

# Military Food: A Logistics a

by Carol P. Shaw and William L. Porter, Ph.D.

**P**roviding nutritious, high-quality food to our military forces in combat is a unique challenge for food scientists at the Army Natick Research, Development, and Engineering Center, Natick, Massachusetts, as well as for logisticians at the Defense Logistics Agency (DLA) and in the military. Most food in the commercial sector is stored less than 3 months before it reaches the consumer. In contrast, combat rations must have at least a 3-year shelf life and withstand temperatures that range from minus 40 to 120 degrees Fahrenheit.

Food scientists at Natick formulate the ration components and develop the packaging systems. After testing rations to determine storage stability, producibility, and customer acceptance, Natick prepares specifications and commercial-item descriptions (CID's) for acceptable ration components and coordinates with DLA, the military services, Department of Agriculture, Food and Drug Administration, Office of the Surgeon

General, commercial producers, and others. A contract is eventually awarded by the Defense Personnel Support Center to a commercial vendor for production of rations, such as the meal, ready-to-eat (MRE).

The rations are packed into cartons, palletized, and stored in U.S. and overseas depots. Rations are also stored around the globe in pre-positioned war reserve stocks (PWRS's) for use during combat situations. During peacetime, these rations are rotated out of stock on a first-in, first-out basis for use in training exercises.

It may take 3 to 4 years or longer for stored rations to reach the military consumer. Rations like MRE's may be stored at elevated temperatures for a considerable time. This contributes to a loss of food quality. In many cases, the climatic conditions in depots and at PWRS locations are less than ideal. Temperatures can range from the 40's to the low 90's.

Because of experiences during Operations Desert Shield and Desert Storm, Natick established the research program entitled food stabilization and shelf-life indices for military subsistence storage at environmental extremes. Natick's research is improving the storage stability, acceptability, and nutritive value of rations in high-heat environments and refining methods to rapidly and objectively assess the quality of stored rations. Natick is also determining the bioavailability of nutrients in rations stored at high temperatures.

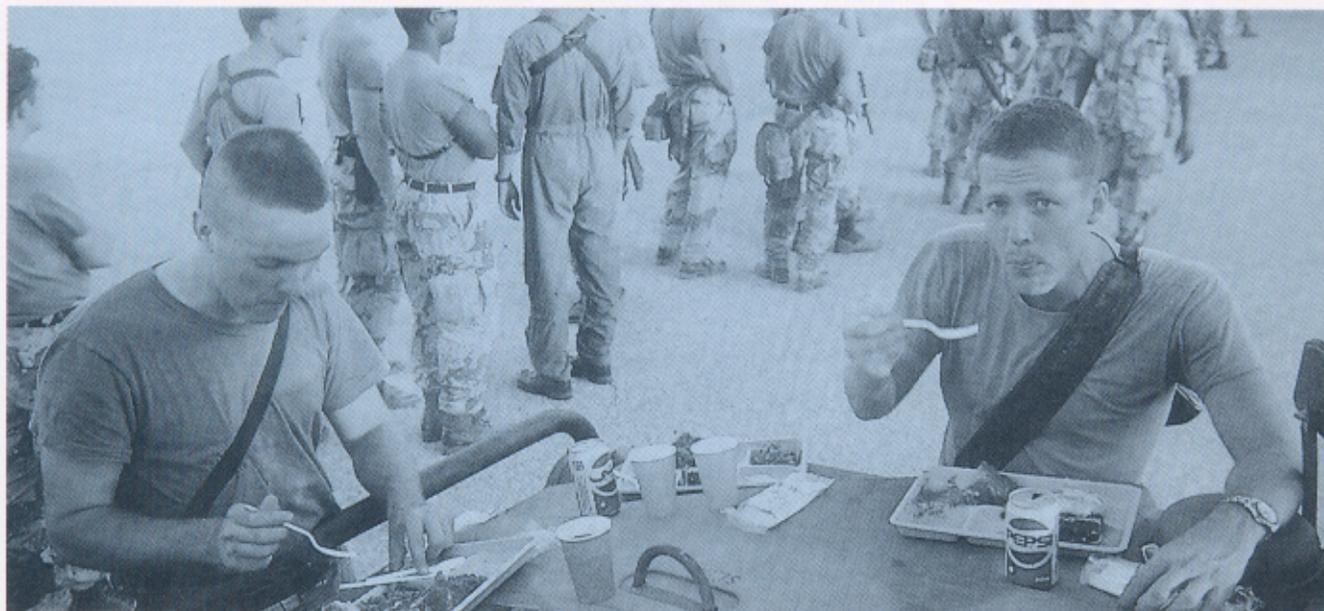
Natick is investigating the relatively new method of shipping and storing rations in container vans. At the storage depots, rations are loaded into containers that are transported by rail or truck, transferred onto ships for ocean crossing, and unloaded onto trucks or railcars for transportation to their final destination, which may be in the desert. The rations could be stored in the container directly in the sun for 6 months or longer before being consumed. Under these conditions, a container van is like a solar cooker.

With DLA's assistance, Natick obtained three container vans loaded with MRE's, B rations, and tray rations that were returned from Operation Desert Storm. DLA transported the vans to the desert sands of Yuma Proving Ground, Arizona. Yuma and Natick personnel installed thermocouples to monitor temper-



□ Rations stored in this container, set up in the desert at Yuma Proving Ground, Arizona, are used to determine the effects of heat on ration quality.

# nd Scientific Challenge



□ During Operation Desert Storm, tray rations provided soldiers with a hot alternative to ready-to-eat meals.

atures at various locations in the vans. Once a week, temperature data were downloaded from a recorder and mailed on a computer disk to Natick.

Data from the summer of 1992 show that rations in container vans are significantly heat-stressed; however, conditions in the vans are less severe than we anticipated. Although temperatures 4 inches below the roof inside the vans reached as high as 151 degrees Fahrenheit, temperatures inside the ration cases rarely exceeded 120 degrees. We believe that the large mass of food inside the vans moderates the temperature extremes. However, the mean temperatures of the rations over the summer were usually about 5 to 7 degrees higher than the mean temperature outside the vans. Protective insulation on top of the rations only lowered the mean temperatures in the vans by 1 or 2 degrees.

Natick and DLA will continue to monitor temperatures of the stored rations for 1 year to determine what effects heat has on ration quality. Information gathered from this joint initiative will enable Natick scientists to identify ration components that must be reformulated to withstand high-heat conditions so military

customers will continue to receive highly acceptable and nutritionally complete rations. New techniques will be developed to determine the quality of rations after long-term storage so only the best possible rations reach our customers.

Recent military missions to Panama, the Middle East, and Somalia remind us that the places an army travels can be stressful not only to the soldier but also to the soldier's food supply.

**ALOG**

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