SN EDUCATOR GUIDE

May 11, 2019 & May 25, 2019

Down on the (Cricket) Farm

Student Activity Guide: Chirpy Jerky

Directions: The *Science News* article "Down on the (cricket) farm" discusses raising insects as a food source for humans. What do you know about the nutritional value of insects? Would you eat insects as a snack or make them a regular part of your diet? During this investigation you will perform common biochemical tests for protein, fat, starch, glucose and pH to find and compare nutrient compositions of insects with those of more conventional snack foods. After completing the tests, you will analyze the results and compare them to the nutrition labels for the snack food and insects tested. Finally, you'll see if your opinion about insect consumption, and its possible benefits, has changed.

Please note: You should never eat or taste substances in a laboratory setting!

Pre-lab questions

Answer the following pre-lab questions individually before joining your group to complete the activity.

1. What are your current ideas about eating insects as snacks? Have you ever eaten an insect? Would you try one if you were given the opportunity?

2. Do you think insects could be a viable food source for people more broadly? Explain your answer.

Biochemical investigation

1. Grind up examples of each type of dried insect and snack food using a mortar and pestle or other tools provided by your teacher. Carefully clean the mortar and pestle after each sample to avoid cross-contaminating the samples. Weigh out 1.5 grams of each ground sample, add it to a test tube and label the test tube. Add 15 milliliters of water to each test tube. Seal each test tube tightly with a cap or with your gloved thumb and shake it vigorously to mix. After one minute of shaking, allow the contents to settle for about two minutes, and record your visual observations of the sample tubes.

Insect 1:

Insect 2:

Insect 3:

Snack food 1:

Snack food 2:

Snack food 3:

Student answers will vary, but students should note whether the water is clear, cloudy or colored, whether the solution separates into layers as the particles settle after shaking (especially a layer of fat at the top) and whether visible particles float to the top, fall to the bottom or remain suspended within the water over the course of about two minutes.

2. Dip a pH strip into each tube, let it dry for 30 seconds or so and compare its color to the pH color code that came with the strips. Record your results.

Insect 1:

Insect 2:

Insect 3:

Snack food 1:

Snack food 2:

Snack food 3:

Some samples may be noticeably acidic. For example, proteins are made of amino acids and thus are acidic, and dried fruit may contain significant amounts of citric acid and ascorbic acid (vitamin C).

3. Dip a glucose test strip into each tube, let it dry for 30 seconds or so and compare its color to the color code that came with the strips. Record your results.

Insect 1:

Insect 2:

Insect 3:

Snack food 1:

Snack food 2:

Snack food 3:

Some foods will have detectable glucose, especially snack foods that contain corn syrup (a mixture of glucose and fructose).

4. Seal and shake up the test tubes again, then divide the contents of each one equally among four test tubes, three new test tubes and the tube holding the original sample. The three new tubes for each type of

sample will be used for testing, and the remaining tube will be the control. You will compare your test results to the control tube to see how the contents have changed. Be sure to label all the tubes.

5. In one tube of each type, use Sudan red as a test for fat. Sudan red dissolves in fats or oils but not in water. Add one drop of Sudan red to one tube of each type. If the Sudan red colors a layer near the surface, that layer contains fat. Generally, the thicker the layer, the more fat is present. If the Sudan red keeps to itself or just forms a light color throughout the sample, the sample does not contain fat. Record your observations.

Insect 1:

Insect 2:

Insect 3:

Snack food 1:

Snack food 2:

Snack food 3:

Examples of foods with significant fat are peanuts, potato chips and beef jerky.

6. In another tube of each type (not the tube that already has Sudan red), test for starch. Add one to two drops of iodine. If the iodine is yellow or light brown in solution, no starch is present. If the iodine turns the solution bluish-purple, dark brown or black, starch is present. Generally, the darker the color, the more starch is present. Record your observations.

Insect 1:

Insect 2:

Insect 3:

Snack food 1:

Snack food 2:

Snack food 3:

Examples of foods with lots of starch include crackers and chips.

7. In a third tube of each type, test for protein. Add one to two drops of biuret reagent. (Be careful, biuret reagent is corrosive!) If the solution turns blue, no protein is present. If the solution turns purple, protein is present. Generally, the more purple, the more protein is present. Record your observations.

Insect 1:

Insect 2:

Insect 3:

Snack food 1:

Snack food 2:

Snack food 3:

The insects and snack foods such as beef jerky and peanuts should contain significant amounts of protein.

Analysis questions

1. Examine the list of ingredients and the nutritional information on the bags that the snack foods and edible insects came in. How well do they agree with your biochemical test results? What does this tell you about the accuracy of the tests you performed? What might be the sources of error?

2. What are the main nutritional components of the insects you tested? What are the main nutritional components of the snack foods you tested?

3. Does any of the snack food or insect nutritional information surprise you?

4. Based on your biochemical test comparisons and knowledge from the ingredient list, which if any of the following would you eat? Why or why not?

Meat from animals that have been fed insects (for example farmed fish)

Foods that contain powdered insects in the recipe

Deep-fried insects

Chocolate-covered insects

Salt-covered insects

Plain and crunchy insects

Live insects

5. After completing this lab, have your thoughts about consuming insects changed? Would you substitute insects for your common snack foods? Would it be beneficial to consider making insects a part of your regular diet? Why or why not?

6. Why do you think it's not common to eat insects in the United States? Do you think it could become a common trend? Why or why not?

7. Based on the reading of the article and this activity, how likely is it that insects will play a substantial role in feeding a growing global population? Could eating insects be beneficial for society? Explain.