

FOOD

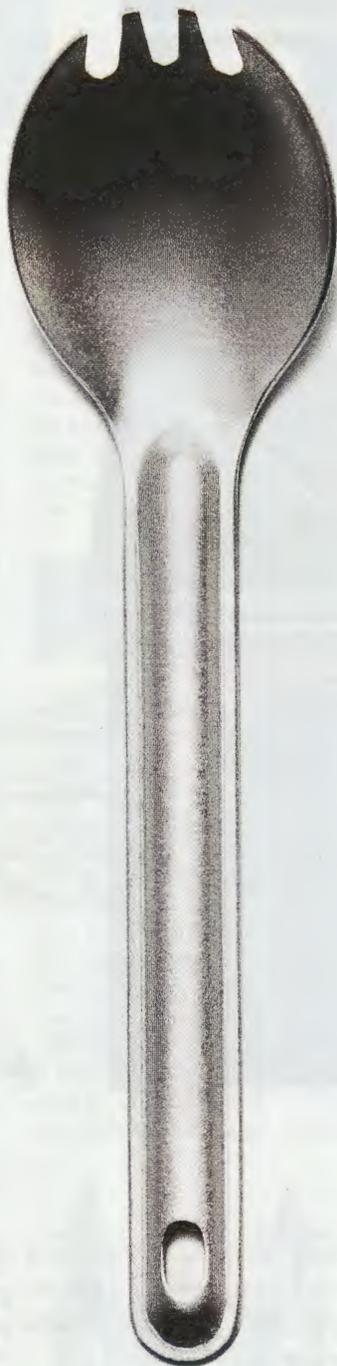
THAT

LASTS

FOREVER

Want to shop once a month?
New techniques can keep meals
fresh longer—much longer

BY DEBORAH
BLUM



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In his basement office at the University of Wisconsin, Rich Hartel lines up the failures. The 10-year-old jar of marshmallow cr me in which the corn syrup settled into a thick amber pool at the bottom. The two-year-old petrified Peeps. "I have some one-year-old Twinkies at the back of my cabinet," offers Hartel, a professor of food science. Contrary to popular belief that they're immortal, Twinkies are designed for no more than a four-week shelf life, and they tend to become more chewy than soft after the first week. The fact is that most desserts—barring, famously (or infamously), fruitcake—devolve into a sticky wad of starch in a depressingly short time.

At least for now. Scientists like Hartel are working to change that, with some startling recent success. A new generation of food-preservation technologies is starting to transform how long we can keep food tasting fresh, exponentially increasing its life span. NASA recently reported that it has come up with bread pudding that can last a solid four years. Over at the Pentagon, there's pound cake that stays springy for up to five years. And that's just the desserts. Long-lasting entr es and side dishes are being concocted, with enormous implications: in the future we may have to go to the grocery store only once a month and will rarely, if ever, need to throw out food because it has gone bad. Further, if fruits and vegetables can be better preserved, food scientists hope they will become less expensive and more available for people on limited budgets.

Consumers are already taking advantage. Tuna in those vacuum-sealed pouches that started popping up in stores a few years ago tastes fresher than canned tuna and has a similar shelf life, about 2½ years. Foodmakers had conquered one part of the equation. Spam is famously imperishable—but palate-wise, it's practically in a category of its own and not a likely standard bearer for fresh-tasting, everyday meals.

Though Spam is sold with an expiration date two years in the future, Phil Minerich, vice president of research at Hormel, says that actually underestimates its durability. "We really put that on there to help the consumer move it through," he says. "We don't want it to be sitting on the shelf for 12, 15 years." But, he adds, a well-sealed can of Spam would remain edible that long, if not longer.

The new food preservationists aren't just after longevity; they're reaching for a different standard of edibility. "In the last decade, there's been an evolution in the way we think of long-lasting foods," says Lauren Oleksyk, leader of the food-processing, engineering and technol-

There are three big challenges to making food with a long life span, and a sandwich presents all of them: controlling moisture, controlling atmosphere and controlling microorganisms, from bacteria to mold. (Many traditional food-preservation techniques, such as drying and salting, work because they kill microorganisms or limit their growth.) Oleksyk's team members needed to keep liquids from the sandwich filling from seeping into the bread, so they mixed water-absorbing ingredients including glycerol and sorbitol into the filling. They also increased the use of fine, edible polymer films, which are undetectable in the mouth. (Hartel notes that in desserts,

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ogy team at the U.S. Department of Defense Combat Feeding Directorate.

Much of the new technology stems from the military's need for long-lasting food for troops, packaged as MREs (meals, ready to eat)—rations that have never been famous for tasting good. In 2002, Oleksyk and her colleagues introduced their first alternative option, an "indestructible" sandwich: a bread envelope stuffed with pepperoni or barbecued chicken, designed to last three to five years without refrigeration at standard room temperature.

chocolate is often used as a moisture barrier. His favorite example is the Twix, designed so that chocolate separates the dry cookie from the moist peanut butter or caramel inside.)

The supersandwich also limits exposure to oxygen, which accelerates chemical changes in food, by tucking packets of oxygen-scavenging chemicals in the outer wrapping. And the packaging is as impervious as possible, with layers of heat-resistant polypropylene and metal foil.

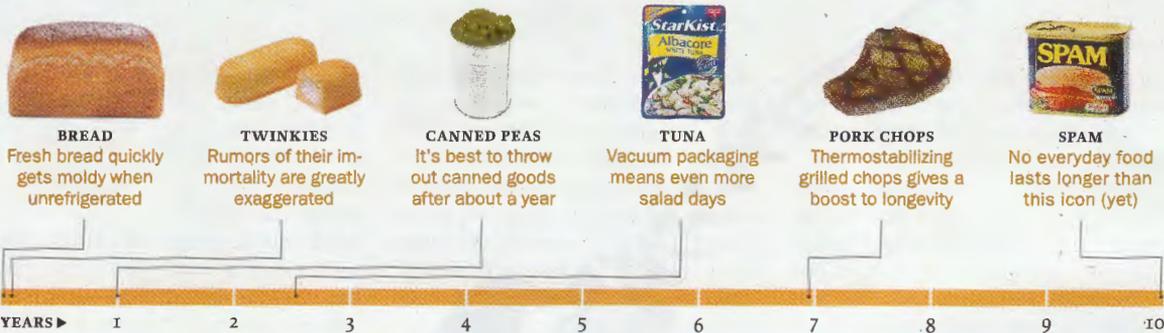
But the most important advance may be innovative ways of

THE "INDESTRUCTIBLE" SANDWICH



Without new and more sophisticated methods of preservation, we could fall short of feeding a global population expected to top 7 billion this year

SHELF LIVES IN THE BALANCE



controlling bacteria, like a newly refined method of high-pressure processing (HPP), which greatly improves taste. The old method of sterilization requires 30 minutes of 250°F (121°C) heat, and as any cook knows, every hot minute changes the food. With HPP, food is sealed in a plastic pouch, placed in a chamber and subjected to 87,000 lb. of pressure per sq. in., effectively killing any bacteria. The makers of some commercially available lunch meats, like Hormel's Natural Choice line, already rely on high-pressure processing rather than chemical preservatives. Companies that handle delicate seafood products like raw oysters are also adopting the approach. Oleksyk says the technique may soon allow the military to offer sandwiches stuffed with ingredients like tuna salad and mayonnaise.

"It's night and day compared to the old heating process," Oleksyk says. "The foods taste like they're freshly prepared." The Defense Department hopes to introduce packaged HPP fruit that will retain its crispness for at least three years in a way that cannot be achieved by canning. Oleksyk's goal is to eventually create meals that can last up to 10 years. That would mean—especially if combat rations continue to be delivered on the standard three-to-five-year schedule—that there would never be a point when the food didn't taste fresh, she says. "They wouldn't have any idea how old it actually was."

Oleksyk admits that these are still mostly dreams of the future, but researchers at NASA have also been pushing the boundaries of old-time heat treatment. A report

published in December in the *Journal of Food Science* offered a detailed portrait of the outer limits of shelf stability for heat-treated, or thermostabilized, foods. The report was based on a three-year study of 13 foods, including vegetable side dishes (carrot coins, three-bean salad), pork chops, vegetable omelettes and apricot cobbler. Once processed and packaged, the foods were stored at Johnson Space Center and taste-tested on a regular basis over the three years. They remained edible for a surprising length of time, although they had clearly aged, turning darker and changing in texture. "We tested a tuna-fish casserole," says lead author Michele Percho-

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nok, a food scientist at the center's Habitability and Environmental Factors Division. "The pasta got soft, but the tuna held up very well."

The best results consistently came from meat products, she says. For instance, extrapolating from its three-year study, the agency calculated that grilled pork chops could remain edible for nearly seven years and tuna or salmon for close to eight years (far longer than desserts, which had shelf lives of 1½ to five years). She attributes the durability of meats mostly to their tough protein fibers.

Ultimately, long-lasting foods could have global impact. We rely on shelf-stable foods after disasters and when electricity fails. After Hurricane Katrina in 2005, many Gulf Coast residents subsisted on MREs

provided by the military; these and similar products feed victims of earthquakes and blizzards to drought. What's more, frozen- and chilled-food sections are expensive for grocers. In a future when energy supplies may be increasingly limited, researchers suggest, investment in food preservation looks like a smart move.

That's one of the main messages in a recent analysis titled "Feeding the World Today and Tomorrow" from the Chicago-based Institute of Food Technologists. The lead author, John Floros, head of the food-science department at Penn State University, says that without good food preservation, we could

fall short of meeting the needs of a global population expected to top 7 billion this year. The problem, he says, is that we lose too much food to rot and decay. In developing countries without sophisticated food-distribution and cooling systems, the loss is consistently 30% a year and in some places as high as 70%. He expects such challenges to increase, along with uncertainties in food production related to projected global climate change. Floros works with NASA on its food-stability projects, but "we're not just talking about long-term space missions," he says flatly. "We're talking about survival here on earth."

Blum is a science writer and the author of *The Poisoner's Handbook*



Will consumers bite? Better taste and texture are critical for makers to change the way people think about preserved foods