

Week of April 6-10, 2020

COON

All of these assignments are on google classroom. You must pick one of the 3 listed, and complete by next Monday, April 13 for credit. If you would like to use google docs to complete the work that would be most efficient. However, paper copies can be returned to the school.

Class	Choice 1	Choice 2	Choice 3 (Enrichment)
Ag Science	Anatomy of Animal Reproduction Systems Part 1	Reproductive Development of Animals Part 2	FFA journal
Ag Business Mang	Personal Finances	Time Value of Money	Chart work experiences
BSAA	Heredity and DNA	Animal Growth and Development	Animal Nutrition
Landscape Design	Turf Grass part 1	Turf Grass part 2	Analyzing a Landscape
Intro To Ag	History of Ag part 1	History of Ag part 2	Supervised Ag Experience Part 1
Ag Mech.	Principles of Small Engines	Small Engines and their components	Small engines tear down

April 6-10th

Jeff Coon ^(Ag) Animal Science Date Name

Animal reproduction Part 1

1. At what male reproductive site are sperm cells stored?
2. How does the male's scrotum maintain the testicles below body temperature?
3. What produces a fluid that moves down the urethra ahead of the seminal fluid to clean and neutralize the urethra?
4. Name the parts of a female mammal's uterus.
5. What is the sensory and erectile organ of the female?
6. What is external opening of the female reproductive system?

Anatomy and Physiology of Animal Reproductive Systems

EVERY LIVING THING has a number of organ systems operating to perform specific functions. If you were to examine one of these systems, you would observe a number of parts working for distinct purposes. An organ system resembles a running machine. Like a machine with gears and gadgets working like clockwork to do a single task, an organ system comprises organs working together to carry out a particular function. A reproductive system is an organ system for the creation of offspring. Explore this E-unit to learn more about each part of a reproductive system and the role it plays in the reproduction of life.



(Courtesy, Agricultural Research Service, USDA)

Objective:



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

Key Terms:



bladder	mucosal cells	sperm
cervix	ova	spermatozoa
clitoris	ovaries	testicles
copulation	oviducts	testosterone
Cowper's gland	parturition	urethra
epididymis	penis	urine
fallopian tubes	prostate gland	uterine horns
follicles	retractor muscle	uterus
gestation	scrotum	vagina
glans penis	semen	vas deferens
infundibulum	seminal vesicles	vulva
labia majora	sheath	zygote
labia minora	sigmoid flexure	

The Male Reproductive System

A successful livestock producer needs a complete understanding of the male reproductive organs. Usually, a livestock farm will have only a limited number of males available for breeding purposes.

The male reproductive system has several interconnected working parts that must function together for successful mating to occur. In the reproductive system of a male mammal, the major organs are the testicles, epididymis, scrotum, vas deferens, urethra, seminal vesicles, prostate gland, Cowper's gland, and penis.

The **testicles** play a major role in animal reproduction by producing **sperm**, or the male sex cells, also called **spermatozoa**. Testicles also produce a hormone, **testosterone**, which causes the appearance and behavior of the animal to have masculine traits. Every male animal has two testicles.

Sperm cells enter the **epididymis** attached to each testicle. They are stored there while they mature.

The **scrotum** is a two-lobed sac that contains and protects the two testicles. It also regulates the temperature of the testicles, which must be maintained below body temperature. When the environmental temperature is lower than the desired temperature, the scrotum contracts, pulling the testicles toward the body for warmth. When the environmental temperature is higher than the desired temperature, the scrotum relaxes, permitting the testicles to drop

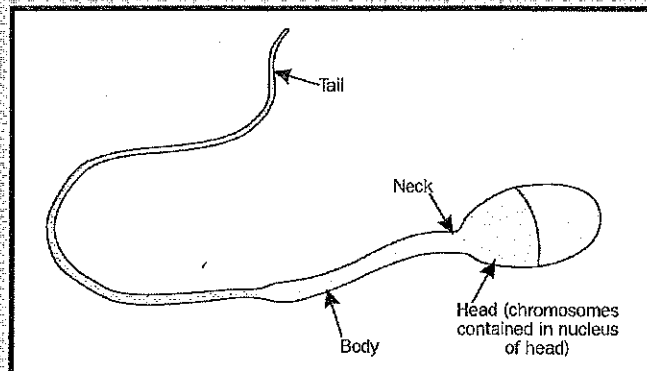
UNDER INVESTIGATION...

LAB CONNECTION: Semen Samples

Find out what semen looks like under a microscope. Have a beef, dairy, or swine producer supply you and your classmates with a few samples of semen. Be sure to ask how to handle the samples properly so that the sperm cells will be viable when examined.

Put some of the semen on a clean microscope slide and use a cover slip. Look at the semen through the microscope and identify the sperm cells. Use the accompanying drawing to learn the parts of a sperm cell. See if you can find the parts in your sample sperm cells.

Determine how long the sperm cells stay viable under the microscope. Also, think about how the environment you are exposing the sperm cells to affects their viability. Was the slide cold, wet, or unclean when you placed the sample on it? Try to relate these factors to the environment of the vagina when semen has been deposited in it.



The anatomy of a sperm cell.

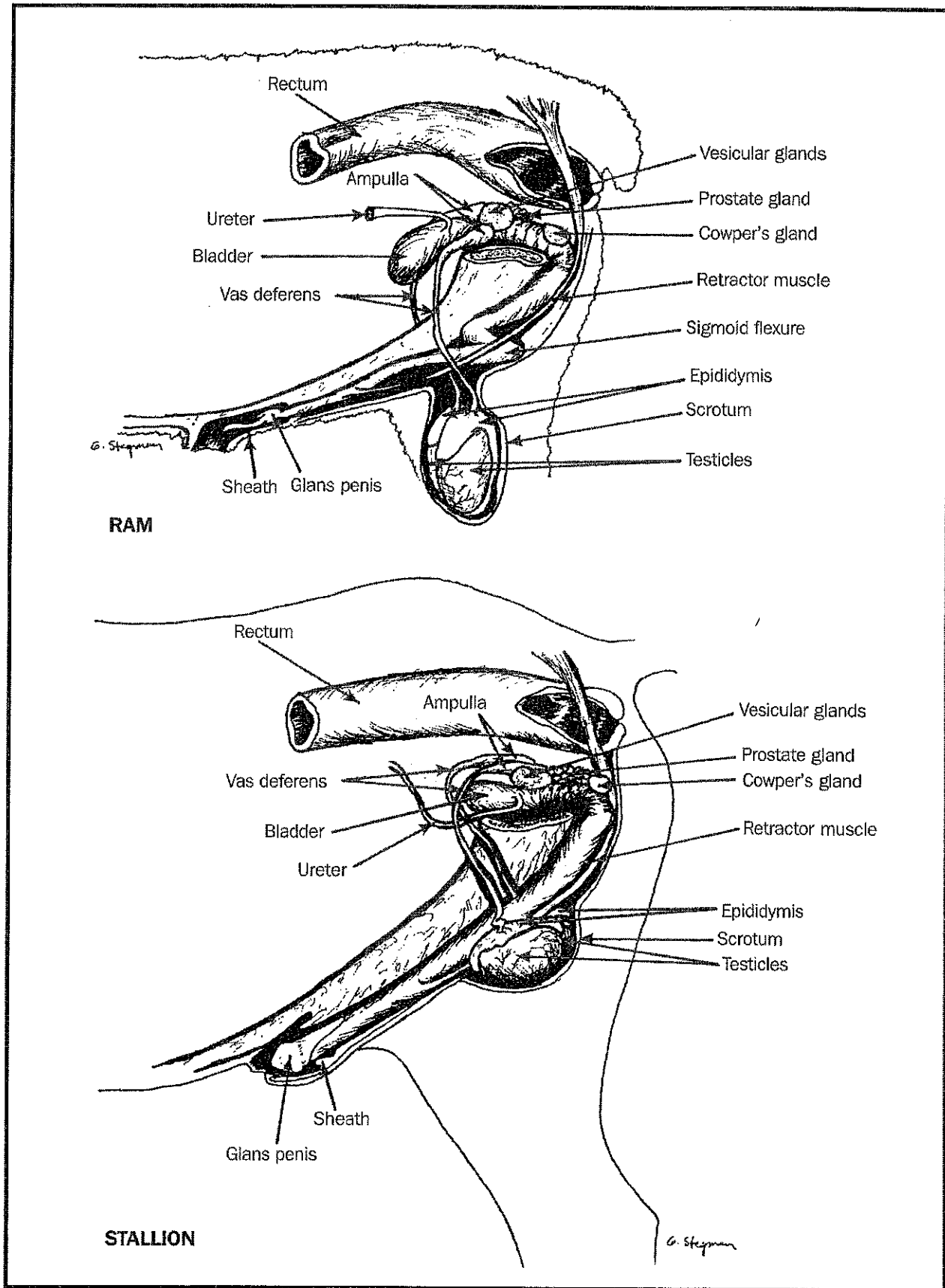


FIGURE 1. The reproductive organs of a ram and a stallion.

away from the body. This temperature regulation is greatly important to the reproductive process because of its effect on the production and vitality of sperm.

Another important organ of the male reproductive system is the **vas deferens**, which serves as a transportation tube that carries the sperm-containing fluid from each epididymis to the urethra. The **urethra** is the large, muscular canal extending from the urinary bladder to the end of the penis.

Several glands add volume and nutrients to the sperm-rich fluid coming from the epididymis. They are known as the accessory sex glands. The **seminal vesicles** open into the urethra to produce a fluid that protects and transports sperm. The **prostate gland** is near the urethra and the bladder. It produces a fluid that mixes with the seminal fluid throughout animal reproduction. The mixture of seminal and prostate fluids and sperm is called **semen**. The **Cowper's gland** produces a fluid that moves down the urethra ahead of the seminal fluid. This fluid cleans and neutralizes the urethra, helping protect the sperm as they move through.

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, which is necessary for **copulation**, or mating, to occur. The **sigmoid flexure**, commonly found in bulls, rams, and boars, and the **retractor muscle** extend the penis from the **sheath**, a tubular fold of skin. The **glans penis** at the tip of the penis acts as a sensory organ.

The Female Reproductive System

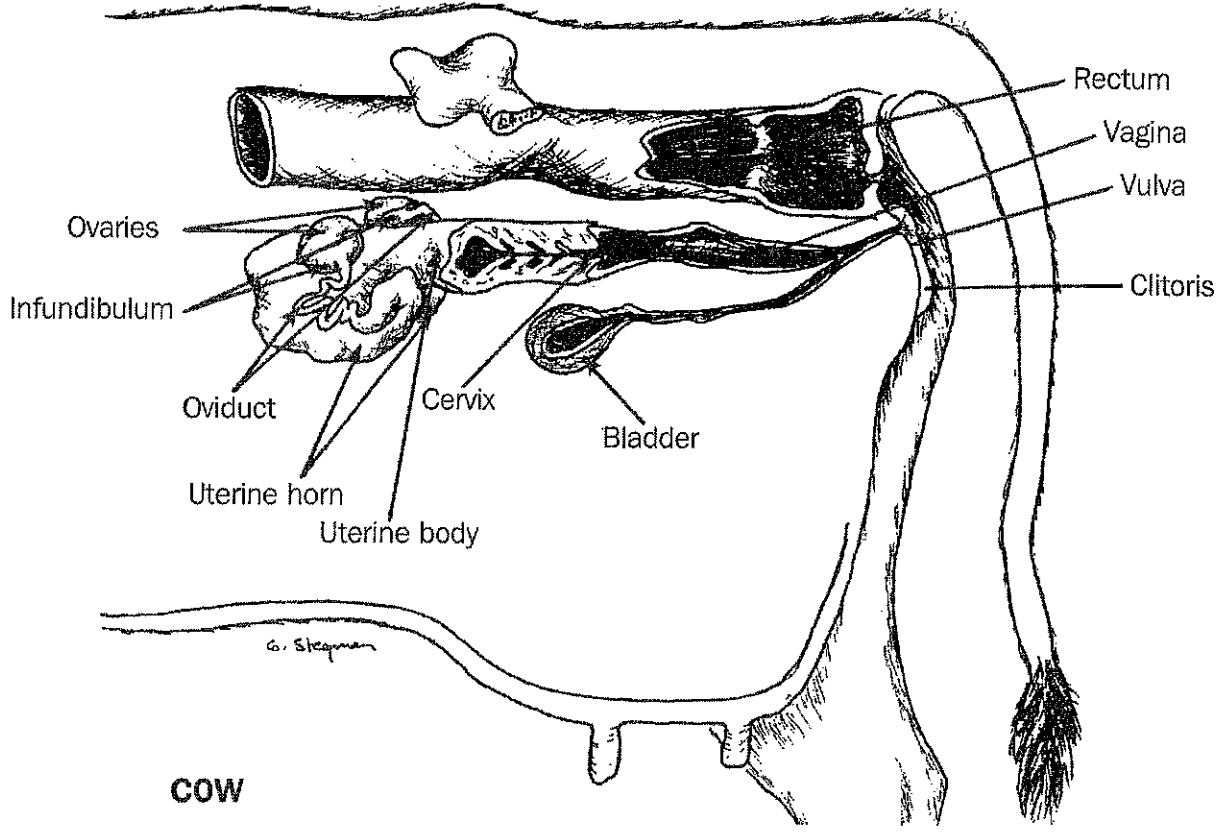
Like the male, the female mammal has a complex system of organs that compose the reproductive system. Producers must be familiar with these various organs and their functions to ensure successful reproductive development of their livestock. Some major organs that make up the female reproductive tract are the ovaries, oviducts, uterus, vulva, bladder, clitoris, and vagina.

A female mammal typically has two **ovaries**. Within each ovary are hundreds of tiny **follicles**, or cavities, where the ova are produced. The **ova**, or eggs, are the female sex cells. Each ovum is the largest single cell in the body. The ovaries also produce the female sex hormones, estrogen and progesterone.

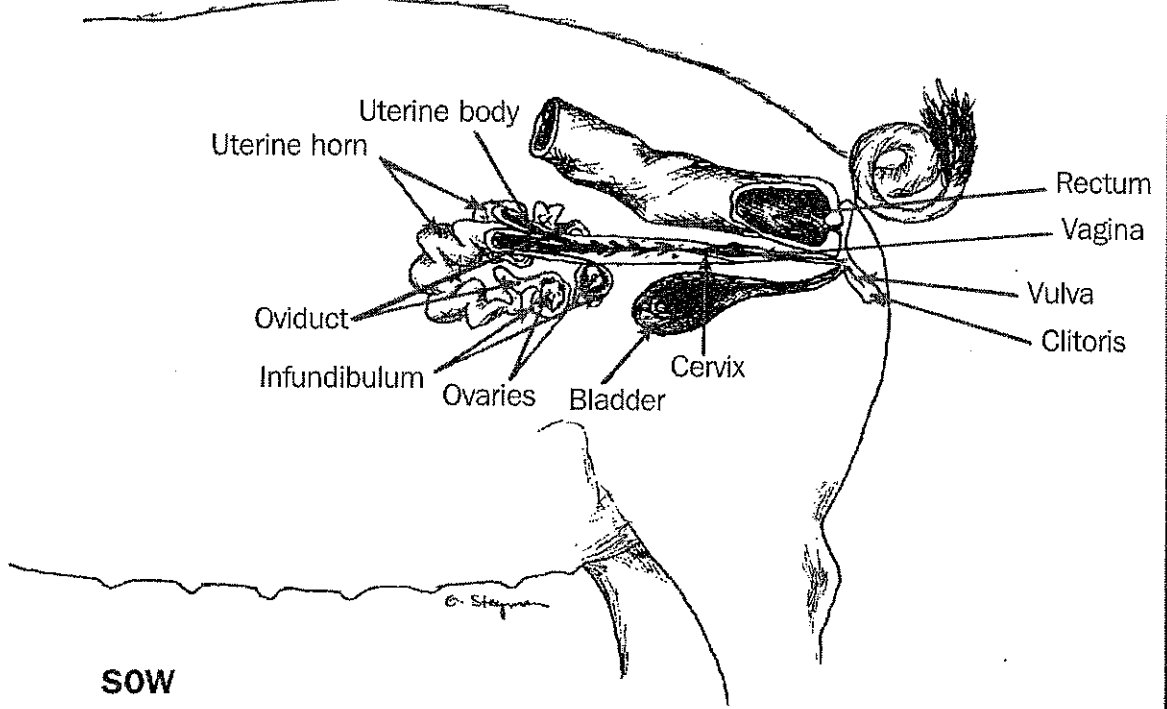
Two tubes carry the ova from the ovaries to the uterus. These are called the **oviducts** or **fallopian tubes**. They reside close to the ovaries but are not attached to them. The funnel-shaped end of each oviduct nearest an ovary is called the **infundibulum**. At ovulation a follicle ruptures, releasing 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 fertilized egg, known as a **zygote**, moves to the uterus about three days after fertilization.

The **uterus** of a mammal is a Y-shaped structure consisting of the body, two uterine horns, and the cervix. The size and shape of the uterus vary with the species. The upper part of the



COW



SOW

FIGURE 2. The reproductive organs of a cow and a sow.

uterus consists of two **uterine horns** that progress to the oviducts, or fallopian tubes. In most species, except the horse, pregnancy occurs in the uterine horns. In the horse, however, pregnancy occurs in the body of the uterus. The uterus is the site where the fetus grows until **parturition**, or birth. The uterus of a mammal that normally produces a large number of offspring at each breeding cycle has relatively large horns and a small body. In contrast, the uterus of a mammal that normally produces a single offspring or twins has smaller horns and a larger body. The **cervix** is the lower outlet of the uterus. It is composed primarily of connective tissue and constitutes the gateway between the uterus and the vagina. Like the rest of the reproductive tract, the cervix is lined with **mucosal cells**, which make significant changes as the animal goes from one estrous cycle to another during pregnancy, or **gestation**.

The **vulva** is the external opening of the reproductive and urinary systems. The exterior, or the visible parts of the vulva, consists of two folds called the **labia majora**. Inside the labia majora are two folds called the **labia minora**. The **bladder** collects all liquid waste, or **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 **clitoris** is the sensory and erectile organ of the female. It is just inside the vulva. The clitoris develops from the same embryonic tissue as the penis in the male and produces sexual stimulation during copulation. Lastly, 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 and the vulva. The lining is moist during estrus and dry when the animal is not experiencing estrus.

Summary:



To have a successful livestock operation, a producer must understand animal reproduction. To gain complete understanding, a producer must be familiar with the parts of both the male and female reproductive systems. In the male reproductive system, the major organs are the testicles, epididymis, scrotum, vas deferens, urethra, seminal vesicles, prostate gland, Cowper's gland, and the penis. In a female reproductive system, the major organs are the ovaries, oviducts, uterus, vulva, bladder, clitoris, and vagina.

Checking Your Knowledge:



1. At what male reproductive site are sperm cells stored?
2. How does the male's scrotum maintain the testicles below body temperature?
3. What produces a fluid that moves down the urethra ahead of the seminal fluid to clean and neutralize the urethra?
4. Name the parts of a female mammal's uterus.
5. What is the sensory and erectile organ of the female?
6. What is external opening of the female reproductive system?

Expanding Your Knowledge:



Explore this E-unit and the Internet for diagrams of the reproductive systems of male and female animals of various species. How do the reproductive systems differ between species? How are male and female reproductive systems similar? Can you name some comparable organs in male and female reproductive systems?

Web Links:



Male Reproductive System

http://www.kidshealth.org/parent/medical/body_basics/male_reproductive.html

Female Reproductive System

http://www.kidshealth.org/parent/medical/body_basics/female_reproductive_system.html

Animal Reproduction

<http://www.saburchill.com/chapters/chap0031.html>

Agricultural Career Profiles

<http://www.mycart.com/career-profiles>

April 6-10th

Mr. Coon (Ag) Animal Science
Part 2

Date Time

Checking Your Knowledge:

1. Why is fertility still low after puberty?
2. What should an animal producer do in cases of dystocia during parturition?
3. Why is it important for a young animal to obtain colostrum?
4. Why must poultry maintain the humidity of their eggs?
5. How does the fertilization of poultry and fish eggs differ?

Reproductive Development of Animals

THE REPRODUCTIVE DEVELOPMENT of animals is quite fast in comparison with that of humans. Animals can reproduce within a year or two of birth. The pace at which animals develop depends on many factors, including the maturing of internal organs, the environment, the animals' diet, and many hormone-stimulated processes. Although the reproductive development of poultry and fish is similar in some ways to that of other animals, poultry and fish are more similar to each other with regard to reproduction. The young of poultry and most fish hatch from eggs in an external environment.



Objective:



Explain the phases of reproductive development in animal life.

Key Terms:



colostrum

dystocia

fertilization

gestation

incubation

lactation

ovum

parturition

puberty

spawning

sperm

zygote

Animal Reproductive Development

Animals must mature and develop internally before they can reproduce. **Puberty** is the point at which an animal reaches a level of sexual development that makes it capable of repro-

duction. In a female the estrous cycle begins, and she will experience her first estrus. In a male the testicles develop, and he will produce his first ejaculate with some fertile sperm.

Puberty is not the point of complete reproductive development. Animal fertility is actually quite low, and chances of achieving pregnancy are very slim. In the female the uterine body is not prepared to accept the attachment of an embryo. The male does not produce a high enough level of sperm cells to service females continually. He can even become sterile for a time if not let develop fully before being used for regular breeding.

Male and female animals develop reproductively at different rates. For example, a young gilt will usually experience her first estrus at 6 to 8 months of age. A young boar will typically reach puberty at 5 to 18 months of age. It is important to remember that pigs and other animals' reproductive development is influenced by many factors. These include their environment, nutrition, breed, exposure to mature animals, and health.

Animal producers must be cautious when mixing sexes of animals approaching puberty. While the chances of a fertile mating occurring are slim, unwanted pregnancies are possible.

Once animals fully develop reproductively, they are then mated to produce new offspring. For a mating to be successful, fertilization must occur. **Fertilization** is the uniting of the ovum of the female and the sperm of the male. The **ovum** is the female sex cell. The **sperm** is the male sex cell. Semen containing sperm is deposited in the female. Usually the male must mount the female, insert his penis into her reproductive tract, and deposit the semen. The sperm cells in the semen then use a swimming-like motion to find the ovum. When a sperm cell penetrates the ovum, fertilization occurs. Once the ovum becomes fertilized, it is called a **zygote**, or fertilized sex cell. When united, the two sex cells exchange DNA, and if everything goes correctly, a pregnancy will occur.

The zygote will travel down through the female reproductive tract and eventually attach to the uterine wall. At this point, gestation begins. **Gestation** is the period during which the offspring grows and develops in the uterine body of its mother. The young grows from the diameter of pencil lead to birth weight. Birth weight is normally reflective of the mature size of the animal. For example, the birth weight of an elephant is significantly higher than that of a house cat.

The length of gestation varies with the species. It can be quite long—for example, approximately 340 days for horses. A dog's gestation is about 56 days. A rabbit's is fairly short—approximately 31 days.

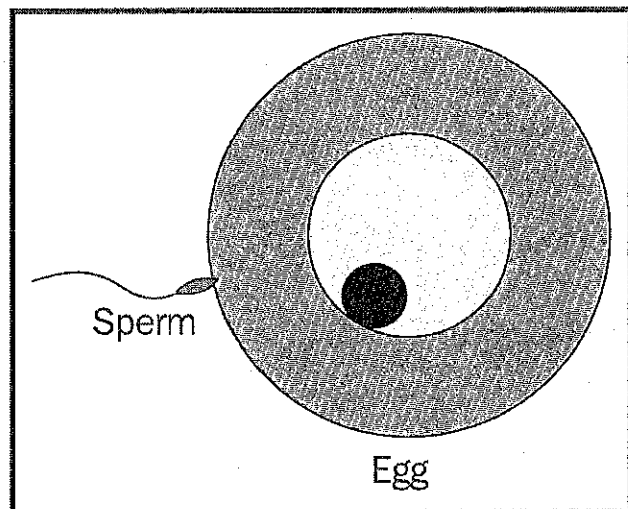


FIGURE 1. Fertilization occurs when the sperm of the male unites with the egg of the female.

Near the end of gestation, the mother prepares to give birth. The process of giving birth is called **parturition**. Parturition involves several steps. The cervix dilates; the uterine body begins contracting; the offspring is expelled from the body; and the placenta, or afterbirth, is expelled. This can take anywhere from 1 to 12 hours.

Animals approaching parturition should be carefully monitored. Problems, such as dystocia, can occur. **Dystocia** is severe distress in the female while giving birth. Assistance may be needed to complete the process. A professional, such as a veterinarian, should be consulted.

A female typically gives signs of approaching parturition. These could include the building of a nestlike-structure, isolation from other animals, or a noticeable change in behavior.

Shortly before or immediately after parturition, the female prepares to care for her young. This is done through the production of milk, or **lactation**. This is extremely important for the survival of the young. The first milk, or **colostrum**, provides enzymes to fight bacteria and disease. A young animal is commonly exposed to a harsh environment at birth and needs all the defense it can get to remain healthy and strong. The milk is extracted from the mother's mammary system. Lactation, like parturition, is stimulated by hormones in the body of the female. Hormones are released to begin both processes at nearly the same time.

POULTRY AND FISH REPRODUCTIVE DEVELOPMENT

The reproductive development of poultry and fish is very similar. Poultry and most fish hatch their young from eggs in an external environment from the body. Like animals, they must reach sexual maturity before they are able to reproduce.

Poultry

In poultry the female begins producing eggs in her body on a regular basis. Fertilization occurs within her body. The male mounts the hen and deposits sperm into her funnel. The sperm cells are included in the egg as it develops and passes through the funnel.

The female will then start laying eggs in a nest. The quality, type, and size of the nest depend on the species of the poultry. Once the desired number of eggs is laid, incubation begins. **Incubation** is the act of poultry physically sitting on top of the eggs to keep them warm until the young hatch. The temperature must be kept in a range of 99° to 100°F (37.2° to 37.8°C). The poultry will incubate the eggs for the



FIGURE 2. This goose nest is built of twigs and feathers to protect the eggs. (Courtesy, USDA)

required number of days, which varies among species. The incubation period for a chicken is 21 days, a turkey 28 days, and an ostrich more than 40 days.

The poultry must also maintain the humidity of the eggs for the last two weeks of nesting. This will soften the eggs and assist the young when hatching. The eggs must also be exposed to sufficient levels of oxygen and turned 2 to 5 times daily for the first 14 to 18 days of nesting. If the eggs are properly fertilized, cared for, and not found by predators, young should hatch.

Fish

Fish also build nestlike structures in which to lay their eggs. They build them in the mud and rock along or near the banks of rivers and lakes. Fish are seasonal breeders, stimulated by daylight, water temperature, and other environmental factors.

Spawning is the act of the female fish laying thousands of eggs in a nest, where they are fertilized by the male fish. The male and female fish will guard the nest until their young hatch. Incubation of the eggs takes 6 to 10 days, depending on the temperature of the water. The warmer the water, the faster the eggs hatch.

Summary:



Animals must mature and develop before they can reproduce efficiently. This process begins with the animals going through puberty so that sex cells can be produced by both sexes. Once the animals are developed reproductively, fertilization must occur by uniting a sperm cell and an ovum. Once pregnant, the female begins the gestation process. At the conclusion of gestation, parturition begins. During or shortly after the birthing process, the female begins lactating to support her young.

Poultry must also mate before an egg can be fertilized. The fertile eggs are laid in a nest and incubated until they hatch. Fish, too, lay their eggs in a nest. Once the female lays the eggs, the male fertilizes them.

Checking Your Knowledge:



1. Why is fertility still low after puberty?
2. What should an animal producer do in cases of dystocia during parturition?
3. Why is it important for a young animal to obtain colostrum?
4. Why must poultry maintain the humidity of their eggs?
5. How does the fertilization of poultry and fish eggs differ?

Expanding Your Knowledge:



Interview an animal producer to discuss the processes of breeding, fertilization, and parturition. Ask questions about when fertilization occurs in animals of the producer's specialty. Also, ask about special care of females during their gestation process. Do the animals have special needs? Ask about steps to prepare for parturition of females. Are any special procedures necessary? What does the producer do if dystocia occurs? Ask to participate in the breeding, fertilization, or parturition process of an animal. Share the results of this interview with your classmates.

Web Links:



Gestation Table for Cattle

<http://www.cattletoday.com/gestation.shtml>

Canine Breeding and Reproduction

<http://www.aces.edu/pubs/docs/U/UNP-0052/>

Chicken Embryo Development

<http://www.rit.edu/~nlwsbi/EMBRYOS.HTM>

Agricultural Career Profiles

<http://www.mycart.com/career-profiles>

April 6-10th

Mr. Coon

Ag Science

Name

Date

Activity with SAE project