

# Functional Foods: Keys to Success

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By Peter Leighton

Early humans relied on calories for survival. From foraging to hunting, man's diet was extremely diverse and relatively unpredictable. We ate from hundreds of crops and wild animals, offering exceptional biodiversity in our diet, and our bodies adapted to the inconsistent intake of nutrients with an amazing ability to maximize their efficiency. Soon man was domesticating animals and mastering agricultural practices that resulted in incredible benefits in health and mortality, as well as facilitating changes in lifestyle. In a relative short order, man was eating for taste and satiety as our modern agricultural and food practices were born.

Post-industrial agricultural and food processing has removed phytonutrients heretofore thought "inactive" or useless. These compounds are routinely removed from plants through selective breeding and modern processing. Furthermore, we used to eat from over 800 plant foods; now most Americans eat only three, namely French fries, ketchup and iceberg lettuce. Modern practices are also introducing many chemicals to the plants and animals we eat, in efforts to increase yield and profitability. Studies are starting to demonstrate a relationship between our (Western) diet and chronic diseases.

This is one of the key reasons why functional foods are meeting high consumer demand; these products can target the nutritional needs created by our changing diet and lifestyles, integrating a variety of healthful or nutritious components. What's more, functional foods are often experiential and convenient, providing a perfect storm that is driving double-digit growth. I will look at the functional foods market, consumer interests, innovative bioactives, formulation issues and some insights for success. But first let's outline the root of the problem.

## **It starts in the field**

Our agricultural processes have been affecting us in many ways. Today's scientifically bred produce grows so quickly that it contains measurably fewer micronutrients. Research done at the University of Texas at Austin concluded that recently grown crops have shown decreases of up to 38 percent in protein,

calcium, vitamin C, phosphorus, iron and riboflavin when compared with produce from past decades. Of the 13 major nutrients found in fruits and vegetables, six have declined substantially.



Our post-industrial agricultural and food processing industry has devoted decades of work to removing certain phytonutrients heretofore thought “inactive” or useless. Most plants produce a host of phytochemicals to perform varying metabolic functions such as coloring agents known as flavonoids to protect against

excessive sunlight and other stresses, and Sulforaphane (an astringent in broccoli) to discourage the plant from being eaten by animals. These compounds are routinely removed from plants through selective breeding and modern processing.

Yet modern science is now discovering tremendous value to these “orphaned phytonutrients”. As sensitive and specific biotechnology and pharmaceutical R&D tools are being applied to nutrition science, more and greater data is confirming the health benefits of these compounds, and epidemiological studies are linking their depletion from the food chain to increases in chronic diseases. For example, the sulforaphane that has been selectively bred out of commercial broccoli because of its bitter taste has been found to stimulate enzymes in the body that detoxify chemical carcinogens. Similarly, while there are hundreds of flavonoids, science has been uncovering a host of exceptional health benefits they confer, most significantly their cardiovascular benefit.

Both scientists and consumers are now recognizing this problem and are moving to take an active role in maintaining health & wellness through nutrition. Integrating the new tools of biotechnology and nutrigenomics, for instance, innovative solutions are being created and applied to a new generation of “wellness” foods. Consumers want lifestyle solutions, where validated science and functional benefit meets pleasure and convenience.

### **Consumers don’t want to eat from their medicine cabinet**

As an outgrowth of the nutrition industry, many companies have been working hard to aggregate nutrition, taste, convenience and targeted functionality into food and beverage products. While these so called “functional foods” are not a new class of products, because of their tremendous popularity we have created this moniker to distinguish them from conventional or processed foods. While helpful to distinguish these products, this unofficial designation presents other problems I will outline later.

While we can debate what products are “functional foods”, the U.S. market for functional foods is greater than \$30 billion in sales a year — about 5 percent of the total U.S. food market, and it’s growing at up to 10 percent per year, far more than the 1 to 4 percent forecast for the conventional food market. The U.S. functional foods market is predicted to be worth around \$43 billion by 2013.

Consumers are finding functional foods attractive for a host of reasons. Most consumers are more proactive about their health, especially baby boomers that are witnessing the health issues of their parents and vainly refuse to succumb to the demise of aging. Many are recognizing the need for reintroducing the many “lost” nutrients that are proving to be beneficial for optimal health. Advances in food science have helped bring a far superior taste and mouth-feel to the integration of some otherwise nasty tasting bioactive ingredients. And while consumers have accepted the need for vitamin supplementation, 55% would prefer to buy foods for nutritional benefits than supplements. But as I will cover later in this article, to be successful in marketing functional foods one must remember that science tells and emotion sells. In other words, successful functional foods are based in science but purchased for taste and convenience; they are not medicines.

# Types of Functional Foods

There are three general types of functional foods & beverages with high marketability.

		
<b>Inherently Healthy</b>	<b>Bioactive Added</b>	<b>Engineered</b>
Contains or made from a beneficial bioactive ingredient.	Fortified with a beneficial bioactive ingredient.	Formulated to provide a specific benefit through bioactive ingredients.

## **What are functional foods?**

There are three different types of functional foods. First, there are those products that are inherently healthy. This includes products that do not add any bioactives, but intrinsically contain nutritional compounds that have scientific data to support functionality. For instance, Welch's grape juice sales increased 33% following the release of clinical data supporting antioxidant activity and cardiovascular benefits; Gardenburger sales increased 25% in the two months following FDA approved health claims for soy; Cranberry juice sales increased 20% after the results of a 1994 Harvard study demonstrating health benefits; and General Mill's Cheerios sales jumped 11% after being marketed for heart health benefit.

The second category of functional foods is those that add a researched bioactive compound to provide a health benefit. The classic example here is Tropicana Pure Premium orange juice, which reformulated its line with added calcium fortification, growing sales 173% and building a new category. This category of functional foods addressed the reintroduction of orphaned phytonutrients that provide a validated functional benefit as discussed previously.

Finally, engineered functional foods are those formulated specifically to deliver a desired functional benefit. Whether you knock back a Red Bull for an energy lift, a PowerBar for sports performance benefit or a Gatorade to replenish electrolytes, these products are based upon scientific research to deliver to the consumer a desired benefit.

Functional Foods are not a panacea and are certainly a product category bound to be "abused", just as dietary supplements have been. What do I mean by abused? In controlled dosing, such as pills, one can specify the amount of certain bioactive compounds such as vitamin A. But when these compounds are in a food product, it is a bit more difficult to manage the dosing, especially when a good tasting snack product is involved. Maybe one just wasn't enough and soon the consumer is doubling or tripling the amount of vitamin A, possibly reaching a potentially toxic level. Remember General Mill's Cheerios? Well the FDA recently claimed that Cheerios were being marketed as a drug, since the company promoted cholesterol reduction of 4% in 6 weeks.

Another valid concern is the encouragement of additional caloric intake. Functional foods "delude people into thinking that [they] are healthy," says author and New York University food scientist Marion Nestle. And many of the foods marketed as functional are not particularly "healthy", aside from the bioactives involved.

Considering that over half of households are using food or beverages to treat or manage specific health issues, it is important to recognize the burden that must be carried by companies marketing these products. If consumers are eating

medicine like its food, they will get too much of a good thing. And the consumption of additional calories simply feeds a real health pandemic: obesity. So it is very important that manufacturers think very carefully about what they are formulating and how they are marketing these functional food products. The key take away is this: functional food success will be defined by *wellness*, not disease treatment.

### **The FDA is in play**

The FDA has recently been “raising questions” as to whether certain functional beverages are now legal or not. The U.S. Food & Drug Administration has recently announced new guidance (see 21 CFR 10.115(g)(5)) related to the difference between liquid dietary supplements and beverages bearing novel ingredients.



According to the FDA, “We have seen an increase in the marketing of beverages as dietary supplements, in spite of the fact that the packaging and labeling of many liquid products represent the products as conventional foods. Products that are represented as conventional

foods do not meet the statutory definition of a dietary supplement...”

The FDA further explains, “Liquid products that suggest through their serving size, packaging, or recommended daily intake that they are intended to be consumed in amounts that provide all or a significant part of the entire daily drinking fluid intake of an average person in the US, are represented as beverages.” Such products, the FDA said, “may not be marketed as a dietary supplement.”

I suspect that this line of thinking on behalf of the FDA is not limited to beverages, but may soon bear witness to a functional food. This issue will likely remain as a thorn until such time that it is properly challenged in court, but it demonstrates the need to pick your battles carefully and act responsibly.

### **Consumers want wellness**

80% of Americans say they consume or are interested in consuming functional foods & beverages. A 2009 research report from Pricewaterhouse Coopers illustrates that even in a weak economy people will pay a premium for products seen as preventing a health problem or providing a good alternative to sodas and empty-calorie snacks.

In aggregating and analyzing the data on functional food products and consumer research surveys, one thing becomes apparent. Consumer interest in functional foods is related to their “health halo”— their scientific support or experiential effect in maximizing health, performance and perceived wellness. These products fail miserably when marketed or consumed as therapeutic products. The largest functional food categories are ones that are not considered therapeutic, but rather preventative/wellness. 69% of Americans are pursuing a preventative lifestyle vs. 27% who are trying to treat a health concern. Consumers are looking for tasty, convenient and “healthful” options to “traditional” foods and beverages. They will not sacrifice taste, but prefer products that will enhance their wellbeing.

### **Formulating success**

There are a host of formulation issues to consider when developing functional foods, some unique to the nature of functional foods and other issues that challenge most any food technologist. For instance, I have noted that many of the bioactive phytonutrients that are demonstrating significant benefit are also often very bitter and distasteful. Many of these bioactives have clinical data supporting benefit at certain dosage levels, quite often at levels, which limit the delivery forms and make for challenges in achieving great taste. Survivability and bioavailability are important considerations, especially when making any kind of claim or “structure/function” statement. And there is always the issue of costing; while many functional foods can demand a slight premium in price, there are limits and relationships to perceived benefits.

Typically there are two approaches to formulating functional foods; bottom up and top down. Bottom up refers to the application of a new technology or bioactive into a product form. In general this approach is platform driven such as how many ways can we deliver probiotics. Top down formulating is driven by the desire to address a consumer need. This approach may utilize probiotics to address better immune function in children, for instance.

Some bottom up trends to watch:

#### **Fiber**

According to the American Dietetic Association, most adults consume only 14-15 grams of fiber per day, significantly less than the RDI of 38 grams. In 2007, General Mills expanded its Fiber One brand to include nutrition bars. These “functional” bars racked up first year sales in excess of \$100 million. Most consumers recognize the need for fiber, have a tough time consuming enough in their diet, and associate it with weight loss and better digestive health.

#### **Omega-3**

Linked to lower blood pressure, a reduced risk of heart disease, a decrease in arthritic symptoms, and benefits for pregnancy, post-partum, and infant health, Omega-3 EFA's will continue to build steam.

### **Plant sterols**

Research has linked plant sterols to lowering cholesterol, reducing the risk of certain cancers, and they are also thought to have menopausal benefits. While the early entrants to the market have anchored strongly to therapeutic positions, this class of bioactive has tremendous potential.

### **Peptides**

More and more research is demonstrating a host of benefits to various peptides. Some are focused on reducing anxiety while others are lowering blood pressure.

### **Probiotics**

One of the largest segments of the functional foods market, probiotics continues to show impressive growth and flexibility. Probiotics are thought to improve lactose tolerance, reduce diarrhea, enhance immunity, prevent colon cancer, improve IBS symptoms, and lower blood pressure.

### **Nanotechnology**

Advances in nanotechnology are driving discovery of new compounds and carriers that overcome some of the other challenges facing food technologists. Furthermore, as research continues to evolve in this area, we are learning more about this tool for receptor activity and

### **Phyto-specifics**

Advances in research and technology are identifying and characterizing specific botanical compounds that have exceptional (and often specific) benefits. These include classes of compounds such as polyphenols and catechins, and very specific fractions.

Some top down trends to watch:

### **Beauty from within**

The baby boomers vanity is proving to be a compelling driver for products that can help mitigate aging and enhance perceived beauty. This will be a very robust category as it is only now in its infancy.

### **Mood Food**

A 2006 study suggested that dietary changes may be responsible for the increased diagnosis rate of mental illnesses. 35% strongly believe that foods can be used to improve mental health. Look for increased desire in functional foods that can positively alter mood and reduce stress and anxiety.

### **Sleep**

Related to anxiety, sleep is a major issue that consumers will look towards foods for help. 64% of the population suffer from sleep problems several times a week, and this number is growing at over 13% per year.

### **Digestive health**

Both acute and chronic digestive issues are a major concern, and one that consumers are readily open to self-modulate. The global market for just probiotics is greater than \$16 billion.

### **Immune system**

Globally, immune support is the biggest parental health concern and will continue to grow and sub-segment.

### **Cognitive**

Half of 50–64 year olds are very concerned about lack of mental sharpness versus 43% of the total population. As boomers age, they are looking to keep their mental edge, and younger, competitive consumers are eager for a performance enhancer.

### **Libido**

Speaking of performance enhancement, this segment will continue to be on fire. Consumers are paying upwards of \$10 per dose to enhance their sexual experience.

### **Phytonutrition**

A World Health Report attributes at least 2.7 million deaths a year to insufficient fruit and vegetable intake linked to cardiovascular disease, stroke, type 2 diabetes, some cancers and obesity. According to the US Council on Nutrition, 91% of Americans don't get the minimum 5 servings of fruits and vegetables per day.

### **Weight management**

The U.S. population spends \$30 billion a year on self-care products for obesity. There are several distinct sub-segments in the weight management category, and satiety is currently a very strong growth sector.

### **Energy**

35 million people have concerns about their energy levels. One need only look at the meteoric sales of energy drinks and shots to see the consumer need, yet I believe this category will draw new blood through sub-segmentation and alternative mechanisms of action.

### **Joint health**

80 million people suffer joint pain and the expansion from supplements into functional foods is just taking root. Combined with an aging population and you can see why this category will continue to grow.

Another way to address the top down market is through market segments:

### **Kids**

90% of parents said they try to ensure their children have a nutritious, balanced diet, but that they find it difficult to find healthy products with “child-appeal.” According to the National Institute of Arthritis and Musculoskeletal and Skin Diseases, up to 90% of peak bone mass is acquired by age 18 in girls and age 20 in boys, which makes youth the best time to “invest” in your bone health. As a result there is an opportunity to target children with bone fortifying products via concerned parents. The number of kids under age 6 is projected to grow 10% by 2015

### **Seniors**

As 31 million Americans turn age 65 over the next 10 years, the demand for condition specific foods will grow. 53% of adults are controlling their diet in some manner—61% for weight, 36% cholesterol, 22% blood sugar, 18% high blood pressure, and 14% diabetes. Seniors have special needs and functional foods can well address them. Many seniors already take a significant number of medications, and functional foods can offer nutritive support to balance pharmaceutical depletion without more pills.

### **Diabetics**

The number of people living with diabetes worldwide is expected to double from the current 140 million to 300 million by 2025. According to the American Society of Nuclear Cardiology, one in four people suffering from Type II diabetes also has heart disease but shows no obvious signs of the disease. A new generation of children suffering from type 2 diabetes will further drive functional food opportunities.

### **Menopausal women**

47 million women are either menopausal or peri-menopausal, and nearly one-third of the U.S. female population. Menopause brings greater risk for heart attacks, stroke, bone fractures, obesity, depression/mood issues, insomnia, periodontal disease, and eye problems.

### **Insights for success**

While I have addressed some important issues related to successful formulation and marketing of functional foods, I can summarize four rules that are critical and should be carefully considered.

1. Provide a benefit that is appreciated and understood. As I noted earlier, *science tells and emotion sells*. Use strong and appropriate scientific research to identify, characterize and support your functional food product, but stay away from any kind of therapeutic message. Don't overcomplicate the product and work within the confines of existing consumer perceptions. It is hard for people to make quantum leaps; they are much better at incremental steps up the knowledge tree. I am not suggesting that you "dumb it down", rather give it context.
2. Consumers eat to enjoy, everything else is secondary. A product must be experiential (whether by taste or use), intuitive (in how to use or how it works), safe and validated.
3. Use appropriate validation. Everything must be validated, whether you realize it or not. There are three types of validation: First person validation is when you try something and it meets your expectations. Second party validation is when you rely on an expert, whether your cousin the computer geek or Consumer Reports, or even your favorite celebrity, to provide a recommendation or validation. Third party validation is a regulatory or institutional seal of approval. The more therapeutic a product or greater the risk of use, the more reliant you must be on third party validation.

4. Deliver a wellness solution, not a medicine. I have already discussed this issue but it is an important one. Besides the fact that the FDA and FTC are itching for a showdown, time and again the market has shown disfavor for functional foods trying to market themselves as therapeutics. To use CVD as an example, it is so much easier and validated to take a statin than to make a dietary sacrifice and “hope” that it’s having an impact.

In closing I would offer encouraging words to responsible marketers of functional foods. The market is offering a myriad of converging trends that all promise strong growth and unlimited potential. The limiting factors are regulatory ignorance, marketing incompetence or ethical impunity.