

From deep sea to deep space: Creating and optimizing food for people living and working in extreme conditions

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How do you feed a six-person crew on a three-year mission to Mars? Food scientists are working on this and other challenges related to creating and optimizing food for astronauts, soldiers, pilots and other individuals working and living in extreme environments, according to a June 23 panel discussion at the 2014 Institute of Food Technologists (IFT) Annual Meeting & Food Expo in New Orleans.

The constraints often are similar whether the food is created for the desert, mountains, deep sea or space – it needs to be nutritious, palatable, light-weight, easy to store and transport, and stable for months or years depending on the location and duration of the mission.

"Extreme feeding is what we do," said Ann H. Barrett, a food engineer with the U.S. Army Soldier, Research, Development and Engineering Center, Combat Feeding Directive, charged with overseeing food and food packaging for Army staff working in a broad range of conditions and locations. In most instances, the food must remain viable within the designated environment, while giving the soldier, pilot or other staff member the energy and nutrients to survive the physical challenges and harsh conditions of their assignment, said Barrett.

For example, prepackaged meals, called Meal, Ready to Eat (MRE), are 1,300 calories, weigh 1.5 pounds, and are shelf-stable for three years at 80 degrees Fahrenheit.

The National Air and Space Program (NASA) is embarking on "the ultimate challenge," to create a viable food program by 2030 that will feed a six-person team of astronauts for up to three years, said Grace Douglas, PhD, advanced food technology project scientist at NASA.

There will be different gravities on Mars, "we'll have crew in pressurized suits, and ultimately, these astronauts will go much farther from earth for a much longer duration," said Douglas.

"We need to create a safe and nutritious food system that meets space flight requirements," said Douglas. For example, beverages must withstand high pressure, and food must have the appropriate viscosity to remain on a fork or spoon. Optimally, the food will have "crew acceptability," meaning the [astronauts](#) want to eat the products over many years.

With current prepackaged foods designed for space, six crew members living on Mars for 1,095 days will require 12,023 kilograms of food. Fortunately, food scientists at NASA and other organizations are working to make prepackaged foods that are lighter, tastier and more nutritious, with a longer shelf life.

For example, Douglas said that NASA scientists recently grew and harvested a head of lettuce on a space flight. The opportunity to someday grow safe, nutritious crops in space could help with nutrition and food variety in space.

Provided by Institute of Food Technologists

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