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NJ Food Industry: Increasing its Slice of the Life Science Pie

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The New Jersey Food Industry: Increasing its Slice of the Life Science Marketplace

BY LOU COOPERHOUSE

The prepared food industry is undergoing rapid technological changes, and is perhaps evolving at a faster pace than any other industry sector. Changes in the marketplace are driving tremendous innovation in this category, resulting in new types of functional ingredients, new forms of packaging, new methods of distribution, and a greater diversity of products than have ever existed before. Consumers today are seeking foods that are convenient, nutritious, easy-to-prepare, fresh, flavorful, visually appealing, portion controlled and, above all, that taste great.

It is said that "perception" drives trial in the food marketplace, in which the objective is to communicate the brand, imagery, freshness, wholesomeness, nutritional content, and sensory stimuli that results in trust and affects the initial purchase of a food product. However, it is also said that it is "reality" that affects the repeat purchase, in which the overall experience and value provided by the food product demonstrates whether this promise has been fulfilled. Surveys have continually shown that taste is the most powerful criterion for repeat purchase.

In the U.S., consumers spend approximately \$1 trillion annually for food, or nearly 10 percent of the Gross Domestic Product, and over 16 million people are employed in the food industry. The era of broad-based products and mass marketing is long gone, and it is estimated that well over 10,000 new products, most of them aimed at specific consumer niches, are introduced each year. These new product introductions represent a very large percentage of annual sales for many firms. It has become increasingly challenging to anticipate changing tastes and demographics; to create products that are better suited to unique marketplace segments than existing foods; and to do this quickly, efficiently, and cost effectively.

New product success requires innovation and differentiation, and the application of a broad array of scientific disciplines. Food technologists must assess the physical, chemical and biological characteristics of food through all phases of its manufacture and processing, from "farm to fork" that starts with the raw material and ends with its final presentation to the consumer. Food science requires an understanding of animal science, plant biology and pathology, nutrition, chemistry, biochemistry, biotechnology, microbiology, math, engineering, and statistics.

The application of food technologies, integrated with culinary expertise, is critical for success in the marketplace. Organizations today require a disciplined process from concept to commercialization, and a solid understanding of these technologies, which effectively become "tools in the toolbox."

Technologies used in food manufacturing include:

- Good agricultural practices including sanitary on-farm harvesting and post-production processes
- Formulation technologies including flavor science; starch technology; and application of bactericidal agents such as acidulants (natural or synthetic), antimicrobial agents (natural ones such as rosemary extract, and synthetic ones such as sodium benzoate, potassium sorbate, sodium nitrite, sodium lactate, nisin, and sodium propionate),

antioxidants, use of competitive microorganisms, or processes that control water activity;

- Packaging technologies that result in microwaveable capabilities; convenient easy-open packages; film materials that affect oxygen transmission rate, light transmission, condensation, and product respiration; modified atmosphere packaging which alters the gas environment within a package; and active and intelligent packaging systems that provide an array of benefits such as the scavenging of oxygen or release of carbon dioxide, or indicators that mimic temperature abuse or the ripening of produce.
- Thermal-processing hurdles, which may include the heating of product either before or after the packaging process, and include techniques such as hot-fill processing and post-packaging pasteurization;
- Non-thermal processing hurdles, such as ultra high pressure processing, irradiation, and pulsed light and pulsed electric fields processing;
- The application of a quality assurance and food safety system, including HACCP (Hazard Analysis and Critical Control Point) which assesses all aspects of the food process, define the locations at which potential hazards (microbial, chemical, and physical) may occur, and establish a means of monitoring these points to eliminate these hazards;

Industry surveys reveal that the great majority of projected growth over the coming years will be in "wellness" products that demonstrate a linkage between diet and disease, diet and health, and diet and mood. Consumers are increasingly nutrition-literate, and are demanding such products that are low-carb, low-fat, low-calorie, low glycemic index, or are associated with an improvement in their lifestyle in a number of ways. Because of growing concern about obesity levels and greater public interest in health, we are now seeing explosive growth in the beverage category, for example, including bottled water, fruit drinks and functional beverages. In fact, bottled water, which is now being introduced with a wide array of functional attributes, is expected to overtake carbonated soft drinks in sales over the next three years.

Entire new categories of foods have been created in recent years, which have been driven by new technologies developed to meet consumer needs. This includes the fresh-cut produce sector, which is now a \$15 billion segment, recognized as the fastest growing category today but one that did not even exist just 20 years ago. Consumer interest in convenience and health led to the development of this category, but this market would not have been able to develop at all if it were not for tremendous innovations that occurred in packaging technology. Technologies have now been developed that allow for an extended product shelf life, which enables regional and national distribution, and an economic model that has resulted in new avenues for profitability for the nation's agricultural sector.

Despite the huge growth opportunities that exist in the food industry, serious outbreaks of food borne disease are continually occurring and are

being documented on every continent, illustrating both the public health and social significance of these diseases. The integration and consolidation of food industries, and the globalization of the food trade, are changing the patterns of food production and distribution and are further exacerbating the significance of food borne disease outbreaks worldwide. Regulatory authorities in North America, Europe and elsewhere are continually increasing the breadth and depth of their food safety surveillance, and at the same time developing more sensitive microbiological testing methodologies while tightening their standards, which is dramatically heightening the concern of industries throughout the agricultural and food chain worldwide. The Center for Disease Control and Prevention (CDC) estimates that 76 million people become sick, 325,000 people are hospitalized, and 5,000 people die from food borne illness in the US each year. CDC also estimates that the annual cost of food borne illness in the United States each year is between \$7.7 billion and \$23 billion.

Refrigerated prepared foods are typically found in the perimeter of the supermarket, and frequently provide the highest profit margin for both manufacturers and retailers alike. However, these refrigerated foods are perishable, and are inherently not as safe as frozen and shelf stable grocery products, so represent the types of foods that lead to a number of food industry recalls in the US every year. Bacteria such as *Listeria monocytogenes*, *Escherichia coli* O157:H7, *Campylobacter*, and *Salmonella* are the leading causes of food borne disease in the world, and can cause serious illness and death. The nationwide recall of fresh spinach that occurred in September 2006 is an excellent example of the magnitude of a food safety outbreak. Unfortunately, there is no "magic bullet," or singular

technology, to assure product safety for the broad spectrum of refrigerated products that exist, and refrigeration alone cannot be guaranteed to control microbial growth, as temperature abuse can occur throughout the product's cold chain from "farm to fork". "Hurdle technologies" can provide incremental levels of quality and safety assurance, and can be incorporated via superior agricultural practices, and procedures and processes in product formulation, packaging, processing, distribution, and merchandising.

Future foods will provide a level of "personalization" and customization that has not been available before, and will prove to be synergistic with other available health therapies such as those provided by the pharmaceutical sector. Foods targeted for health promotion, physical performance, and disease prevention and management, will result from new advances in food technology. The combination of genomic sequencing and nanotechnology research will ultimately generate new nutrition delivery systems, and bring active functional and nutraceutical agents more precisely and efficiently to the wanted parts of the human body.

Food organizations today must be flexible, nimble, and cross-functional in their skills and teams. In addition, they must partner with organizations and universities to best understand consumer trends and technology advances that are occurring worldwide, in order to be successful in today's rapidly evolving marketplace.

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