

Ruminant Digestion

Different Digestive Systems

- The three different types of digestive systems are:
 - Monogastric
 - Modified Monogastric
 - Ruminant

Ruminant

- A few animals with ruminant digestive systems are sheep, cattle, goats, deer and giraffes.
- Ruminant animals have four complex stomach structures.
- The four stomachs are called the rumen, reticulum, omasum and abomasum.
- Herbivores are usually ruminant animals.



Parts of Ruminant System



- Mouth- teeth and lips hold food and chew it, saliva moistens food.
- Esophagus-food travels to stomach.
- Four Compartments:
 - 1st-Rumen
 - 2nd-Reticulum
 - 3rd-Omasum
 - 4th-Abomasum

1st Compartment: Rumen

- Large fermentation vat, where bacteria and protozoa thrive to break down roughages.
- Rumen is lined with papillae to increase surface area and absorption



Rumen

- Contains microorganisms that digest cellulose and can synthesize amino acids as well as B-complex vitamins.

Rumen Sizes in Cattle and Sheep

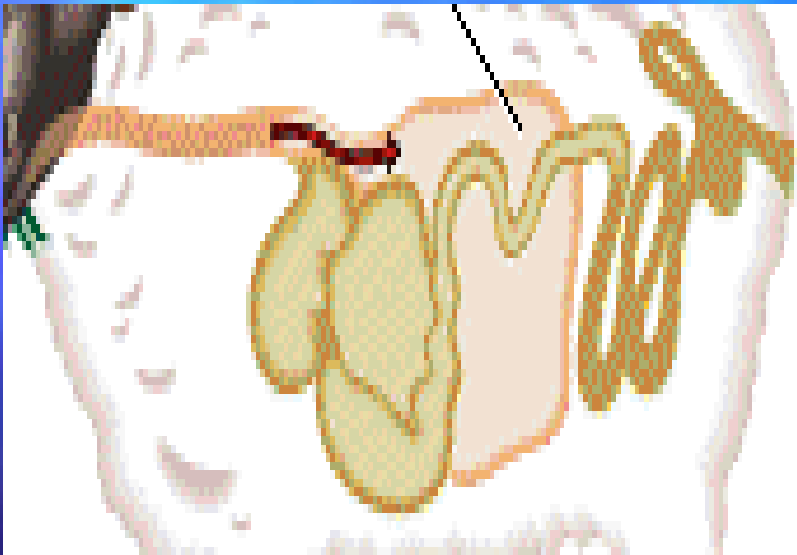
Cow- 40 Gallons

Sheep- 5 Gallons

2nd Compartment- Reticulum

- Reticulum has a lining with small compartments similar to a honeycomb. Hence its nickname the “honeycomb.”
- Interacts with the rumen in initiating mixing activity and provides additional storage for fermentation.
- **Capacity:**
- Cow: 2 Gallons
- Sheep: 2 Quarts

3rd Compartment: Omasum



- Omasum has many folds, often referred to as manyplies.
- Aids in the grinding action of the food
- **Capacity:**
- Cow: 4 gallons
- Sheep: 1 quart

4th Compartment: Abomasum

- Abomasum: The true stomach
- Corresponds with the stomach of monogastric animals.
- Majority of Digestion takes place.
- Capacity:
- **Cow 4 Gallons, Sheep 3 quarts**

Small Intestine

- Functions in splitting food molecules and in nutrient absorption.
- **Capacity of Ruminant Animals:**
- Cow: 15 Gallons or 130 feet
- Sheep: 2 Gallons or 80 feet

Large Intestine

- Functions in absorbing water and forms indigestible wastes into solids.
- Last chance for minor nutrient absorption.
- **Capacity of Ruminant Animals**
- Cow: 10 gallons
- Sheep: 6 quarts

Review of Ruminant Digestive Systems



- Animals that have ruminant digestive systems eat forage rapidly and later regurgitate the feed, known as the cud.
- The regurgitated food is chewed thoroughly, swallowed and then more feed is regurgitated. This process is continued until all the feed is masticated.

How the Ruminant System Works

- Once the feed has arrived in the rumen, it is mixed with microorganisms, such as bacteria, protozoa and certain fungi. They assist the ruminant animal in utilizing cellulose, and in synthesizing protein from non-protein nitrogen and certain vitamins.

How the Ruminant System Works

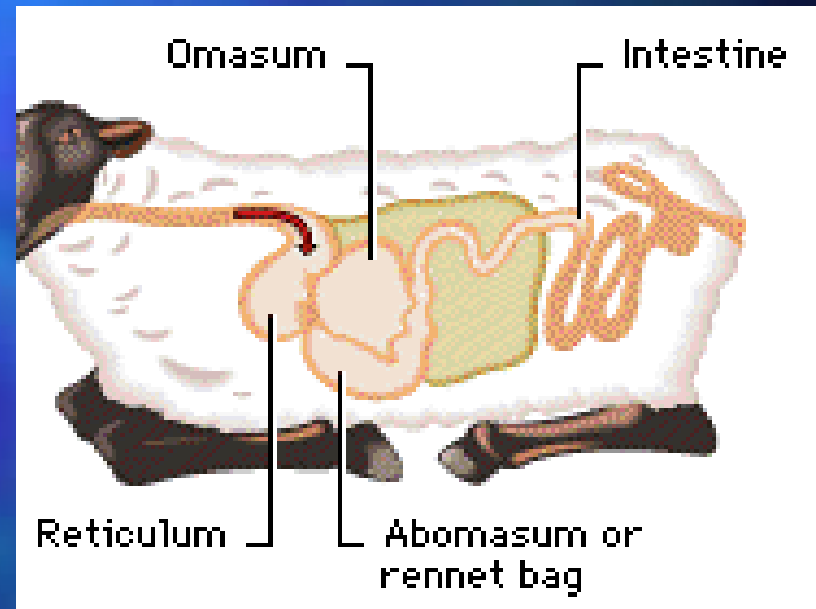
- Then the feed arrives in the Reticulum that is commonly referred to as the “honeycomb”. Its major function is to work with the rumen in mixing and grinding the feed.
- Also functions in screening foreign objects from the digestive system.

How the Ruminant System Works

- Then the feed arrives in the omasum, or the third compartment referred to as “manyplies.” The omasum assists in removing 60 to 70 percent of the water before the feed enters the abomasum.

How the Ruminant System Works

- Once the feed has arrived in the abomasum, or the “true stomach,” digestive juices, which contain enzymes, break down proteins, and add moisture to the feed as it enters the small intestine.



Small & Large Intestine in Review

- From the abomasum, the feed enters the small intestine where nutrients are absorbed in the blood system.
- From the small intestine, the food passes into the large intestine where the water is removed and the feed is prepared for excretion.

Ruminant Digestive System Student Note Outline

Different Digestive Systems

- The three different types of digestive systems are:

1...

2...

3...



Ruminant

- Ruminant animals have _____ complex stomach structures.
- A few animals with ruminant digestive systems are _____,
- _____, goats,
- _____ and giraffes.
- The four stomachs are called the _____,
- _____,
- _____ and the _____.
- _____ are usually ruminant animals.



Parts of Ruminant System



- **Mouth-teeth and lips hold food and chew it, saliva moistens food.**
- **Esophagus-_____stomach.**
- **Four Compartments:**
 - **1st_-**
 - **2nd_-**
 - **3rd_-**
 - **4th_-**

1st Compartment: Rumen

- Large fermentation vat, where _____ and _____ thrive to break down roughages.
- Rumen is lined with papillae to increase _____ and absorption



Rumen

- Contains microorganisms that digest _____ and can synthesize amino acids as well as B-complex vitamins.

Rumen Sizes in Cattle & Sheep

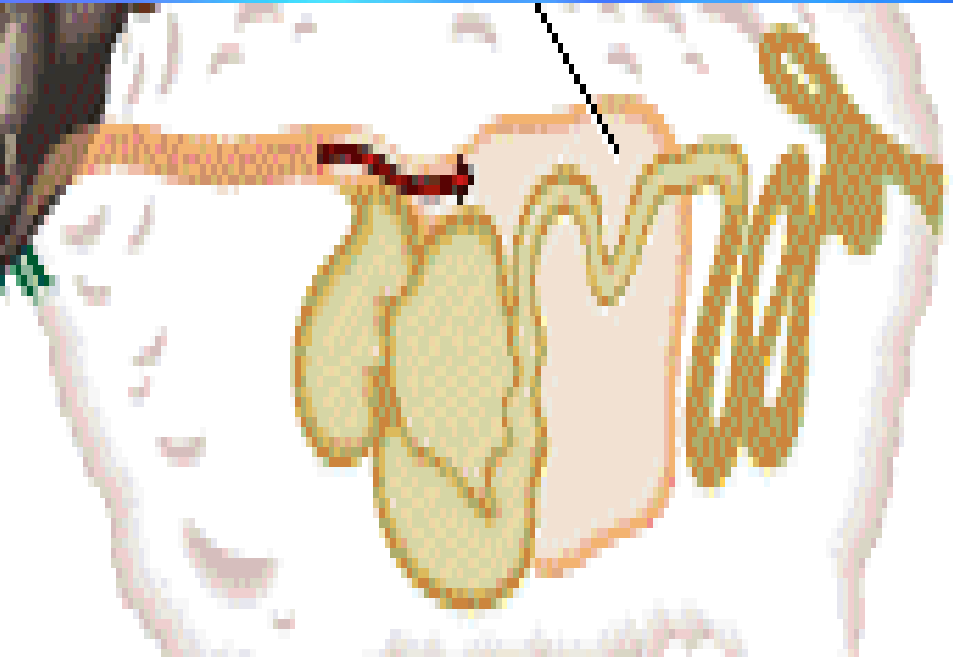
Cow- _____

Sheep- _____

2nd Compartment-Reticulum

- Reticulum has a lining with small compartments similar to a honeycomb. Hence its nickname the “honeycomb.”
- Interacts with the rumen in initiating _____ and provides additional storage for _____.
- **Capacity:**
- Cow: _____
- Sheep: _____

3rd Compartment: Omasum



- Omasum has many folds, often referred to as _____.
- Aids in the grinding action of the food
- **Capacity:**
- Cow: _____
- Sheep: _____

4th Compartment: Abomasum

- _____: The true stomach
- Corresponds with the stomach of _____ animals.
- Majority of digestion takes place.
- **Capacity:**
- **Cow** _____ **Sheep** _____

Small Intestine

- Functions in splitting food molecules and in _____.
- **Capacity of Ruminant Animals:**
- Cow: 15 Gallons or _____
- Sheep: 2 Gallons or _____

Large Intestine

- Functions in absorbing _____ and forms indigestible wastes into solids.
- Last chance for minor nutrient absorption.
- **Capacity of Ruminant Animals**
- Cow: _____
- Sheep: _____

Review of Ruminant Digestive Systems



- Animal that have ruminant digestive systems eat forage rapidly and later regurgitate the feed, known as_____.
- The regurgitated food is chewed thoroughly, swallowed, and then more feed is regurgitated. This process is continued until all the feed is masticated.

How the Ruminant System Works

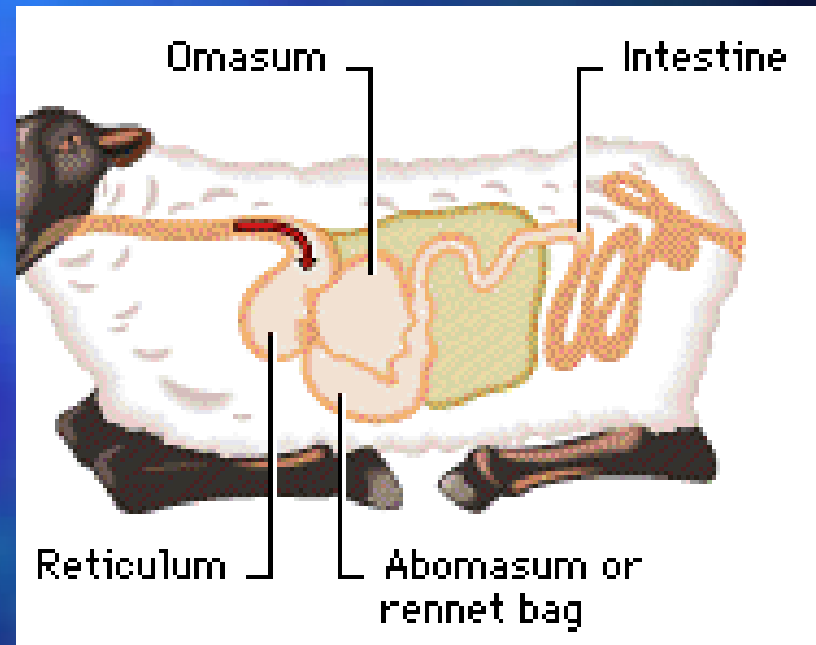
- Once the food has arrived in the rumen, it is mixed with microorganisms such as _____, protozoa and certain fungi. They assist the ruminant animal in utilizing _____, and in synthesizing protein from non-protein nitrogen and certain _____.

How the Ruminant System Works

- The feed arrives in the _____ that is commonly referred to as the “honeycomb.” Its major function is to work with the rumen in mixing and grinding the feed.
- Also functions in screening foreign objects from the digestive system.

How the Ruminant System Works

- Once the feed has arrived in the abomasum, or the “true stomach,” _____, _____, which contain enzymes break down _____, and add moisture to the feed as it enters the small intestine.



Small & Large Intestine in Review

- From the abomasum, the feed enters the _____ where nutrients are absorbed in the blood system.
- From the small intestine, the food passes into the large intestine where the water is removed and the feed is prepared for excretion.

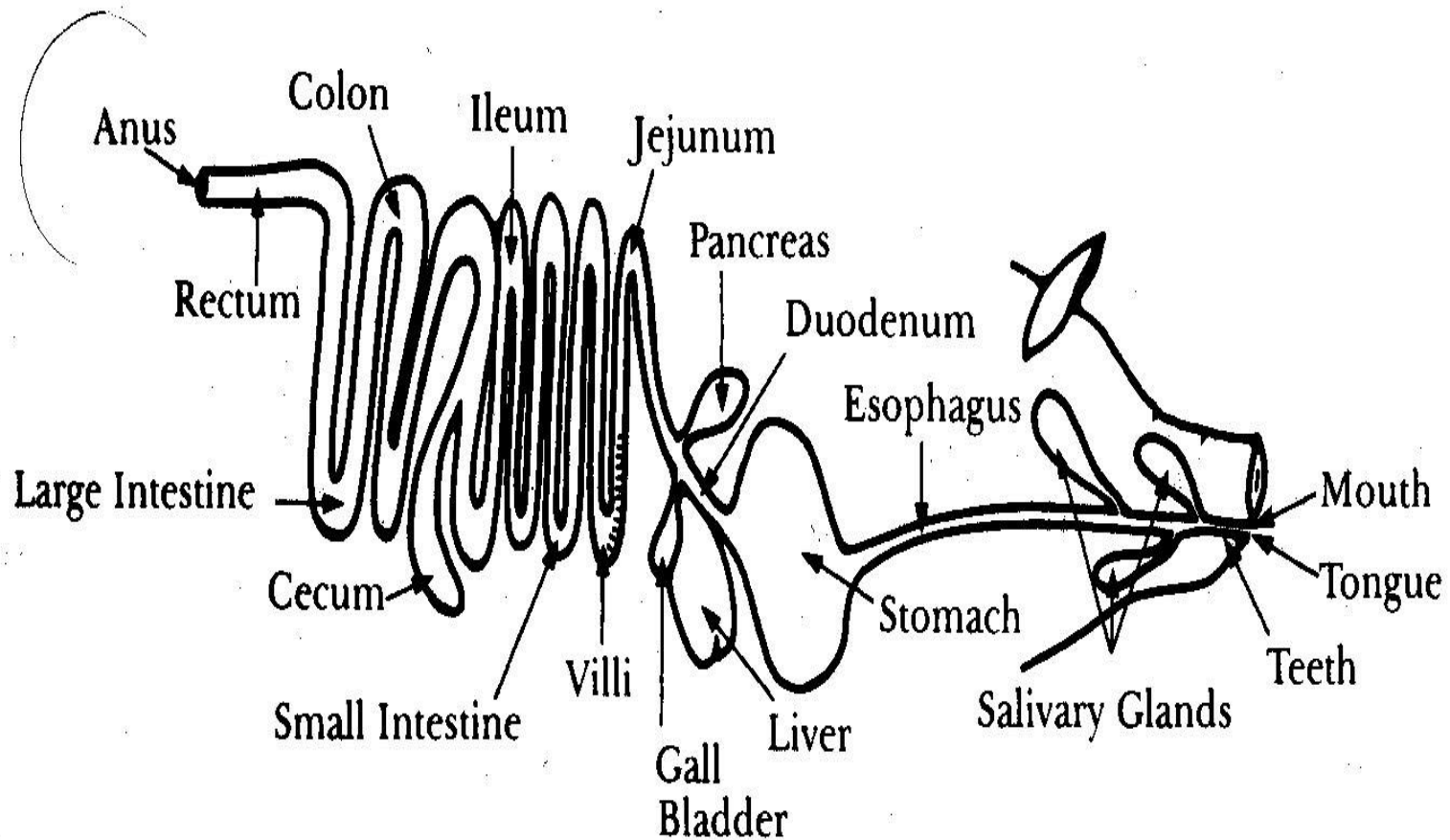


Figure 2-1. Digestive system of a pig.

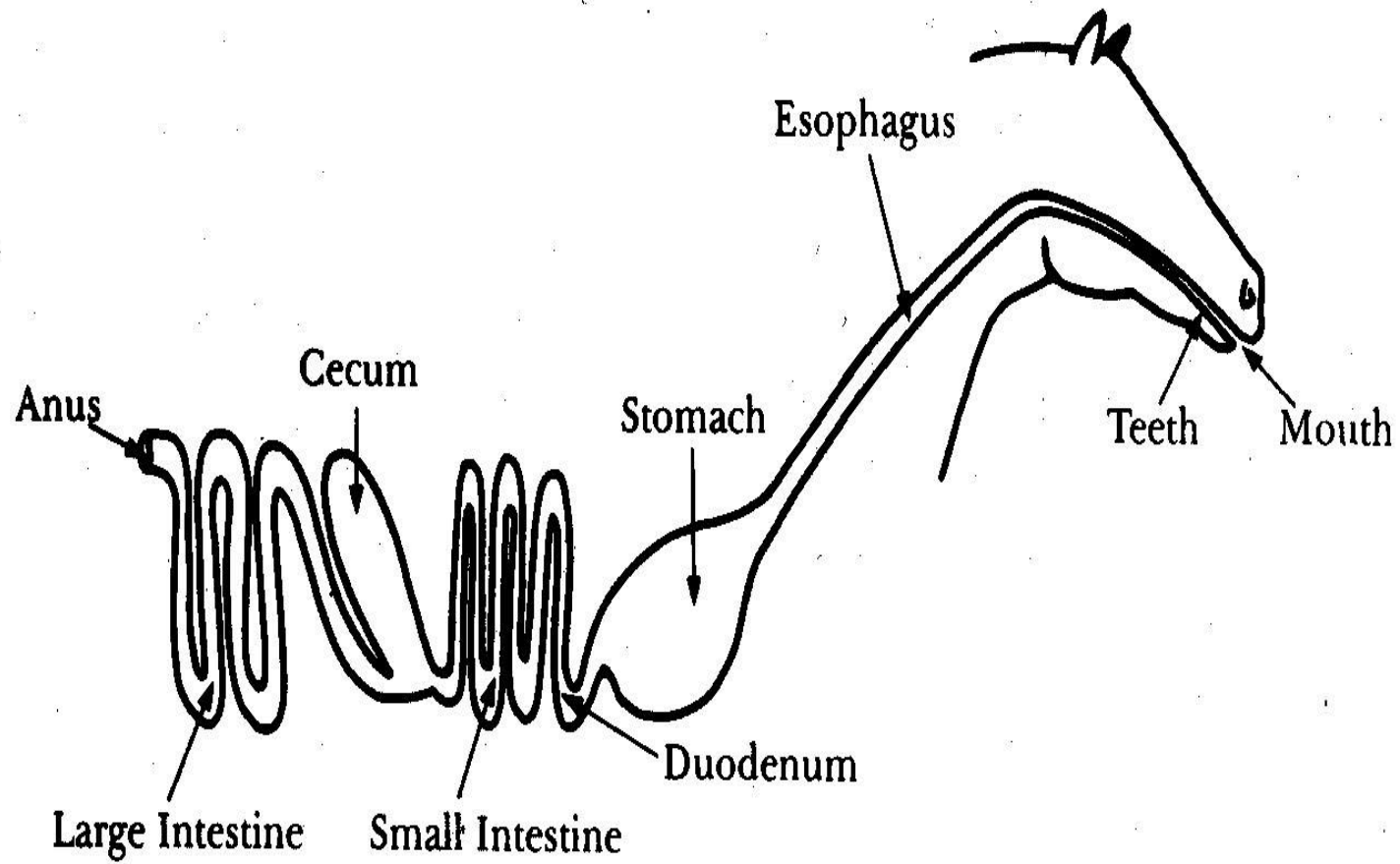


Figure 2-2. Digestive system of a horse.

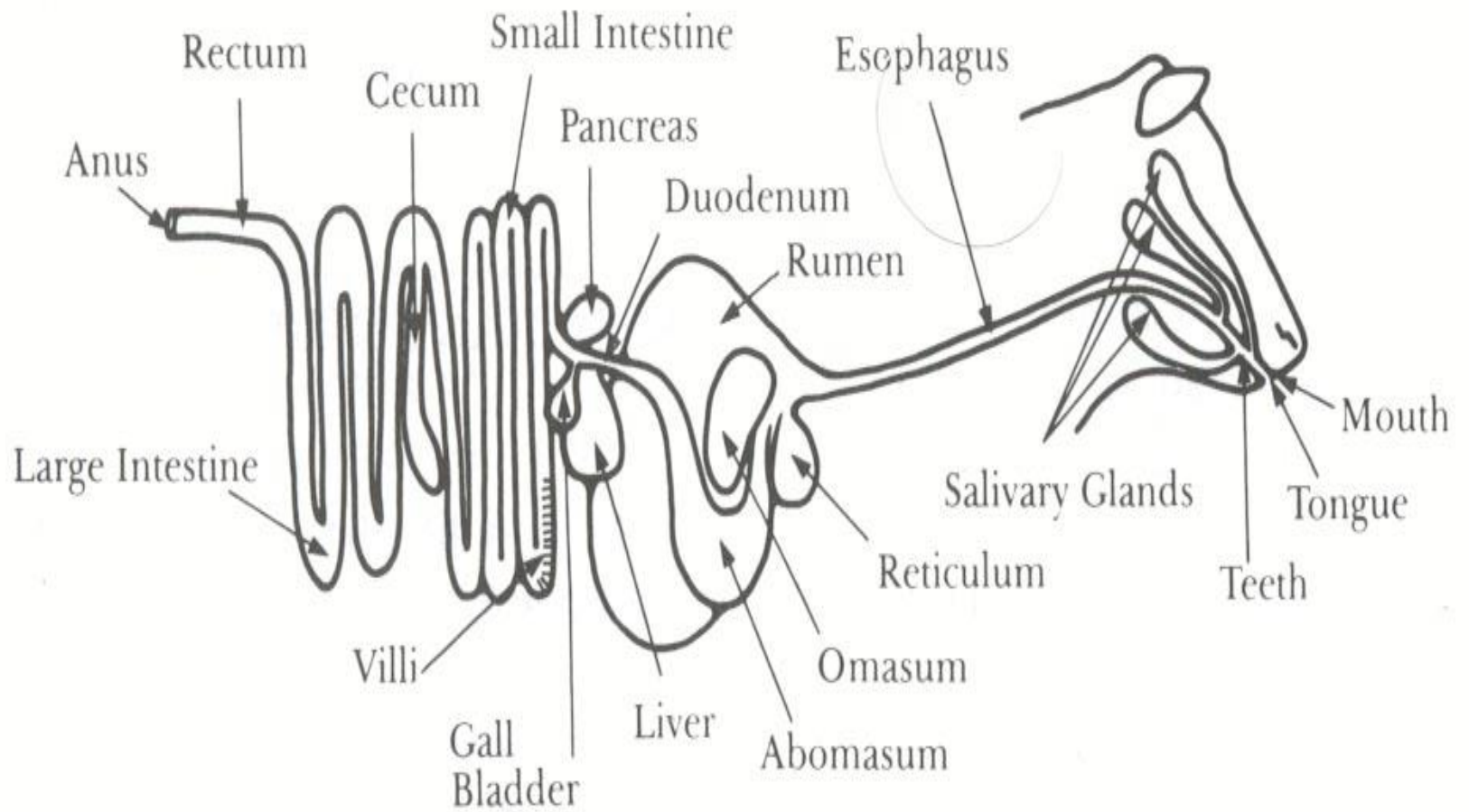


Figure 2-3. Digestive system of a cow.