

Potential New Methods for Fresh-cut Success

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According to estimates just released from Food Spectrum, entitled "Retail Prepared Refrigerated Foods: The Market and Technologies," sales of prepared refrigerated foods in U.S. supermarkets will grow from \$9.5 billion in 2001 to \$12.2 billion by the end of 2005. Of that total, Food Spectrum expects the entire category of value-added produce to grow to \$5.2 billion in 2005. Sizable gains in both value-added fruits and vegetables will contribute to that growth. Like other prepared refrigerated foods, fresh-cuts represent a "new generation" of foods that are growing and evolving quickly in response to consumer demand for convenience, variety, quality and health.

As opposed to frozen or shelf stable products, many refrigerated foods can be eaten right from the container without heating. Caesar salad mix or prepared mayonnaise-based salads, for example, can only be found in the refrigerated state. Thus, they have no "in-store competition" from frozen or shelf stable products. Fresh-cut or wet salads also provide improved visual appearance, with a high contrast of colors and textures that encourage consumers to make initial purchases. Because they are just minimally processed, refrigerated foods also deliver outstanding taste, a factor that's good for repeat sales.

Refrigerated foods, however, are sensitive to both time and temperature; hence, quality changes continually over the course of relatively short product shelf life. This dramatic variability in quality contrasts sharply to the longer shelf life of frozen and shelf stable foods. Refrigerated foods need distribution controls, quality retention and/or

shelf life extension technologies to ensure their success.

Importance of Hurdles

It is important to understand the technologies available to help refrigerated value-added foods succeed in the marketplace. Manufacturers must understand how products can be formulated, packaged, processed and distributed because these factors all have a direct impact on product quality, cost, shelf life and, most importantly, safety. Recent new technologies and others on the horizon promise to provide even more alternatives for developing high quality refrigerated prepared products. Integrating these technologies promise to make the difference between companies that succeed and those that fail in the refrigerated foods sector.

Technologies for improving quality, shelf life and safety are called "hurdles" and are described in detail in Food Spectrum's new report. Hurdles are preventative tools designed to extend the bacteriological and/or sensory shelf life of food products. They are "tools in the toolbox" for manufacturers of refrigerated foods and others involved along the cold chain. Processors should use hurdle technologies, because we cannot always rely on an unbroken cold chain during the distribution of perishable foods. In fact, refrigeration alone is not enough to prevent the growth of some infectious or toxicogenic microorganisms. Post process contamination even at low levels may create a situation where pathogenic microorganisms may grow to high levels and cause illness and potentially cause death. Therefore other barriers to microbial growth must be

incorporated into these foods to yield a safe and stable system.

There is no "magic bullet," but hurdles can be applied in some or all phases of the cold chain to provide increments of safety. Hurdles can be used in product formulation and may include the use of acidifiers, antimicrobial agents, antioxidants, blanching, and processes that control water activity. Thermal-processing hurdles may also be used, but for fresh-cut produce, non-thermal processing hurdles such as ultra high pressure processing, irradiation, pulsed light and pulsed electric field processing are available. Finally, hurdles can be applied during the packaging process. They include modified atmosphere packaging, clean room packaging, active packaging systems, intelligent packaging systems, and proper use of packaging materials. Synergistic results can be achieved when hurdles are used in combination, and are a very important consideration.

New Technology

High quality value-added produce starts with raw material control. Vertical integration and superior agricultural practices are critical to success. Variety, source, season, initial maturity, processing maturity, slicing and cutting equipment, chemical or other treatments and dips, packaging environment, temperature management, shipping, and handling all affect flavor and shelf life. Modified atmosphere packaging, clean

room packaging, active packaging, incorporating antimicrobial agents during formulation, and applying appropriate packaging materials are typical hurdles for value-added produce. Some or all of these technologies are necessary for the safety and quality of the end product. New techniques such as ultra high pressure processing and irradiation are options that have not been generally applied to value-added produce to date but may have some application. In addition to providing a product of high quality, each of these technologies has been shown to significantly reduce levels of food spoilage and pathogenic microorganisms such as *E. coli* O157:H7, *Salmonella*, *Listeria*, and *Campylobacter*.

Ultra high pressure (UHP) processing has shown it can extend shelf life and destroy food pathogens without altering the food. High hydrostatic pressure for a short period of time (about 30 seconds to two minutes is typical) results in no heat treatment occurring, so that vitamins, color and texture are retained in their fresh or just prepared conditions. Whereas first-generation products treated with UHP include juices, fruit preserves, and shellfish, more recent activities have centered on refrigerated

prepared foods and value-added meat products. Odwalla announced in June 2001 they have adopted UHP technology for refrigerated juices, as an alternative to thermal flash pasteurization.

Since the first irradiated food product was introduced in 1992, few processors have used it. Irradiated fresh ground beef, however, is gaining acceptance in the marketplace and may help pave the way for broader commercialization of irradiated foods. In addition, irradiation has been used to prolong the shelf life of fruits and vegetables because it inhibits sprouting and delays ripening. As a result, many exotic and tropical fruits, for example, which typically cannot be shipped to other areas, may now have a longer shelf life, allowing them to be exported.

Finally, while post pasteurization does not leave product technically fresh, mild heat treatments have proved to inactivate enzymes involved in browning or senescence, helping to extend—and sometimes double—shelf life. Similar to blanching, timed heat treatments leave the product with better texture, color and flavor than freezing or canning and consumers may not always be able to distinguish between produce treated with heat or heat shock and produce that

is truly fresh. Heat treatments destroy pathogens, eliminating post-processing contamination, a significant fact because studies show many incidences of food-borne illness result from handling conditions in the manufacturing environment *after* product has been processed.

Temperature Control Is Basic

Temperature control, however, is the most important and most obvious tool for extending shelf life and assuring the safety of fresh-cut products. Unfortunately, it is frequently misunderstood and overlooked. The current industry "standard" for refrigerated holding conditions is 40°F, as advised by health departments, federal and state agencies. Despite these standards, minimal education initiatives are in place and various surveys have shown that temperatures of foods in U.S. chilled food distribution channels are frequently in the range of 45-55°F. The "cold chain" is typically broken, while today's temperature "standard" is technically too warm.

Studies have shown that both quality and safety of most refrigerated foods are significantly enhanced when the product is stored at temperatures that approach the actual freezing point of foods. The



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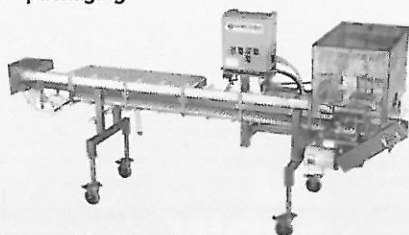
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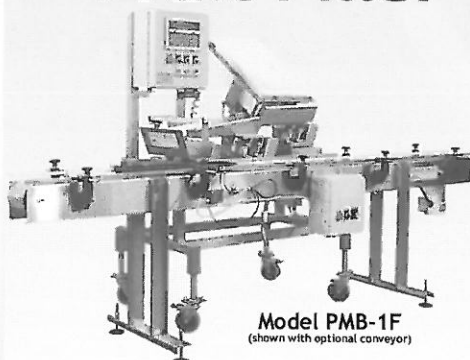
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Can interface with infeed conveyor to filling system for turn-key packaging



Model MC-1

Gentle Fruit Filler



Model PMB-1F
(shown with optional conveyor)

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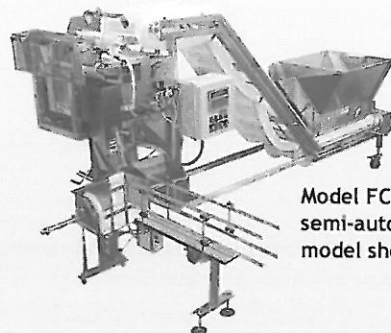
Produce Filler

Fills 1 to 10 pounds of shredded, diced, floret and small whole vegetables

Fill rates up to 24 a minute (FCS-2)
(up to 12 a minute with FCS-1)

Designed for first-in-first-out keeping produce fresh

Interface with bagger or pre-made bags



Model FCS-1
semi-automatic
model shown

optimum temperature for holding refrigerated foods is in the "super chill" range between 28-36°F (-2°C to +2°C). When temperatures are continuously maintained at that level, product shelf life has been shown to be 1.5 to 4 times greater versus conventional temperatures of 4-8°C (39-46°F).

Food Spectrum strongly believes the industry should establish a more appropriate temperature standard for holding refrigerated foods. It should be 33°F (1°C) and not 40°F. In addition, a well-recognized refrigerated icon (such as a thermometer or refrigerator symbol) should be developed to communicate that product must be kept cold. A national awareness program with a message similar to "Colder is better" needs to be addressed to all participants in the cold chain, including the consumer.

In addition, tremendous state-to-state variability and consumer confusion exists with shelf life coding of refrigerated foods. As a result, it is also strongly recommended that a consistent national procedure for shelf life coding be developed and communicated to the public at large. ■

Editor's note: Lou Cooperhouse (lcooperhouse@foodspectrum.com.) is President & CEO of Food Spectrum LLC, a consulting and research company specializing in value-added foods. Their recent report, "Retail Prepared Refrigerated Foods: The Market and Technologies," was published with the Food Policy Institute at Rutgers University. It analyzes products sold in supermarket produce, deli, and meat departments, offering market size estimates, forecasts, and competitors' market shares, as well as competitive profiles and an analysis of refrigerated foods. It also discusses process and packaging technologies used for new and established products, focusing on fresh-cut produce, prepared salads and other refrigerated foods. For the whole report, mini-studies or a separate technologies study, call: 1-877-FOOD888, or visit, www.foodspectrum.com.

Hands-on HACCP Workshop

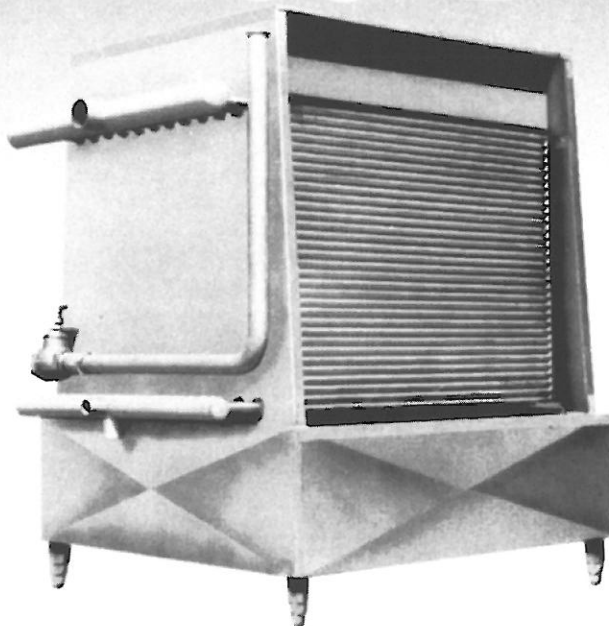
"Developing & Implementing HACCP for the Fresh-Cut Industry" is the title of an accredited hands-on workshop for fresh-cut processors slated for May 21-23, 2002, in Atlanta, Georgia. Co-sponsored by the University of Georgia Department of Food Science & Technology, and the International Fresh-Cut Produce Association (IFPA), the program is organized by Dr. William C. Hurst, who is accredited as a lead HACCP instructor by the International HACCP Alliance.

The program will also include speakers from IFPA, the FDA, United Fresh Fruit & Vegetable Association, and the University of Georgia's Center for Food Safety. In addition to fundamental HACCP training, this short course will emphasize how pre-requisite programs, such as "Good Manufacturing Practices" (GMPs) and "Sanitation Standard Operating Procedures" (SSOPs) must be monitored, documented, verified and integrated into an effective HACCP plan. Breakout sessions will allow participants to develop a customized HACCP plan for a specific fresh-cut product.

Now in its third year, this short course has received overwhelming praise from past participants for its practicality and benefit to the industry. Upon completion of the course, participants take a standardized HACCP exam and receive a certificate of accreditation upon passing the exam. For the latest information on this course, please visit the UGA Food Science Extension Outreach Program's webpage at <http://fsext-outreach.ces.uga.edu/events/2002calendar.htm>; send an email to efosat@arches.uga.edu for the brochure in PDF format, or call Marian at (706) 542-2574 to receive a brochure by mail. ■

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