



# Eat Up!

## Food Scientists Develop Stable Foods for Soldiers



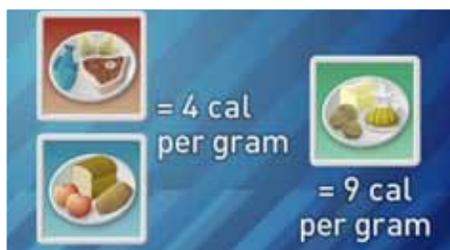
Natick, MA (Army Research Lab) -- Food scientists and technologists create rations, or "Meal, Ready-to-Eat" (MREs), for soldiers. They support soldiers in the field by creating a variety of lightweight portable rations that take nutrition, calories, shelf-life safety, and taste into account. There are many different fields of science involved in creating rations.

*"One of our continuous missions is to provide variety."* Michelle Richards, food scientist

Framework	Standards
Middle School	<ul style="list-style-type: none"> <li>NSES - F.i.5 ➤ Food provides energy and nutrients.</li> <li>STL - 2.S ➤ Trade-off is a decision process.</li> <li>STL - 8.G ➤ Requirements are make up of criteria and constraints.</li> <li>STL - 15.G ➤ Technologies are used to improve food.</li> <li>STL - 15.J ➤ Technologies provide long-term storage of food and reduce health risks.</li> </ul>

### Content Illustrated

➤ Different nutrient components of food have different caloric values.



## Content



### Life Science

- Because active soldiers exert a lot of energy, they need a higher-calorie diet (3,600 calories per day) than do normal teenagers (1,800 to 2,800) do.
- Calories in food come from proteins, carbohydrates, and fat. Protein and carbohydrates have 4 calories per gram. Fat has 9 calories per gram.

### Physical Science

- A calorie is the amount of energy needed to raise the temperature of 1 gram of water by 1°C.

### Technology

- It takes one to five years to develop an MRE food item.
- A portable flameless heater heats food to 100°F in 10 minutes.
- Software assists in food testing to make sure nutrient levels (of vitamins and minerals) are adequate.
- Hurdle technologies, including acids, salts, binding agents, and packaging, inhibit the growth of bacteria in egg products.

### Engineering

- Food scientists design rations that fulfill requirements. The rations must be able to last for three years at 80 degrees, provide nutrients, contain 3,600 calories per day—with less than 30 percent coming from fat—and taste good. They must also be safe, lightweight, and compact.

### Math

- Food scientists calculate the percentage of fat in the rations, and its caloric value.

## Guiding Questions

- How do you create a balanced meal for nutrition and stability for use by soldiers in the field?

## Suggested Activities

*To think about as you watch:*

- Prepare a report and demonstration about natural and processed foods with a long shelf life. What keeps them from spoiling?
- Watch this webisode as an additional resource for the *Engineering Now* unit, *Sunflowers*.

## Keywords

bacteria, biochemist, calorie, carbohydrate, chemist, fat, flameless heater, hurdle technologies, MRE (meal, ready to eat), microbiology, nutrition, protein, ration, shelf life

- *Eat Up!* can be found online at [www.ndep.us/Eat-Up](http://www.ndep.us/Eat-Up). Visit [www.ndep.us/LabTV](http://www.ndep.us/LabTV) for a list of process skills modeled in webisodes.