OVERVIEW

Students will compare how much energy is released as heat from two different food types.

ACTIVITY

ENERGY SOURCES

Living things that cannot harness solar energy through photosynthesis must eat other organisms or the products of other organisms as food. Consumers, which include members of the animal and fungus Kingdoms, frequently use a variety of food sources to meet their energy and nutritional needs.

The amount of energy stored in food usually is measured in **calories**. One calorie is defined as the amount of energy it takes to raise the temperature of one gram of pure water (equivalent to one milliliter of water) one degree Celsius. The calories shown on most food labels are written with an uppercase "C" and represent one kilocalorie or 1,000 calories.

Carbohydrates, fats and proteins are the primary sources of energy in foods. Sugars, starches (such as those in bread, pasta and potatoes) and fiber (such as in many vegetables, whole fruits and whole grains) are the main forms of carbohydrates. Foods rich in fats include animal and vegetable oils, lard, butter and cream. Proteins, the building blocks of muscles and molecules within cells, are present in meats, eggs, and animal products, as well as in plant materials, like nuts and beans.

Each of these classes of nutrients provides a different amount of energy as food. Fats and oils provide about nine Calories (Cal) per gram. Carbohydrates and proteins each provide four Cal per gram. The amount of energy provided by each of these kinds of foods is independent of the source and presence of other nutrients. In other words, olive oil and peanut oil both provide about nine Cal per gram.

This activity introduces students to the concept of "calorie" and allows them to compare the relative amounts of energy in similar-sized portions of a carbohydrate-based food and a food rich in oils.

TIME

15 minutes for setup; 45 minutes for activity

SCIENCE EDUCATION CONTENT STANDARDS*
GRADES 5–8

LIFE SCIENCE
- All animals, including humans, are consumers, which obtain food by eating other organisms.

PHYSICAL SCIENCE
- Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, and the nature of chemicals. Energy is transferred in many ways.

SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES
- Food provides energy and nutrients for growth and development. Nutrition requirements vary with body weight, age, sex, activity, and body functioning.

SCIENCE, HEALTH & MATH SKILLS
- Observing
- Comparing
- Predicting

* National Research Council. 1996. National Science Education Standards. Washington, D.C., National Academies Press.

Continued

Fast Facts

- Carbohydrates provide most people with about 50% of their energy needs.
- The word "calorie" comes from the Latin word for heat.
- Energy also is measured in joules. One calorie is about 4.2 joules.
- Food must be digested before the body can use it. Digestion changes food into substances like glucose, a simple sugar, that can be carried in the bloodstream to provide energy for cells throughout the body.

Teacher Resources

Downloadable activities in PDF format, annotated slide sets for classroom use, and other resources are available free at www.bioedonline.org or www.kbscience.org.