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Building Safety into the Product Development Process

All food processors are mandated to produce safe food; a program that should begin during the product development process. To paraphrase a colleague of mine in industry, he stated that, "No matter what marketing wants my group to develop, I will ensure that the product is safe."

One thing that developers cannot take for granted is that all foods are safe. This is especially true with many grain-based products. Who would have thought that there would be two major foodborne outbreaks in a 10-year span associated with breakfast cereal? Or, even more surprising, is a documented outbreak traced to potato chips. Yes, potato chips—a product that is fried in hot oil at temperatures in the 340–360°F range. The causative agent was a seasoning blend containing paprika that was contaminated with salmonella. So, one can assume that almost any product can end up being a vehicle for foodborne illness, assuming the right (or wrong) series of events happens. Now, when these incidences were investigated, the problems were traced to breakdowns in the sanitation system, but the end results don't change the fact that problems can occur with almost every product.

Product Development Team

Whether a product is developed internally or a company goes outside for the work, the group doing the development should be properly trained in food safety, and specifically hazard analysis and critical control points (HACCP). In fact, companies who have their own product development group should be sure that one person from that group is part of their HACCP team. All members of the HACCP team must receive HACCP training. This can be done internally, the company can send their people to a course, or they can bring someone in-house to do the training. The bottom line is that people must be trained and that training must be documented. To ensure that people have been properly trained and to meet the requirements of third-party audits, companies should consider using persons who are certified HACCP trainers and whose materials have been certified by a recognized organization.

The Product Development Process

Product development is more than simply developing a product. For every successful introduction, there are dozens of failures. In many cases, the failure may be traced to poor market research. It is for this reason that marketing people must clearly define what they want and what they believe the public wants. Good market research will increase the chances of success. A few years back, many companies leapt into the market with their new no- and low-carbohydrate products only to find that that trend was more of a "blip on the radar" than a true trend. Again, good market research could have saved these companies millions.

There are different phases involved in developing a new product. These may be summarized as:

- Ideation
- Development
- Pilot Testing
- Commercialization and Roll-Out

We have already touched on ideation in our discussions on market research. One of the challenges to product development scientists is the current marketplace. More and more consumers are looking for products that are fresh, natural, minimally processed, and easy to prepare. That combination of demands has led to both foodborne illness and economic spoilage in the marketplace. The causes are often not the fault of the company who manufactured the product, but they do remain liable for problems. Years ago, there were several outbreaks of botulism attributed to frozen pot pies. The cause in each case was consumer abuse, yet the manufacturer suffered and the government seriously considered adding warning labels to frozen prepared foods.

During this phase, product development scientists must not blithely accept the dictums of marketing. They need to clearly lay out potential challenges and hazards associated with any new product. In other words, a risk assessment should be included in this phase of the project. This assessment should address not only food safety issues, but those that could affect quality, legal compliance, and any others. Let's focus on developing a product and ensuring that the new product is safe.

The development process entails taking the concept created by marketing and bringing a prototype or prototypes to fruition. There are a number of elements that make up the process. These include both product and process development. One of the actions taken by developers in this day and age involves allergens.

Many developers have been instructed to minimize the use of allergens in new products. This expands potential markets for products since eliminating allergens will allow sensitive persons to use the product. It also makes life easier for processors since they do not need to worry about building allergen controls into a process. The biggest problem with this philosophy of product development is that many of the allergens are not only excellent sources of protein but they have health benefits. Soy is acknowledged as being heart healthy and a cancer fighter. Tree nuts, such as almonds, contain oils that are heart healthy and are a good source of protein.

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And, on the subject of sourcing, part of the role of product development is to select ingredients to be used in the new product. Finding vendors that can provide high-quality and safe ingredients can be a challenge (remember the potato chips mentioned above). Before being incorporated into the final formulation, each new vendor must undergo the scrutiny of the company's vendor approval program.

The process development element of product development, especially with baked or fried products, may be receiving greater attention and undergoing increased scrutiny in the near future; scrutiny from both food safety professionals from different companies and from the regulators. Samonella outbreaks that were traced to almonds in 2001 and 2004 resulted in the mandate that almond processors, and those using raw almonds as an ingredient, ensure that these products be processed to eliminate salmonella. The mandate further states that operators must utilize processes that have been issued and validated by a process authority recognized by the Almond Board of California.

Along these same lines, some scientists implied that the way that peanuts were cooked at the Peanut Corporation of America may have contributed to their problems. The bottom line is that, as a result of situations such as these, many processors are re-evaluating the efficacy of processes used to manufacture their products. However, validating a process is a more complex protocol than many think it is. The greatest challenge may be identifying the target organism and then selecting a surrogate (non-pathogenic) to actually verify the process parameters in actual process operations. Competent process authorities may find that they may be in demand in the near future.

The development process also challenges scientists to create products at the bench that can be scaled up. This is one reason why it is important to understand current products and processes. In fact, many new products are line extensions that can be slotted into existing process lines and current HACCP plans. In fact, following this path can reduce expenses and minimize potential problems with the whole process.

Once the developers have a prototype, the next step is to take the product to the pilot plant and beyond. Can it be produced at a larger scale? Of course, there are operations which do not have pilot plants, so rather than conducting a small-scale run on small-scale equipment, the company is forced to do small batches in a production facility. This is a more expensive option since they interfere with production operations. It is during this phase that one would do the process validation studies. These may involve inoculating test products with the surrogate organism and evaluating whether the process effectively eliminates them; or if validated processes exist, the developers may be able to measure heating parameters of the product. For example, if the existing data show that heating the product to a center temperature of 185°F is effective at ensuring safety, the developers will need to conform that the product can be heated to that temperature.

So, safe food is the law, and the challenges to ensure that food processors, even manufacturers of seemingly safe products, will remain an ongoing challenge. It is very likely that manufacturers of grain-based products will be taking a long hard look at the lethality inherent in their processors. Is your product safe? That is something that each of you need to validate.

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