

PENANG SANGAM HIGH SCHOOL
P.O.BOX 44, RAKIRAKI
LESSON NOTES

Year/Level: 12C/D

week 15

Subject: Biology

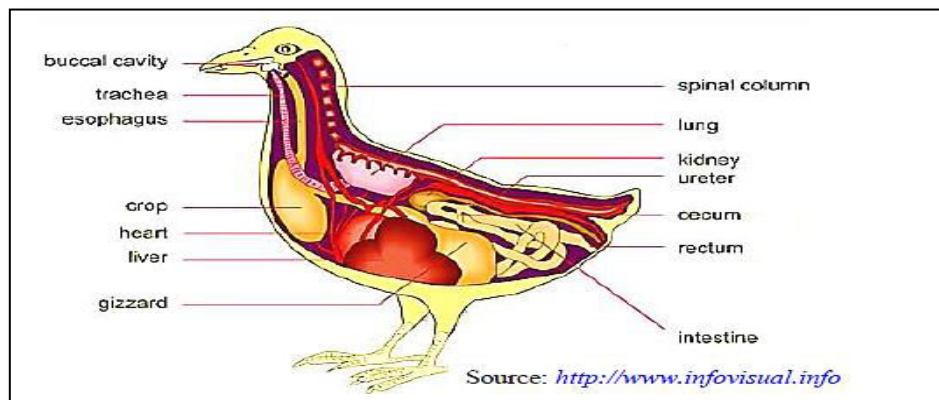
Strand	1 structure & life processes
Sub Strand	1.4 comparative form and function in plants and animals
Content Learning Outcome	Discuss the process of digestion in selected organisms.(birds , herbivores)

Nutrition in Birds

Adaptation for feeding

- Birds, especially those that eat fish are classed as ‘**gulpers**’.
- Birds have beaks that are adapted in shape and size for ingesting particular kinds of food.
- For example.
- Hawks have sharp hooked beaks for tearing up prey.
- Herons have long pointy beaks for ‘fishing’.
- Honeyeaters have long curved beaks for sucking flower nectar.
- Parrots have short strong beaks for cracking seeds.
- Birds **do not** have teeth because they are too heavy and will add to the weight during flight.
- Instead, birds have muscular **gizzards** for grinding up food. (Most birds eat small stones to help their gizzards grind up food) they also have a crop for food storage.
- Otherwise, a bird gut is similar to the guts of the other vertebrates.

Bird Digestive System



1. **Mouth:** food enters here.
2. **Oesophagus (Gullet):** transports food from the mouth to the stomach.
3. **Crop:** a pouch in the oesophagus that stores food temporarily before moving it to the stomach.
4. **Stomach (Proventriculus/ Gizzard):** principally the organ where food is broken into smaller units. It has two parts; **Proventriculus**- stores food.
5. **Gizzard** - muscular part of the stomach that uses grit (sand/ gravel) to grind grains and fibre into smaller particles.
6. **Small Intestine** – it has three parts; duodenum, jejunum and ileum- aids in digestion and nutrient absorption.
7. **Liver:** the largest glandular organ in the body that aids in the metabolism of carbohydrates, fats and proteins.

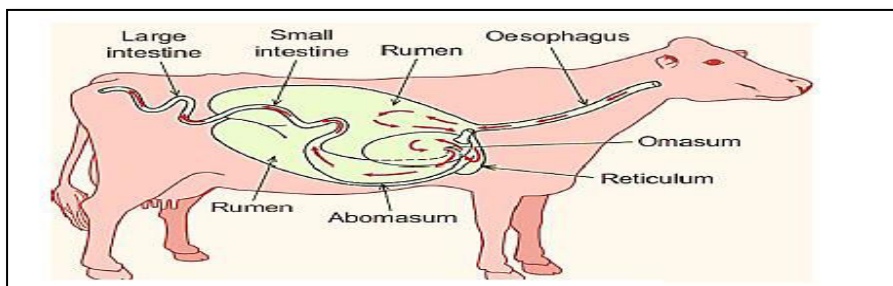
8. **Cecum:** bacterial action in the cecum helps breakdown undigested food passing through the intestine. The cecum turns into the large intestine, which connects with the cloaca.
9. **Large Intestine:** primarily functions to absorb water dry out indigestible foods and eliminate waste products.
10. **Cloaca:** Where the digestive, urinary and reproductive systems meet.
11. **Vent:** the external opening of the cloaca that passes waste out

Herbivore and Carnivore Guts in Mammals

- Human guts cannot digest plants. If eaten, it would just pass through the alimentary canal and out of the anus.
- This is due to plants cells having very tough cell walls made of cellulose.
- The cellulose is not digested easily by the human digestive system.
- The human digestive system lacks the enzymes that are capable of cellulose digestion.

Nutrition in Cattle

- Cattle belong to a class of animals known as ruminants.
- Due to the double chewing (regurgitation) in cows they are a good example of 'masticators'.
- They have four compartments to their stomach and chew their cud.
- In addition, ruminants have an unusual configuration of teeth.
- Their small and large intestine are designed to handle large volumes of material.
- Cattles are evolved to exist on large amounts of fibre.
- They do not do well on all grain or high fat diets.



- Despite these adaptations for plant digestion, the faeces of cows and other herbivores will show that some grass has still passed through the gut *undigested*.

Adaptation in herbivorous mammals for digesting plants	
Feature	Purpose
Wide, flat teeth	For grinding leaves between their teeth like humans
Double chewing	Herbivores chew plant material, swallow it and then regurgitate it to chew it again later.
Symbiotic bacteria	Herbivores have special cellulose-digesting bacteria that live in their guts. These bacteria help the animal break down the cellulose in the cell walls. In exchange, the herbivore provides the bacteria with food. Often these bacteria are housed in the caecum.
Very long intestine	This allows herbivores more time to digest and absorb the food.

Activity

1. Why don't birds have teeth? How do they grind up their food?

2. Why is most plant material so difficult to digest? Describe one way herbivorous mammals are adapted to digest plants.
