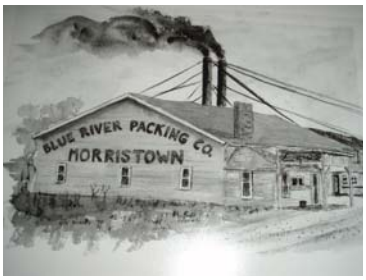
THE WORLD FOOD PRIZE

Dr. Philip E. Nelson
2007 Laureate

Early Life and Education



Born in 1934, Philip Nelson grew up on a 500-acre farm near Morristown, Indiana. Along with his older two sisters and a brother, young Nelson helped out during planting and harvesting seasons on the farm and also in his family's tomato canning factory, known as the Blue River Packing Company. The canning operation was subject to the seasonality and perishability of the tomato crop and operated at peak capacity for a short period of time after harvest, employing around 300 workers.

At the age of 15, Nelson was introduced to Purdue University's extension system after winning that organization's 4-H award for the 24 perfect tomatoes he had entered in competition at the Indiana State Fair. For this accomplishment, he was given the title, "Tomato King."

Nelson headed for Purdue following his graduation from Morristown High School, and there he met, and later married, his wife Sue. Returning to the Nelson farm and canning operation after obtaining his Bachelor of Science degree in general agriculture in 1956, Nelson became the plant manager of Blue River Packing.

The hub of the tomato industry was moving west to California during the late 1950s and, by 1960, the elder Nelson made the painful decision to close the Blue River enterprise. After briefly considering employment options in seed sales and in the food processing industry, young Nelson was drawn back to Purdue to study, he thought, veterinary science. However, soon after arriving on campus, he was offered a paid assistantship in horticulture. He had always been fascinated by the discipline and, he realized, the income would be highly beneficial since he and Sue now had a daughter to support.

Food Science Research

Nelson was appointed a part-time instructor in Purdue's Horticulture Department during the years he studied for his Ph.D. By 1967, he had earned the degree—his dissertation topic was the volatility of flavors in canned tomatoes—and he again considered positions in the food industry, interviewing with several companies in New York, Chicago, and other cities.

On a flight to one of his interviews, Nelson happened to be seated next to Purdue's Dean of the College of Agriculture, Earl Butz (who later served as U.S. Secretary of Agriculture under Presidents Nixon and Ford). Butz advised Nelson to talk to him first before making any final decision about employment in the private sector.

Nelson did just that, and Butz offered him a tenure-track faculty position at Purdue, which ultimately led to a 46-plus-year career at the university.

When he considered what research projects he might work on, Nelson decided to explore ways to improve

tomato processing methods, drawing on his years of experience in his family's canning factory. He knew that any successful methods that could be discovered and implemented to prevent post-harvest spoilage would be a great boon to the food processing industry and the consumer.

Noting that tomatoes were one of the world's most processed food products, Nelson wondered if they could be stored aseptically (pathogen free) in tanks at ambient temperature for a long period of time without becoming contaminated or spoiling. His hope was that, by being able to hold large quantities of the product to a date beyond harvest and then process it at intervals throughout the year into various products (sauces, juices, ketchup, etc.), he could help the tomato industry become less seasonal while maintaining (even enhancing) the nutritional content and flavor of the final product.

In recent years, over 90 percent, or between 20 and 21.6 million tons, of the 22 to 24 million tons of fresh tomatoes harvested globally are aseptically processed and packaged for year-round remanufacture into many different tomato-based food products.

In pursuing his goals, Nelson was able to accomplish what had not been done before: to successfully bring together several crucial aspects of the aseptic processing system—parts of which already existed; parts of which he discovered, designed, or modified during the course of his scientific research —that are used today in aseptic packaging installations across the globe.

From the early days of his research with tomatoes, a unique aspect threading throughout Nelson's career was his working side-by-side with equipment manufacturers in the private sector to design and build the tanks, valves, filters, and flexible bag containers for storing processed food.

Food Science Leader

For his outstanding achievements from 1970 until the present, Nelson has come to be recognized as the leader of modern food science and technology.

In its 1991 assessment of the top ten innovations in food technology, the Institute of Food Technologists (IFT) rated aseptic processing and packaging as Number One, above juice concentrates, safe canning processes, freeze drying and food fortification. Nelson was awarded IFT's prestigious Nicholas Appert Award in 1995 and would go on to serve as IFT president from 2001 - 2002.

As his pioneering technology began to be used in many developing countries, it became evident that, by making possible the economical and safe delivery of nutritious food to the poor and undernourished of the world, Nelson's achievements resulted in significantly increasing the availability and accessibility of food.

Breakthroughs and Technological Advancements

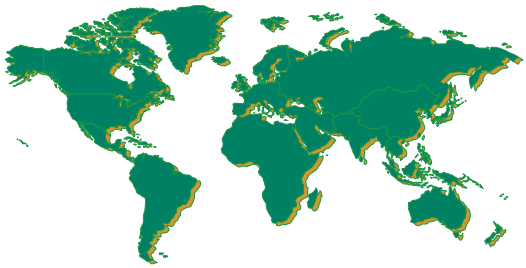
The food science breakthroughs emanating from Nelson's Purdue laboratories and in collaboration with several entrepreneurs and companies in the United States and abroad transformed the vegetable and fruit packing industry from a fresh pack system of putting up product once a year to a remanufacturing industry making a variety of products year round. Specifically in the case of orange juice, bulk aseptic storage and transportation has made possible wide-scale distribution of not-from-concentrate juice.

Nelson's early realization of the importance of eliminating the seasonality of commercial processing and packaging and eliminating post-harvest spoilage buoyed his search for solutions. While transforming the processing industry, his innovative research has also made possible wider choices for consumers, greater stability and shelf-life of food products, and general longevity in the food supply, and has created dramatic and long-range feeding opportunities.

Nelson's unique and revolutionary discoveries include:

- Refining and perfecting the heat sterilization and cooling methods for preserving vegetable or fruit products
- Developing experimental 100 gallon, sterilized carbon steel tanks coated with an epoxy resin for holding the sterilized product at ambient temperature. Later on, tanks ranging in size from 40,000 to over 1 million gallons were manufactured using Nelson's protocols.
- Designing and constructing aseptic valves for the large containers, preventing microorganisms from moving through the valve stem into the sterile system.
- Refining a system for smaller-scale, in-bag storage (1 gallon to 300 gallons), allowing processors to fill multilayer, inexpensive sterile flexible packaging material with aseptically processed products.
- Perfecting a special fitment for the aseptic bags allowing sterile product to be introduced without recontamination. This fitment was evaluated by Nelson as a membrane that is ruptured during the fill, then resealed with a sterilized foil cap.
- Increasing the capacity of bulk bag-in-box technology up to 3,000 gallon capacity for cost-effective shipping of processed food.
- Developing, with a Norwegian ship builder, the installation of aseptic bulk storage systems ranging in size from 1.8 million gallons to 8 million gallons into the hulls of ships for transport of orange juice across the globe.

Global Impact



The aseptic bulk processing and packaging technology pioneered by Nelson can be found in almost every country in the world.

In the 1970s, Nelson was part of a National Academy of Sciences team that traveled to India to study the problem of food spoilage, which at the time affected 50 percent of all the food produced in the country. Meeting with several Indian officials, including then Minister of Agriculture M.S. Swaminathan (who was awarded the first World Food Prize in 1987), Nelson began to explore ways that his technology could be used in developing countries to preserve food for domestic distribution and consumption and for export and sale overseas.

Nelson's research and achievements in aseptic processing technology have benefited developing countries by providing an inexpensive packaging and shipping system for importing and exporting food stuffs. An example is Senegal where, in 1989, a new aseptic processing and packaging operation was developed to process local fruits into juices. This endeavor, at its height, accounted for a U.S. $4 million per year impact to the Senegalese economy (an impact comparable to $7 billion in the U.S. economy).

Humanitarian feeding programs funded by the U.S. Department of Agriculture and managed by Land O'Lakes since 2000 have provided aseptically packaged milk and biscuit products as part of school nutritional programs in the Philippines, Vietnam, Indonesia, Pakistan, and Bangladesh. Because the durable, sterile packaging ensures the delivery of safe and nutritious products to remote regions, loss has been minimized. In 2005 and 2006 in the Philippines, less than .2% of the product was lost.

Potable water packaged in flexible material was transported to Southeast Asia to provide relief after the tsunami hit in 2004 and to the U.S. Gulf Coast in 2005 following Hurricane Katrina. While these applications were not aseptic, the convenience of use and cost-effectiveness of the flexible packaging resulting from Nelson's research was clearly demonstrated to global relief agencies, and developments to expand relief programs to include aseptic water processing, storage and supply are actively being pursued.

Lasting Legacy

In addition to his scientific discoveries, Nelson has also had an enormous impact during his career in educating food scientists. He built one of the largest and most recognized food science departments in the world at Purdue from 1983 to the present. Also, over the past 23 years, thousands of professionals have participated in workshops in aseptic processing developed and led by Nelson at Purdue, and around the country and the world.

During his career, he partnered with several domestic companies to design and develop the novel aseptic equipment and processes critical to holding massive quantities of vegetable and fruit products at ambient temperature for long periods of time. Among those companies were: NAAS Foods of Indiana, Bishopric Products (later called Enerfab Inc.), the Scholle Corporation, and Fran Rica Manufacturing (now part of FMC). With the success of his work over the years, came requests by more than twenty companies worldwide for Nelson to help in finding solutions for their specific needs. These included: TetraPak, PepsiCo/China, Kikkoman's/Japan, Citrosuco/Brazil, and Aleuropa.

Dr. Philip Nelson is a giant and icon of the food world whose discoveries have made major contributions to the availability of nutritious foods worldwide. He is commonly credited for recognizing the untapped potential of aseptic technologies for much larger scale applications. His legacy continues as many of the emerging value-added uses of aseptic processing and storage continue to be applied and adopted worldwide.

Praise for Dr. Philip E. Nelson

"Nelson invented a world-improving technology and educated the world on how to use it."
– *George Sadler, National Center for Food Safety and Technology, Illinois Institute of Technology*

"We could not today, as regulators at USDA and Health & Human Services, deliver the health standard we enjoy globally without his work."
– *Jim Moseley, Former Deputy Secretary - U.S. Department of Agriculture*

"[Nelson's discoveries] have become the predominant method for the preservation of perishable products in Third World countries, and thus was born the 'Aseptic Revolution.'"
– *Charles E. Sizer, Vice President of Research, Universal Food and Beverage Company*

"Nelson has had a monumental impact in improving the way the world stores and transports its food supply."
– *William J. Scholle, President and CEO, Scholle Corporation*

Dr. Philip E. Nelson will be presented the $250,000 World Food Prize on October 18, 2007 at the Iowa State Capitol in Des Moines.

The ceremony will take part during the 2007 Norman E. Borlaug International Symposium, which focuses on "Biofuels & Biofood: The Global Challenges of Emerging Technologies."

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