
Mr. Broderick: Harry Fields, President of IFF Flavors, the World Wide Flavor Division of International Flavors and Fragrances, has had a 32 year

career with IFF that has included worldwide executive assignments on almost all aspects of the flavor and fragrance business.

Future Market Requirements of Flavors

By Harry Fields
President, Flavors
International Flavors & Fragrances, Inc.

Perhaps I should start by acknowledging the great deal of speculation expended on this subject by others. Some prognosticators deal in numbers. For example, Predicasts, Inc. has forecast an increase in flavoring agents in the U.S. from 52.8 million lbs in 1978 to 98 million lbs in 1990. I know of no complete estimate for the rest of the world. Other prophets have predicted various trends, some of them contradictory. It seems to me that a reexamination of the underlying basics may be in order.

Let us begin with the demographics. There appears to be virtually no disagreement that the flavors of the future will depend on the state of science and technology, the safety and health issue, and most importantly on what we shall eat and drink. The latter will in turn be heavily influenced by the projected growth of the world's population from four and a half to nearly seven billion over the next two decades. Just to stay even, which infers no chance to wipe out hunger in the world, we must therefore increase our primary food production in the same time period by more than 50%. This is no easy task.

To make matters worse, Conference Board, Inc. in a study called "Food and Population; The Next Crisis," concludes that the total world supply of arable land, which is now around 3¼ billion hectares, will shrink by an estimated 18% by the year 2000 and is projected to diminish sharply thereafter. We are on a collision course, even if we succeed in substantially increasing yields. This often overlooked point bears constant repetition.

The ever larger demand for agriculture products, coupled with a decrease in arable land, will put a stress on certain agricultural foods, especially those less essential for sustaining life. The first to feel the pinch are those products without perceived nutritional value, consumed only for their flavor properties, such as berries, cocoa, onions, garlic, spices, and vanilla. Some time thereafter will follow foods such as cheese, tree nuts, and citrus products, that do

have nutritional value, but in reality are consumed for their flavor impact. Their product will yield to more nutritionally efficient crops and the flavor industry will be called upon to supplement the reduced natural supply with high quality artificial flavors.

What about the low yield foods, of which animal protein is the main example? We at IFF have been saying all along that the replacement with vegetable protein of a significant part of animal protein is inevitable in the long run. Just consider that to produce one million calories requires, according to Dr. Fredrick Stare, 0.15 acres of land in the case of sugar; 0.44 for potatoes; 0.9 for corn; 1.2 for wheat; 2.8 for milk; 9.3 for chickens; and 17 acres for steers. The protein comparison is equally dramatic. Dr. Aron Altschul reports in the book *New Protein Foods* that one acre of land can grow enough soybeans to provide 2,224 days of man's protein requirements, versus only 77 days for beef cattle. In comparison, wheat flour yields 887 days, rice 772, milk 236, etc.

The handwriting is on the wall—and soy will be a major beneficiary. The poor quality texturized vegetable protein (TVP)-containing foods that were introduced with too much impatience some years ago are hopefully now forgotten. People will accept products if they are good value, nutritious, and palatable. Such foods are currently beginning to appear. The inclusion of soy in the school lunch program has, by and large, been effective and is getting a generation of kids accustomed. The U.S. Army is doing its share by allowing TVP in ground beef. Vegetable proteins reduce the cost of foods and fit the dietary goals by allowing a reduction in animal fat. As the use of TVP becomes widespread, and levels increase, our industry will be called upon to supply major quantities of meat and poultry flavors.

The world has to somehow enlarge its agricultural supply. One indispensable approach is to accelerate the breeding of new, high-yielding hybrid plants. Genetic engineering may lead to the transformation of a

The Future of Flavoring Ingredients

plant that is not presently capable of fixing nitrogen into a nitrogen-fixing plant. This will not only increase yields, but also save on fertilizer—and therefore energy. We can, however, be certain that little or no attention will be paid to the flavor of these new plants. The same applies to the fruits and vegetables bred for mechanical harvesting. I suggest that we shall have to develop flavors to add to these new high-yielding plants—in effect to help Mother Nature. One such example is an IFF flavor for irradiated rices.

The health factor and its relationship to the foods we eat will have a major impact on the flavor market. At present, people are preoccupied with food additives and artificial flavors. Within the next five to ten years, this will have been fully explored and the “nature is good” syndrome will have passed.

The concept of risk versus benefit is beginning to take hold. Responsible investigators are now looking at all the food we eat and its relationship to disease and health, rather than only at individual ingredients. We see much activity here. The National Cancer Institute, for the first time, has issued diet recommendations for the general public. Recently the Secretary of Agriculture and the Surgeon General, acting within the context of the 1977 dietary goals established by the Senate Select Committee on Health and Nutrition, announced a national dietary policy. It calls, among other things, for less sugar, less sodium, less fat, and more fiber and complex carbohydrates. We should not underestimate the impact of this action. We appear to be heading for dietary changes by regulatory prodding and fiat. In this vein, the Department of Agriculture is now urging the removal of candy machines from schools with government supported school lunch programs. Nutrition as defined by the government will have to lead to unconventional new foods. Many foods on the supermarket shelves in ten to fifteen years would not be recognized today. The government, of course, could conceivably change course if the minority of disbelievers in the current dietary direction should prevail, but this does not now appear likely. These unconventional new health foods, developed through direct or indirect

government dictum, will open up new flavor horizons—with probable emphasis on unconventionally produced flavors.

The energy consumed in the preparation of meals cannot be left out of this discussion. For example, microwave cooking is significantly less energy intensive than gas or electricity. It is, however, generally agreed that microwave cooking leads to less flavor development in situ than is the case with conventionally cooked meals. The standard TV dinner was simply not made for microwave cooking. New meals, with the help of flavor additions, will have to be developed to stimulate more widespread microwave use in the home, or such other energy-saving cooking devices that may come along for the kitchen.

Our industry will be inducted into the fight against inflation, helping to provide acceptable alternatives to high priced commodities and bringing inexpensive but high value nutrition to a broad segment of the consuming public. Many of us have done sufficient homework here to be effective quickly. There are other helpful forces at work. In the United States, for example, soft drink consumption has increased in 1978 to 37 gallons per capita and is projected to rise to 50 gallons in 1990 and 75 gallons by the year 2000. All this is mainly at the expense of milk and coffee and partly a result of the deteriorating palatability of tap water. Similar patterns are unfolding in other countries. A substantial part of future beverages will be in powder form, not only as a freight, cost and shelfspace saving measure, but also to protect the environment from bottle and can pollution.

Sociological changes abound that benefit the flavor industry. New life styles, the great attraction of ethnic foods, the growth of the food service industries, the move to the sunbelt, greater life expectancy, the diet craze, and the fitness kick—all of these and other phenomena create unique opportunities for us.

I am confident that food technology innovators will meet the food and beverage requirements of the future. In turn, flavorists will be called upon to deliver high quality flavor impact, despite probably hostile processing conditions, incompatible ingredients, and novel packaging. You will accomplish this with the backup of basic flavor science, whose contribution the three distinguished flavor scientists among the speakers at this symposium are better qualified to explain than I.

But from my vantage point, I see ever more flavor ingredients manufactured by enzymolysis and fermentation; new chemicals whose flavor and safety properties are predicted by computer analysis of their structure; perhaps even chemicals made by genetically engineered microorganisms; new techniques for drying liquids; advances in precursor flavor chemistry; and new solutions to flavor stability. Very little will be commercialized without the flavorist's specialized input and adaptation to the palate. This expertise is indispensable. The creative flavorist is in charge of making foods and beverages pass the sensory barrier of the mouth. The final flavor will carry your signature.

Steve Shymon, Colgate, with
Gene Buday, Reynaud South

Schlomo Reiss, Ungerer, with
George Ivolin, Ivolin Enterprises

David C. Juelg, Schenley Distillers, with
Morris Glazer, Penick Corporation

Earl Merwin, McCormick; and
Jerry DiGenova, Givaudan; with Ira Litman, Globe