Introduction

*Herbivores, Carnivores and Constrictor Jaws* is designed to meet the requirements of the School-assessed Coursework (SAC) component for Outcome 2 (practical activity). It addresses the key knowledge and skills related to VCE Biology Unit One, with particular emphasis on the diet, dentition and digestion of animals.

**Aims**

This program aims to:

- investigate the common requirements of herbivores, omnivores and carnivores
- examine the relationship between diet, dentition, hunting/foraging behaviour, body structure and habitat
- observe, identify and describe the adaptations in specific animals for obtaining and processing nutrients and removing wastes
- compare and classify animals based on their diet and how they process nutrients
- develop some of the skills required when investigating living organisms and in collecting, analysing and presenting data.

Check out what you can do to Fight Extinction at Act Wild [www.actwild.org.au](http://www.actwild.org.au)
1. By analysing skulls we can learn about an animal's way of life. Observe the skulls provided and circle the most correct response in the table below:

**Table 1:**

| Diet group: | Dentition: | | | |
| --- | --- | --- | --- |
| | Upper Incisors | Lower Incisors | Canines | Molars | Carnassial Teeth |
| | Upper Incisors | Lower Incisors | Canines | Molars | Carnassial Teeth |
| | Upper Incisors | Lower Incisors | Canines | Molars | Carnassial Teeth |
| Mandible (lower jaw) length: | Long | Long | Long | Long | Long |
| | Short | Short | Short | Short | Short |
| Diastema: The gap between the incisors and molars. | Present | Present | Present | Present | Present |
| | Absent | Absent | Absent | Absent | Absent |
| Eye position: | Forward Facing | Forward Facing | Forward Facing | Forward Facing | Forward Facing |
| | Side Facing | Side Facing | Side Facing | Side Facing | Side Facing |
| Sagittal crest: A ridge extending along the skull. It is a site for muscle attachment. | Present | Present | Present | Present | Present |
| | Absent | Absent | Absent | Absent | Absent |
| Zygomatic Arch: The arch of bone beneath the eye sometimes referred to as the "cheek" bone. | Wide | Wide | Wide | Wide | Wide |
| | Narrow | Narrow | Narrow | Narrow | Narrow |
| Name of Animal: | | | | | |
2. After completing the skull analysis in Q1, explain how we can determine an animal’s diet by examining the structure of its skull and teeth.

Scats
3. Observe the scats provided.

a. Draw and describe the scats of different animals in Table 2 below.

<table>
<thead>
<tr>
<th>Observations, e.g. size, particles present</th>
<th>Dietary group, e.g. carnivore, herbivore, ruminant, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Herbivore</td>
</tr>
<tr>
<td></td>
<td>Ruminant</td>
</tr>
<tr>
<td></td>
<td>Giraffe</td>
</tr>
<tr>
<td></td>
<td>Herbivore</td>
</tr>
<tr>
<td></td>
<td>Non-ruminant</td>
</tr>
<tr>
<td></td>
<td>Zebra</td>
</tr>
</tbody>
</table>

b. What can you learn about animals by looking at their scats?
4. Select a herd of animals for observation.
   a. How many individuals are in the group?

   b. Estimate how many of these individuals are feeding at the one time.

   To complete questions 5-15 you are required to select an individual animal to observe which is grazing within a group.

   Feeding
   5. Describe how the grass is cropped by the animal (where possible, describe the action of the jaw, lips, tongue and teeth).

   6. Explain how the head structure of the animal you are observing is suited to an herbivorous diet.
Body Structure

7. Draw a rough sketch showing the body proportions of your selected animal.


8. How does the size of the abdomen of the animal you have selected to observe compare with other animals you have seen today?


9. After making your own observations describe how the body proportions of young animals differ from those of older animals.


10. Suggest for what purpose the animal’s tail is used.


11. Where possible to observe, how many toes does the animal have on each foot?


12. Is this animal a ruminant or non-ruminant? Provide a reason to support your answer.
13. Draw a profile of the head of the animal you have been observing, marking in mouth, eye and ear positions.

14. Suggest how the relative positions of the mouth, eyes and ears may help the animal to avoid predation.

15. Research which other structural and behavioural features does the animal have to help it avoid predation?

16. How do lions detect their prey?

17. Spend a few minutes observing the lions. Describe their behaviour.
18. Suggest a hypothesis to explain why lions spend so much time being inactive.

Cheetah (*Acinonyx jubatus*)

19. Observe the Cheetah closely. On the diagram below label, with a brief description, the structural adaptations it has that would be considered an advantage for capturing prey.

20. Once a Cheetah has made a kill, hyenas and lions move in very quickly to take over the food. Suggest some strategies the Cheetah may use to maximise the amount of meat it consumes before it is taken over by a scavenger:

21. Zebras may spend up to 60% of their day grazing on food, while Cheetahs may not eat anything all day. Explain why there is such a large difference between the amount of time these animals spend eating.
**Meerkat (Suricata suricatta)**
The diet of the Meerkat consists of buried invertebrates such as beetle larvae, crickets, scorpions; and small vertebrates such as snakes, birds and mice. Its water requirements are obtained by eating melons, roots and tubers.

22. Spend some time observing the Meerkats. On the diagram below label, with a brief description, the structural adaptations that may enable the Meerkat to find and capture prey.

![Meerkat diagram]

23. The main predators of the Meerkat are hawks and eagles. How does their behaviour help them to avoid being preyed upon by these animals?

24. Compare ruminants and non ruminants by circling your response in the table below:

<table>
<thead>
<tr>
<th>Table 3:</th>
<th>Ruminants</th>
<th>Non ruminants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparative amounts</td>
<td>high / low</td>
<td>high / low</td>
</tr>
<tr>
<td>Time spent eating:</td>
<td>high</td>
<td>low</td>
</tr>
<tr>
<td>Nutrition derived from herbage eaten:</td>
<td>high / low</td>
<td>high / low</td>
</tr>
<tr>
<td>Time take to digest herbage:</td>
<td>large / small</td>
<td>large / small</td>
</tr>
<tr>
<td>Quality of herbage digested:</td>
<td>high / low</td>
<td>high / low</td>
</tr>
<tr>
<td>Location of microbes in digestive system needed to break down cellulose:</td>
<td>foregut / hindgut</td>
<td>foregut / hindgut</td>
</tr>
<tr>
<td>Consumption of water:</td>
<td>high / low</td>
<td>high / low</td>
</tr>
<tr>
<td>Cud chewing:</td>
<td>present / absent</td>
<td>present / absent</td>
</tr>
<tr>
<td>Examples:</td>
<td>bison / giraffe / rhinoceros / deer / antelope / zebra / camel / hippopotamus</td>
<td>bison / giraffe / rhinoceros / deer / antelope / zebra / camel / hippopotamus</td>
</tr>
</tbody>
</table>
25a. The skulls and digestive systems below are representative of a carnivore, omnivore and two types of herbivore; ruminant and non-ruminant. Draw a line to match the skulls with the digestive systems.

<table>
<thead>
<tr>
<th>Skull</th>
<th>Digestive System</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>3</td>
</tr>
<tr>
<td>D</td>
<td>4</td>
</tr>
</tbody>
</table>

25b. The skulls and digestive systems above belong to the zebra, giraffe, chimpanzee and cheetah. Label the skulls and digestive systems you have matched together with each of these animal names. Give reasons for your choices.

Cheetah. 

Zebra. 

Chimpanzee. 

Giraffe.
26. Identify and describe the role of the different kinds of vertebrate teeth.

27. Use specific examples to compare the digestive systems of:
   a. Ruminant and non ruminant
   b. Herbivore and carnivore.

28. Refer to two selected examples you observed today to explain how structural adaptations related to acquiring and processing food assist an animal's chances of survival. Include one example of an herbivore and one example of a carnivore.
Conservation Action - Beads for Wildlife (Additional activity)

29. What impact would the introduction of domestic animals (such as Cattle and Goats) have on the wild populations of Zebras and Lions of the Melako Conservancy in Northern Kenya?

30. Rank the following animals from 1 to 10 in order of importance to the Maasai people of Melako. Your ranking should consider 1 being the most important to 10 the least important. Suggest why

___ Elephant ______________________________
___ Lion _________________________________
___ Zebra ________________________________
___ Rabbit ______________________________
___ Bee _________________________________
___ Cow _________________________________
___ Baboon ______________________________
___ Chicken ______________________________
___ Giraffe ______________________________
___ Camel _______________________________

31. How can African Bead work help preserve the Endangered Grevy’s Zebra of Melako?

32. What can you do to help Zoos Victoria and Grevy’s Zebra?
Glossary

Adaptation: A feature that an organism has to help it to survive, it may be structural, behavioural or physiological.

Canines: The pointed conical teeth located between the incisors and the first molars.

Carnassial teeth: Molars that are modified to have sharp edges for cutting flesh. Found in carnivores.

Carnivore: An animal that eats meat.

Dentition: The type, number, and arrangement of a set of teeth.

Herbivore: An animal that eats plants.

Incisor: A tooth adapted for cutting or gnawing, located at the front of the mouth.

Molar: A tooth with a broad crown used to grind food.

Non-ruminant: Odd toed ungulates of the Order Perissodactyla. One chamber stomach. Includes horses, zebras and rhinoceros.

Omnivore: An animal that eats both meat and plants.

Pre-molars: The teeth that occur on either side of the upper and lower jaw, behind the canines (in the case of carnivores) or in front of the incisors and in front of the molars.

Ruminant: Even toed ungulates of the Order Artiodactyla. The stomach is divided into four components. Partially digested food is regurgitated and chewed again (chewing the cud). Includes cattle, deer, antelope, giraffe.

Scat: Faeces.

Ungulate: A hoofed animal.

Resources


Diet and reproduction of Victorian mammals

What is an ungulate?

Ruminant Digestion
www.mun.ca/biology/scarr/Ruminant_Digestion.html

General anatomy of the ruminant digestive system
www.edis.ifas.ufl.edu/BODY_DS061

Sheep ruminant digestion
www.sheep101.info/cud.html

A comparative anatomy of eating
www.ecologos.org/anatomy.htm

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