Can Insects Save the Planet?

Part 1: You're going to eat what?

Garrett was interested in meeting his new college roommate, Andre. The boys were not able to speak directly all summer because Andre was participating in an internship with a relief organization in the African country of Malawi. Through their text messages and social media posts, Garrett learned that Andre is health conscious and very interested in saving the planet. Andre even texted Garrett several ideas on how they could reduce their ecological footprint as they set up their dorm room. He also let Garrett know that he did not eat meat, but he didn't consider himself a vegetarian because he frequently ate alternative protein sources.

On move-in day, Andre was quick to offer Garrett his famous chocolate "chirp" cookies. Andre explained that he calls them chocolate "chirps" because they are made with cricket powder. Garrett wondered, "What is cricket powder and why would anyone add it to cookies?" Andre shared a website for CHiPs cricket powder. He encouraged Garrett to explore the website to learn more about the benefits.

CHiPS
CRICKET POWDER

Garrett began his search on the **CHiPS FAQ** page, because it was full of information.

1. Based on the FAQs, identify at least 3 reasons why people might use cricket powder.

2. Based on the FAQs, identify at least 2 reasons why people might <u>not</u> want to use cricket powder.

3. What is the benefit of adding cricket powder to a recipe?

4. Garrett thinks that eating crickets is just a fad. Why might Andre disagree with him?

Copyright © 2022 by University of Rochester. All rights reserved.
May be copied for classroom use.

5. Use the **Nutrition Facts Labels** from common protein sources to complete the data table below.

Protein Source	Serving size in grams	Calories per Serving	Total Fat (g) per Serving	Protein (g) per Serving
Chicken				
Pork				
Beef				
Tofu				
Lentils (beans)				
Cricket Powder (insects)				
Peanuts (nuts)				

6. According to the **CHiPS FAQ** page, how many <u>whole</u> crickets would a person need to eat in order to obtain the same amount of protein contained in 1 serving of cricket powder?

7. The CHiPS website advertises cricket powder is high in protein. Based on the nutrition facts labels, is this a valid claim? Support your answer with evidence.

Copyright © 2022 by University of Rochester. All rights reserved.
May be copied for classroom use.

Part 2: Food and Health - Why is protein important?

Garrett noticed that Andre had a picture of a young child on his desk. When asked about the child, Andre explained that this was Abshir, the child he sponsors through the relief organization he interned with in Malawi. Andre told Garrett about the extreme poverty he witnessed in Malawi. Most people he was helping lacked the basic necessities of life – food, water, medicine, even shelter. Since many children who live in extreme poverty suffer from malnutrition, Andre decided to sponsor Abshir hoping to make his life a little easier.

According to the World Health Organization (WHO), 1.2 billion people worldwide live in extreme poverty. The WHO defines extreme poverty as an income of less than one dollar per day. Many people who live in extreme poverty suffer from malnutrition, which is a major health burden for developing countries. The two components of malnutrition are protein deficiency and micronutrient deficiency (a lack of vitamins and minerals).

The most severe form of protein deficiency is known as kwashiorkor (kwaa·shee·**or**·kor). It most often occurs in children in developing countries where famine and protein-poor diets are common. The symptoms of kwashiorkor include swelling (especially in the abdomen), greater risk of bone fracture, stunted growth in children and an increase in the severity of infection. Too little protein may cause changes in body composition that develop over a long period of time, such as muscle wasting.

1. Read each of the meal descriptions in the **Menu of Common Meals** of some of the world's poorest countries. Underline the protein sources in each meal.

2. Use the **Protein Source** data table from Part 1 to identify the number of grams of protein that would be available to someone eating each meal. Assume the person is getting one serving for each protein source.

Country	Meal	Protein source	Amount of protein in 1 serving
Democratic Republic of Congo	Saka Saka		
Zimbabwe	Sadza in a poor family		
Burundi	Cassava Porridge		
Central African Republic	Millet Porridge		
Malawi	Nsima and Ndiwo		

Copyright © 2022 by University of Rochester. All rights reserved.
May be copied for classroom use.

3. Scientists determine that children between the ages of 1-3 years require 13 grams of protein per day. Children 4-8 years need 19 grams of protein per day. Children 9-13 years need 34 grams of protein per day. In many of the world's poorest countries, there is only one meal a day. Use the **data table in question 2** on the previous page to identify countries where children may not get enough protein in their diet. Support your choice(s) with evidence.

4. The grams of protein, although important, are not the whole story of nutrition. Proteins are large molecules made of amino acids. The human body is able to synthesize all but nine amino acids. Those nine amino acids that can't be synthesized are called essential amino acids and must be ingested in the foods we eat. Complete the chart below using the **Amino Acid Cards** for each of the common meals. Each colored dot represents one of the nine essential amino acids.

Meal	Are all 9 essential amino acids present?	Missing amino acid(s)
Saka Saka		
Sadza		
Cassava Porridge		
Millet and Insect Porridge		
Nsima and Ndiwo		
Pepperoni Pizza		
Grilled Cheese Sandwich		
Plant-based Impossible Burger		
Peanut butter & jelly sandwich		
"Chirps" Cookies		

Copyright © 2022 by University of Rochester. All rights reserved.
May be copied for classroom use.

5. Based on the amino acid composition of these typical meals, which meals do NOT provide all of the necessary amino acids and could result in malnutrition if they are the only food source for the day?

6. What is the relationship between meals with animal-based protein sources and the number of essential amino acids in the meal?

During digestion, proteins are broken down into amino acids. These amino acids are absorbed by cells. Cells use these amino acids to build proteins needed by the body. The **Protein Chart** lists a few of the proteins the body synthesizes and a portion of the amino acids required to build that protein.

7. Assume Abshir only eats nsima and ndiwo. Determine which proteins he will be able to synthesize. ***Note: Gray circles represent <u>non-essential</u> amino acids that can be synthesized by the body and do not limit protein production.***

Protein Name	Can Abshir's body make this protein?
Actin (needed for muscles)	Yes No
Collagen (connective tissue)	Yes No
Insulin (hormone that regulates blood sugar)	Yes No
Hemoglobin (transports oxygen)	Yes No

8. Explain how Abshir's diet may provide enough protein, but still cause him to be malnourished?

9. Explain why this type of malnourishment may cause stunted growth and serious health problems. Support your answer with information from the data table.

Copyright © 2022 by University of Rochester. All rights reserved.
May be copied for classroom use.

Part 3: Does my pet's protein matter?

After college, Garrett and Andre decided to adopt a shelter dog to have as an apartment pet. One week after adopting their dog, Garrett and Andre scheduled an appointment with a veterinarian to have their dog examined and to answer a few questions they had about pet health.

Andre wanted to feed their dog vegan dog food. The veterinarian was concerned that the vegan pet food may not meet all of the dog's nutritional needs. He offered Andre and Garrett a fact sheet that explained the benefits and risks of different types of pet food.

1. Use the **Facts about Choosing a Pet Food** sheet provided by the veterinarian to provide at least two reasons why the veterinarian might be concerned about the type of pet food Garrett and Andre choose for their dog.

2. Garrett wanted to use the "gourmet" pet food because he didn't like the sound of meat by-products and felt the gourmet pet food would be healthier. Provide at least one piece of evidence to show that traditional dog food is just as healthy as the gourmet pet food.

3. Andre would prefer to feed their dog the vegan diet. Is this a good nutritional choice? Support your answer with information from the fact sheet.

4. In Europe, insect-based pet foods are available for pet owners who care about the environment and do not want to burden the livestock industry. These foods have not been approved in the United States yet. Based on what you have learned, what advantage would insect-based dog food have over a vegetarian dog food?

Copyright © 2022 by University of Rochester. All rights reserved.
May be copied for classroom use.

Part 4: Investigating Claims – Can eating insects help the environment?

Garrett asked Andre why someone who has many protein food options would choose to use cricket powder as a protein source. Andre explained that he was interested in decreasing his ecological footprint. Garrett did not know that his food choices could harm the environment. He wanted to learn more about how eating insects might help solve some environmental problems.

The **Why CHiPS?** page was loaded with information on how eating crickets benefits the health of the environment. Although there is no one definition of sustainable, most people agree that in order for food to be considered sustainable it should:

- be produced using methods that protect the diversity of plants and animals
- protect the welfare of farmed and wild species
- avoid damaging or wasting natural resources
- promote health and use practices that contribute to local economies

1. Garrett began thinking about his typical daily diet. He realized that he eats beef or chicken at least twice a day most days. Provide at least 2 reasons why Garrett's food choice may contribute to climate change.

2. Identify at least three reasons why shifting to insect-based protein sources might help the environment.

3. Based on the information provided, identify one action concerned people could take to help with sustainability that does not involve eating insects.

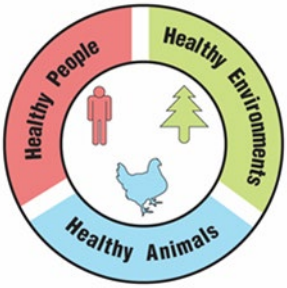
4. Dogs and cats eat about 25% of the animal derived calories in the United States. Additionally, about 33-43% of the beef industry is used for pet food. If you were a pet owner concerned about the environment, which one of the pet food types (traditional, "gourmet", or vegan) would you consider feeding your pet? Explain your choice.

Copyright © 2022 by University of Rochester. All rights reserved.
May be copied for classroom use.

Part 5: One Health and protein sources

One Health Problem

A university is suggesting that the local government take a One Health approach to solving complex local problems, such as protein malnutrition. A One Health approach uses the idea that complex problems often involve the health of people, animals, and the environment. Therefore, solutions to One Health problems must be designed to protect the health of people, animals, and the environment.



1. Use the information in the textbox above to explain what must be involved in a complex problem for it to be considered a One Health problem.

To support adoption of a One Health approach, the university officials want to create a series of slides to provide examples of One Health problems in the community. Your team has been hired to create a slide to answer the question, **"Why is the choice of protein in our diet a One Health problem?"**

Remember how the CDC video used images with captions to help people understand what One Health problems and solutions involve. Using pictures and captions will help people understand and remember what the One Health approach involves.

2. Use the information in the text box above and what you learned about the choice of protein in our diet to develop your slide. Use the following template to organize your slide:

Why is the choice of protein in our diet a One Health problem?		
Picture and a caption to explain how **animals** are involved in the problem	Picture and a caption to explain how **humans** are involved in the problem	Picture and a caption to explain how **the environment** is involved in the problem

Copyright © 2022 by University of Rochester. All rights reserved.
May be copied for classroom use.