

Natick Innovations in Food Product Development

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Throughout the history of warfare, the need for special rations to sustain soldiers operating away from normal supply channels and special mission requirements has been recognized. New concepts of warfare based on highly mobile, widely dispersed operational units have created new requirements for the food service that provide subsistence in the field. Inherent in these requirements is the need to develop and to field new feeding systems and rations that minimize the need for logistic support. The task of reducing the weight and volume of rations is foremost in these system requirements. At the same time, the acceptability of the ration components must be maintained in order to ensure troop morale and effectiveness.

The requirements for operational rations are derived from analysis of existing operational scenarios and projected battlefield deficiencies. These needs are then measured against the current and future capabilities in food processing and food science to define both near- and long-term goals for the development of operational rations. The development and improvement of operational ration components and systems for all branches of the military service is the responsibility of the U.S. Army Soldier Biological and Chemical Command, Natick Soldier Center, Department of Defense Combat Feeding Program (NATICK). In addition, NATICK was originally chosen by the National Aeronautics and Space Administration (NASA) to be the material developer for feeding systems during space flights and the laboratory continues to provide support to NASA. A Memorandum of Agreement concerning the provision of irradiated beefsteaks and turkey slices for shuttle and MIR space station missions is presently in effect with NASA.

From a logistical standpoint, the challenge faced by product developers, is the production of calorically dense engineered foods. Considerations factored into the process are reduced weight and volume, extended shelf stability, conformance to mission requirements, producibility, optimal nutrition, and high acceptability by the average service person. These objectives are achieved through the integration of food processing, product development, and behavioral science principles.

The need to field servicemen under all operational scenarios has resulted in the development of many items that are unique to the military and that are not available commercially. The strategic view for military near, mid-, and long-term operations resulted in the development of Mobility Enhancing Ration Components (MERCs), which will meet the demands of a highly-mobile future fighting force. The essential component of the MERC ration is the eat-out-of-hand, shelf-stable sandwich that requires no preparation and that can be consumed while on the move. The shelf stable sandwich technology utilizes NATICK developed shelf-stable bread and intermediate moisture meat and non-meat fillings. In addition, the Flameless Ration Heater (FRH) was designed to heat Meal Ready-To-Eat (MRE) entrées. The FRH takes a fraction of the time and water required by the previous canteen cup/fuel bar method of heating, is flameless, and can be activated in shelters or even in the soldier's pocket.

NATICK has also developed a number of specialty rations in order to meet defined mission requirements. The Air Force requirement to feed pilots wearing oxygen masks and pressurized suits during high altitude reconnaissance flights resulted in the development of the Tube Food Ration. This ration is ready-to-eat, hermetically sealed, and can be opened by either a Food Transfer Unit (FTU) or a spike on the reverse side of the tube cap. The product is served directly from the tube via a FTU when consumed by individuals in a pressurized suit.

The Dental Liquid Ration, developed under a joint Air Force, Army, and Navy program is designed to feed patients who are unable to eat solid foods due to problems such as broken jaws, dental injuries, and swallowing disorders. This ration consists of dehydrated powders which can be sipped through a straw when reconstituted with water. The variety of components in this ration system provides for complete menus for breakfast, lunch, and dinner.

The Ration Light-Weight, 30 Days is a specialty ration developed to meet mission needs for Special Operational Forces. Each individual packet is required to weigh no more than one pound, have a total volume of less than 45 cubic inches, and provide 1950 calories. The ration was designed so that each individual soldier can carry 30 of these packets and be capable of operating behind enemy lines for 30 days without resupply.

The Food Packet, Survival, General Purpose Ration was developed by NATICK to provide sustainment to military servicemen who are downed behind enemy lines, such as airmen. This

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ration was designed to be stable for up to five years when stored in liferafts, aircraft, and remote storage areas, and to provide nutritional requirements for up to five days.

Recent philosophical changes by the Government have resulted in an effort to minimize the use of military unique items and to use commercial items when possible, in order to reduce cost and to ensure a viable procurement base. However, because of the diversity and specialization of military mission requirements, complete dependence on commercially available products is neither possible nor advisable. Therefore, NATICK will continue to fulfill a vital military function by developing special ration components and providing for a well fed fighting force.