

Objective 8.01: Understand animal reproduction and parturition

Animal Reproduction

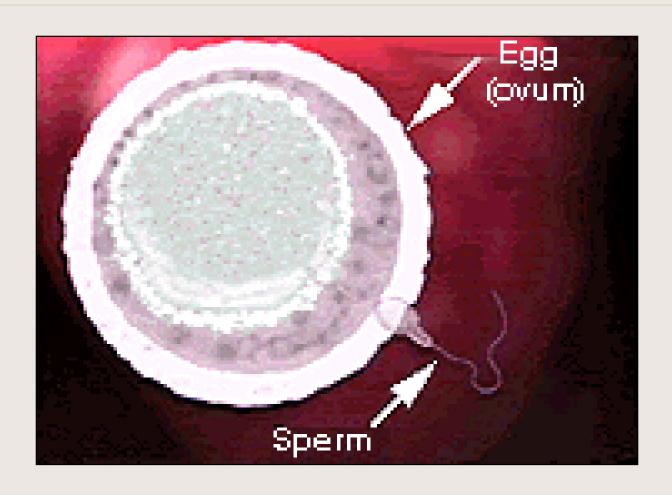
- Castration
 - Removing the testicles of the male to prevent breeding
- Colostrum
 - First milk

- Estrus
 - When a female is receptive to be bred
- Estrus Cycle
 - The length of a females cycle from one estrus to the next
- Gestation
 - Time an animal is pregnant

- Puberty
 - Age at which animals reach sexual maturity and begin to come into heat
- Lactation
 - Period of time that milk is secreted by the mammary glands
- Parturition
 - Than act of giving birth

- Ovulation
 - The release of the egg from the ovary
- Fertilization
 - The union of the sperm and the egg cells

Fertilization



Cows

Age Range Puberty: 6-8 months

• Estrus Cycle: 21 days

• Estrus: 16-18 hours

Gestation: 283 days

Swine

Age Range Puberty: 4-7 months

• Estrus Cycle: 21 days

Estrus: 3 days

Gestation: 114 days

Sheep

Age Range Puberty: 4-8 months

• Estrus Cycle: 22 days

• Estrus: 30 hours

Gestation: 148 days

Goats

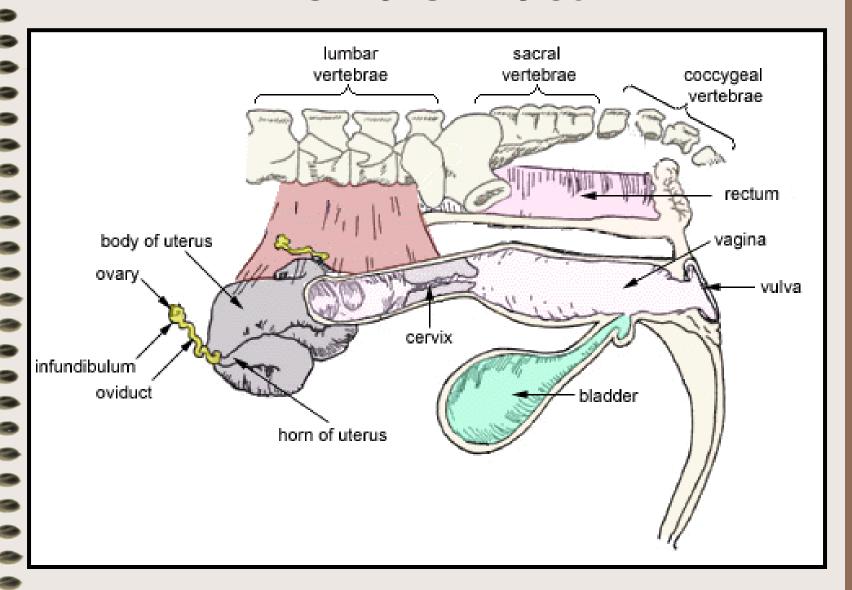
Age Range Puberty: 1st autumn

• Estrus Cycle: 22 days

Estrus: 2.5 days

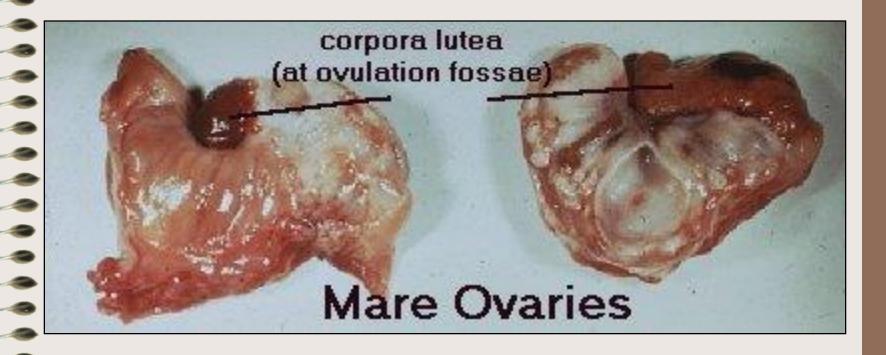
Gestation: 151 days

Female Tract



Ovaries

- Function: produce ova called eggs
- Description: two oval shaped organs located near the end of the reproductive tract inside the body cavity

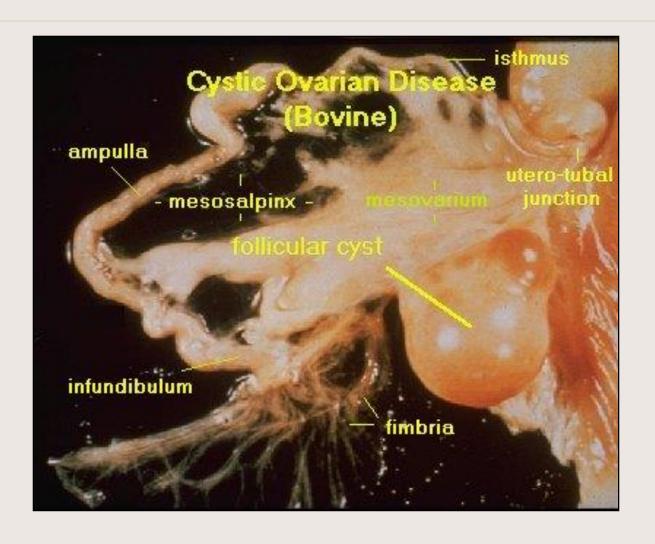


Oviducts

- Function: carry the eggs from the ovaries to the uterus (fallopian tubes)
- Description: small tubes that are near but not attached to ovaries and have a funnel shaped end near the ovary

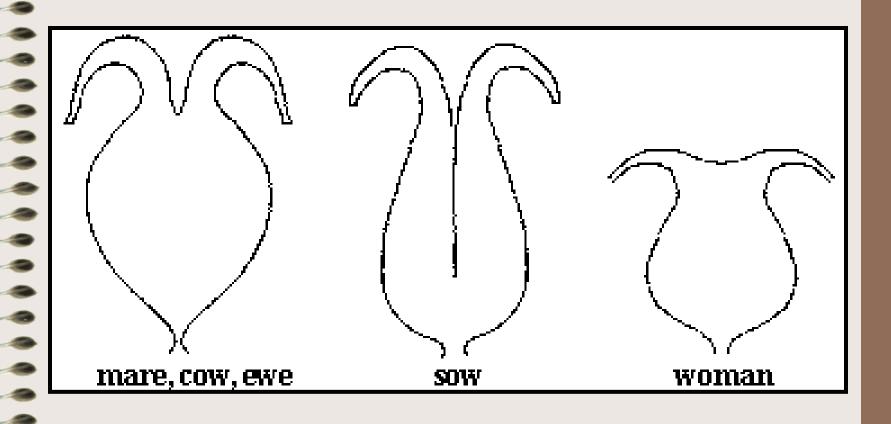
Infundibulum

- Function: picks up eggs at ovulation and directs eggs into the oviduct
- Description: funnel shaped end of each oviduct near the ovary



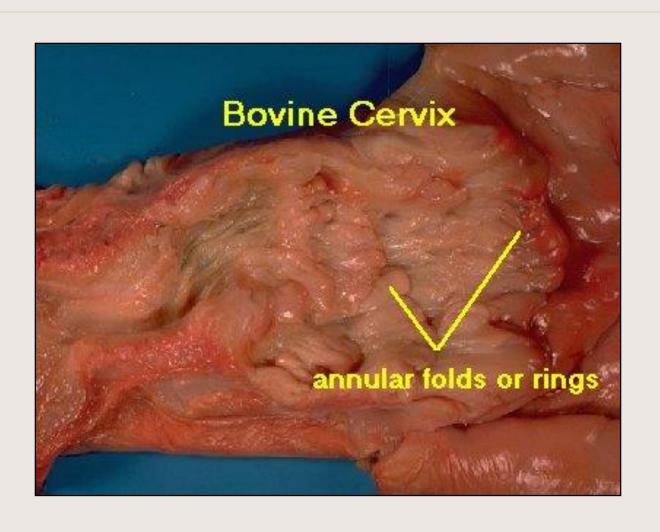
Uterus

- Function: also called womb, place where fetus grows and develops
- Description: organ with two branched horn-shaped attachments called uterine horns; will have a baby inside if animal is pregnant



Cervix

- Function: serves as a passageway for sperm to travel from the vagina to the uterus; also seals the uterus during pregnancy to prevent pathogens from affecting fetus
- Description: thick walled structure made up of folds and rings of muscular tissue; located at the neck of the uterus; separates the uterus from the vagina

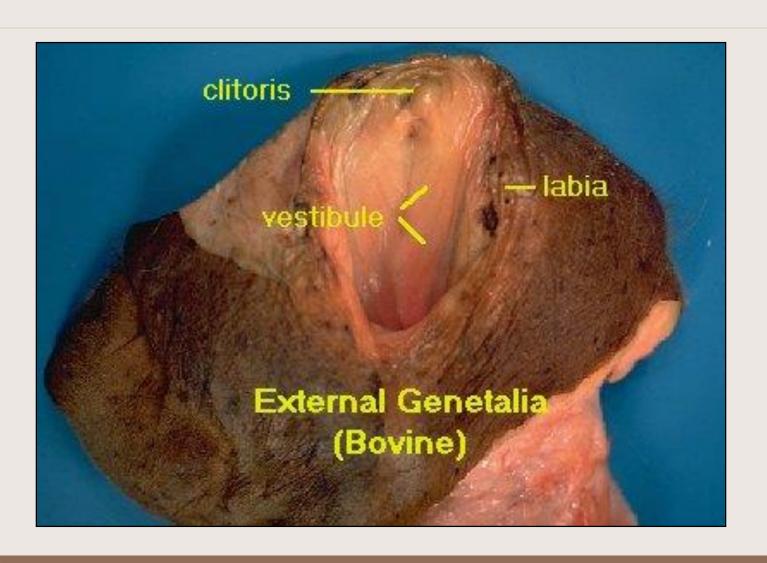


Vagina

- Function: Receives the male penis and sperm at breeding; serves as a passageway for the baby to pass through at birth and is a passageway for urine to be expelled
- Description: connects the vulva to the cervix

Vulva

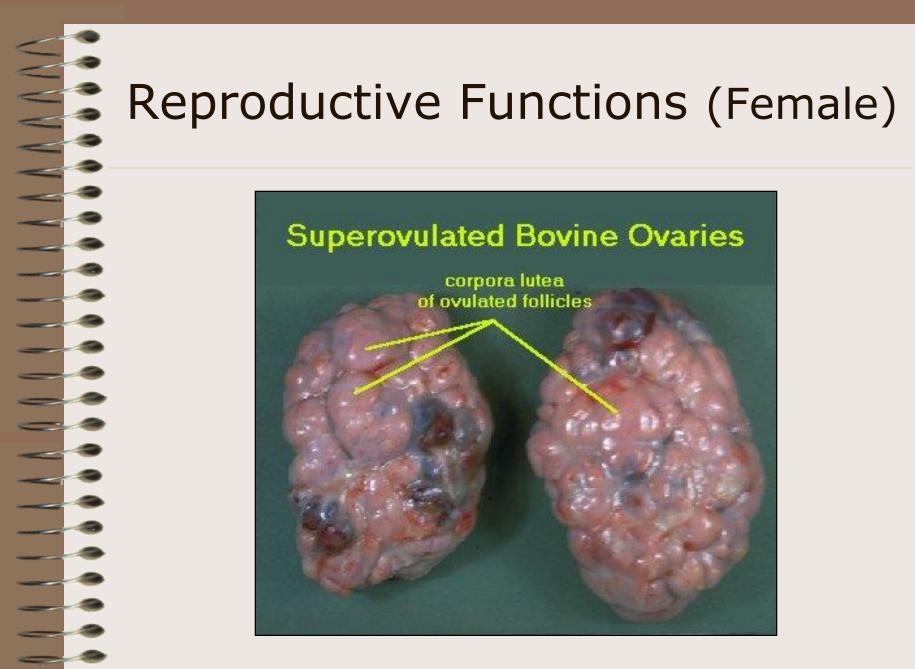
- Function: external opening to female reproductive and urinary systems
- Description: external opening made up of folds of skin



Steps in the female reproductive process:

1. Ovulation

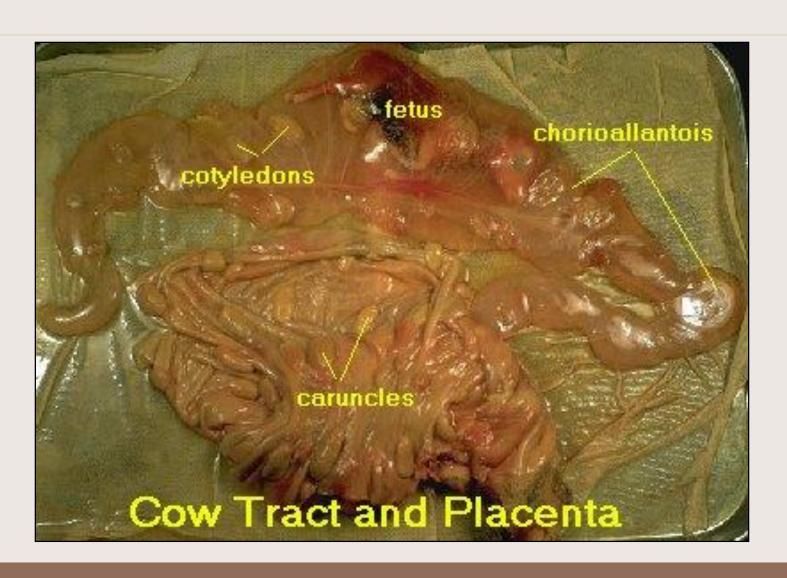
- Produce gamete (ova or ovum)
- Release of egg(s)
- Infundibulum pushes the ovum into the fallopian tube



- 2. Estrus (heat, estrous period)
 - Period of time when a female will accept a male in copulation
 - The female must stand (standing heat) to be mounted before the reproductive process can begin

- 3. Gestation
 - Fertilization to parturition
 - Develop embryo in uterus
- 4. Parturition
 - Expel fully developed young at birth
- 5. Lactation
 - Milk production





Ovulation Rates

Ovulation Rates by Species

Cow- 1 egg per estrus

Ewe- 1 to 3 eggs per estrus

Sow- 10 to 20 eggs per estrus

Mare- 1 egg per estrus

Hen- Approx. 28 eggs per month

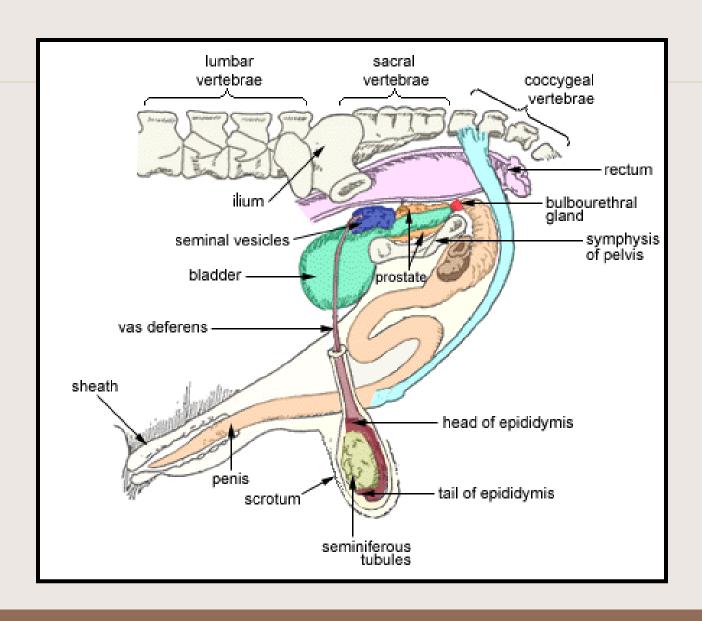
Reproductive Terminology

Species	Act	Offspring
Cows	calving	calf
Ewes	lambing	lamb
Sows	farrowing	pig
Hens	hatching	chick
Mares	foaling	foal
Goats	kidding	kid

The Male Reproductive Tract



Male Reproductive Tract



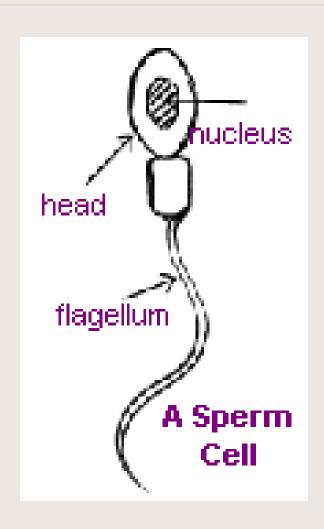
Scrotum

- Function: holds and protects testicles
- Description: saclike part outside livestock that holds testicles

Testes or Testicles

- Function: produce sperm and male sex hormones
- Description: two ovary meaty type structures inside scrotum in livestock and inside body cavity of poultry on each side of backbone

Male Reproductive Tract



Epididymis

- Function: stores sperm while they mature
- Description: long coiled tube connected to each testicle

Vas Deferens

 Function: serves as a passageway for sperm to travel from the epididymis to the urethra

Description: tube that connects the epididymis to urethra

Seminal Vesicles

- Function: produce a fluid that protects and transports sperm
- Description: a gland that opens into urethra

Prostate Gland

 Function: produces a fluid that is mixed with the seminal fluid

 Description: gland near the urethra and bladder

Cowper's Gland

 Function: produces a fluid that moves down the urethra ahead of the seminal fluid; it cleans and neutralizes the urethra to protect the sperm

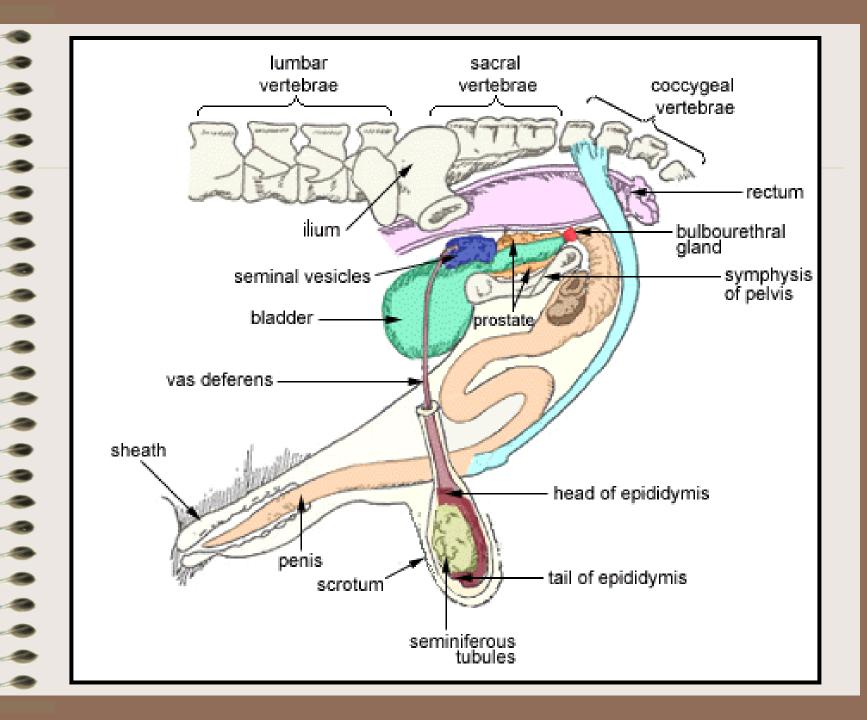
- Description: a gland near the urethra

Penis

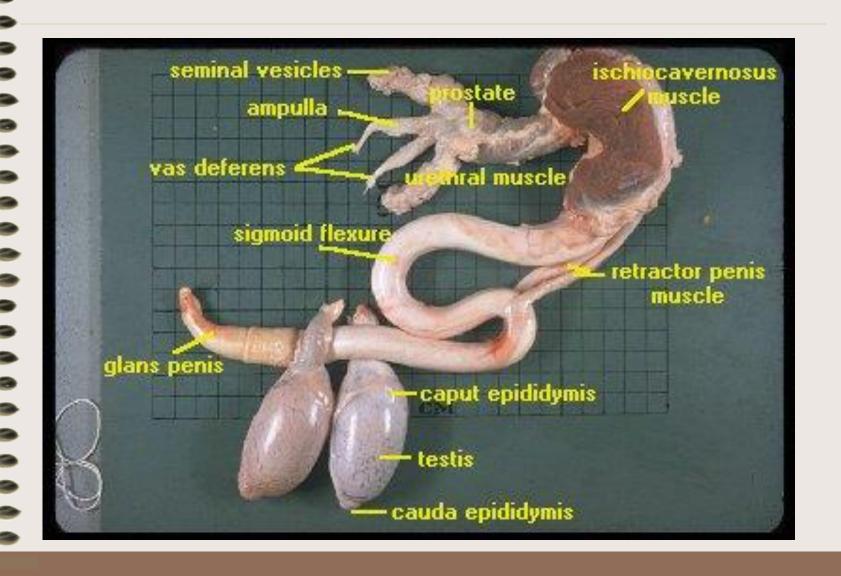
- Function: deposits semen in female animals; papilla serves this function in poultry
- Description: rod like tissue covered by sheath

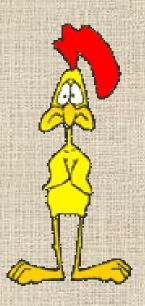
Sheath

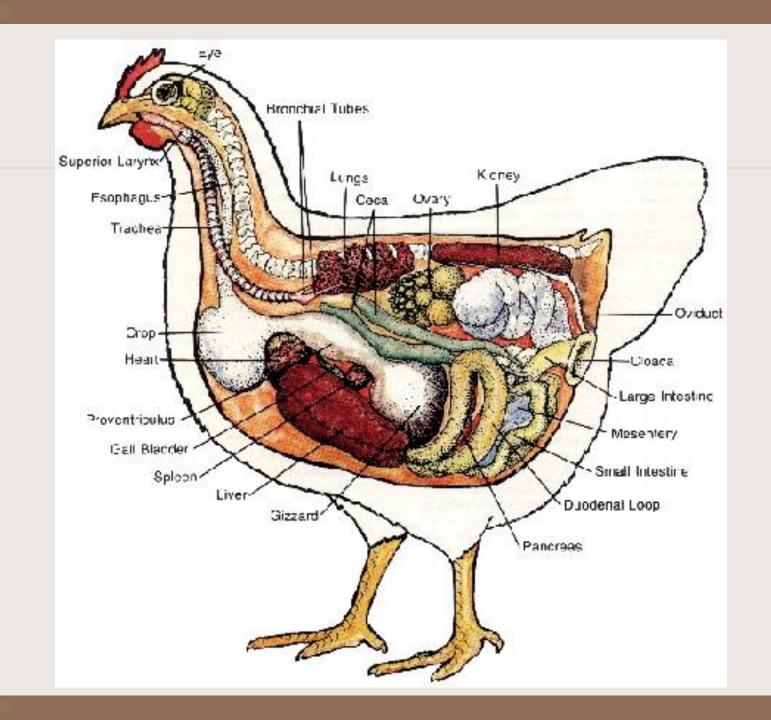
- Function: protects penis from injury
- Description: skin that covers the penis



Male Reproductive Tract







- The major difference between mammals and poultry reproductive systems is that the embryo of livestock develops inside the female's body and the poultry embryo develops outside the body.
- Papilla is the organ in male poultry's cloaca wall that puts the sperm in the hens reproductive tract.

- Chickens have only the left ovary and oviduct functional at maturity.
 The right ovary and oviduct do not function.
- Egg: function is reproduction, but is eaten as food by humans and wild animals

- Domestic chickens lay an egg every 24-28 hours regardless even if sperm are not present.
 Commercially sold eggs are not fertilized.
- Incubation time for chicken eggs is 21 days. Turkey and duck eggs are 28 days.

- Ovary: poultry only have one functioning ovary
 - Function: produces ova and hormones;
 the yolk of the egg is the ovum
 - Description: an attached cluster of yellow, round egg yolks

Infundibulum

- Function: the place where fertilization takes place
- Description: funnel shaped structure located just below the ovary; it is the start of the oviducts

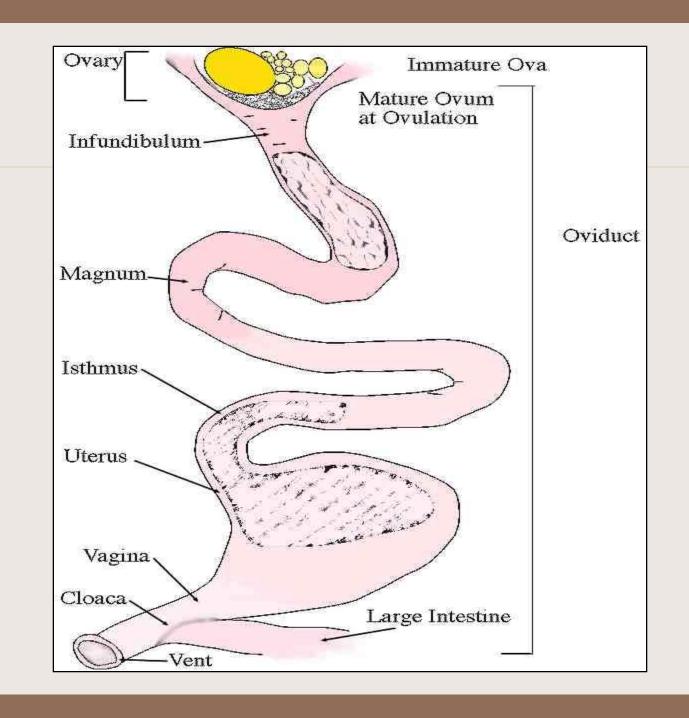
- Oviduct: tube like structure that consists of 5 parts
 - Magnum: secretes the thick egg white or albumen
 - Isthmus: adds the two shell membranes
 - Uterus: secretes the thin white, the shell, and the shell pigment
 - Vagina: holds the egg until it is laid

Cloaca

- Function: location where the papilla of the male bird deposits semen; egg also passes through this part
- Description: located between the vent and base of oviduct

Vent

- Function: expel egg, liquid, and solid waste
- Description: outside opening to the poultry reproductive tract



Shell Membrane Surrounding Egg Isthmus Shell Membrane Large Uterus Intestine Vagina Cloaca

Assignment:

Build a crossword puzzle containing 10 reproductive terms from your class notes. Have another student complete and sign your crossword puzzle. The assignment as well as your other assignment from the handout is due at the end of class.

Parturition of Animals

- If an ovum of the female animal is fertilized and the animal becomes pregnant, the embryo begins to grow and develop
- After a period of embryological development, the developing animal is referred to as a FETUS

- During gestation, the fetus develops in the uterus
- At the end of gestation, parturition begins
- Parturition is birth

- Normal Position
 - Front feet first
 - Nose tucked between front legs
 - Shoulders
 - Body
 - Hips
 - Back legs

https://www.youtube.com/watch?v=y
sfuoXP34i4

Process

- Increased Estrogen causes contractions
- First water bag emerges and breaks
- Second water bag emerges and breaks (contains fetus)
- Several hours later, the placenta and other membranes (afterbirth) are expelled

Animal Genetics

Objective 8.02: Understand genetics of animal breeding

Animal Cell

 The body is made up of millions of tiny cells

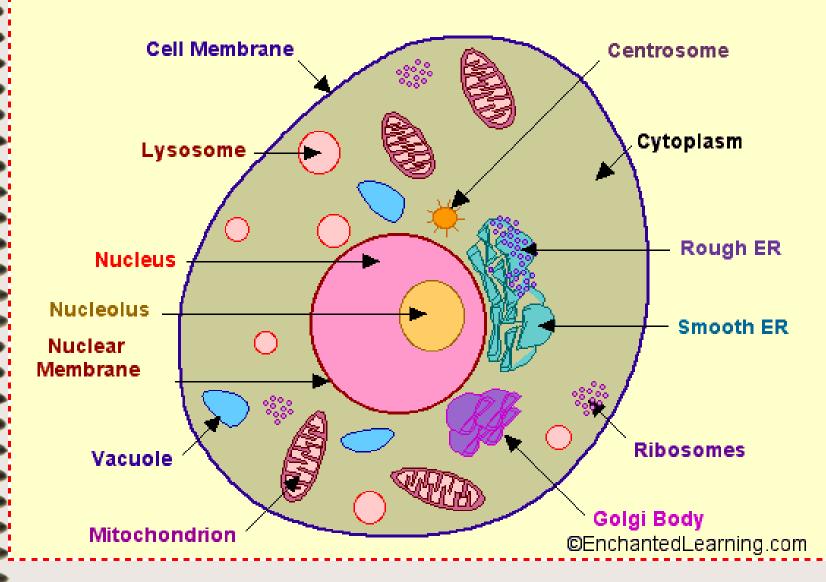
 The cell is the basic unit of the body that supports and sustains

life of an animal

Cell Parts

- Protoplasm-
 - The material or contents inside of a cell.
- Cell Membrane-
 - Thin layer of protein and fat that surround the cell. Some substances can pass into the cell and the membrane blocks others materials from entering.

Cross-Section of an Animal Cell



Cell Parts

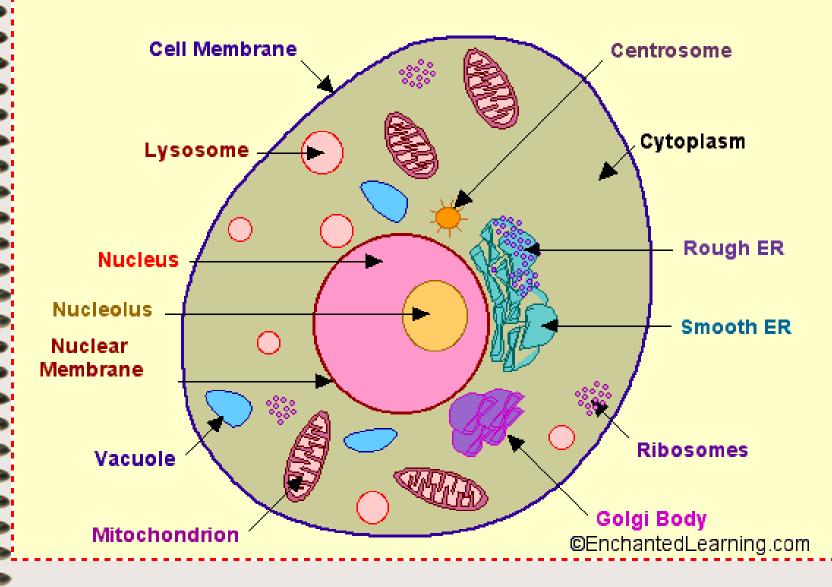
- Centrosome-

 Small body where the microtubules are made. The centrosome divides during mitosis.

- Nucleus-

 Gives cell ability to grow, digest food and divide. Contains chromosomes and DNA.

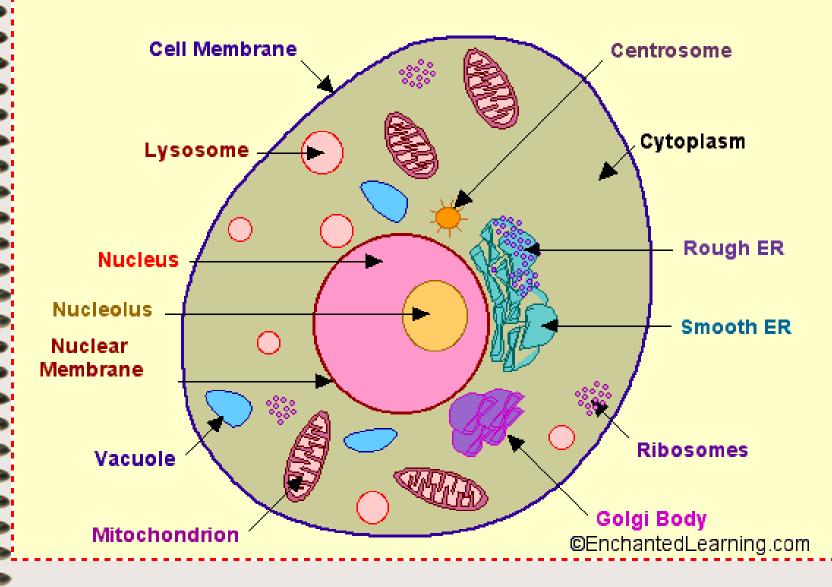
Cross-Section of an Animal Cell



Cell Parts

- Cytoplasm-
 - A jellylike substance that gives the cell shape and contains components necessary for cell functions.
- Golgi Body-
 - Located near the nucleus and produces the membrane that surrounds the lysosomes.

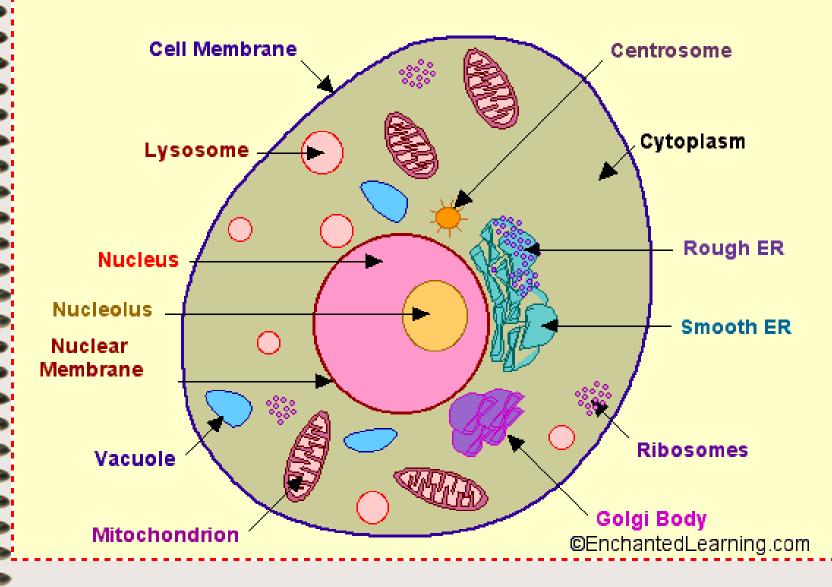
Cross-Section of an Animal Cell



Cell Parts

- Lysosome-
 - Round shaped organelles that contain digestive enzymes that allow for digestion of cell nutrients
- Mitochondrion-
 - Rod-shaped organelles that convert the energy stored in glucose into ATP (adenosine triphosphate)

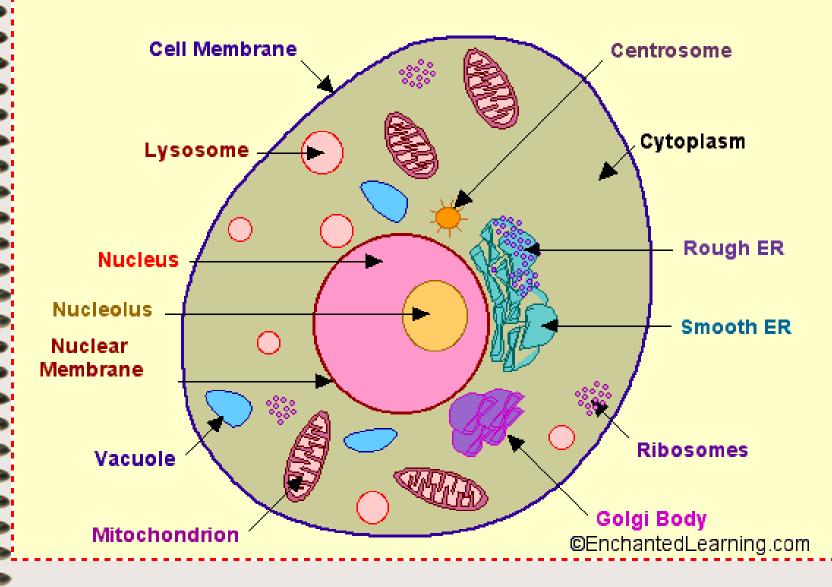
Cross-Section of an Animal Cell



Cell Parts

- Nuclear membrane-
 - Membrane that surround the nucleus.
- Nucleolus-
 - Organelle found inside the nucleus; produced ribosomal RNA

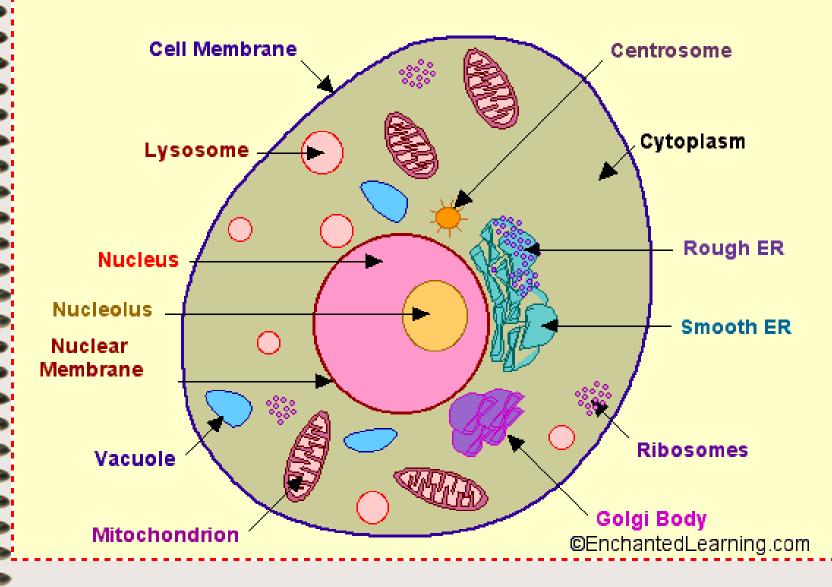
Cross-Section of an Animal Cell



Cell Parts

- Endoplasmic Reticulum-
 - Transports materials through the cell
- Vacuole-
 - Fluid filled membrane that fills with food and waste products inside the cell.
- Ribosome-
 - Site of protein synthesis.

Cross-Section of an Animal Cell



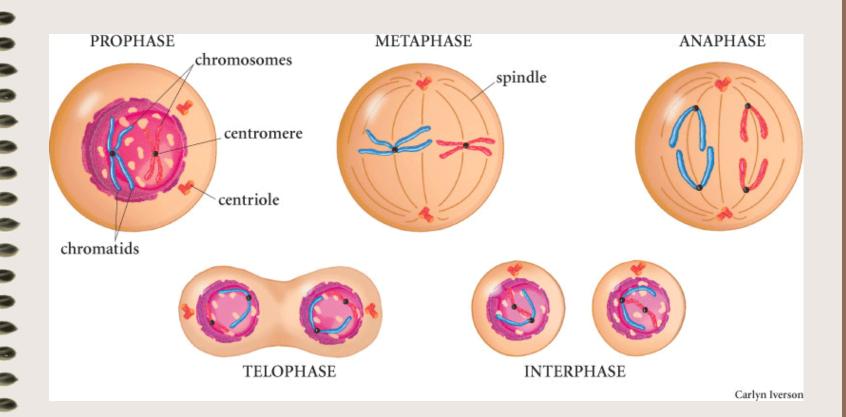
- Mitosis
 - Increases total number of cells
 - Results in animal growth
 - Chromosomes pairs are duplicated

 Prophase- the nucleolus disappears and centrioles move to opposite ends of the cell. Fibers begin to form and extend from the centromeres.

 Metaphase- spindle fibers align the chromosomes along the middle of the cell nucleus.

 Anaphase- the paired chromosomes separate and move to opposite sides of the cell.

 Telophase- nuclear membrane forms around the newly divided chromosomes and cell membrane begins to contract.



- Meiosis
 - Produces sex cells, or gametes
 - Only have one-half the chromosomes of normal cells

- Gamete Formation
 - One set of chromosomes come from the sperm and one from the ovum.
 - The zygote that is created during fertilization has chromosomes from each parent. Chromosomes match up with one another based on the genetic information they carry.

- Production of sperm is called spermatogenesis.
 - Male animals begin producing sperm at sexual maturity.
 - Spermatocytes divide into spermatids through meiosis.

- Production of an ovum is called oogenesis.
 - Females also begin producing ova at sexual maturity.
 - The oocytes divide and form an ovum. The ovum contains cytoplasm and stored food. It provides nourishment for the zygote and embryo.

Chromosomes

- Rod shaped bodies
- Made of protein
- Found in the cell nucleus
- Exist in pairs except for gamete cells

- The number of chromosome pairs differ for various animals
 - Cattle 30
 - Swine 19
 - Chickens 39

Genes

- Located on chromosomes
- Thousands found in each animal
- Control inherited characteristics
 - Carcass traits
 - Growth rate
 - Feed efficiency
- Two types of inherited traits
 - Dominant
 - Recessive

Genes

- Dominant gene
 - Hides the effect of another gene
 - Polled condition in cattle is dominant
 - The gene is represented by a capital letter
- Recessive
 - Gene that is hidden by another
 - The gene is represented by a lower case letter

Genes

Example:

The dominant gene is written- P

The recessive gene is written-p

P= Polled

p= horned

Homozygous and Heterozygous

- Homozygous gene pair
 - Carries two genes for a trait
 - Polled cow might carry the gene PP
- Heterozygous
 - Carries two different genes that affect a trait
 - Polled cows might carry a recessive gene with the dominant Pp

Predicting Genotype

- Genotype-kind of gene pairs possessed
- Phenotype- the physical appearance of an animal
- Punnett squares are used to predict genotypes and phenotypes of animals

Punnett Square

P= Polled

p= horned

Example:

 Two polled cattle that are homozygous for the polled trait

Polled Dam

	Р	Р
Р	PP	PP
Р	PP	PP

Punnett Square

N= Normal size

n= Dwarfism

Example:

 Normal size in cattle is dominant to dwarfism

Normal Dam

	N	N
N	NN	NN
n	Nn	Nn

Punnett Square

N= Normal size

n= Dwarfism

Example:

 What if both parents are carriers for a trait or disorder?

Normal Dam

	N	n
N	NN	Nn
n	Nn	nn

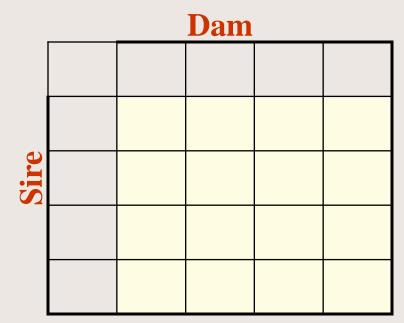
Result: one out of every four births could result in a dwarf animal (1:2:1)

Assignment

Complete a Punnett Square for two animals that are heterozygous for two traits:

- Polled=P
- Black= B

(Alternatives are horned and red)



Answer

A Punnett Square for two animals that are heterozygous for two traits:

- Polled=P
- Black= B

(Alternatives are horned and red)

Dam

	РВ	Pb	рВ	pb
РВ	PPBB	PPBb	PpBB	PpBb
Pb	PPBb	PPbb	PpBb	Ppbb
рВ	PpBB	PpBb	ppBB	ppBb
pb	PpBb	Ppbb	ppBb	ppbb

9:3:3:1

Heritability

- The likelihood of a trait being passes on from the parent to the offspring
 - Low heritability
 - slow herd improvement
 - High heritability
 - faster improvement

Heritability

- Swine rates are usually lower than cattle
- Heritiability for carcass traits are higher than reproductive traits
- Estimates vary from 0 to 70%

Heritability Estimates

Birth weight 40%

Weaning Weight 25-30%

Yearling Weight 60%

Fertility 10%

Tenderness 60%