Animal Digestion and Nutrition

Competency: Analyze the parts and functions of the digestive system of farm animals

By :
ARI WIBOWO, S.Pt.,M.Si
&
SUHARDI, S.Pt.,MP

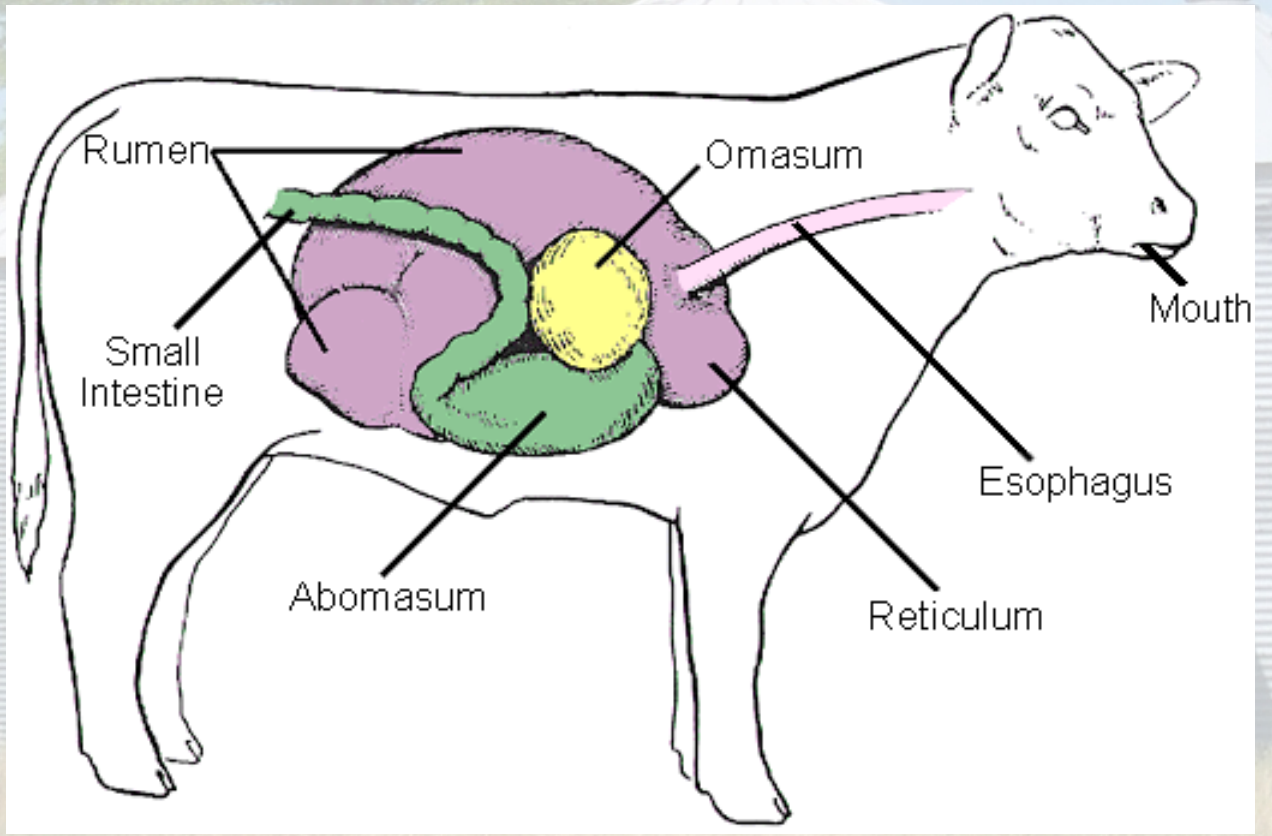
Ruminants

- Objective: Describe the function and major parts of the digestive system of ruminants.

Ruminant Animals

- Animals with complex digestive systems
- Capable of digesting material with a high fiber concentration
- Uses microbial fermentation
  - Cattle
  - Sheep
  - Goats
  - Deer

Ruminants



Ruminant Digestive System

Parts and Functions

- Mouth
  - Bites and chews
- Esophagus
  - Connection
- Four Compartment Stomach
  - Rumen
  - Reticulum
  - Omasum
  - Abomasum

85% of the capacity

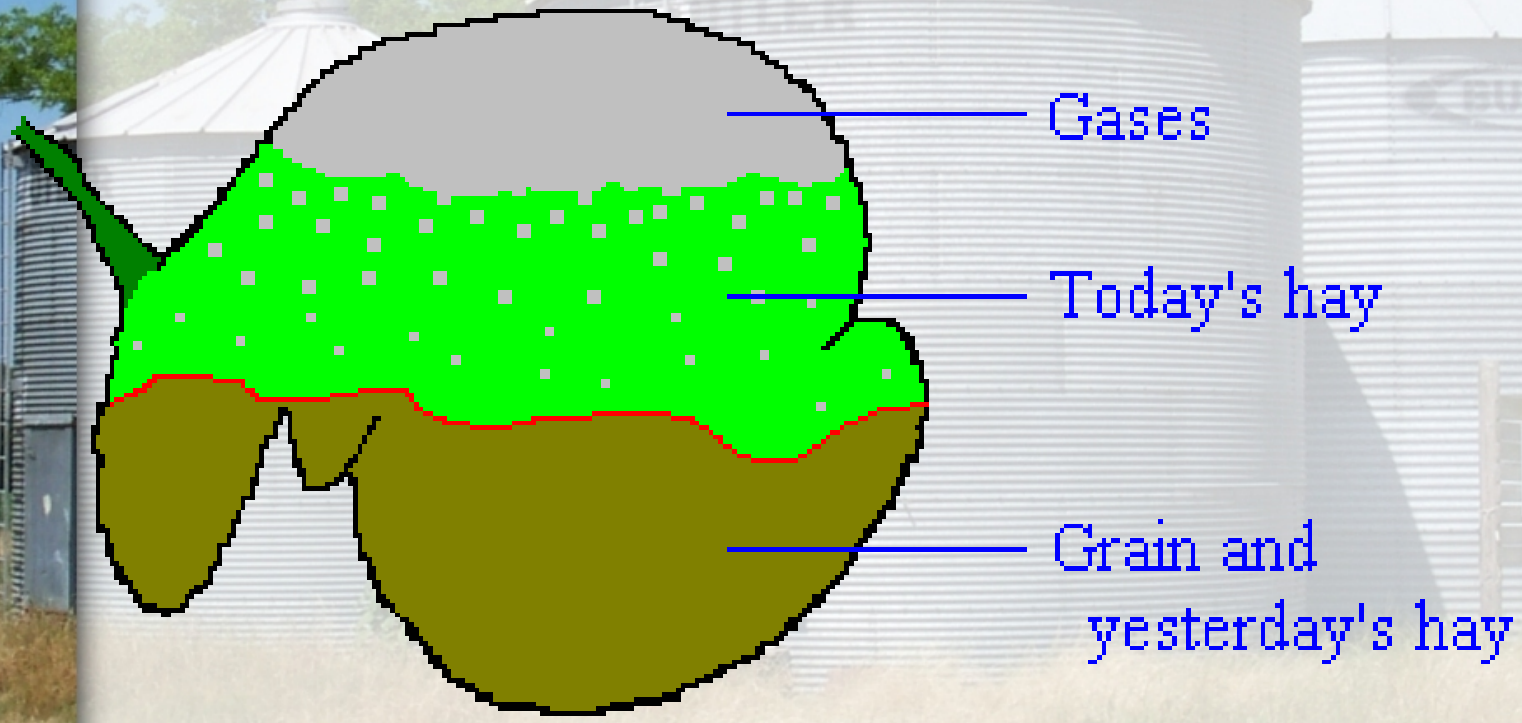
Parts and Functions

- Rumen
  - Largest of the four parts “room-in-it”
  - Filled with bacteria
  - Converts large amounts of roughage to amino acids

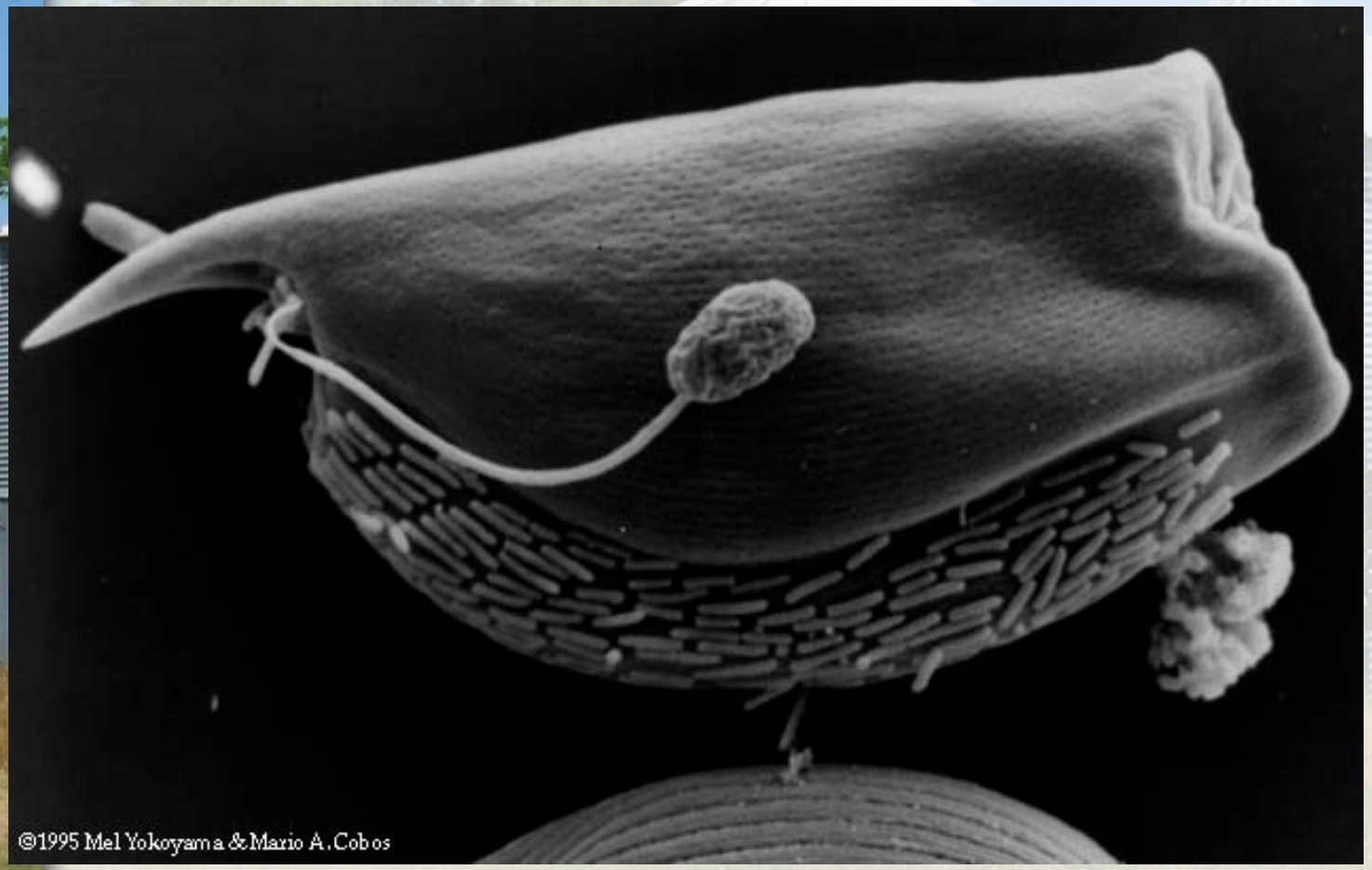
Fact!!!!

- The average cow rumen can hold over 160 liters (40 gallons)

Rumen



Rumen Microbe



Rumen Microbe

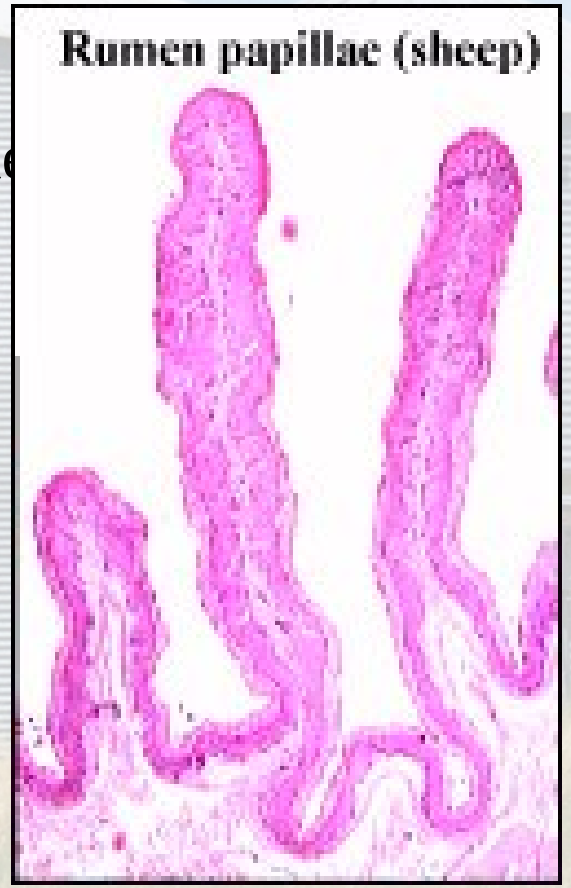
- The large microbe is a type of protist
- The creature that looks like a tadpole attached to the side of the protist is a fungal spore
- The smaller, rod-shaped beasts lining the underside of the protist are bacteria.

Parts and Functions

- Reticulum
  - Compartment where liquid goes
  - Honeycomb in structure
- Omasum
  - Grinds and squeezes
  - Removes some liquid
- Abomasum
  - True stomach
  - Enzymes and acids

Parts and Functions

- Small Intestine
  - Partially digested feed is mixe
    - Bile
    - Pancreatic juice
    - Intestinal juice
  - Most of the food nutrient is absorbed
    - Villi or Papillae



Parts and Functions

- Large intestine
  - Main function is to absorbed water
  - Add mucus to undigested feed
    - Feces

Non-Ruminant

- Objective: Describe the function and major parts of the digestive system of non-ruminants.

Non-Ruminant

- Simple digestive system
  - (Monogastric)
  - Feed must be highly quality concentrates
  - Cannot digest large amounts of fiber
    - Human
    - Dogs
    - Cats
    - Rabbits
    - Pigs
    - Horses????

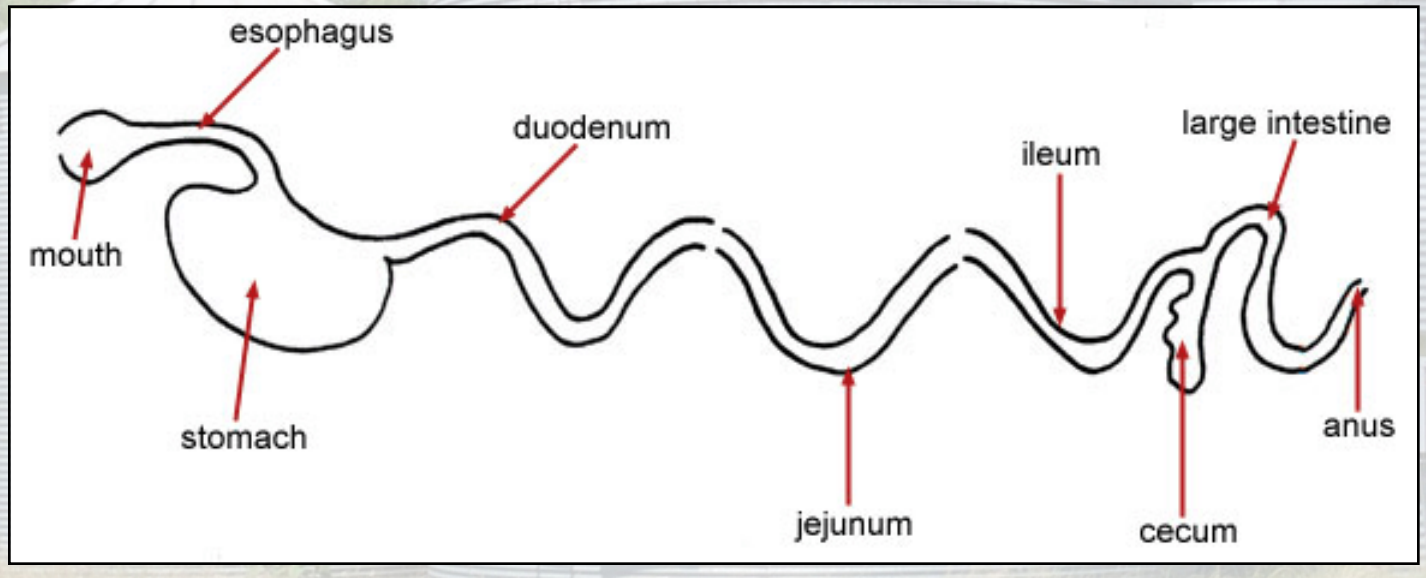
Non-Ruminant Parts & Functions

- Mouth
- Esophagus
- Stomach
  - Enzymes acts on feed
  - Churns and mixes
- Small intestine
- Large intestine

Non-Ruminant Parts & Functions

- Accessory system
  - Liver
    - Produces bile that acts on fat
  - Pancreas
    - Produces insulin
- Anus
  - End of the digestive tract

Monogastric



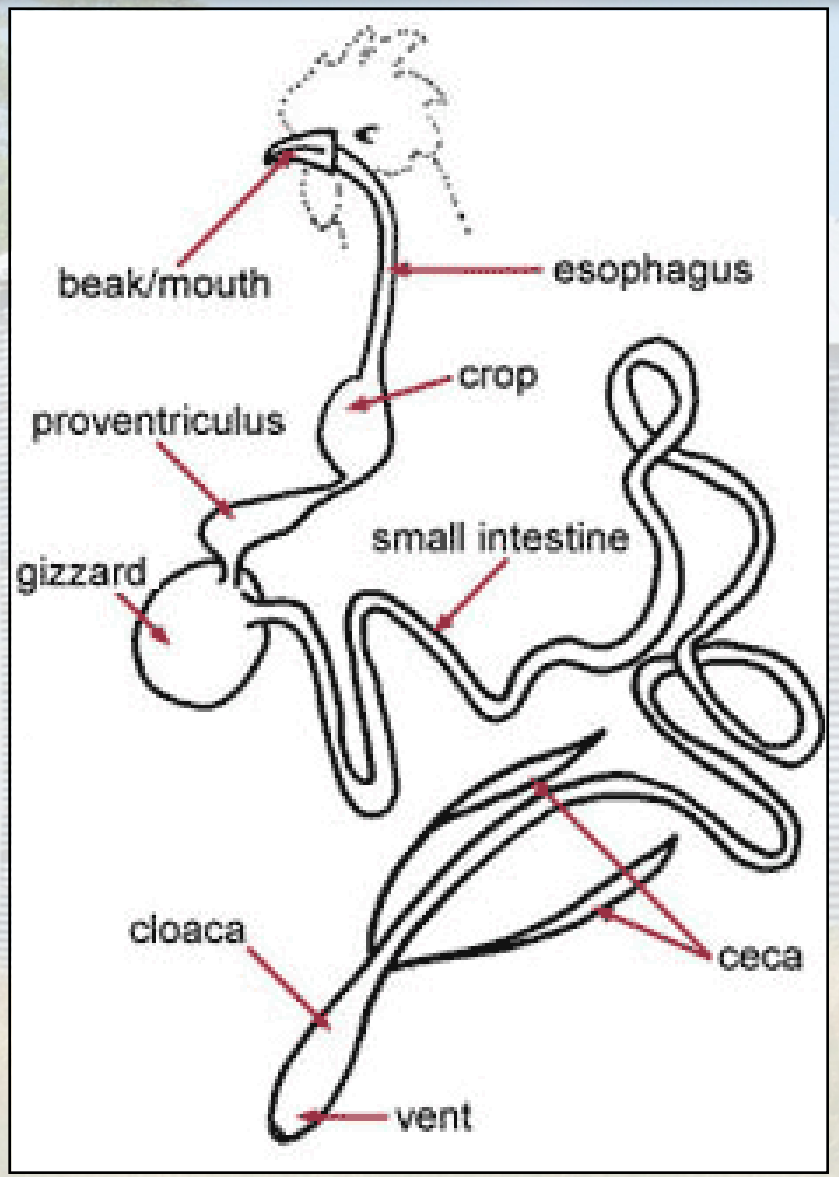
Simple Digestive System

Poultry Digestive Systems

- Objective: Describe the function and major parts of the digestive system of non-ruminants.

Poultry

- Chickens
- Turkeys
- Ducks
- Geese



Poultry Digestive Systems

- Mouth or beak
  - Can not chew food
- Esophagus
  - Connects mouth to crop
- Crop
  - Stores feed

Poultry Digestive Systems

- Gizzard
  - Crushes feed
    - Contains grit and gravel
  - Mixes feed with digestive juices
- Liver
- Small and Large Intestine
- Vent
  - Removes solid and liquid waste

Inspecting Animal Digestive Systems

- Esophagus
  - Tube like structure
- Stomach
  - Pouch with undigested feed
- Liver
  - Large brown organ beneath the stomach or crop

Inspecting Animal Digestive Systems

- Small intestine
  - Long tube
  - Gray colored partially digested feed
- Large intestine
  - Large relatively short compartment
  - Contains fecal material

Nutrients

Competency: Distinguish the functions and sources of feed nutrients for farm animals

Groups of Nutrients

- Objective: Identify the six major groups of nutrients

Carbohydrates

- Composed of sugar, starches, cellulose and lignin
- Provide energy and heat
- Make up the largest quantity of livestock feed
  - Carbon
  - Hydrogen
  - Oxygen

Fats and Oils

- 2.25 times the energy value of carbohydrates
- At body temperature fat are solids and oils are liquid
  - Example: cooking lard
- Extra carbohydrates are stored as fats
  - Carbon, hydrogen, oxygen
- Carriers fat-soluble vitamins

Proteins

- Major component of muscles and tissues
- Made up of amino acids
- Continuously needed to replace dying body cells
- Young animals need large amounts for growth

Organic

Vitamins

- Needed in small quantities
- Helps regulate body functions
- Designated by letters
  - A,B,C,D,E,K
- Sources:
  - Naturally found in feed
  - Feed additives made from animal by-products
  - Made by the body itself

Minerals

- Needed in small amounts
  - Calcium, phosphorus, sodium, etc.
- Regulates body functions
- Provide growth for:
  - Bone
  - Teeth
  - Tissue
    - Example: calcium is needed in poultry for eggshell development

Water

- Makes up 40% to 60% of the animals body
- Dissolves other nutrients and helps carry them to parts of the body

Sources of Nutrients

- Carbohydrates
  - Cereal grains
    - corn
    - wheat
    - oats
    - rye
    - barley
    - sorghum

Sources of Nutrients

- Proteins
  - Plant sources
    - Soybean meal
    - Cottonseed meal
    - Alfalfa meal
  - Animal sources
    - Meat meal
    - Fishmeal
    - Dried milk
    - Synthetic nitrogen source called urea

Sources of Nutrients

- Fats and Oils
  - Grains and protein concentrates
- Vitamins and Minerals
  - Most feed ingredients
  - Supplements
    - Pre-mixes
    - Mineral blocks

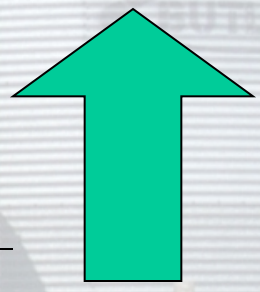
Sources of Nutrients

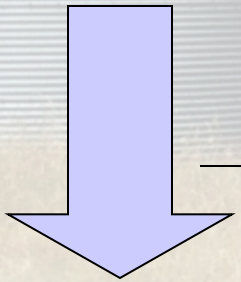
- Other sources and exceptions:
  - Alfalfa (roughage) can be used to provide energy and fiber
  - Molasses
    - Improve taste (palatability)
    - Reduce feed dust

Nutritional Value

- Total Digestible Nutrients

Concentrates are high in TDN





Roughages are low in TDN