



Solving the BILLION \$?

Importance of Parasitology

Grade Level
9-12

Lesson Length
3 periods x 50 Minutes

STEM Careers

- Veterinarian, Vet Tech, Vet Assistant

Nebraska Science Standards

- SC12.3.1 (Structure and Function of Living Systems)

Next Generation Science Standards

Animal Biology

- Students will apply principles of parasitology to ensure the proper growth, development, reproduction and economic production of animals

This lessons aim to bring the science, skills of inquiry, critical thinking, and problem solving to life through an agricultural context



Learning Objectives

By the end of the unit, students should be able to:

- Understand the affects that parasites have on animals.
- Identify the general clinical signs of an animal being infected with internal parasites.
- List the six major parasitic groups affecting domestic animals.
- Describe methods used to control, prevent and/or treat common internal parasites.
- Properly conduct a simple fecal floatation lab to detect parasite eggs.

Materials List (per student team)

NOTE: ALWAYS wear gloves when handling feces.

- Fecal Samples
- Popsicle sticks
- Gloves
- Floatation Solution (Epsom salt and water or sugar and water)
- Microscope slides and cover slips
- 1 Test tube, or Fecalizer
- 1 Waxed paper cup (Dixie Cup)
- 1 Gauze square
- Test tube holder

Preparation

- Prepare Floatation solution
- Print Power Point slides for students
- Print lab reports and floatation guidelines for students
- Collect, organize, and prepare materials to be used for the fecal floatation experiment.



Introduction (Interest Approach)

In order to introduce students to parasitology, from internet sources show animals with severe internal parasite infestations. Ask the students if they think these animal's condition is from improper nutrition, disease, or parasites. Have them defend their answers. Day one and two present the power point on parasites as well as research parasite eggs associated with the animals they will be testing.

Essential Questions

- *What causes billions of dollars to be lost annually in the animal industry?*
- *How do parasites affect the health of animals?*

Learning Activity 1:

Watch this YouTube video to provide a brief demonstration of what the students will be doing <https://www.youtube.com/watch?v=Pe7v-xjiPww&t=51s> After watching the video, ask students to discuss and answer the following questions:

- 1) What is the function of the floatation solution?
- 2) Why do you make sure there is a meniscus at the top of the test tube?
- 3) Why do you leave the cover slip on the test tube for 10-15 minutes?
- 4) Why do the eggs float to the top of the solution?

Learning Activity 2:

Students will conduct the fecal floatation lab either individually or in groups. Prior to conducting the experiment students will individually or per group determine what domestic animal they will perform the fecal exam on and bring that particular sample to class. Also prior to the lab students will research and print off examples of parasitic eggs that their particular animal could have. This will be used as they scan the sample under the microscope to determine the type(s) of parasite(s) the animal has. Each group must create a written plan of action that includes a research problem, hypothesis, materials list, procedure, and data tables. The written plan of action must be approved by the instructor prior to students conducting the experiment.

Students will conduct their experiment. Each student in the group will use the provided lab report to document their findings.



Reflection

Using the prompts below to facilitate reflection, allow each student to respond in writing to the prompts and then facilitate a whole class discussion.

1. Were there any problems that you encountered during your fecal floatation lab?
2. Based on your fecal floatation lab, did your particular animal have internal parasite eggs?



Apply

Use the prompts below to facilitate small group and whole class discussion.

1. How can you as a pet owner or livestock producer ensure that your animals are healthy?
2. How can your knowledge of parasitology impact your animal's life?
3. Based upon knowledge gained in regards to parasites, how might you better care for the particular animal(s) that you own?

References:

- Animal Care Training
- Charles Casada
- Cornell Veterinary Science

Solving the BILLION Dollar Question Lab Guidelines

Instructor Notes & Preparation:

Simple Floatation

Purpose:

Simple floatation tests are commonly used methods for identifying parasite eggs. They are performed routinely in all veterinary hospitals.

Objectives:

The students will be able:

1. Identify parasite eggs using the fecal floatation method and a microscope.

Materials: NOTE: Always wear gloves when handling feces.

- Fecal samples
- Popsicle sticks
- Gloves
- Floatation Solution (Epsom salt and water or sugar and water)
- Microscope 10x & 40x
- 2 Microscope slides and cover slips
- 1 Test tube
- 1 Waxed paper cup (Dixie cup)
- 1 Gauze square
- Test tube holder

Procedure:

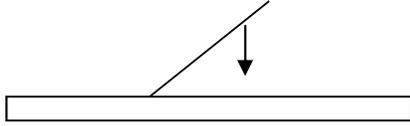
Complete the set-up for the simple floatation.

Simple Floatation Set Up

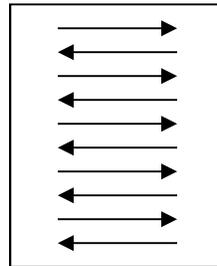
- 1) While wearing gloves, obtain a fecal sample and place a penny size piece in the paper cup.
- 2) Add enough floatation solution to the cup to cover the sample and mix thoroughly until no large pieces remain.
- 3) Bend one side of the cup to form a spout and pour the mixture through the gauze into the test tube. Place test tube in stand.
- 4) Fill the test tube so that a dome of liquid (meniscus) is formed on the top of the tube. If there is not enough liquid to fill the test tube, add some fresh floatation solution to the mixture in the tube.
- 5) Place a cover slip gently on top of the tube so that it rests on the meniscus.
- 6) Leave the cover slip in place for 10-15 minutes. This allows time for the eggs to rise to the top and adhere to the cover slip.
- 7) While waiting have students review the types of eggs they may see in their sample.

Preparing Slides for Scanning

- 1) After the coverslip has been in place for 15 minutes, remove it from the test tube carefully by lifting it straight up. This will prevent eggs that have adhered to the slide from coming off.
- 2) Place the cover slip onto the slide at an angle to reduce air bubbles from being trapped under it.

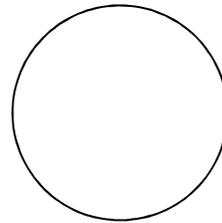
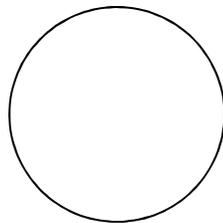
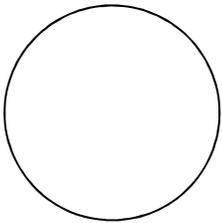


- 3) Begin scanning the slide following the correct scanning pattern so that each area (field) is thoroughly examined.

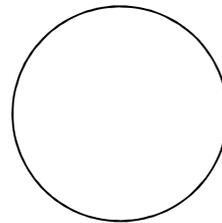
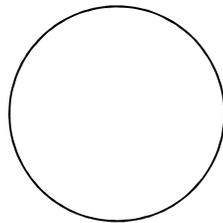
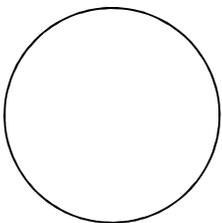


Scanning Pattern

In the circles below, draw and label any parasite eggs you find.



- 4. Draw and label three types of debris that are commonly seen under the microscope when examining a fecal sample.



Analysis/Conclusions: Answers

- 1) Answers will vary
- 2) Answers will vary
- 3) Eggs float to the top because they have a lighter specific gravity than the floatation solution.
- 4) Answers will vary

Name: _____ Date: _____

Lab Report

Please complete the following report during the design and implantation of your experiment.

Research Problem

- Describe what you are investigating and justify why you are investigating the problem.

Hypothesis

- Formulate one or more hypotheses for your experiment.

Procedures

- Create the steps you will follow for your experiment.

Data Collection

- Describe the data that you will collect during your experiment.
- Provide graphs, tables, charts, and raw data as necessary.

Results

- Explain you're your results.

Conclusion

- Based on your data:
 - What can you conclude?
 - Were your hypotheses supported?
 - Were there limitations to your experiment?
 - What are new research questions that derived from this study?