Oakland CUSD #5

BSAA

April 13-17, 2020

Jeff Coon

Week of April 13-20, 2020

All of these assignments are on google classroom. You must pick one of the 3 listed and complete by next Monday April 20 for credit. If you would like to use google docs to complete the work that would be most efficient, just remember to start a new copy with your own work please. Paper copies can be returned to the school.

Class	Choice 1	Choice 2	Choice 3 (Enrichment)
Ag Science	Animal Cell	Heredity and DNA	FFA journal
Ag Business Mang	Managing Employees	Employee benefits	Chart work experiences
BSAA	Animal Cell Structure	Animal Growth factors	Animal Nutrition 2
Landscape Design	Soil Texture	Water Holding Capacity	Landscape pests
Intro To Ag	FFA official dress	FFA opportunities	Ag Commodities
Ag Mech.	Surveying Equipment	Fuels	Lubricants

Choice 1

BSAA Mr. Coon April 13 Name

Checking Your Knowledge:

1. How are plant cells and animal cells different?

2. What are the major organelles in an animal cell?

3. What are the functions of the organelles?

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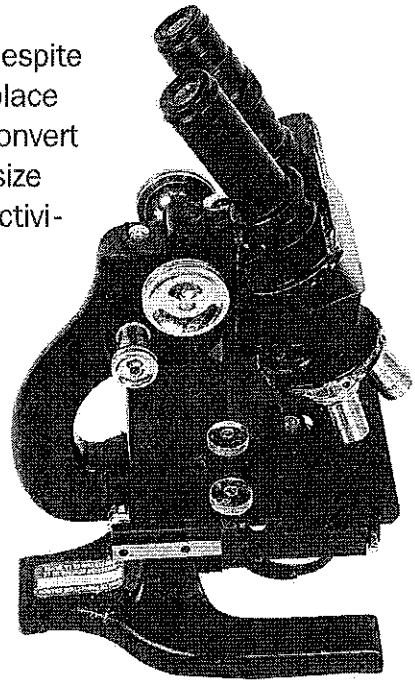
Animal Cell Structures

MOST cells cannot be seen without a microscope. Yet, despite the small size of cells, life's important activities take place within them. Cells are remarkable microcosms of life. They convert energy from one form to another. They use energy to synthesize chemicals for growth and development and for mechanical activities. Cells are the building blocks for plants and animals.



Objective:

- Describe animal cell components.

Key Terms:

- cell
- cell membrane
- cytoplasm
- endoplasmic reticulum
- Golgi complex
- lysosome
- mitochondrion
- nucleolus
- nucleus
- protoplasm
- ribosome
- vacuole

Animal Cell Structures and Their Functions

Animal cells are similar regardless of the animal being examined. The cells contain structures called organelles that carry out specific functions in the cells. A **cell** is a microscopic structure with a selectively permeable **cell membrane**—no rigid cell wall as in plants—that

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holds the contents together. The cell membrane is also necessary for controlling the flow of material into and out of the cell.

The control center of a cell is the nucleus. The **nucleus** is the portion of the cell that not only coordinates cellular activity but also has the genetic material that is passed on during cell division. The **nucleolus** synthesizes the organelle ribosome.

Protein synthesis occurs in the **ribosome**. The **mitochondrion** is responsible for energy transformation through cellular respiration. The **endoplasmic reticulum** creates many cellular membranes and performs other functions. The **Golgi complex** takes in products of the endoplasmic reticulum, then stores, repackages, and transports them to other locations. Digestion within the cell occurs in the **lysosome**. Storage and waste disposal are key functions of the **vacuole**. The **cytoplasm** is the liquid that fills the cell, except the nucleus. The total content within the cell membrane is called **protoplasm**.

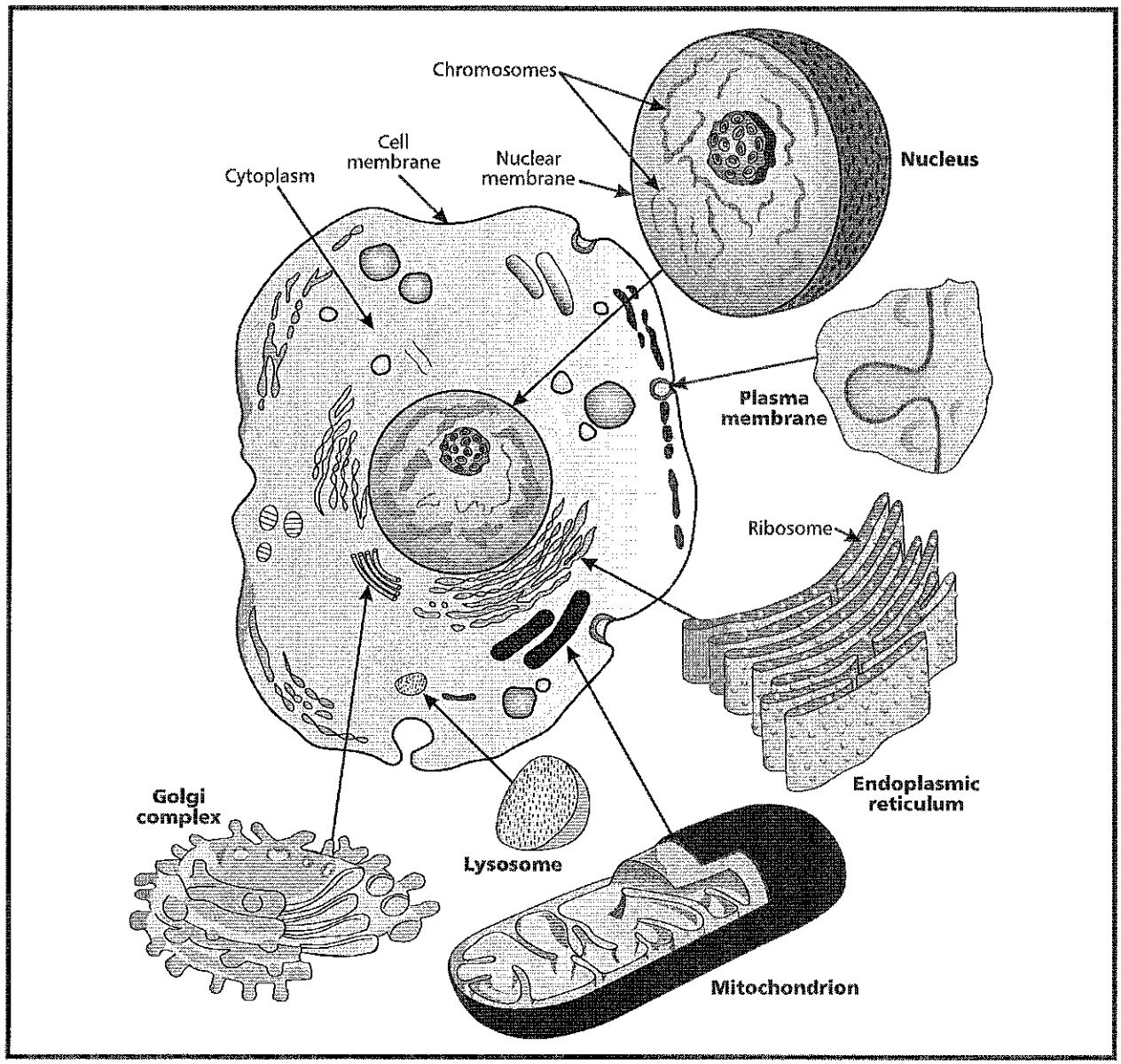

FIGURE 1. Animal cell components.

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Summary:

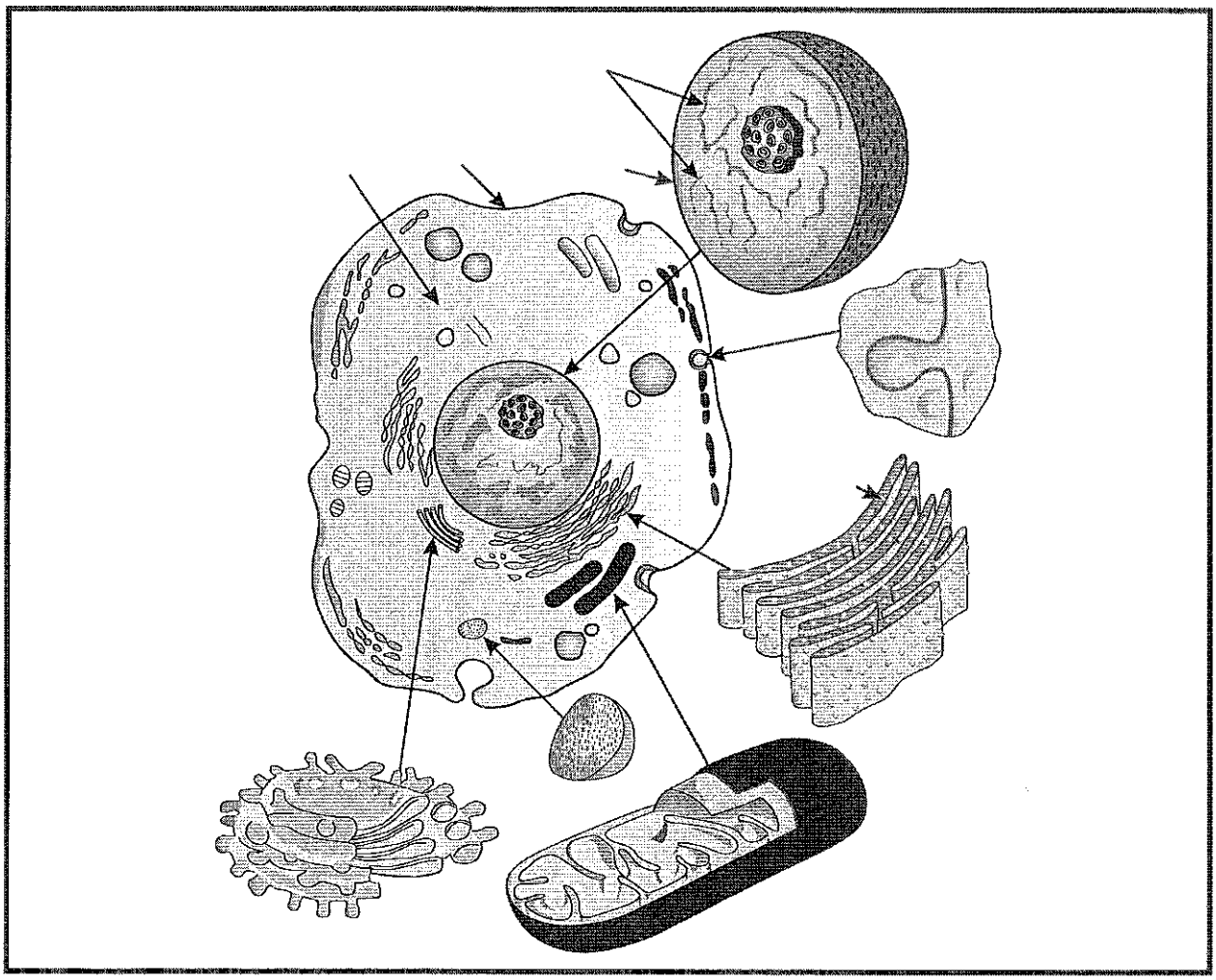
Cells are similar in all animals. The nucleus coordinates cellular activity and contains the majority of the genetic material in a cell.

Checking Your Knowledge:

1. How are plant cells and animal cells different?
2. What are the major organelles in an animal cell?
3. What are the functions of the organelles?

Expanding Your Knowledge:

Without looking at Figure 1, label the organelles of an animal cell on this drawing. Then, check your answers against Figure 1.



Web Links:

Cells Alive! Animal Cell

http://www.cellsalive.com/cells/animcell.htm

Interactive Animal Cell structure

www.wiley.com/legacy/college/boyer/0470003790/animations/cell_structure/cell_structure.htm

Agricultural Career Profiles

http://www.mycaert.com/career-profiles

Choice 2

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Checking Your Knowledge:

1. What factor most influences animal growth?

2. Why do males tend to be heavier than females?

3. Why do cold temperatures affect animal growth?

4. Why are animals castrated?

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Animal Growth Factors

To help animals grow, those who care for them must understand the factors that affect animal growth. Just as your parents provided you with certain things to help you grow, so must producers do the same with their animals. This E-unit provides information on the four major factors that affect animal growth.

Objective:

Explain the factors affecting growth.

Key Terms:

castration
hormone
testosterone

Factors Affecting Growth

The environment affects both plant growth and animal growth. However, the greatest impact on animal growth is genetics. The gender of the animal and the nutrition it receives also influence growth.

GENETICS AND GROWTH

Inheritance of sound genetics that translate into desirable characteristics is a key to success in the meat animal industry. The traits passed to an animal from its parents largely determine the potential growth rate and quality of the animal. Without quality genetics, the best possible management and care will still not result in the optimal growth and development of an animal. Think of genetics as a water pitcher—no matter how much water you try to put in, the pitcher

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will hold only a certain amount. Similarly, no matter how much care and nutrition you give an animal, its growth and quality potential is limited by its genetic makeup. At the same time, if an animal doesn't receive the best nutrition, care, and management, it won't reach its potential, just as your pitcher would not be full without putting enough water into it. An animal's mature size is also dependent on its genetics, as is feed conversion. Ultimately, if all other factors are equal, the animal with the superior genetic makeup will use less feed to produce a higher-quality carcass.

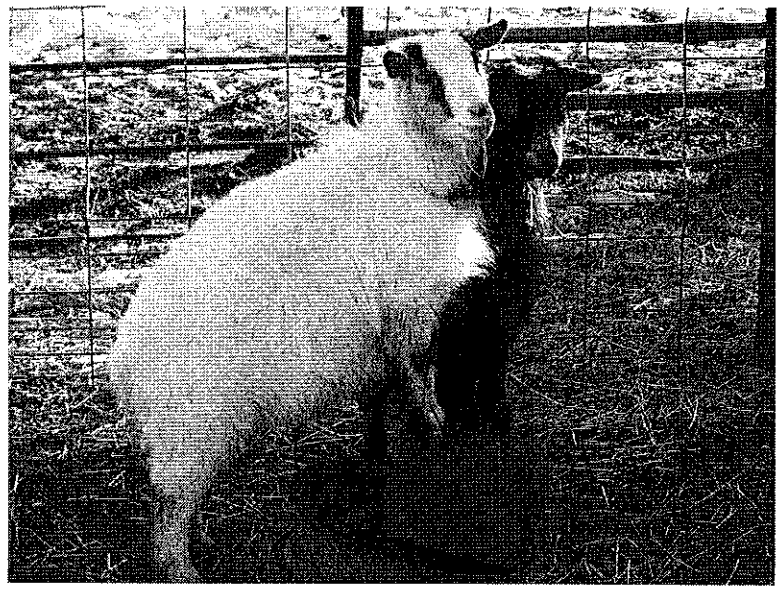

FIGURE 1. Pygmy goats will never grow to be as large as dairy goats. Their genetic code results in their lesser height and weight.

GENDER AND GROWTH

Gender affects growth rates largely because of naturally occurring hormone levels. A **hormone** is a chemical produced by a gland, then secreted into the bloodstream to affect another region of the body. The primary glands are the thyroid, the pituitary, the testicles or ovaries, and the renal glands. Androgens are a group of hormones that trigger muscle and bone development. Androgens occur at higher levels in males than in females. As a result, males tend to reach a heavier mature weight in less time.

Testosterone is a hormone secreted by the testicles that causes a male to produce sperm, behave more aggressively, and have a leaner carcass. When a male animal reaches maturity, an increase in testosterone has a negative effect on meat tenderness and taste. As a result, male

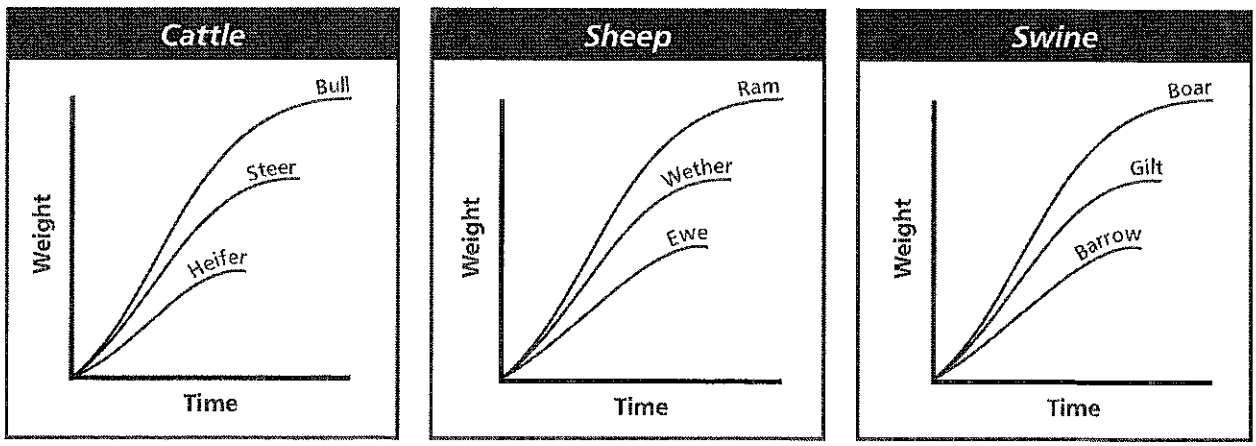

FIGURE 2. Maturity patterns in cattle, sheep, and swine.

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animals grown for meat are often castrated. **Castration** is the removal of both testicles. A castrated male tends to produce a carcass that is of higher quality because of its desirable fat covering and lack of testosterone.

The growth of female animals is usually slower than that of males. This is due to a number of factors, including hormones and sexual maturity. During the period of estrus, a female typically stops growing or may even lose weight. This causes the animal to take longer to reach the desired market weight, resulting in higher feed costs per pound of gain.

Males and females can have different nutritional requirements at different stages in their lives. In many modern swine operations, barrows and gilts are separated so that they can be fed differently when they near market weight. Gilts can convert higher-protein feed into lean muscle more efficiently than barrows, so producers can feed higher-protein feed to the gilts and lower-protein feed to the barrows. This results in getting the gilts to market weight faster than if they had been fed the lower-protein feed. Thus, feed costs are reduced, and feed efficiency is improved.

NUTRITION AND GROWTH

Nutrition is often a limiting factor to an animal's growth and development. An adequate level of each of the essential nutrients is required for an animal to maximize its growth potential. Protein and carbohydrate deficiencies reduce growth rate drastically. To revisit the water pitcher discussed earlier, the pitcher will not get full and hold its maximum potential if enough water is not put into it. Likewise, animals will not grow to their maximum potential if they are not given the nutrition they need for growth.

ENVIRONMENT AND GROWTH

Animals raised for meat and animal products must be cared for to reach their genetic potential. Most agricultural animals are endothermic, meaning they are warm blooded. An endotherm's body temperature remains practically constant. Energy must be used to warm the body through muscle movement and other functions. Excess heat is released by radiation, evaporation, and conduction. When temperature extremes occur, the animal's growth and production generally decrease. Proper care and management practices can offset temperature extremes so that normal growth can continue.

Other environmental factors affect growth as well. Animals that must travel through deep mud

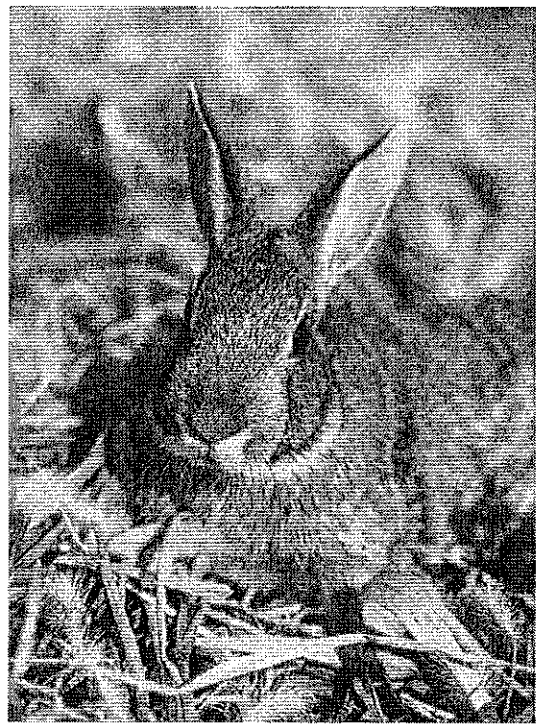

FIGURE 3. Endotherms like rabbits must expend energy consumed in feed to maintain their body temperatures when environmental temperatures are cold. This energy use does not contribute to the growth of the animals.

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between food and water expend additional energy traveling through the muddy conditions that would otherwise be used for growth.

Summary:

Producers can manipulate some factors that influence growth. Genetics, gender, nutrition, and environment all influence the growth rate of animals. Typically, producers will select animals that exhibit positive growth rates for breeding.

Checking Your Knowledge:

1. What factor most influences animal growth?
2. Why do males tend to be heavier than females?
3. Why do cold temperatures affect animal growth?
4. Why are animals castrated?

Expanding Your Knowledge:

Visit a local animal producer or animal shelter. Interview the manager to determine what changes are made to the animals' diets when it is extremely hot or cold. How is food and water intake affected by temperature extremes?

Web Links:

Cooperative Extension Service

http://www.csrees.usda.gov/ProgView.cfm?prnum=4469
http://www.csrees.usda.gov/nea/animals/animals_all.html

Agricultural Career Profiles

http://www.mycaert.com/career-profiles

Choice 3

BSAA Mr, Coon April 13 Name

Remember to copy and paste this elsewhere, it was shared with the entire class, all edits made will show to everyone. We were given the invitation to edit, does not mean we should put answers here. (Joe)

Checking Your Knowledge:

1. Define digestion.

2. List the structures that food passes through in the gastrointestinal tract of a nonruminant animal.

3. What are villi? Where are they located in the gastrointestinal tract?

4. Differentiate between metabolism, anabolism, and catabolism.

5. List the compartments of a ruminant stomach and explain their functions.

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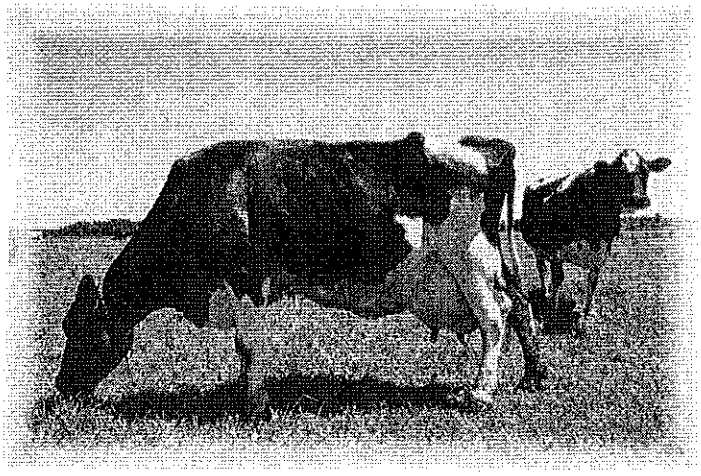
Digestion

DIGESTION is the physical and chemical breakdown of feeds as they pass through the gastrointestinal tract. The structures of the **gastrointestinal tract** include the mouth, the esophagus, the stomach, and the intestines. Digestion breaks down and releases the nutrients in feeds so they may be absorbed into the bloodstream. Once in the bloodstream, the nutrients are transported to cells to maintain the life of the animal or used to produce animal products, like milk and eggs.



Objective:

Describe digestion, and explain and contrast the functions of the nonruminant and ruminant digestive systems.

Key Terms:

abomasum
absorption
anabolism
bloat
catabolism
cecum
crop
digestion
duodenum
gastrointestinal tract
gizzard

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jejunum
mastication
metabolism
monogastric
nonruminants
omasum
osmosis
oxidation
peristalsis
polygastric
prehension
proventriculus
regurgitate
reticulum
rumen
ruminants
symbiosis
villi

Digestion in General

Digestion occurs in different parts of the gastrointestinal tract, and each part has its own unique function. **Prehension**, which is the simple act of an animal bringing food into its mouth, begins the process. In organisms having teeth, **mastication**, or the physical reduction of particle size, begins in the mouth. Mastication is the chewing of food. The chemical breakdown of food also begins in the mouth with the addition of saliva. Food then moves into the esophagus. The esophagus connects the mouth to the stomach. Food moves through the esophagus by muscle contractions called **peristalsis**.

After food reaches the stomach, further chemical digestion occurs. The stomach is extremely

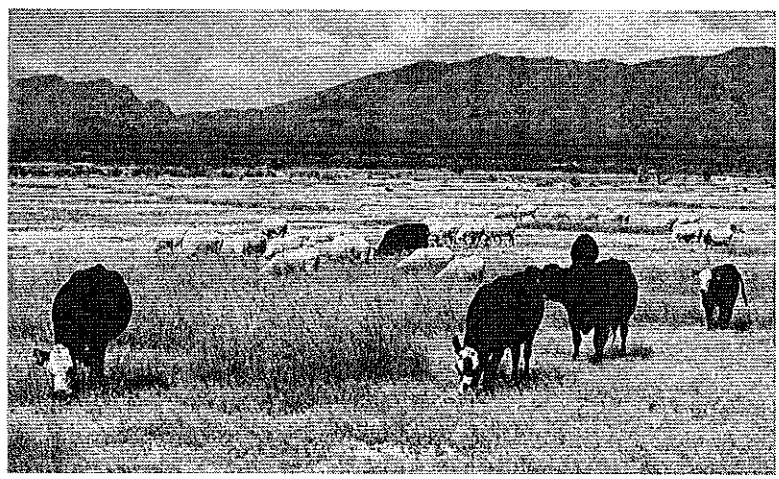

FIGURE 1. When grazing, cattle and sheep must chew their food numerous times to aid digestion. (Courtesy, Agricultural Research Service, USDA)

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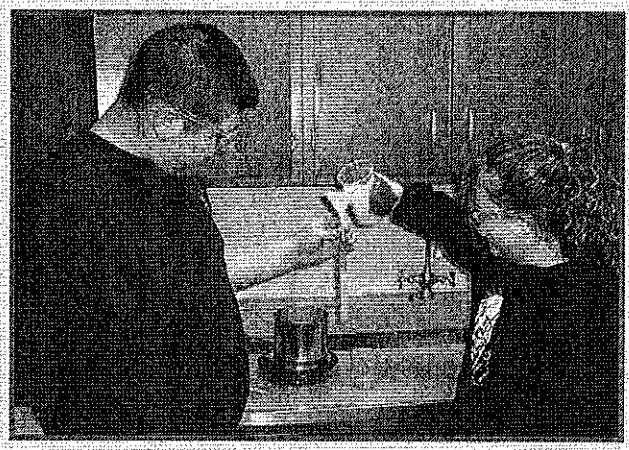
UNDER INVESTIGATION...

LAB CONNECTION: Absorption of Nutrients

The wall of the small intestine is a selectively permeable membrane that prohibits material that is not completely digested from passing into the bloodstream. This selectivity results in molecules that are too large to pass on through the digestive tract.

Use of dialysis tubing filled with various solutions demonstrates the selectivity of membranes. Use of enzymes in the dialysis bags can further demonstrate the need for digesting feedstuffs in order for the nutrients to be absorbed into the bloodstream.



Students fill a dialysis bag with a starch and saliva solution to demonstrate absorption.

acidic, with a pH near 2. Hydrochloric acid secreted in the stomach causes the low pH. The hydrochloric acid breaks down proteins in the feed into amino acids, which are small enough to be absorbed. The hydrochloric acid also kills any bacteria ingested with the feed before they do damage to the lower portions of the gastrointestinal tract.

The small intestine is the next structure in the digestive tract. Partially digested food enters the duodenum, the first segment of the small intestine. The **duodenum** is the location of the final stages of digestion. The **jejunum** and the **ileum** are the last two segments of the small intestine. Absorption of nutrients is the primary function of the jejunum and the ileum. **Absorption** is the movement of food nutrients into the bloodstream from the digestive system. **Villi**, or small finger-like projections in the folds of the small intestine, increase the surface area, allowing for more exposure to blood vessels and, therefore, for more absorption to occur. Most absorption takes place via osmosis. **Osmosis** is the movement of substances across a semipermeable membrane from an area of higher concentration to an area of lower concentration.

Any remaining material that passes from the small intestine enters the large intestine, or colon. This undigested material is prepared for excretion, and water in the material is absorbed into the bloodstream.

Food nutrients absorbed into the bloodstream are taken to cells to support metabolism. **Metabolism** is the sum total of all life processes. Metabolism includes anabolism, catabolism, and oxidation of nutrients. **Anabolism** is the building or repair of body tissue. This is a primary function during an animal's growth and keeps the animal in proper condition. **Catabolism** is the breakdown of tissue for other uses and into waste products. **Oxidation** of nutrients is necessary to release energy for the animal. During stressful environmental conditions,

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such as extremely cold temperatures, oxidation releases additional energy for the animal to keep warm, at the expense of anabolism, or animal growth and repair.

Nonruminant Digestion

Animals are classified by the type of digestive tract they have. **Nonruminants** are animals that have simple, one-compartment stomachs. This type of digestive system is called **monogastric**. The human digestive system is monogastric.

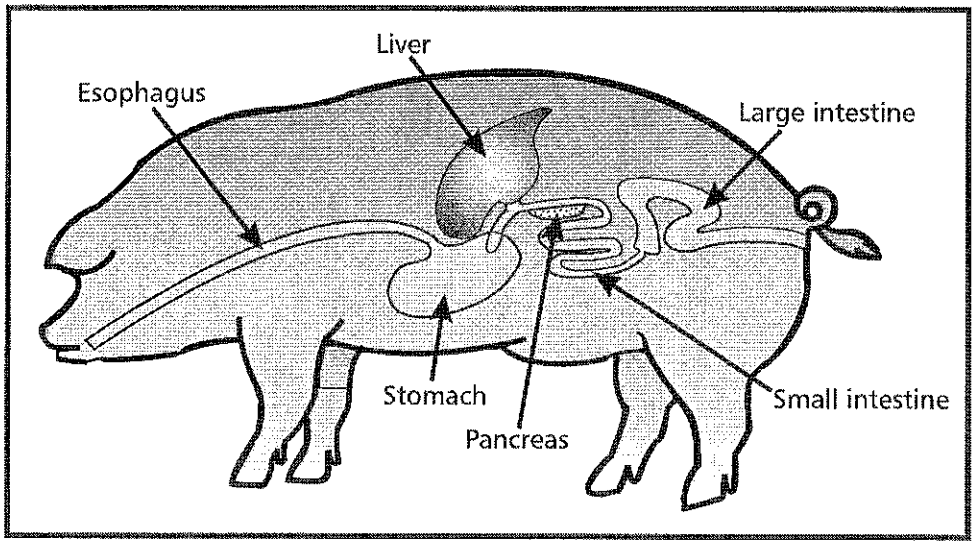

FIGURE 2. Swine digestive system.

Monogastric digestion is similar to the process described earlier in this E-unit. The monogastric stomach acts primarily as a storage structure; therefore, most digestion occurs in the small intestine. Because of their small stomachs, nonruminants are normally fed more often than ruminants. Their diet is usually higher in concentrates, such as corn and proteins, but lower in fiber, because nonruminants cannot digest cellulose found in grass, hay, and other forages.

Horses and rabbits are monogastrics with an adaptation that allows them to consume relatively large quantities of forages. The **cecum**, similar to the human appendix, is located at the end of the small intestine. The cecum is home to bacteria that ferment forages. As the bacteria break down the forages through fermentation, the forages denature into usable nutrients that can be broken down and absorbed.

Poultry are also monogastrics with physiological adaptations. The **crop** is a storage structure in the upper portion of the poultry digestive system. From the crop, food passes into the **proventriculus**, or true stomach. The proventriculus mixes acid with the food prior to it entering the gizzard. Poultry have no teeth to reduce particle size; instead, their feed is ground in the **gizzard**, a muscular structure in the digestive tract.

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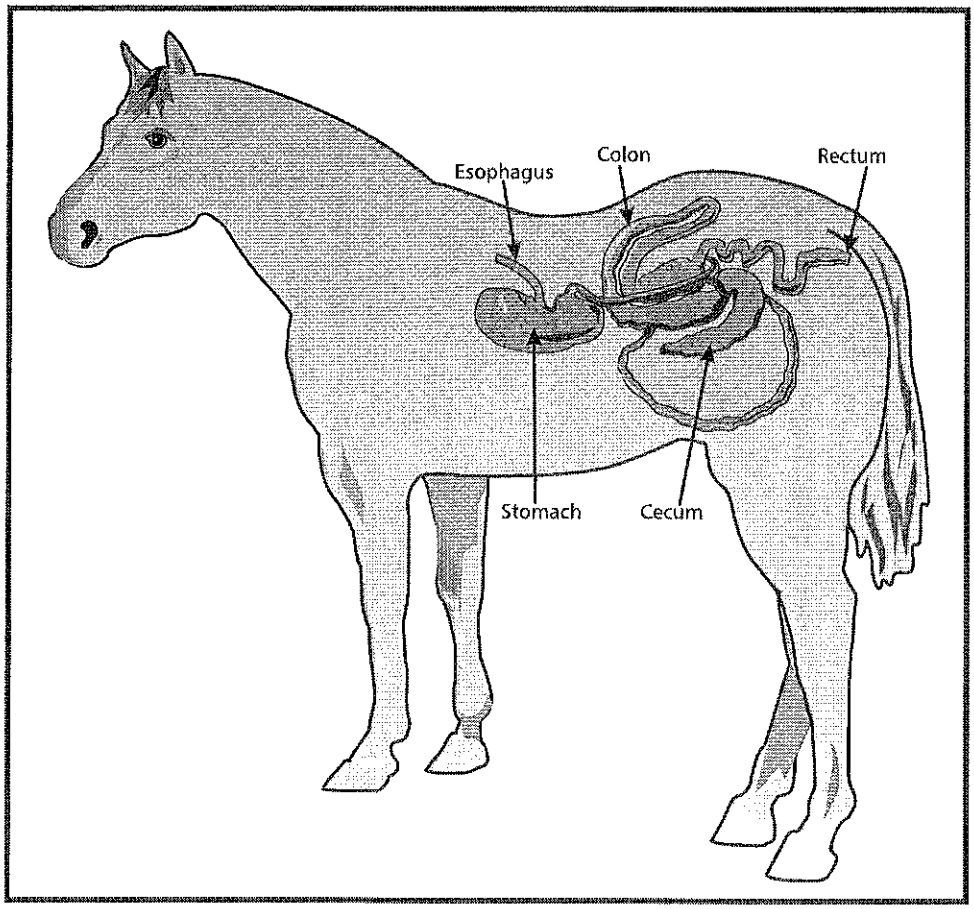

FIGURE 3. Horse digestive system.

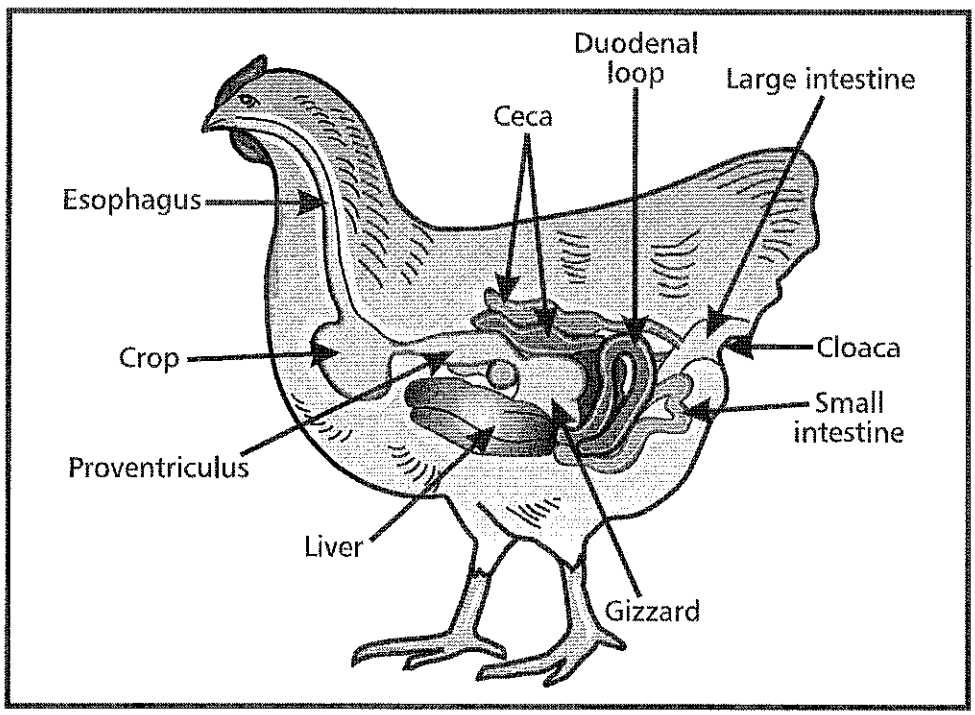

FIGURE 4. Poultry digestive system.

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Ruminant Digestion

Ruminants are animals that have four-compartment stomachs. A ruminant's stomach is much larger than a nonruminant's. The stomach of the ruminant makes up approximately two-thirds of the total capacity of the digestive tract. This type of digestive system is called **polygastric**.

Ruminants spend as much as eight hours per day ruminating. A ruminant animal typically grazes for a few hours and then lies down and digests its food. As it grazes, the ruminant consumes large quantities of food that are stored in the rumen. The animal will **regurgitate**, bringing the food back into its mouth to continue chewing it and further break it down. The food then passes back into the stomach for further physical and chemical digestion. Chewing is no small task for cattle, as it is estimated that they will chew 40,000 to 60,000 times a day, eating and rechewing regurgitated feed!

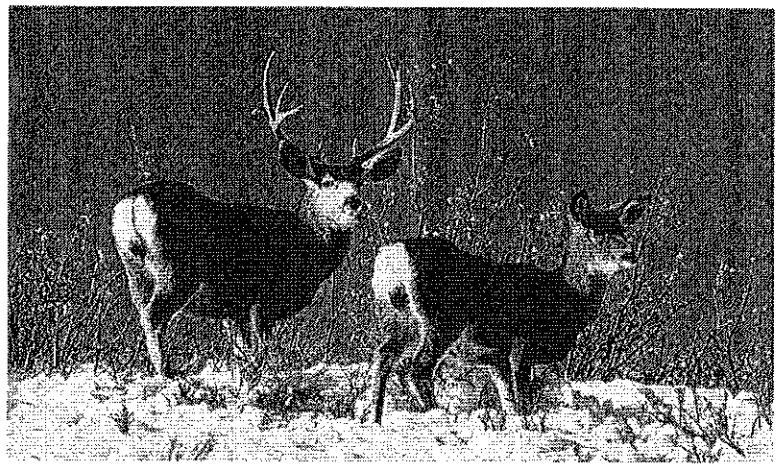

FIGURE 5. Mule deer are ruminant animals.

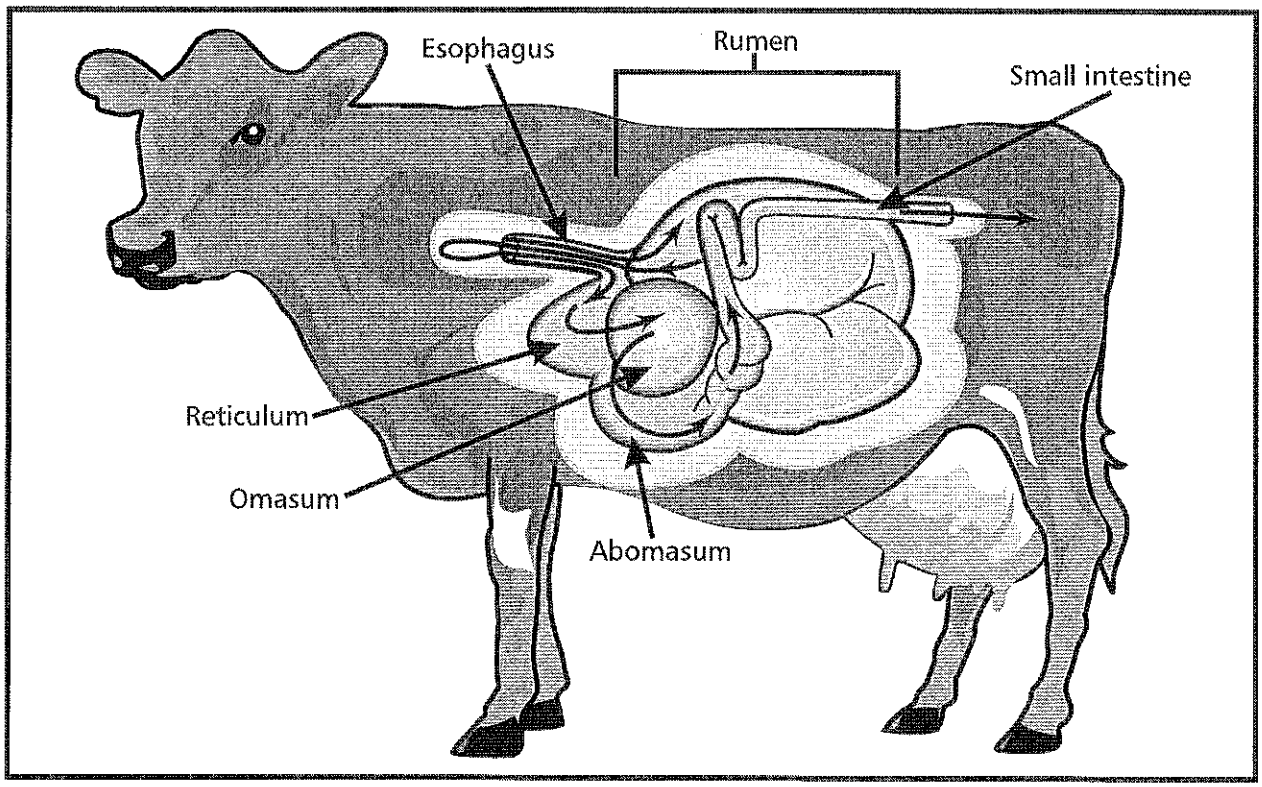

FIGURE 6. Cattle digestive system.

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RUMEN

The rumen is the first compartment of the ruminant stomach. The **rumen** is the site of forage digestion and is the large storage container for consumed feed and forage. The rumen's wall muscles keep the feed mixing through strong contractions. The rumen provides a host site for bacteria, anaerobic fungi, and protozoa that carry out a symbiotic relationship. The **symbiosis** exists when both the ruminant and the microorganisms benefit. In this case, the rumen provides food for the microbes, while the microbes digest foods for the animal.

The microorganisms produce protease, and they also produce volatile fatty acids because of starch digestion. The microbes also synthesize vitamin K, all the B-complex vitamins, and all the essential amino acids. The microbes flourish in the fermentation environment created in the rumen. Microbial fermentation results in the digestion of cellulose into starches and sugars, with carbon dioxide and methane as byproducts. The carbon dioxide and methane must be expelled to prevent **bloat**, the buildup of gases in the rumen. Bloat often occurs when animals eat larger quantities of green forages than they can digest. A cattle rumen has a capacity of 40 to 60 gallons and may contain 500,000 billion bacteria and 50 billion protozoa.

RETICULUM

The reticulum is the second part of the ruminant stomach. It is often called the hardware stomach. The **reticulum** is a small pouch that traps foreign materials consumed by the animal. Producers of dairy cows often administer magnets to attract any metallic material, such as nails or wire, mistakenly eaten by the cows.

OMASUM

The omasum is the third compartment of the ruminant stomach. The **omasum** is a round structure layered with folds of tissue that help absorb the water, electrolytes, and remaining volatile fatty acids as feed passes through it.

ABOMASUM

The **abomasum** is often called the true stomach of the ruminant because it functions most like a monogastric stomach. The abomasum is made up of many folds to increase the surface area within it. This surface area is in contact with the large quantity of feed that passes through it daily. The walls of the abomasum secrete hydrochloric acid and enzymes. The food material enters the abomasum at a pH of near 6.0, but that is quickly lowered to 2.5 by the acid. The lower pH provides an environment for the enzymes to work properly, breaking down the proteins.

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Once the food has gone through the four compartments of the ruminant system, it proceeds to the small intestine for absorption.

Summary:

Digestion includes the physical reduction in size and the chemical breakdown of food particles in the gastrointestinal tract. Digestion begins in the mouth and continues through the esophagus, stomach, and intestines. After food particles are digested into their components, nutrients may be absorbed into the bloodstream and transported through the body for use by cells.

Nonruminants are animals with simple, one-compartment stomachs. Ruminants are animals with four-compartment stomachs. The ruminant stomach includes the rumen, reticulum, omasum, and abomasum. A ruminant is able to digest large quantities of roughage because of the activity of microbes in its rumen. It is also able to produce amino acids from nonprotein sources of nitrogen.

Checking Your Knowledge:

1. Define *digestion.*
2. List the structures that food passes through in the gastrointestinal tract of a nonruminant animal.
3. What are villi? Where are they located in the gastrointestinal tract?
4. Differentiate between metabolism, anabolism, and catabolism.
5. List the compartments of a ruminant stomach and explain their functions.

Web Links:

The Digestive System

http://www.teachnet.ie/farmnet/Digestive.htm#The Rumen and Ruminant system

Teachers Domain—Ruminants

http://www.teachersdomain.org/6-8/sci/life/stru/ruminant/

Agricultural Career Profiles

http://www.mycaert.com/career-profiles