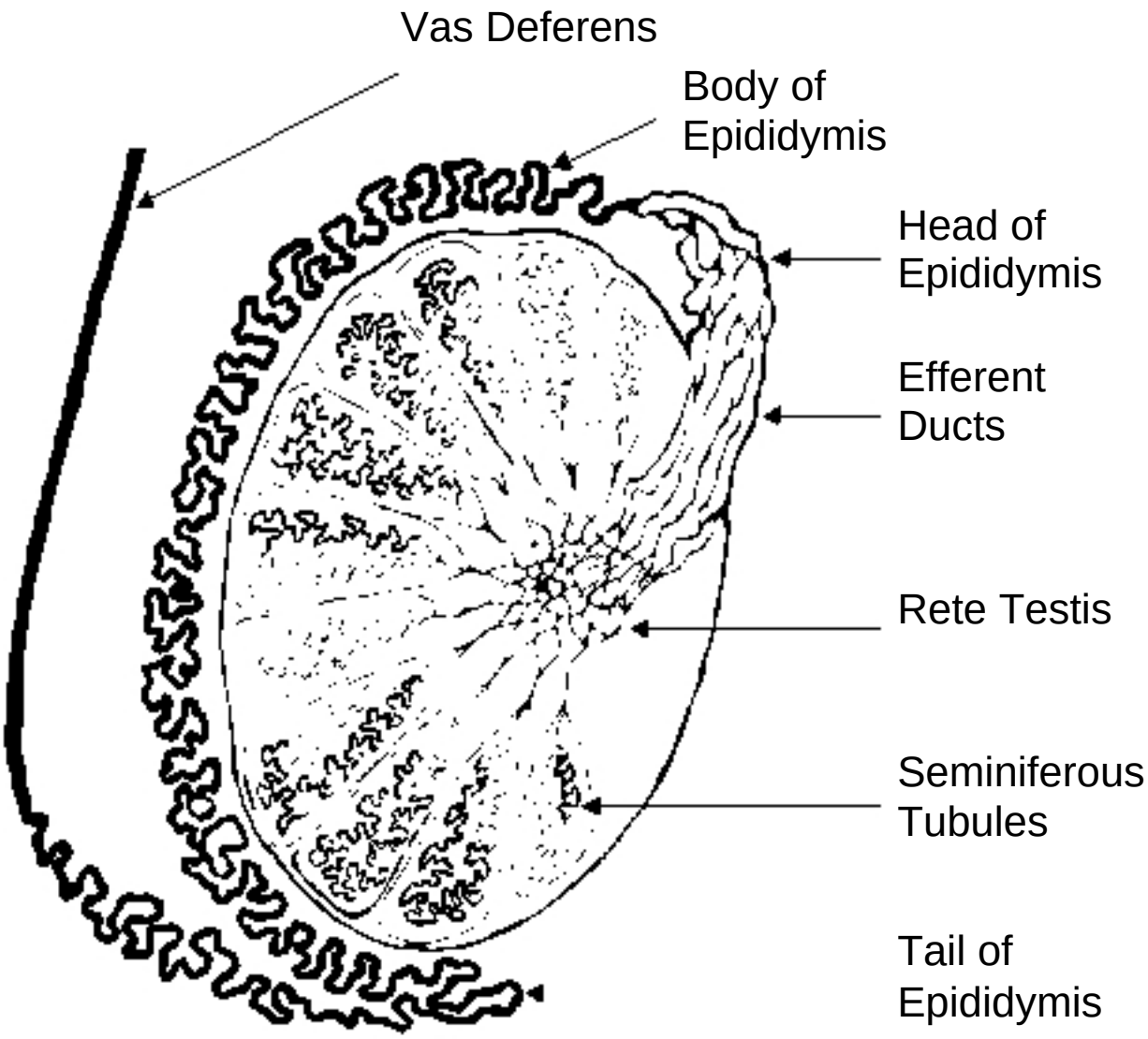
TM: 6-1

REPRODUCTIVE ORGANS OF THE BULL



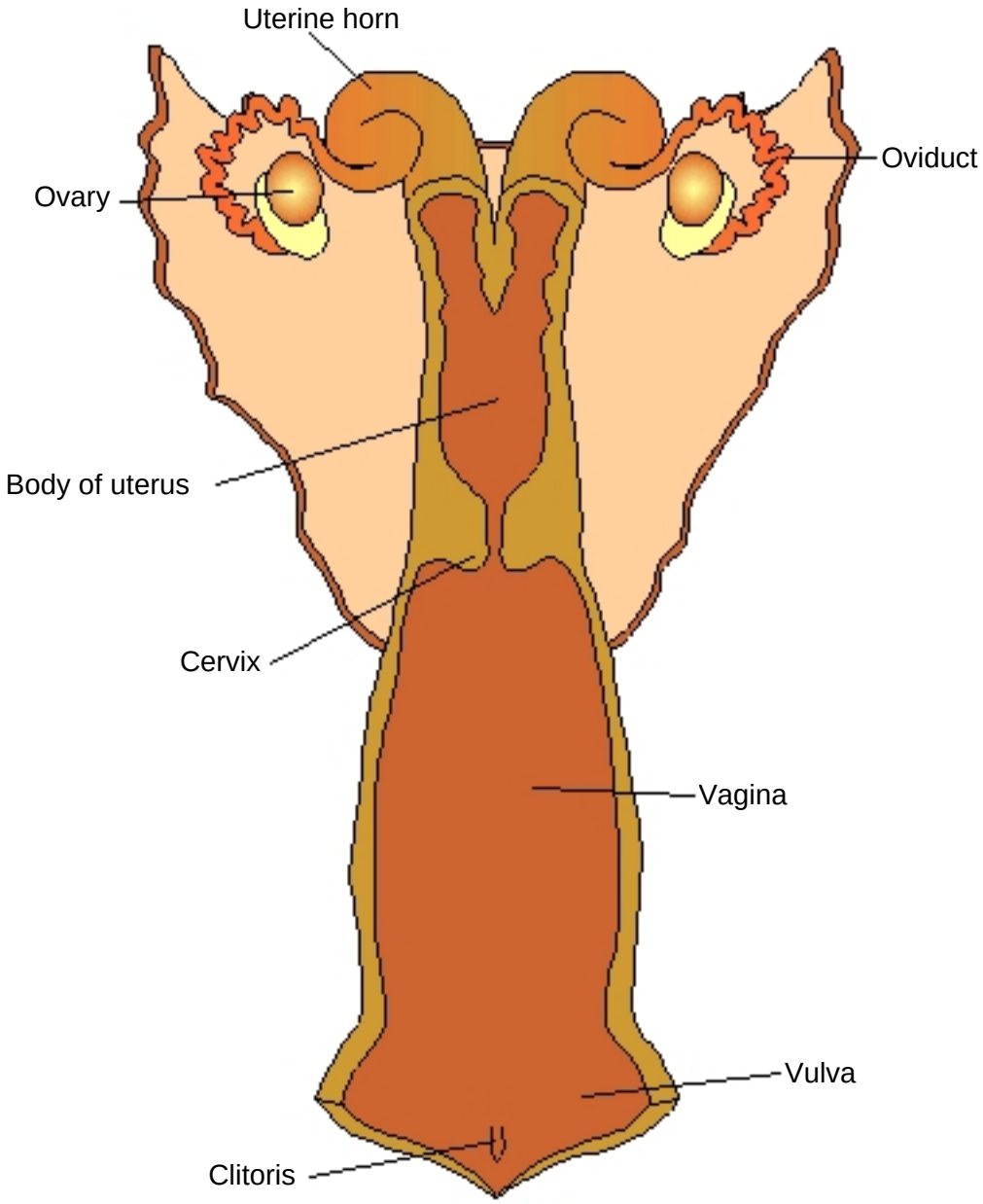
TM: 6-2

TESTES—PRIMARY REPRODUCTIVE ORGAN OF THE BULL



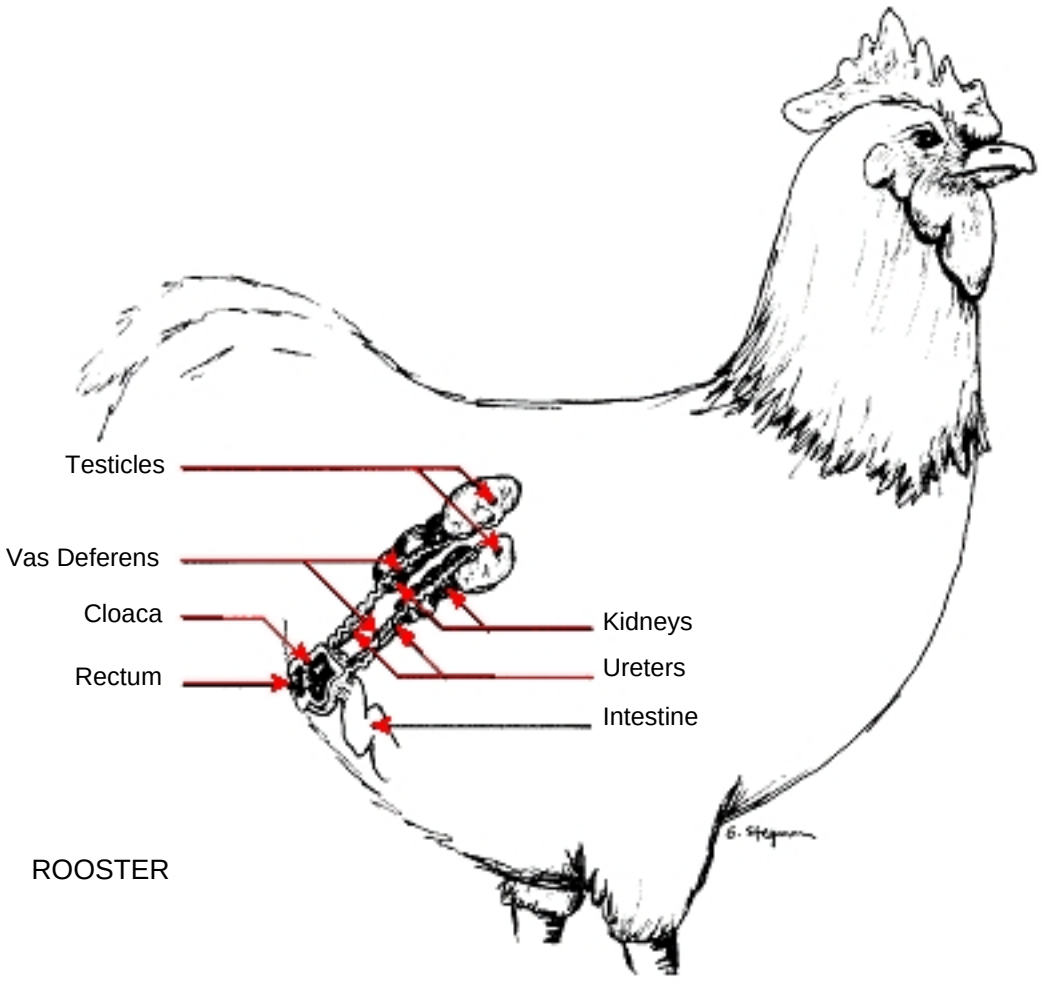
TM: 6-3

DORSAL VIEW OF THE REPRODUCTIVE SYSTEM OF A FEMALE COW



TM: 6-4

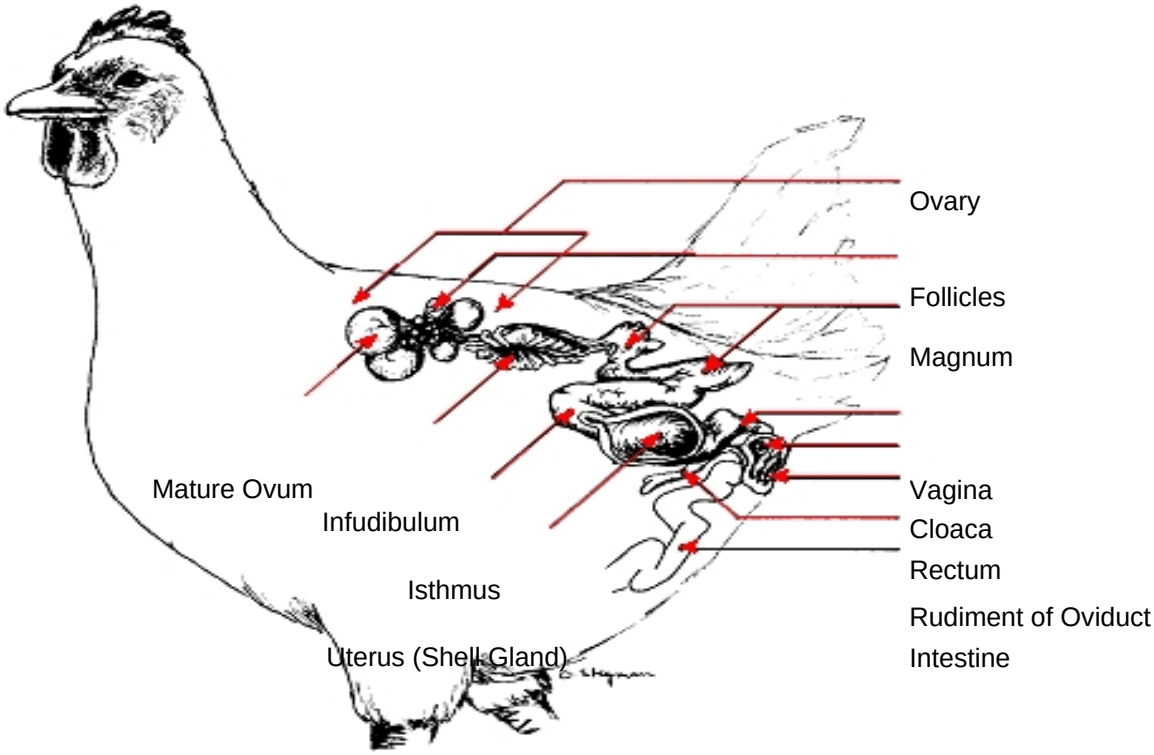
REPRODUCTIVE ORGANS OF A MALE CHICKEN



ROOSTER

TM: 6-5

REPRODUCTIVE ORGANS OF A FEMALE CHICKEN



HEN