

Ready to Eat! Thirty Years of the MRE – Part Six

New processing technologies and the coming of ketchup and mustard



Written by: [Jan Tegler](#) on December 30, 2011

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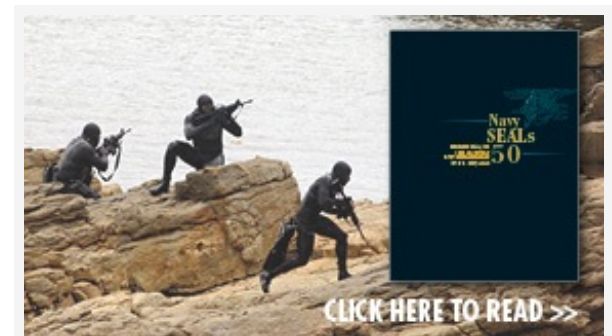
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Gerald Darsch, director of Department of Defense combat feeding, demonstrates the Unitized

Group Ration-Express to Sgt. 1st Class Mark Danley and Spec. Tina Avalos during Meal, Ready-to-Eat (MRE) field tests held in Heidelberg, Germany. U.S. Army photo by Juan R. Meléndez Jr.



In the final installment of our series on the Meal, Ready to Eat and its [30 years of history](#) we look to the future to see what's in store in the near term for America's primary individual combat ration.

“As mentioned previously, the MRE is probably the most frequently updated combat ration in the world, both in terms of menu variety and technology. There are even “Special Purpose” MREs. The “Meal, Religious” features Kosher and Halal MREs while the “Meal, Tailored Operational Training” provides “an alternative operational training meal in lieu of ‘sack lunches’ and catered commercial meals to military organizations that engage in inactive duty training.”

Keeping the MRE current requires the relatively small cadre of nutritionists, food scientists and technologists at the Combat Feeding Directorate to stay up to date with evolving technologies and developments in health and nutrition.

Fortunately, the CFD recognized early on that partnering with the nation's industry and research institutions could pay significant dividends. Today, the Directorate continually leverages that relationship, says Logistics Management



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New Mexico State University (NMSU) and its applied engineering arm, the Physical Science Laboratory (PSL)

Specialist Joe Zanchi, with the CFD's Combat Rations Team.

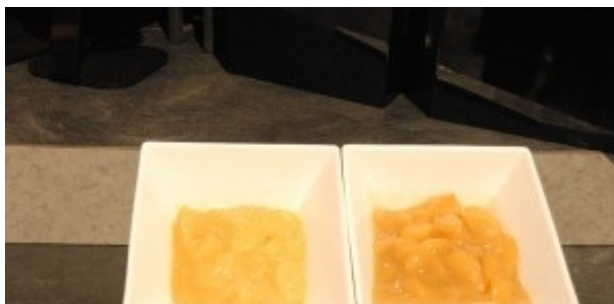
"The U.S. is unique in its ability to make that investment in combat feeding," he points out. "It's not the same for a lot of our foreign partners. Part of the strength of our program is that decades ago we realized that there had to be a positive relationship with our industrial sector. We're really partnered with leading-edge companies in the food industry and with academic institutions that are moving technologies forward. We're able to take advantage of that."

Two technologies under development for commercial applications which could be beneficial to the MRE – high pressure food processing and microwave sterilization – are being closely followed by the CFD for their potential in a military setting.



The team of nutritionists, food scientists and technologists at the Combat Feeding Directorate work hard to ensure that the warfighter receives the best rations possible. U.S. Army photo by David Kamm

“The majority of today’s processed foods are heat treated to kill bacteria. This often diminishes product quality, particularly in terms of freshness. High pressure processing (HPP) provides an alternative means of killing bacteria that can cause spoilage or food-borne disease without a loss of sensory quality or nutrients.”



Under HPP, food is subjected to elevated pressures (up to 87,000 pounds per square inch or approximately 6,000 atmospheres), with or without the addition of heat, to achieve microbial inactivation. Pressure inactivates most vegetative bacteria at pressures above 60,000 pounds per square

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Spiced apples are the first to be high-pressure packaged in Meals, Ready-to-Eat (MREs). The apples on the left are high-pressure processed, and on the right are the apples currently in MREs. This pressurization technology has been approved by the Food and Drug Administration (FDA), and will be used in future MREs. U.S. Army photo by Eriika Wonn

inch. The primary benefits are higher quality processed foods with improved freshness and extended shelf life.

“There’s been a lot of enthusiasm about high pressure processing and its benefits where it may fit in here as it nears commercialization,” Zanchi reports. “High pressure processing has the potential to keep processed food like that found in the MRE fresher and perhaps lend it better nutrient retention. It’s less stressful on the

food when it’s processed so it improves its quality. We look at all of the areas where there is innovation which we think might have relevance for a military feeding application.”

“*Microwave sterilization is another technology which could benefit the MRE, says CFD Senior Food Technologist Jeannette Kennedy. The technology is basically what the term describes. Microwaves are used to deliver energy to packaged food under pressure and controlled temperature to achieve inactivation of bacteria harmful for humans, thereby sterilizing the food.*

The main benefits are similar to those of HPP, due primarily to the speed of microwave sterilization. With traditional food processing and sterilization techniques, prolonged exposure to high heat often diminishes product quality. Microwaves interact with polar water molecules and charged ions. The friction



resulting from molecules aligning in rapidly alternating electromagnetic fields generates the heat within food. Since the heat is produced directly in the food, the thermal processing time is sharply reduced.

This yields fresher processed food with better nutrient retention, improved visual appeal and the advantage of post packaging processing which can reduce spoilage and eliminate refrigeration costs for manufacturers.



The crew from NBC's "Rock Center with Brian Williams" turned the Pilot Plant Kitchen at the Combat Feeding Directorate at Natick Soldier Research, Development and Engineering Center into a temporary TV studio during a Nov. 4, 2011 visit. This kind of attention is unusual for the directorate, whose work mostly goes unsung. U.S. Army photo by NSRDEC Photographer David Kamm

“Microwave sterilization is something we’re definitely working on,” Kennedy says. “The hurdle currently is that the packaging of the MRE entrees has a foil layer in it. Foil is a great barrier for moisture, so it helps maintain the shelf-life of the products. But you can’t microwave foil. So we’re looking at developments in packaging that has the same barrier properties as foil but which is not foil.”

“Microwave sterilization is much quicker,” she continues. “Just as you have a microwave at home, it’s a much faster process of making food suitable for consumption. It’s a different alternative to the canning process wherein temperature and pressure are used in order to commercially sterilize food inside the vessel. Instead of using cans, we use a flexible pouch, kind of like what you get tuna fish in at the store. With microwave sterilization our MRE manufacturers would fill the pouch and then microwave sterilize it. That’s the goal.”



The adoption of new technology has, as we’ve detailed, already benefitted the MRE.



Pvt. Heather Buchanan learns the characteristics of a Meal, Ready-to-Eat (MRE) entree to determine if the ration is serviceable. Balancing MRE quality and longevity has long been an area of focus for the Combat Feeding Directorate. U.S. Army photo

The once thorny and intractable problem of how to encase Tabasco sauce in a flexible pouch like the rest of the items in an MRE rather than the bottles that had been in use was solved with the application of new packaging technology developed commercially.

Always alert to possible spin offs enabled by new technological solutions, the CFD recently used the same technology to include two new condiments in the MRE that had rather surprisingly been absent until now.

“That breakthrough has allowed the inclusion of a couple more food items that were similarly difficult to package in flexible packaging,” Jeannette Kennedy reveals. “Ketchup and mustard will be going into the 2013 or MRE-33 production. The pH (the relative acidity; the higher the pH, the lower the acidity) in ketchup and mustard is very low so we weren’t able to include them in the menus, but now we can. We think this should provoke a very positive response!”

Clearly, as the MRE enters its 31st year of existence, progress continues. And though combat rations and the MRE in particular will always be a source of celebration and not a little griping among warfighters, the CFD is doing its best in the complex and ever-changing field of combat feeding to live up to its motto – “warfighter tested, warfighter approved!”

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