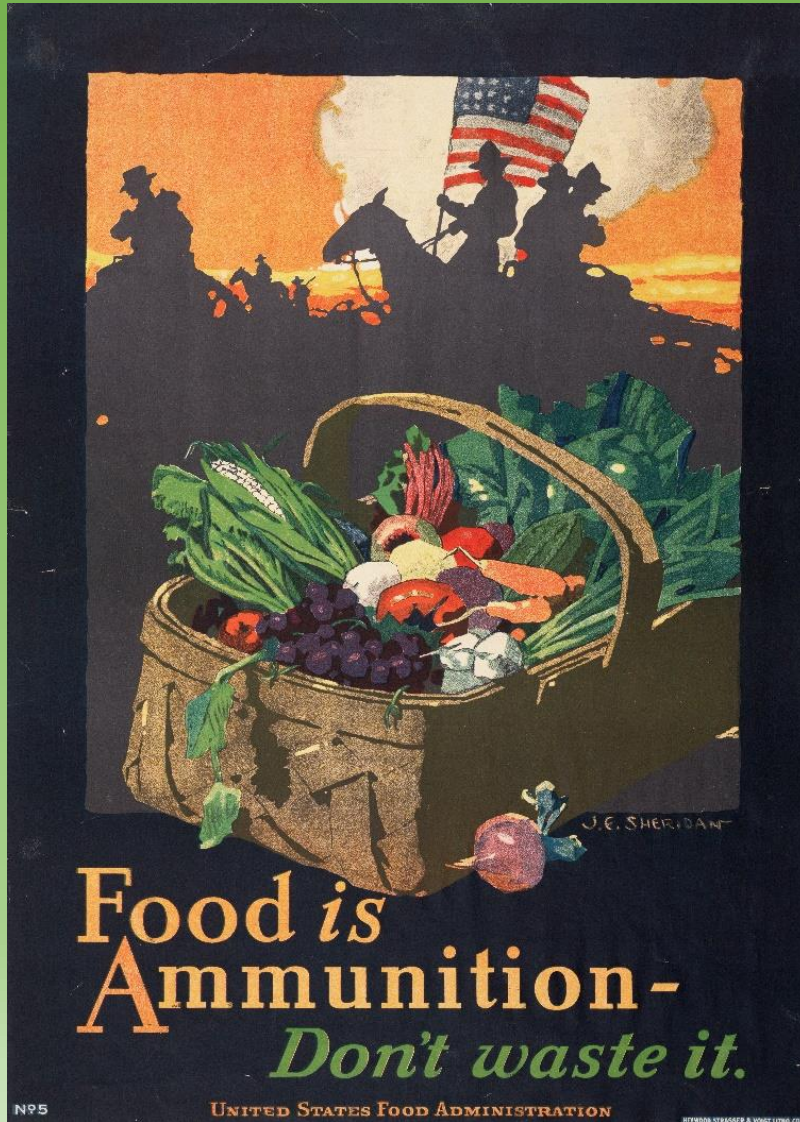


A BRIEF HISTORY OF U.S. ARMY RATIONS

**Frontier Army Museum
Fort Leavenworth, Kansas**



U.S. Food Administration poster, 1917-1920. National Archives
ARC #512488



Soldiers assigned to 3rd Cavalry Regiment enjoy Thanksgiving dinner
on Fire Base Saham, Iraq, Nov. 20, 2018. (Photo Credit: U.S. Army)

“An army marches on its stomach”
- Napoleon Bonaparte

One of the major hurdles for any military force is keeping soldiers fit and healthy in order to accomplish the mission. One of the main ways to keep a healthy force is through nutrition. Since the Continental Army, military rations have gone through numerous changes based on nutrition research, current technology, and available resources.



Thanksgiving mess hall, Fort Leavenworth, KS 1903. Frontier Army Museum collection



M1910 Canteen and C1861 Army Stove, Frontier Army Museum collection

1775 Continental Army Rations

In 1775, the Continental Congress determined that enlisted soldiers should receive a ration that included:

1 lb pound of beef (or three-quarters of a pound of pork or one pound of salted fish)

1 lb flour or bread per day

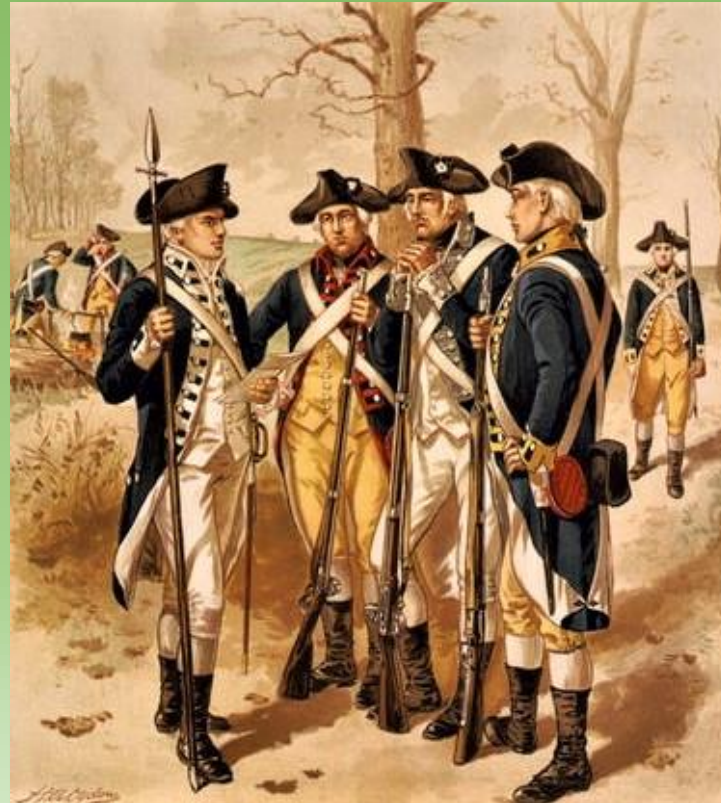
3 lbs pounds of peas or beans per week

1 pint of milk per day

1 pint of rice per week

1 quart of spruce beer or cider per day

a little molasses



Ogden, Henry Alexander, Artist. Infantry: Continental Army, - 1783, IV / H.A. Ogden ; lith. by G.H. Buek & Co., N.Y. United States, ca. 1897.

At the time food preservation, particularly refrigeration, was not a perfect science and perishables were rarely available to soldiers in the field. The lack of fresh fruits and vegetables in the soldier's diet created health issues such as death or illness by certain nutrition deficiency illnesses, like scurvy.

Ration of 1812

20 oz. beef	.64 oz. salt
18 oz. flour	.64 oz. soap
1 gill rum	.24 oz. candle
1 gill vinegar	

Note: Gill is a measurement of liquid volume in the British Imperial United States Customary systems. In the United States it is defined as half a cup, or four U.S. fluid ounces.



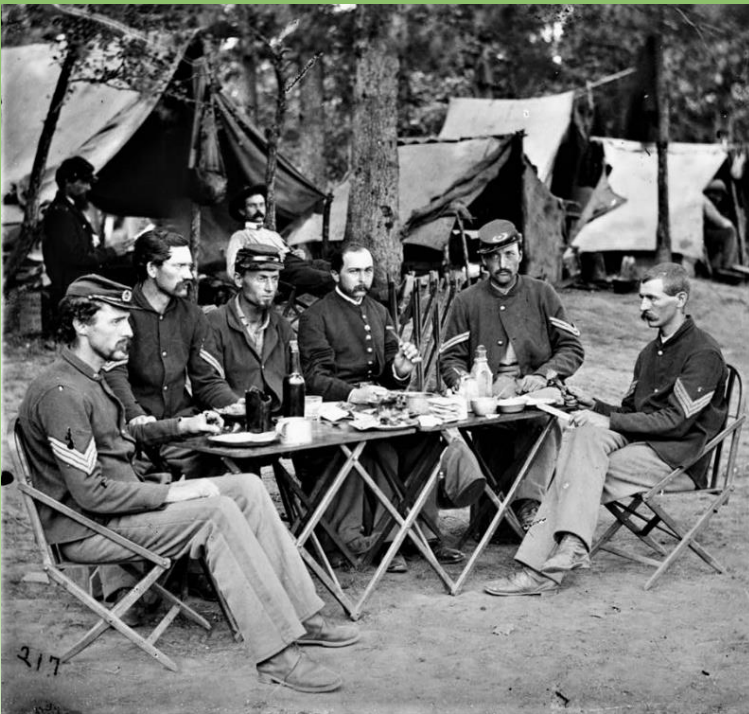
Capture of H.B.M. Frigate Macedonian, Capt. J.S. Carden by the U.S. frigate United States, Stephen Decatur, Esqr., Commander, Library of Congress

The ration of 1812 did not improve much over the ration available to the early Continental Army. Rum (one gill) was added, but other items such as peas, milk, and rice were removed. The meat and flour rations were increased, but only slightly.

Overall the ration decreased in calorie count and nutrients. Although provided ample protein, calcium, thiamin, and niacin, the ration was deficient in vitamins A, riboflavin, and vitamin C. The ration of rum lasted until 1832 and was replaced by coffee and sugar. Coffee and sugar rations increased in 1838.

Civil War Rations

In 1860 and 1861 Congress passed acts that increased the variety of rations. Coffee, sugar, and flour were increased. Potatoes, yeast powder, and pepper were incorporated into the ration. The components went from nine to twelve items.



O'Sullivan, Timothy H, photographer. Bealeton, Va. Noncommissioned officers' mess of Co. D, 93d New York Infantry. United States Bealeton Virginia, 1863. Library of Congress

20 oz. beef	.045 oz. yeast
2.4 oz. sugar	.04 oz. pepper
22 oz. flour	2.65 oz. dried beans
.32 gill vinegar	.64 oz. soap
7 oz. potatoes	1.6 oz. green coffee
.64 oz. salt	.24 oz. candle

During the Civil War, medical director for the Army of the Potomac Major Jonathan Letterman became aware of serious medical issues plaguing Union troops. MAJ Letterman developed several big changes to the medical department including the introduction of a dedicated ambulance corps to transport the wounded, developing an evacuation system for the wounded, and addressing camp hygiene. One of the items within the camp hygiene initiative included bigger and more nutritious portions, better cooking methods, more hygienic handling of food, and an ensured breakfast.

Civil War and Coffee

For soldiers coffee served as a morale booster, a source of energy, and a comfort drink. Coffee was greatly esteemed and coveted during the Civil War. In 1887, soldier John D. Billings reminisced about coffee:

“How often, after being completely jaded by a night march...have I had a wash, if there was water to be had, made and drunk my pint or so of coffee, and felt as fresh and invigorated as if just arisen from a night’s sound sleep!”

Union and Confederate troops both had coffee rations, but coffee rations were very limited in the south. Confederate soldiers tried to duplicate the strong, warm drink by using dandelions, chicory, corn, rye, okra seeds, sweet potatoes, acorns, and peanuts with disappointing results. Coffee rations during the Civil War were brought to camps in oat sacks by the quartermaster department. To divide the portions of coffee evenly throughout the companies a blanket was laid out on the ground and individual piles of coffee were spooned out on the blanket. Each soldier would take a pile. Soldiers generally made their own coffee to their taste, rather than the company cook making it in a large mess kettle and serving it to them.



Coffee pot, c1845. Frontier Army Museum collection

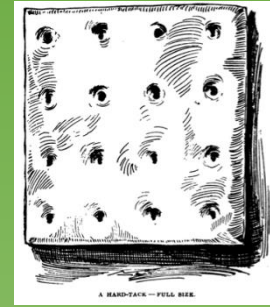
Confederate Dandelion Coffee Recipe

Dandelion roots – 2 tablespoons
Cookie sheet
Pot
1 cup of water
Strainer
Coffee cup

Dig up dandelion roots, younger dandelion have better roots. Wash the roots and chop them up into small pieces. Heat your oven to 200 degrees. Place the chopped pieces on a cookie sheet and bake at 200 degrees for 1-2 hours. Make sure to check on the roots and mix them around to get them fully dried out. Increase the oven to 350 degrees and roast the dried pieces.

Bring a cup of water to a boil and add 2 tablespoons of the roasted dandelion root. Boil for 10 minutes and strain into a coffee cup. Enjoy!

Hardtack Recipe: 1861



These cracker-like squares were a staple ration for American soldiers on both sides of the Civil War. Though they are called different things in different cultures, this basic recipe has been a staple for militaries around the world for centuries. Made of flour and water, and sometimes a bit of salt or sugar, they are sturdy, filling, and will last a long time if kept dry. Indeed, some soldiers kept a few as souvenirs after the war, and they are commonly on display in Civil War museums over 150 years later.

Recipe:

2 cups flour

1/2 tablespoon salt (optional)

1/2 to 3/4 cup water

Preheat oven to 250 degrees F. Combine flour with salt in a mixing bowl. Add water and mix with hands until the dough comes together. Roll out on a table to about 1/3 inch thickness. Use a knife to cut 3×3 squares from the dough. Place on baking sheet, and use a dowel to make 16 evenly-spaced holes in each square. Bake for at least four hours, turning over once half-way through baking. Cool on a rack in a dry room.

World War I—Reserve Rations

In 1899 the sugar ration had increased. By 1908 butter or margarine, lard, and flavoring extract were added. When World War I began the U.S. ration contained seventeen items. It had a variety of foods and improved the soldier diet. By today's standards the WWI ration only lacked vitamin A.

12 oz of bacon or 14 oz of meat (usually canned corned beef)

two 8-oz cans of hard bread or hardtack biscuits

packet of 1.16 ounces of pre-ground coffee

packet of 2.4 ounces of granulated sugar

packet of 0.16 ounces (4.5) of salt



American Expeditionary Forces, Food Preparation. "Canned Bill" Members of Co. D, 6th Infantry, 5th Division cutting up canned corn beef. (near) Nantillois, (Meuse), France, October 22, 1918. U.S. Army Signal Corps Photograph. Courtesy of the Library of Congress. (2016/10/28).

WORLD WAR II—K RATIONS

Leading up to World War II, the U.S. Army recognized the need to modernize soldier rations. Armies became highly mobile with smaller units, which meant soldiers had to survive on combat rations for days at a time.

In 1941 Ancel Keys, a University of Minnesota physiologist, was assigned by the U.S. War Department to develop a non-perishable, ready-to-eat meal that could fit in a soldier's pocket. Keys used items found at a local supermarket that were inexpensive but provided high calorie count such as hard biscuits, dry sausages, hard candy, and chocolate bars. Although the initial tests were deemed "better than nothing" by soldiers, they were successful in providing energy and relieving hunger.

Although designed as emergency rations, Quartermaster Corps officials insisted on using the K-ration to satisfy all requirements of front-line troops until the end of the war.



Signal Corps Image, US Army Image



Signal Corps Image, US Army Image

The final version of the K-ration consisted of three meals: totaling 2,830 calories and 79 grams of protein.

Breakfast Unit: canned entree(early version), canned chopped eggs(all subsequent versions), biscuits, malted milk(early version), dried fruit bar, pre-mixed cereal (late version),purification tablets, a four-pack of cigarettes, gum, coffee, a packet of paper, and sugar (granulated, cubed, or compressed).

Dinner Unit: canned entree pork luncheon meat (early version), canned processed American cheese, Swiss and American cheese, or bacon and cheese (cheese entree all subsequent versions), biscuits, 15 Dextrose or malted milk tablets (early) or five caramels (late), sugar (granulated, cubed, or compressed), salt packet, a four-pack of cigarettes and a matchbook, chewing gum, and a powdered beverage packet (lemon (c.1940), orange (c. 1943), or grape (c. 1945) flavor).

Supper Unit: canned meat, consisting of sausage (early version), either pork luncheon meat with carrot or apple (first issue), beef and pork loaf (second issue); biscuits; a 2-ounce (57 g) D ration emergency chocolate bar (early version), Tropical bar, or (in temperate climates) commercial sweet chocolate bar (late version), a packet of toilet paper tissues; a four-pack of cigarettes, chewing gum, and a bouillon packet (cube or powder).

VICTORY GARDENS

Victory gardens were vegetable, fruit, and herb gardens that were planted by civilians during war time. During WWI and WWII the United States government encouraged people to plant victory gardens to supplement their rations and boost morale.

The U.S. Department of Agriculture estimated that more than 20 million victory gardens were planted during WWII. These gardens produced nearly 9 million tons of fresh produce.

Plant your own victory garden!

Check the Farmer's Almanac to see what and when you should plant
<https://www.almanac.com/gardening/planting-calendar>



Spring gardens

- beets
- carrots
- kale
- mustard
- onion
- parsnips
- peas
- potatoes
- radishes
- spinach
- turnips

Summer gardens

- basil
- beans
- corn
- cucumbers
- okra
- peppers
- pumpkin
- winter
- Swiss chard
- tomatoes
- watermelon

Fall and winter gardens

- beets
- carrots
- lettuce
- kale
- mustard greens
- parsley
- parsnips
- radish
- spinach
- Swiss chard
- turnips



State Historical Society of North Dakota image,
SHSND# USGPO-1945-0629743

MCI: 1950s-1980s

In 1958 the military introduced the Meal, Combat, Individual (MCI) ration. A wider variety of items were introduced in the MCI and encouraged a better daily nutrition intake. During the Vietnam War the MCI contained 1,200 calories through a can of meat (like ham or turkey loaf), a can of “bread” which could be crackers or hardtack or cookies, and a can of dessert, like applesauce, sliced peaches or pound cake. The MCI eventually phased out and was replaced with the Meals Ready to Eat (MREs) ration.

Each MCI included a “M” unit can (meat-based entree item), a “B”-unit (bread item) composed of the Crackers & Candy Can and the flat Spread Can, and a “D”-unit can (dessert item).

Meat unit

The “M” unit came in 12 basic varieties grouped in three menus of four different entrees (later supplemented by “alternative” variant entrees). Taking into account slight differences in preparation or meat, a total of 18 entrees were available over time:

- **M-1:** Beefsteak, Chicken or Turkey Loaf, Chopped Ham & Eggs, or Ham Slices (Cooked in Juices or Fried). **M-1A:** Tuna fish.
- **M-2:** Meat Chunks w/ Beans in Tomato Sauce, Ham & Lima Beans, Beef Slices w/ Potatoes in Gravy (Beef and Boulders), or Beans w/. Frankfurter Chunks in Tomato Sauce. **M-2A:** Spaghetti w/ Meatballs in Tomato Sauce.
- **M-3:** Beef in Spiced Sauce, Boned Chicken or Turkey, Chicken w/ Noodles in Broth, or Pork Steak Cooked in Juices. **M-3A:** Meat Loaf.

Bread unit

The “B” unit came in three different varieties:

- **B-1:** Seven crackers and two chocolate discs, peanut Butter Spread.
- **B-2:** Four Hardtack Biscuits and a cookie sandwich or fudge disc, cheese Spread
- **B-3:** Four Cookies and a packet of Cocoa powder. Jam Spread

Dessert unit

The “D” unit came in three different types:

- **D-1 (Fruit):** Halved apricots, sliced peaches, quartered pears, or fruit cocktail. **D-1A (Fruit):** Applesauce.
- **D-2 (Cake):** Pound Cake, Fruitcake, or Cinnamon Nut Roll.
- **D-2A (Cake):** Date Pudding or Orange Nut Roll.
- **D-3 (Bread):** White bread. (There were no alternatives).



Image from Wikipedia commons

Today: Meals Ready to Eat (MREs)



Meals Ready to Eat, or MREs, replaced the MCIs in 1981. The MRE has been in continuous development since its introduction. MREs were a vast improvement over previous rations because they are a lightweight, easily transportable meal. The meals can be consumed without heating if needed, however some of the MREs packages come with a manual heater.

The number of entrees options has increased over the years. In 1996 there were 16 options, 1997 there were 20 options, and in 1998 there 24. Today there are 24 available entrees and more than 150 additional items. Each MRE provides an average of 1,250 calories (13 percent protein, 36 percent fat, and 51 percent carbohydrates) which is one-third of the Military Recommended Daily Allowance of vitamins and minerals. A full day's worth of meals would consist of three MREs.

DID YOU KNOW?

- MREs must be capable of withstanding parachute drops from 1,250 feet and non-parachute drops of 100 feet.
- The packaging is required to maintain a minimum shelf life of three and a half years at 80 degrees F or nine months at 100 degrees F.

Science behind nutrition

What is a calorie? A calorie is a measure of energy. The calorie number on food labels refers to kilocalorie (kcal), which is also known as a food calorie. A kilocalorie is 1,000 calories. For foods, the calorie count is a measure of how much energy that food stores in its chemical bonds.

In humans our bodies burn calories in order to produce energy. If we take in more energy than we need, it is stored as fat to be used at a later time. Too much and too little energy is not healthy, a balance of calorie intake and output is ideal.

How much calories do we need? This depends on a number of variants. Age, biological sex, and physical energy affect how many calories you need. If you are very active physically, such as a soldier, you will need more calories than someone who leads a more inactive lifestyle.



Turning energy from food into energy that the body uses is called metabolism. It is a series of chemical reactions. Each reaction breaks down food and releases energy.

A basal metabolic rate is the rate in which someone's body uses energy at rest. Even at rest your body is consuming energy. Some functions in your body are always at work such as pumping blood, thinking, breathing, and other basic natural functions. Your basal metabolic rate is responsible for nearly 70% of the calories your body uses each day.

Various foods consist of various nutrients. Depending on the amount of nutrients in the food product will determine how much energy the body can produce from its consumption. However it should be noted that not everyone gets the same amount of energy from the same food. Variations in gut bacteria, enzyme production, and even the length of your intestines can influence how much energy you absorb from food.

**When it comes to basic nutrition the main elements are:
carbohydrates, proteins, fats, vitamins, minerals, fiber, and water.**



Radical Rations Activity Discussion

- 1. Looking at the items you selected, why did you choose them?**
- 2. Did the items you selected fulfill the caloric needs of today's U.S. Army soldier? Why or why not?**
- 3. Did you include anything that would be considered good for morale such as candy or chocolate? Why is this an important element?**
- 4. Do any of your selected items need special care such as needing to be kept cool or air tight?**

How do we keep foods fresh?

One of the struggles for creating healthy rations for soldiers is the inability to include fresh vegetables and fruits in individual rations. Keeping the items fresh for long periods of time is a major issue due to moisture content.

When fresh items, such as apples, are cut the enzymes react to the oxygen in the air causing oxidation (an increase of oxygen). In apples, the extra oxygen turns the apple brown.

According to Scientific American, “polyphenol oxidase (PPO) enzymes in the chloroplasts rapidly oxidize phenolic compounds naturally present in the apple tissues to o-quinones. O-quinones then produce the well documented brown color by reacting to form compounds with amino acids or proteins.”

In other words a chemical reaction occurs when oxygen is introduced into the apple and turns it brown.



It's time to see this chemical reaction in action.
Time for an experiment!



Apple Oxidation Experiment

Materials

- Apples! Try several different types of apples to see if they react different from one another.
- Lemon juice
- Other coating options: Ginger Ale, milk, plain water, salt water, Asorbic Acid Powder, baking soda, vinegar, honey, sprite, orange juice (select as many as you wish to try out!)
- Knife or apple slicer, small cups or bowls, sticky notes or paper
- Printable Journal Page (next page)



Instructions

- 1: Gather all the materials needed. Depending on the number of coatings you are trying, you may need multiple small bowls or cups.
- 2: With an adults help, cut the apple(s) in various wedges, depending on the number of coatings you are trying. If you are using multiple types of apples make sure to keep them separate from one another. Try to make the slices the same size. Apple slicers are wonderful for this.
- 3: Place each slice in a bowl. Mark each bowl with the apple and coating type with a slip of paper or sticky note. Make sure to leave one slice as the control (this means no coatings, just exposure to air).
- 4: Evenly coat each apple slice with a different coating. Dump out excess juice/coating. Make sure to keep the apple types and coating with the correct identification tag.
- 5: Grab your observation paper. Watch the apples and record the results. If you want you can set out a timer and record the time it takes for each apple to turn brown.

Apple Oxidation Experiment Journal

Apple type: _____

What you think will happen: _____

Color the apples to show browning



CONTROL (air)



COATING: _____



COATING: _____



COATING: _____



COATING: _____



COATING: _____

What happened?

Apple Oxidation Experiment Discussion

- Which apple type control turned first?
- Which apple and coating turn first? Last?
- Did they all turn equal shades of brown?
- Taste test! Does the apple slice coated in lemon juice taste different than the plain apple slice?
- Does the brown apple slice really taste all that bad?
- Did the lemon juice really work?
- Did any of the other coatings work?

After thoughts – CAUTION SCIENCE AHEAD!

How does lemon juice stop apples from browning after being cut? Lemon juice helps keep the apple from turning brown because it is full of ascorbic acid (Vitamin C) and it has a low (acidic) pH level. Ascorbic acid works because oxygen will react with it before it reacts with the polyphenol oxidase (PPO) enzyme in the fruit.

However it's interesting to note that different apples brown at different rates when exposed to oxygen. Different apples have various levels of PPO (polyphenol oxidase enzymes) which means they will react to oxidation at different rates! Since the browning is a chemical reaction, you can combat with another chemical reaction.

Looking for more?



Follow the Frontier Army Museum on Facebook <https://www.facebook.com/FrontierArmyMuseum>

Frontier Army Museum webpage: <https://history.army.mil/museums/TRADOC/frontier-army-museum/index.html>

Online Audio tour: <https://frontierarmymuseum.oncell.com/en/index.html>



For more information on the U.S. Army and nutrition visit:

<https://www.goarmy.com/soldier-life/fitness-and-nutrition.html>

<https://www.armymwr.com/programs-and-services/healthy-army-communities/nutrition>