



Packaging & Shelf Life Solutions

Oregon State University's Food Innovation Center (FIC) provides package design and solutions as well as shelf life testing to help ensure food products are of optimum quality. Food Manufacturing spoke with Dr. Qingyue Ling, Assistant Professor for the FIC, about the center's services and future trends in packaging and shelf life innovations.

Interview By Lindsey Coblentz, Associate Editor

Q: What food product packaging and shelf life testing services does the FIC offer?

A: The Food Innovation Center helps food companies mainly in the Pacific Northwest develop new food products that can be introduced into the marketplace. The FIC works with a large range of companies from startups to successful food companies in the area of product formulation, packaging, shelf life testing and sensory evaluation. We also serve companies from other regions of the country. Our food packaging services include selection of packaging types and materials and finding packaging solutions for a variety of food products.

Q: How does the FIC determine the proper packaging material for a food product?

A: To determine the right packaging material to use for a food product, one has to understand the type of food being packaged, how it is processed and manufactured, how it is distributed and regions to which it is distributed. The food product itself and its ingredients will tell you if it is sensitive to variable storage and distribution environments.

For example, frozen foods are very sensitive to storage temperature. The packaging material has to provide good temperature insulation in addition to rigidity for protecting its physical integrity. Good temperature insulation can help maintain good quality of frozen foods by minimizing such defects as freezer burn caused by temperature variation in cold storage.

High fat content products are sensitive to oxygen and can degrade and become rancid if the products' exposure to oxygen is not eliminated or minimized. To minimize this, one can choose packaging materials with excellent oxygen barrier properties. In addition, one may use a vacuum packaging nitrogen gas flush technique to remove residual amounts of oxygen inside the packaging container.

Dry food products are very sensitive to ambient moisture content or relative humidity. If moisture is absorbed into the product, it will change the quality of the product significantly. Therefore, it is always recommended that a high moisture barrier packaging material be used to package dried food products.

Q: What are some of the innovative package solutions the FIC has developed?

A: The Food Innovation Center applies innovative packaging solutions for solving challenging packaging issues. For example, we have helped our clients extend the shelf life of fresh fruits and vegetables by selecting special packaging films with the right amount of gas permeability parameters for oxygen and carbon dioxide to slow the respiration rate of fresh produce. Fresh fruit shelf life can also be aided by enclosing an ethylene

absorber sachet inside a fruit package, which can remove excessive ethylene generated by the produce to avoid over ripening. Another innovative package solution is using anti-microbial coated packaging films which improve the food product's safety.

Q: How does your shelf life testing program work?

A: The Food Innovation Center provides shelf life testing to food companies that either don't know how to conduct shelf life testing or do not have their own facility or resources to carry out shelf life testing. The FIC shelf life testing service is a fee-based service. We first gather product and packaging information from our clients along with information on how the product is distributed and its distribution environment. This information is used to establish the proper environmental chamber parameters. If necessary, we can record the temperature and humidity history of products throughout the actual distribution channels and upload the recorded data into our temperature and humidity chambers to simulate the actual storage conditions of a product in distribution.

The FIC develops a proposal with the client before any testing work begins. The proposal usually specifies the scope of testing, the number of samples required, the type of shelf life testing, the type of quality analysis, the duration and number of sampling days and the overall budget for the testing as well as the deliverables. Often, there is some degree of negotiation between FIC and the clients until the two parties agree on the services required. Both the client and FIC will sign a service agreement for the final approval from Oregon State University before the testing can start.

Q: What determines the shelf life of a food product, and how can a product extend its shelf life?

A: The shelf life of a food product is determined by many factors, including product formulation, how it is processed (thermal or non-thermal), the type of packaging materials used and its distribution and storage environment. A food product can extend its shelf life by careful consideration of each of these areas.

Q: How can proper packaging and shelf life impact food safety?

A: Proper packaging will minimize cross contamination caused in the packaging process. Often, people forget to sanitize packaging containers or lids before and after filling. Anti-microbial packaging can also be used as an extra step to kill or minimize microbial presence inside the food packaging in distribution, thus improving food safety. Shelf life testing can determine if your product is developed properly and at approximately what time and temperature parameters your product may not be safe to eat by conducting proper microbial analyses.

Q: What do you see in the future regarding packaging and shelf life innovations?

A: There will be more innovative packaging technologies developed for better food products in terms of taste, aroma, safety and environmental sustainability. The future will certainly bring advances in the area of real-time sensing and detecting of quality changes through direct feedback systems. In the future there will also be better methodologies developed for more accurate and reliable shelf life testing.