



From farm to fork: Food processing for safer, longer lasting food

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Consumer confidence in food safety is basic to the food processing industry and essential to its success.

Food Preservation

From the time meat was first cooked on a fire or salt was used to preserve what he ate, man has been processing food.

Originally, processing was used simply to preserve food for consumption beyond a product's normal life cycle or place where it was grown. Until the industrial revolution, food production remained rudimentary; people generally ate what they or others living nearby could produce and preserve. In addition, food production employed a very large proportion of the population.

Today, the food industry in Europe is totally different: three per cent of the population produces three-quarters of the region's food. The rest is imported from all over the world. Demographic changes have also triggered an increasing demand for convenient foods and variety as well as nutritional quality and affordability.

All these changes have combined to shape the modern food processing industry. Despite new products and the increasing reliance of consumers on processed food, the fundamental purpose of food processing remains the same - to make food available when and where it is needed.

Why We Process Food

The food processing industry strives to meet consumer expectations for food that is safe, unspoiled, nutritious, convenient, enjoyable, available in a wide variety and affordable.

Food safety. Consumer confidence in the safety of food is vital to the food processing industry. Confidence is one of the key elements in building brand loyalty which, in turn, determines the success and profitability of individual food companies.

The safety of processed food involves eliminating and/or preventing the multiplication of the microbes that exist in all food and which can cause foodborne diseases.

Preservation. Preserving the taste, smell, look and feel of food and preventing spoilage is also an important function of food processing. Preservation is accomplished by inactivating basic natural processes in food:

- Enzyme action - all food contains natural enzymes that break down proteins, fats and carbohydrates to facilitate animal and plant growth. Once an animal has been killed or a plant harvested, these enzymes, if left uncontrolled, continue to work, breaking down the food itself and resulting in spoilage.
- Microbial action - all food can be attacked by bacteria and fungi that cause food to rot or become mouldy. If permitted to multiply, these microbes can cause spoilage.
- Oxidation - many food components can be attacked by oxygen in the air, making them rancid or resulting in an unpleasant taste. This, too, must be controlled.

Nutrition. Processing techniques preserve natural nutrients or increase the nutritional value of some products such as vitamin-enriched cereals, breads and dairy products. Processing also makes some foodstuffs more digestible, thus increasing both their appeal and the bio-availability of important nutrients. For example, cooking can increase the bio-availability of starches.

Convenience. With the increase in the number of families with two wage-earners, single persons or single-parent households, providing food products that are convenient to prepare at home is an increasingly important function of the food processing industry. Products include complete meals for almost instant serving from freezer to microwave to table; frozen pizzas ready for the oven; special mixes for pastries and breads.

Variety. As a result of modern food processing, today's consumer in Europe has unparalleled choice: fish from the North Atlantic and South Pacific; frozen lamb from New Zealand; exotic canned fruits from the tropics; fresh or frozen pastries. The list is nearly endless: the world is the consumer's garden. Data from one large supermarket chain indicates an increase from around 600 food products in a typical supermarket of the mid-1950s to more than 10,000 food products available today.

Affordability. Food that is not affordable is also not available to the average consumer. The food processing industry has played a major role in ensuring that the varied and nutritious products available today are also affordable. In the most developed countries in Europe where the widest variety of processed food is available, consumers spend between 12 to 20 per cent of household budgets on food and drink; in other European countries, food spending accounts for as much as 40 %.

What is Food Processing?

Almost all food must be processed in some way before it can be eaten. Even fresh vegetables from the garden must be cleaned and trimmed. There are various levels of food processing:

- Harvesting crops, slaughtering livestock or catching and killing game or fish is the preliminary

step

- Cutting, cleaning, packaging and refrigeration of these raw foods make them practical to use for the consumer while preserving moisture content, and preventing (or retarding the growth of) microbes
- Secondary processing goes a step further in creating a whole array of food products from canned and frozen vegetables to fully prepared dinners, baked breads, cheeses, milk, chocolate bars, biscuits, convenience meats and a variety of other products.

The main methods of secondary food processing include:

- Heating. Pasteurisation involves heating to temperatures of at least 72°C for 15 seconds to kill most foodborne pathogens and then quickly cooling to 5°C. However, food is not totally sterilised; refrigeration is required and shelf life is limited. Sterilisation involves heating to temperatures of at least 120°C or more for a couple of seconds, which kills most microbes and inactivates enzymes; the heating process is followed by rapid cooling. Sterilisation significantly increases shelf life and reduces the need for refrigeration as long as the package remains unopened.
- Cooling. Refrigeration and freezing maintain food at controlled, low temperatures to keep enzymes inactive and inhibit the growth of microbes. To remain effective, cooling and freezing must be maintained consistently through transport, retail sale and storage at home until shortly before preparation and consumption. The fact that food might spoil at ambient temperatures makes temperature control critical.
- Drying. This produces stable foods by reducing their water content, which, in turn, denies microbes the environment needed for reproduction. Food products where this technique is used are: powdered milk and soups, pasta, meat, fish, potato flakes, cereals, etc.
- Smoking. This method both dries the food and adds extra flavour.
- Fermentation. The process by which microbes produce alcohol or acid, which act as preserving agents. Yoghurt, beer, wine, cheese, salami and some dairy drinks are typical examples.
- Food additives. Food additives also play a key role in food processing. For example, some additives make food acid and thereby protect against spoilage; anti-oxidants prevent fats and oils from becoming rancid; emulsifiers and stabilisers help produce stable mixtures of ingredients which, like oil and water, would otherwise separate.

Ensuring Quality and Safety in Processing

Food processors rely on modern quality management systems to ensure the quality and safety of the products they produce.

The three key systems in use are:

- Good Manufacturing Practices. These entail the processing conditions and procedures that have been proven to deliver consistent quality and safety based on long experience.
- Hazard Analysis Critical Control Points (HACCP). While traditional quality assurance programmes focused on the quality of the finished product, HACCP, a recent proactive technique used in the food industry, focuses on preventing defects in the production process itself, rather than identifying them.
- Quality Assurance Standards. Adherence to standards established by the International Standards Organisation (ISO 9000) and the European Standard (ES 29000) ensures that food processing, catering and other food-related industries conform to prescribed and well-documented

procedures. The effectiveness of these programmes is regularly assessed by independent experts, in order to sustain consumer confidence in the producer's quality assurance procedures.

Environmental quality. In addition to ensuring quality and safety, food processors constantly strive to minimise the environmental impact of their processing and products. This includes continual efforts to reduce air, water and solid waste emissions and to reduce the environmental impact of packaging by using recycled and recyclable materials and reducing the weight of packaging.

Before and after processing. The quality of food products is dependent on the quality of raw materials and on the quality of transport, storage and sale to the consumer. Therefore, quality management systems of food processors (e.g. ISO 9000 systems) also involve working with the suppliers (individual farmers and raw material wholesalers), transporters, product wholesalers and retailers to ensure quality assurance procedures at each level.

On a regular basis, processors brief suppliers on the specific requirements for raw materials and provide technical assistance to help ensure raw material production meets specifications. In addition, quality audits and inspections of raw materials at the point of delivery help ensure that specifications are met. Processors also provide technical assistance to, and conduct audits of, transporters, wholesalers and retailers to ensure that specifications for temperature, moisture and other conditions are met and that sell-by dates are observed.

Protecting Food Through Packaging

Food packaging is an important part of food preservation and safety. It ensures that food reaches the consumer in peak condition. Packaging is not just a simple box; it is in fact a system for preserving the safety and quality of food products in transport, wholesale warehouses, retail stores and in the home. It does this by:

- maximising shelf life by acting as a barrier against water vapour, air, and microbes. Similarly, packaging also retains moisture and gases, which preserve product freshness and safety
- carrying important information on the label (brand name, use-by dates, ingredients, refrigeration or cooking requirements, recipes, etc.) to help the consumer store products safely at home
- providing evidence that the product is intact and has not been tampered with
- preventing loss of aroma and protecting against odours from external sources
- bar codes on packaging identifying the date and the location of manufacture which enables processors, transporters and retailers to keep track of products for both inventory control and identification of potential hazards.

Loyalty Based on Trust

The fundamental purpose of food processing has always been to make nutritious food available when and where it is needed. Equally, the success of each food processing company is dependent on the loyalty of the consumer to each individual brand and product. In turn, loyalty relies on the consumer's trust in the quality and safety of products.

Product safety cannot, however, be achieved by food processors alone. While the food industry follows many rigorous internal quality assurance procedures, it must also work in partnership with suppliers, transporters, wholesalers and retailers, as well as with the consumer and the catering industry, who are

no less responsible for the preparation of safe meals.

It is this notion of shared responsibility both in the processing and in the preparation of food that is fundamental to ensuring that food is both nutritious and free of the contaminants that cause foodborne diseases. For in the final analysis, only carefully produced, safe food can give the consumer maximum satisfaction.