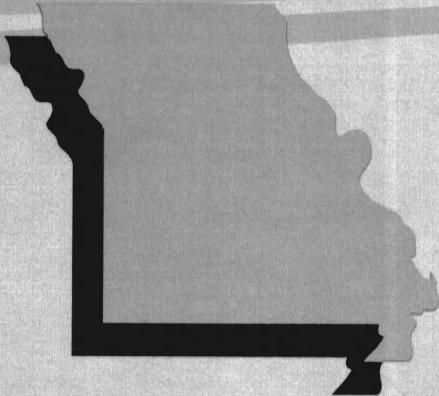


Missouri's Food Processing Industry



**Perspectives on
Agriculture, Food and
Natural Resources**

Missouri Agricultural Experiment Station Special Report 491

Perspectives on Agriculture, Food and Natural Resources

This special report is one of a series (listed below) prepared for a project of the Missouri Agricultural Experiment Station (AES).

The project, called "Perspectives on Agriculture, Food and Natural Resources," was designed to identify and describe trends in Missouri Agriculture and Rural Missouri and to assess the implications of changes that are occurring. A purpose was to assist the AES in establishing priorities and planning programs.

These reports provide background information on the future economic, social, political and technical environment for agriculture. A second series of reports, now being developed, examines the challenges and opportunities facing selected industries and identifies some of the research needed to help Missouri agriculture achieve its potential.

LIST OF PUBLICATIONS:

- SR486 The Social and Economic Organization of Missouri Agriculture, 1964–1992
- SR487 The State of Rural Missouri
- SR488 The Status and Potential of Missouri Agriculture
- SR489 Selected Characteristics of the Missouri Horticulture Industry
- SR490 The Status of Selected Natural Resources in Missouri
- SR491 Missouri's Food Processing Industry
- SR492 10-Year Agricultural Outlook
- SR493 Comparative Funding of the Missouri Agricultural Experiment Station

Missouri's Food Processing Industry

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Introduction

Food processing represents the nation's largest manufacturing sector. As recorded by the 1987 census there were 16,000 manufacturers of food products in the United States. The total value of goods produced by these manufacturers was \$400 billion in 1991, representing \$141 billion in value added.

Food and kindred product manufacturing was estimated to be \$12.7 billion, representing about 6.5 percent of the total Missouri economic activity in the years from 1982 to 1991. About 600 facilities employed nearly 50,000 people in 1991. Food processing represents the fourth largest industry when measured by number of processing facilities, the second largest industry after transportation when measured by total number of employees.

Consumers

Studies of consumer trends suggest that the modern consumer is motivated by convenience more than ever before. There is a continued trend toward eating food prepared away from home. An interesting development in this area has been the proliferation of grocery store delicatessens. Here food is prepared outside the home to be consumed at home.

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Nutritional characteristics of foods also are important to many consumers, particularly those with more disposable income. Nutritionally “correct” foods, such as low- or no-fat products, reduced sugar and salt, and “natural” ingredients have dominated the new product introductions in the past several years. On the other hand, “indulgence” foods such as premium ice cream and speciality chocolates are also popular.

While it is too early to determine if there will be a lasting effect on consumer behavior, recent incidents involving food safety, such as the controversy over the use of Alar on apples or the death of children in the Northwest from meat-borne *Escherichia coli*, may influence the types of food products demanded by consumers. There is some evidence that these events have caused at least a transient change in food consumption patterns in the United States. In a recent survey of Missouri consumers, food safety and biotechnology were considered to be very important issues by those surveyed. The proliferation of “deli” operations may have significant impact on food safety in the future.

Regulations

Driven in part by a greater understanding of the role of diet in disease, the single largest change in U.S. food law occurred in 1990 with the passage of the Nutritional Labeling and Education Act. In theory, the increased information about the nutritional characteristics of foods would create a demand for more nutritionally correct products. The legislation took effect in 1993, so there is little evidence to support or disprove this hypothesis.

The food safety incidents of recent years have resulted in several proposed changes in legislation. Various regulations related to the use of pesticides have been proposed, many spurred by the publication of the National Institutes of Health report *Pesticides in the Diet of Infants and Children*. The “MegaReg” proposed by the U.S. Department of Agriculture in 1995 would change almost every aspect of meat processing. At this time the status of the proposed regulation is uncertain.

Technology

Technological advances in food science in the past several years reflect a response to perceived consumer demands. More exotic flavors, more natural ingredients and less invasive technologies are just some of the recent changes in the field. Modified-atmosphere packaging and supercritical fluid extraction techniques are examples of this type of technical advance.

Processing technologies to reduce energy and labor costs have also been important. Extrusion cooking can decrease these costs and create the novel products many consumers demand. Much of the growth in snack foods is related to advances in this technology.

Recently there has been a strong push to improve the safety of processing operations. Renewed interest in the irradiation of meats (and expansion of the regulation to include new products), the application of post-harvest carcass washing procedures and an exploration of new food preservation additives are noticeable in the current industry climate.

Interesting trends in food processing activity can be seen by comparing data from 1982, 1985 and 1991. If 1982 is taken as the base year, overall sales in this industrial sector increased by almost 40 percent during this period, while employment decreased by almost 8 percent.

Industry Overview

Economic Summary

Among the 50 states, Missouri ranked twelfth in food processing in 1982 and leads the nation in the production of frozen specialties. In addition, Missouri ranked third in the production of processed cheese, fourth in beer, fifth in wheat flour, ninth in natural cheese, and tenth in bottled soft drinks (1982). More recently, new meat and poultry processing plants and several other food industries were established.

The value of exports (food sent out of the state to other states and abroad) has increased from 14 percent of total export activity to 16.1 percent from 1982 to 1991. Exports were worth a little more than \$10 billion in 1991. This increase was due in large part to the substantial increase in the production of food for companion animals during this period.

While difficult to quantitate because of their small size, transient nature and lack of regulatory requirements, “cottage” industries have proliferated in the state. Policies of Missouri state agencies, such as the Departments of Agriculture and Economic Development, as well as various activities of University Extension, have helped fuel this increase in economic activity. Undoubtedly these activities do not represent a large portion of the total economic activity. Nevertheless they are an important source of income to an increasing number of individuals.

Employment Summary

Food processing is a relatively large industry in Missouri. When compared by standard industrial classification codes, food processing facilities were the fourth largest group of manufacturing sites (592 locations). These processors employed 51,682 people, about 2 percent of the total work force. There were on average 87 workers at each facility in 1994.

Geographical Distribution

The largest concentration of processing facilities is found in the St. Louis area (151 sites). Missouri production sites employed a total of slightly less than 20,000 people in 1994. In southwestern Missouri, a few large processing plants employ many individuals. Kansas City, St. Joseph and central Missouri also have relatively heavy concentrations of processing facilities.

Food processing facilities are well distributed in the state with areas of concentration near the major metropolitan areas of Kansas City and St. Louis.

Specific Industries

Meat, Poultry and Their Products

There are slightly more than 250 food processing facilities (36% of total food manufacturing operations) creating meat products in the state of Missouri. The vast majority of these are very small (77% have fewer than 10 employees). About 140 different plants are involved in the production of sausage and other further processed meats. In contrast, there are many fewer poultry and egg processing facilities, but most of them (32%) are large sites employing more than 500 people. Many of the poultry plants are owned by companies whose names are familiar to consumers, such as Butterball Turkey Company of Carthage, Hudson Foods Incorporated of Noel and Springfield, and Tyson Foods located in Monett and Neosho.

The export activity of meat and poultry processors was about \$1,400 million in 1991; a 143 percent increase from 1982. The export value of fresh red meat decreased during this period, while the value of poultry products increased nearly 500 percent. Employment also increased by about 40 percent, with declines in the fresh red meat processing industry and more dramatic increases in the poultry processing sector.

Meat and poultry processing provided about \$2 billion of industrial output in 1991 and represented \$369 million in added value.

Dairy Products

The dairy industry, including butter, cheese, processed milk and ice cream, has many fewer facilities (9% of total) than the red meat processing sector. Most of these facilities are intermediate in size. However, Kraft General Foods, Springfield; MidAmerica Dairymen, Springfield; Pevely Dairy, St. Louis; Schreiber Foods Incorporated, Carthage, and Schnucks Markets, St. Louis all have facilities employing more than 500 employees.

Overall economic activity in this area is unimpressive. Export values in 1991 were \$1.2 billion, an increase of 35 percent from 1982. Employment declined by about 7 percent over the same period.

By almost every measure, economic activity related to butter and fluid milk production has decreased in the past decade. On the other hand, activity associated with condensed and evaporated milk and milk products has increased (export value increased 468 percent, employment increased 164 percent to slightly fewer than 1,500 people, \$163 million in added value in 1991).

Fruit and Vegetable Products

There are about 44 companies producing various types of processed horticultural commodities. These include canned, pickled, dehydrated and frozen products. As with red meat processors, most of these are small facilities (45.4% with fewer than 25 employees). The largest operations in the state are operated by ConAgra Frozen Foods Corporation, Marshall; Durkee-French Ingredients Company, Springfield; Fairmont/Zarda (a division of MidAmerica Dairy-men, Incorporated), Kansas City; Gilster-Mary Lee, Perryville; and Thomas Lipton, Independence.

The most dramatic increase in export value was in the sector producing pickles, sauces and salad dressings (525% increase in export value, 125% increase in employment), while the frozen fruit and vegetable processing industry declined by all economic measures.

Export value increased by 295 percent to \$282 million and total value added increased by 333 percent to \$110 million during 1982-1991. However, employment decreased by only 43 percent during the same period.

Frozen Specialities

Companies in the frozen specialty category produce products such as frozen dinners and pizzas. They make up about 2 percent (16 operations) of the total food manufacturing operations in the state. Of the largest facilities, three are owned by ConAgra Frozen Foods Corporation. These facilities, located in Macon, Marshall and Milan, produce most of the Banquet frozen food line. Another large facility, Wetterau Incorporated in Hazelwood, produces frozen bakery products.

Export value increased by 45 percent from 1982 to 1991 to \$282 million, which represented \$79 million in added value. During this same period, employment figures decreased from 2,228 to 1,742 employees (22%). Total industrial output for this sector was \$302 million in 1991.

Grain, Cereal and Baked Products

Included in grain products for this report are grain milling operations, cereal breakfast foods, breads, cookies and pasta products. Snack food processors are included in another section. There are more than 90 different processors in this segment of Missouri's food industry (13%), with most operations having five to 25 employees (31%). Large operations (more than 500 employees) include Continental Baking Company, St. Louis; Kraft General Foods, Incorporated, Springfield; Purina Mills Company, St. Louis; and Quaker Oats Company, St. Joseph.

Total value of exports from this sector was \$927 million in 1991, an increase of 116 percent from 1982. Export value of blended and prepared flour products (such as boxed cake mixes and cookie dough) increased by 489 percent over this period. Total added value of cereal-based products was \$527 million in 1991, an increase of 62 percent from 1982. Industrial output increased 51 percent to \$1.4 billion during the same time frame. Despite the general increase in other economic indicators, employment decreased in this sector by 38 percent to 7,190 employees in 1991.

Companion Animal Foods

The pet food industry is an often-overlooked portion of the food processing industry. However, in Missouri this manufacturing activity has increased by almost 1,000 percent over the past 10 years when measured in total industrial output (\$1.7 billion in 1991), while employment has increased to 3,181 people (45% increase over 1982). In relation to other food manufacturing operations in Missouri, companion animal foods rank second in export value (\$1.6 billion), value adding (\$786 million) and industrial output (malt liquor ranks first in all these categories) and fourth in total number of people employed.

There are about 30 manufacturers of companion animal foods in Missouri. There are a number of small processors (17 with fewer than 25 employees). The largest facilities are part of Purina Mills Company (Brentwood, St. Louis).

Candy, Chocolate and Snack Foods

The candy, chocolate and snack foods category includes nuts, potato chips and similar products. Time series data from this group should be interpreted with caution, since figures for Standard Industrial Classifications 2066

(chocolate products), 2096 (nuts and seeds) and 2098 (potato chips) were not available in 1982.

There are 54 manufacturing facilities reporting activity in this area. The largest facility is Guys Foods in Liberty, followed by Leaf Incorporated, St. Louis; Pet Foods, Incorporated, Hannibal; and Sunline Brands, St. Louis. Fifty-five percent of the facilities in the state hire fewer than 25 employees.

In 1991 these manufacturing operations reported \$297 million in exports, \$123 million in added value and \$423 million in total industrial output. There were 2,210 Missourians employed in the industry in 1991. Candy manufacturers reported an almost unbelievable 9,900 percent increase in export value, and a 53 percent increase in employment during the decade from 1982 to 1991.

Fats and Oils

Probably as a reflection of changing food consumption patterns, the sector of the food processing industry producing purified fats and oils declined in almost every economic category, except total sales, during the 1982-1991 period. There is only one large processor in the state, Farmland Industries, Incorporated, Kansas City.

Export values for this industrial classification decreased by almost 30 percent during the 1980s, while employment decreased by 115 people (16%). Total sales for this sector increased from \$371 million to \$425 million (15%) during the same period.

Beverages

ALCOHOLIC:

Malt liquor (beer) production is the single most important food manufacturing operation in Missouri as measured by value of exports, adding value and total industrial output. Only the poultry and egg processing industry employs more people. This industrial classification is dominated by the industry giant Anheuser-Busch, Incorporated, of St. Louis. In the period from 1982 to 1991, total export values for this section of the industry (Anheuser-Busch and Boulevard Brewing, Kansas City, established in 1989) increased only 24 percent. Value-added figures indicate a 72 percent increase to \$1.4 billion and total industrial output was estimated at \$2.6 billion, an increase of 15 percent. During this same time, employment for the industry decreased from more than 10,000 employees to slightly less than 6,000.

Other alcoholic beverage producers in the state include McCormick Distilling Company, Weston; David Sherman Corporation, St. Louis; and Beverage Concepts, St. Louis; as well as 17 wineries. Total value of exports increased by about 200 percent, employment increased by about 41 percent, and value added increased by 20 percent while total industrial output declined by 6 percent.

SOFT DRINKS:

The soft drink industry in Missouri has undergone several changes in the past few years, principally related to the Dr. Pepper and Seven-Up brands. Coca-Cola and Pepsi-Cola bottling plants make up the vast majority of the individual facilities in this classification. There are a few independent soft drink manufacturers in the state, the largest being Vess Beverages, Maryland Heights, employing 165 people in 1994. Sales of soft drinks increased by about 67 percent while employment decreased by 15 percent during the 1982-1991 period.

Other Manufacturing Operations

FLAVORINGS, EXTRACTS AND SYRUPS:

Missouri has the highest concentration of flavor producers in the nation outside of Chicago, Illinois. At least 12 companies involved in producing essential oils, extracts, spice and herb blends, and colors are located in the St. Louis metropolitan area; another 24 companies are located throughout the rest of the state. Most of these companies are relatively small (62% have fewer than 25 employees). The largest companies in this classification, however, are not in St. Louis. Durkee-French Ingredient

Corporation, located in Springfield, is the single largest producer of mustard flour in the world. Thomas Lipton Company in Independence and Pet Incorporated, Hannibal, also employ more than 250 employees.

Economic evaluation of this food processing sector for the 1980s reveals results in a mixed report. While export values increased by 17 percent, value added figures declined by 33 percent and total industrial output decreased 8 percent. Employment in the industry increased by 9 percent over the same time.

OTHER INGREDIENTS:

Finally, there is a category that includes everything not covered anywhere else. These industries are generally considered to be ingredient suppliers, although popcorn manufacturers, "health foods" and ethnic food processors are also included. They are as diverse as the international giant Monsanto, St. Louis, and the two-and-a-half-person operation of McCarthy Seasonings, St. Louis.

Because of the diverse nature of this classification, economic indicators are probably misleading. However, the number of companies claiming this category has increased from fewer than 10 listed in the 1980 Missouri Directory of Manufacturers to 53 in the most current issue of the directory.

Overall, flavoring and other ingredient manufacturing reported a 13 percent decrease in employment and an 11 percent decrease in total industrial output during the 1982-1991 period.

Number of Companies

Trends

Global Mind-set

A short walk down the aisles of any recent food trade show supports the notion that food processing is becoming an increasingly global effort. Flavor producers from the Pacific Rim, equipment manufacturers from Europe, ingredient suppliers from the tropics and functional ingredients isolated from the world's oceans can be found at every turn. Many of the raw materials used to create new and more functional food products for the increasingly sophisticated American consumer are drawn from global markets. In turn, processed foods are often created with the world market in mind.

Many raw materials used to create food products are drawn from global markets.

International trade agreements and safety regulations may influence the processing of products in subtle yet profound ways. Variations in allowed ingredients, packaging expectations and distribution systems provide food manufacturers with a multitude of challenges as they attempt to expand their business into the global marketplace.

Health and Disease

There have been enormous advances in our understanding of the relationships between diet and human disease. This is particularly true for chronic diseases such as diabetes, as well as diseases with long development times such as cancer and circulatory system disorders. Despite sometimes conflicting information, the food manufacturer is expected to provide the consumer with products that meet current ideas for healthy diets. New legislation allowing the use of limited health claims on food labels is expected to result in a proliferation of products formulated to take advantage of the marketing opportunity afforded by this change.

On the other hand, some consumers, perhaps as a reaction to the information explosion, continue to demand less "healthy" products. The perceived relationship of "low fat" and "diet" products with poor taste and texture developed over a very long time. It will not be easy to convince everyone that "healthy" can taste good. Thus, for example, there is room in the current marketplace for both "no-fat" and "premium" ice cream products.

Despite the occasional backlash of consumers, most food futurists foresee an increasing demand for foods designed in accordance with the recent advances in nutritional science. A few of these will be examined further.

NUTRACEUTICALS:

Recently, it has been reported that self-medication will be one of the most significant trends for mainstream consumers. Foods used to prevent disease are loosely referred to as nutraceuticals. In particular, herbs and vitamin-rich plant materials are considered by many people to be useful for disease prevention, health protection and stress reduction. Irrespective of the position taken by the health care community, food companies will work to meet consumer demand in this area.

Novel technologies for preserving the biologically active compounds in intact herbs and spices will continue to develop. Most of these are likely to make use of modified-atmosphere packaging, which involves creating a unique gaseous environment around the food product to decrease spoilage. These techniques often require special packaging materials.

Research into extraction technology will be applied to these new materials. Supercritical fluid extraction, which involves use of a gas rather than the comparatively hazardous organic solvents currently used in extraction, will likely find new applications in creation of nutraceutical products. In addition, selective extraction techniques may be developed to reduce the undesirable characteristics of some nutraceuticals, such as the “un-smelling” of garlic.

Herbs and Spices: Products using greater amounts and different varieties of botanicals to achieve unique flavors as well as potential health benefits are expected to increase. Use of relatively novel food ingredients such as aloe vera and ginseng is becoming more popular. These new food ingredients will require careful chemical, biological and physical evaluation in food products. Addition of relatively large amounts of previously infrequently consumed plant materials may necessitate new toxicological screening methods.

Novel Spice and Flavor Combinations: The popularity of nutraceuticals is expected to increase the use of spice and herb combinations in all types of foods, “healthy” or not. Technologies designed to produce biologically active food ingredients are also expected to create new flavorants for the rest of the food industry.

Vitamins and Minerals: In the infancy of modern nutritional science, the role of vitamins and minerals in acute disease made newspaper headlines. More recently, the potential role of antioxidants such as vitamin A, C or E and selenium in cancer prevention continue to appear in the popular press, often before the scientific findings have been published in appropriate journals. Recently health claims related to the role of folic acid in preventing neural tube defects have been allowed by the U.S. Food and Drug Administration. Calcium fortification of products to prevent osteoporosis will continue.

The food manufacturer is expected to provide the consumer with products that meet current ideas for healthy diets.

FIBER:

The suspected role of fiber in health helped to create the breakfast cereal industry in the early part of this century. Now, with a greater understanding of the beneficial effects of fiber, this functional ingredient is finding applications in an increasing variety of foods. In addition, novel sources of fiber such as chicory, peas and tropical fruits have been introduced to food product developers. The unique effect of fiber on texture of foods has long been of interest to food scientists, and the food industry will continue to demand research on new fiber sources.

FAT REPLACERS:

One of the many potential uses of fiber is to replace the fat in food products. While fiber can mimic some of the textural attributes of fat, the use of fiber to completely replace lipid materials in foods has not been completely successful. Thus, new sources of fiber and chemical and biological manipulation of fiber or fiber sources will be an interesting area of continued study.

Recently, fats have been modified by enzymes or other techniques to be indigestible. These modified fats have unique functional and biological properties requiring additional basic study as well as product formulation changes to accommodate their unique characteristics.

Demand for now infrequently consumed fats such as fish or flaxseed oil will increase because of their potential to reduce blood cholesterol levels. In addition, modification of traditional sources of fat, such as beef tallow or soybean oil, will continue in an attempt to produce a “perfect” fat: one with no calories, little flavor of its own but able to carry a wide variety of desirable flavors, stable in light and oxygen, and inexpensively priced.

SWEETENERS:

In recent years the use of artificial sweeteners in food products has skyrocketed. Decreasing calorie consumption while still enjoying dessert is a powerful consumer desire. Food product developers are still looking for new, “natural” sources of non-nutritive sweeteners. In addition, extending shelf life and stabilizing existing sweeteners to the effects of thermal processing will continue to be an important consideration.

PROTEINS:

Inclusion of isolated proteins in formulated foods will continue. Protein-fortified “sports” drinks have become popular. These products compete for attention on many levels, including vitamin richness and high fiber and protein. Part of the popularity of sport drinks

may be due to their convenience, making them attractive alternatives to a more traditional meal for time-conscious consumers.

Branded Products

Brand names provide consumers with a sense of confidence in the quality of a product. Many large food companies are using their brand name recognition to help launch new product ventures.

Kosher Certification

Kosher certification has been associated with increased quality and safety of meat products for a significant number of consumers. Recent concerns about meat safety have been used to further expand the use of kosher certification not only for meat products, but also for packaging materials.

Downsizing and Outsourcing

The trend for food companies to increase efficiency by decreasing size is expected to continue. This will require food ingredient suppliers to become more technologically savvy. It is also expected that the number of food consultants will increase.

Ethnic Foods

The changing demographics and ethnicity of the world's population have created new markets for what have been considered traditionally to be niche, or fringe products. Increasing affluence of nations on the Pacific Rim and increasing numbers of consumers with Hispanic or Latin American ethnic ties have vastly expanded these markets in recent years.

Regulatory pressure to further increase the safety of the food supply will increase.

Health and Safety

Despite demands for novel products and unique flavors, the American consumer has been sensitized to the fragile relationship between food processing and food safety. Regulatory pressure to further increase the safety of the food supply will increase. Why not. Who could possibly vote for "less safe" food? The food industry, with decreasing numbers of technical support personnel will depend more on research done by consultants and universities than ever before.

The Environment

Food processing is usually associated with the use of large amounts of water and energy. Current food distribution channels are also energy intensive. Packaging materials require a large quantity of limited resources to produce. Research on reducing energy and other resource use by the food processing industry is essential to answering environmental concerns while maintaining product quality and safety, as well as company profitability.

Competitiveness

Production flexibility is one key to competitiveness in a volatile global marketplace. This is particularly important with food ingredients sourced from a single geographical location. Modification of product formulation and processing techniques to allow for the use of a wider variety of starting materials or to cope with differing distribution systems will be essential for the food industry.

Cooperative Research: Alliances

There is a great need for novel research to address consumer demand, global competitiveness and environmental stewardship.

In a recent review by P. Hollingsworth (Food Research: Cooperation is the Key, *Food Technology*, 2[1995]:67-75) the changing nature of food industry research was examined by interviewing key industry professionals. An examination of the current situation revealed that the U.S. food industry faces greater debt than ever before. This in turn is expected to decrease dollars available for research, yet there is a great need for novel research to address consumer demand, global competitiveness and environmental stewardship.

The conclusion reached by most of the industry leaders questioned suggested the creation of alliances. This will involve a cooperative approach between processors, ingredient and equipment suppliers, research universities and consultants. Teams will be built to take advantage of unique expertise within each area of the food processing industry. Teams will solve individual problems, dissolve and reform in different ways to tackle the next challenge.

For these alliances to function as envisioned, there are several areas needing attention. Trust must be developed quickly among team members. Financial and professional rewards must be distributed equitably. In particular, universities were singled out as needing to participate more completely in alliance building. This will in part require universities to become more market oriented.

Data Sources

National economic figures used in this report were drawn from a number of sources. The best and most complete information on the food industry is a book by J. Connor (*Food Processing: An Industrial Powerhouse in Transition*, Lexington Books, Lexington Massachusetts, 1995). Unfortunately, this book provides data only up to 1986. It has been reported that Dr. Conner has finished, or nearly finished, an updated version of this work. Those in the industry look forward to its publication with great anticipation. Other information can be found in various trade publications such as *Food Processing* or *Food Technology*.

Most of the numbers related to the Missouri economy were recalculated from work by G. Devino and C. Braschler (*The Role of Food and Kindred Products Industries in the Missouri Economy, 1982-1991*, Missouri Agricultural Experiment Station Report, 1994-1996). Their report used data from another database called the Implan system. That report led to the current document's organization around standard industry classification codes, although occasionally this document has reorganized the groupings of specific industries within the broad classifications proposed in the original publication. In the current report a few industries were omitted because of limited data. In particular, sugar refining and seafood processing as well as some other minor operations were omitted. No attempt was made to adjust the dollar figures for inflation or other factors.

Another principal source of information was the *1994 Missouri Directory of Manufacturers Including Mining and Quarrying* (Harris Publishing, Twinsburg, Ohio). As directories go, it is very complete. Even so, some companies are not included, some are misclassified, and others have already changed operations significantly. One problem that continually plagued the current analysis was that one company could appear in a number of classifications, or that some companies had multiple listings within a classification, while others used only their corporate headquarters for a listing. It was finally decided to accept the Directory for what it was, a great attempt to classify the manufacturing in the state and not to try to fix any apparent inadequacies.

For information on consumer trends, *Food Trends and the Changing Consumer* (by B. Senauer, E. Asp and J. Kinsey, Eagan Press, St. Paul, Minnesota, 1991) and the trade publication *Food Product Development* proved to be most valuable. The review of the 1994 Institute of Food Technologists trade show, which was the subject of several articles in the August 1994 issue of *Food Technology*, served as the foundation for much of this section. Nevertheless, the information on trends will ultimately be proved only by future historical analysis.

Standard Industrial Classification Codes

Meat, Poultry and Their Products	2011, 2013, 2015
Dairy Products	2021, 2022, 2023, 2024, 2026
Fruit and Vegetable Products	2032, 2033, 2034, 2035, 2037
Frozen Specialities	2038
Grain, Cereal, and Baked Products	2041, 2043, 2045, 2046, 2051, 2052, 2098
Companion Animal Foods	2047
Candy, Chocolate and Snack Foods	2064, 2066, 2096, 2098
Fats and Oils	2074, 2075, 2077, 2079
Alcoholic Beverages	2082, 2084, 2085
Soft Drinks	2086
Flavorings, Extracts and Syrups	2087
Other Ingredients	2099



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