

# BioQuest<sup>®</sup> Lab # 24

OBSERVE • QUESTION • MEASURE • THINK • PREDICT

## Advanced Owl Pellet Study Kit

By Gari Walz

Name \_\_\_\_\_

Class Period \_\_\_\_\_ Date \_\_\_\_\_

### Student Study Guide

Owls are predatory birds that swallow their prey whole. The soft body parts, after digestion, are eliminated as feces, but the undigested remains are regurgitated. In addition to owls, other birds such as hawks, falcons, harriers, eagles, and kites eject their pellets. Owls tend to process the pellet and reject it most efficiently in approximately one or two pellets per day.

The non digestible remains are called pellets. The pellets include the skeletal remains of the prey animals that were consumed. The pellets are very compact and include mainly the body coverings (fur, feathers) of the prey species. The carnivorous diet of the owl includes mammals, birds, insects, amphibians, reptiles or fish small enough to be swallowed whole. The interesting thing about this investigation is that you will not know for certain the numbers and kinds of food eaten by the owl until you have dissected your owl pellet.

### Purpose:

1. To examine the contents of an owl pellet to determine the diet of the owl.
2. To identify individual skeletal bones and determine the identity of the prey animal.
3. To collect data from the dissected owl pellets for individual and class use.
4. To recognize that the skeletons of different animals separated from the pellets represent a food chain.
5. To learn how to survey class results and figure the percentage of prey consumed.
6. To construct energy pyramids in order to express the flow of energy through food chains of various lengths.
7. To construct a possible food web from evidence of an animal food chain.

### Procedure:

1. Obtain, dissect and separate the contents of one owl pellet. It is best to work with a partner.
2. Determine the mass of the pellet by weighing it. Next, measure the length and then the diameter from the largest place on the pellet. Record all of the measurements in the Data Section. (Calculate the circumference in millimeters or centimeters.)
3. It would be advisable to compare the weights and sizes of pellets with other students to determine if the pellet size is due to the number or size of the prey. You could calculate the circumference ( $\pi \times$  diameter).
4. Place the pellet on a white sheet of paper. Separate the bones from the fur or feathers that cover it using the probe provided.
5. Place the body covering in one pile. On another pile, place the clean bones separated from the fur or feathers.
6. Remove the individual skulls and match with their lower left and right jaw bones, and examine the teeth to verify the animal by using the dental formulae listed on the Resource Information Section. Once identified, record the number and type of animals in the Data Section.
7. Prepare a bar graph (horizontal or vertical) using the class records to determine the percentage of prey consumed found in all of the pellets. Consult your instructor for assistance.
8. Construct a food chain for each species of prey animal that you dissected and recovered from the owl pellet to show the potential flow of energy. (The prey animals in the owl's diet are identified as either herbivores or carnivores. The shrew is a carnivore and could consume insects, spiders, centipedes etc. Moles are carnivores that feed underground. Their diet includes earthworms, grubs, millipedes, etc. Voles and mice are mainly herbivores consuming leaves, grass, seeds, roots, etc. Animals identified as omnivores would include birds, house mice and rats.)
9. Prepare an energy pyramid with trophic levels to show as many organisms as are present in the food chain. Consult your instructor for assistance. What animal is found at the highest trophic level in these feeding relationships?
10. Calculate the expected energy loss at each trophic level in the pyramids you construct. Consult your instructor for assistance. (Convert the product of your answer from decimals to percentage.) How do additional steps in the pyramid affect the final amount of energy available to the top carnivore?
11. The complex food chain identified in this study is better known as a food web. Can you illustrate the probable food web on a separate sheet of paper showing the owl as the top carnivore? Use a line with an arrow to illustrate the direction of the energy flow. If you are uncertain of the feeding relationship, use a dashed line to illustrate them.

## Data Section:

### Individual Records:

1. Pellet size: (make measurements in millimeters (mm) or centimeters (cm))

Length \_\_\_\_\_

Diameter \_\_\_\_\_

Circumference \_\_\_\_\_

Mass \_\_\_\_\_ (grams)

2. Prey identification: (prey animals per pellet)

\_\_\_\_\_ Voles

\_\_\_\_\_ Old World Rats

\_\_\_\_\_ Birds

\_\_\_\_\_ Moles

\_\_\_\_\_ Old World Mice (house)

\_\_\_\_\_

\_\_\_\_\_ Shrews

\_\_\_\_\_ White-footed Mice

\_\_\_\_\_

3. Total number of animals in the pellet: \_\_\_\_\_

### Class Records:

Prey	Vole	Mole	Shrew	Rat	White-footed Mouse	House Mouse	Bird
Number							

1. Total number of pellets dissected: \_\_\_\_\_

2. Total number of animals identified: \_\_\_\_\_

3. Average number of prey per pellet: \_\_\_\_\_

### Questions for Review:

1. How much of the prey animal is regurgitated as a pellet?
2. Are owls the only birds to eject or regurgitate pellets?
3. How much variation is seen in each pellet size? What does this suggest?
4. From the data, which prey species is the most common? The least common?
5. How does the species of the animals in the pellet identify the owl's habitat? Is it possible that these prey species DO NOT indicate the TRUE animal populations in the wild? Explain.
6. Look for new biological vocabulary and be able to explain.
7. How would a food cycle be different from a food chain or a food web?

**Resources Information:**

1. The size and shape of skeleton bones will vary according to the age and animal genus.
2. In addition to markings on the skull, the dental formulae will assist in the correct taxonomic identification.
3. The number, variation, and shape of the incisor (I), canine (C), premolar (P), and molar (M) teeth will help verify the animal genus. Example: Shrew teeth are pointed and are a dark reddish color at the cutting edge.
4. Dental formulae can be written for a half, full, or quarter jaw where ICPM refers to the order of teeth in the jaw previously mentioned. (The numbers above the fraction line represent the teeth on the upper jaw and those below represent the teeth on the lower jaw.)

$$I \frac{3-3}{2-2}, C \frac{1-1}{0-0}, P \frac{3-3}{3-3}, M \frac{3-3}{3-3} = \frac{20}{16} = 36 \text{ Scalopus}$$

$$I \frac{3-3}{1-1}, C \frac{1-1}{1-1}, P \frac{3-3}{1-1}, M \frac{3-3}{3-3} = \frac{20}{12} = 32 \text{ Sorex, Microsorex}$$

$$I \frac{1-1}{1-1}, C \frac{0-0}{0-0}, P \frac{0-0}{0-0}, M \frac{3-3}{3-3} = \frac{8}{8} = 16 \text{ Microtus, Rattus, Mus, Peromyscus}$$

5. Lower Jaw structures: (All views are of the right jaw, near actual size.)



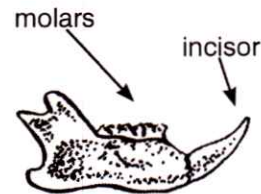
Vole



Shrew



White-footed Mouse

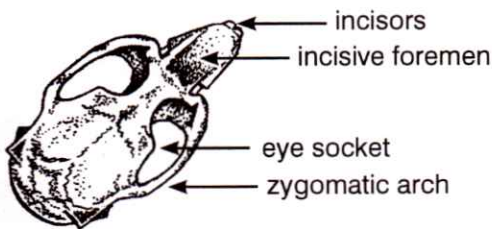


Old World Rat



Mole

6. Dorsal view of vole skull with associated structures:



7. Enamel patterns on grinding molars:



zig-zag pattern  
(common to voles)



3 row of tubercles  
or points on molars  
(common to mice and rats)

*Nasco* Fort Atkinson

901 Janesville Ave. • P.O. Box 901  
Fort Atkinson, WI 53538-0901  
1-800-558-9595

[www.eNasco.com](http://www.eNasco.com)  
E-mail: [info@eNasco.com](mailto:info@eNasco.com)

COPYRIGHT © 1991 NASCO

PRINTED IN U.S.A.

U10593 — RV 07/07