Perishable Inventory Management using ‘Predictive Shelf Life’ Process

Approach
The shelf life of perishable foods can be maximized by maintaining required cold chain conditions and appropriate handling within the distribution chain. Inteligistics, in conjunction with the preeminent food quality thought leaders, formulated a scientific process called ‘Predictive Shelf Life’. This process extends and analytically confirms shelf life of food products at any point during the active distribution chain.

This approach combines kinetic data of changes in quality attributes with accurate measurement of environmental conditions (time, temperature, humidity) and handling methods. The kinetic data of quality change provides the necessary mathematical coefficients for developing a predictive model.

The ‘Predictive Shelf Life’ model (InteliLife™) is a scientific tool to evaluate alternative scenarios of managing sales and for managing inventory based on estimated quality and remaining shelf life at any stage in the food distribution chain. The Predictive Shelf Life model, InteliLife™, enables inventory managers and stakeholders in the distribution chain to quantify the impact of temperature excursions on the product’s quality and shelf life (e.g. quality degradation and shelf life reduction of product resulting from an excursion of 5°F for 1 hour). This information affords them the opportunity to take corrective management decisions regarding further distribution of the inventory.

Perishable Inventory Predictive Shelf Life Examples

Figure 1, Uniform Deterioration
Consider an example of a perishable inventory items A, B, C and D of ages 0, 1, 2 and 3 periods, in which all items deteriorate according to the single deterioration function shown. The function of quality score versus time represents the changes in a sensory attribute monitored during isothermal storage.

Figure 2, Non-uniform Deterioration
Consider the example of the same perishable inventory, where one of the items (B) deteriorates with a slightly different deterioration function that may have resulted from an increase in storage temperature for item B during the interval between the periods 1 and 2 than the remainder of the items.

When item B undergoes a non-uniform quality deterioration due to increase in temperature as shown in Figure 2, its remaining shelf life is clearly reduced as seen in the graph and it suggests an action to move that item more rapidly through the remaining steps of the chain. This acts as an advisory for those engaged in managing the inventory.

Fig 1: Uniform quality deterioration function for items in a perishable inventory stockpile
Fig 2: Non-uniform quality deterioration function for items in a perishable inventory stockpile
Our Ecosystem of Visibility Solutions Across the Value Chain

Benefits
- Efficiently manage the food distribution chain while minimizing losses due to spoilage, shrinkage and “Use by” dates
- An inventory issue policy that is based on the remaining shelf life enhances consistency in the quality of perishable foods
- Reduces waste while providing the consumers with higher level of Nutrients
- Real time actionable information
- Stakeholders will achieve higher revenues and gain a larger percentage of saleable products
- Quantifiable metrics to optimize and enhance the customer expectations and brand’s quality and freshness reputation

Our Tools/Solutions
Inteligistics’ InteliView™ suite of Solutions provides real-time data collection at any specified point along the food distribution chain. These solutions assist in maintaining the required cold chain of the product at each stage of the distribution chain. Additionally, this system continues to provide the necessary inputs, or documented transparency, to run the Predictive Shelf Life model, InteliLife™, at any point during the distribution chain.

The product and ambient Temperatures along with humidity data, are collected in real-time and in a manner that provide the necessary mathematical coefficients for executing the Predictive Shelf Life model, InteliLife™. Appropriate real time alerts (by email, text and phone) will be sent to stakeholders for actionable management of any risks exceeding the preset temperature and humidity thresholds. The time, temperature and humidity data collection may include all points of the food distribution chain, including harvest point, precooling, processing facilities, warehouses, transportation and retail store shelves.

Our cloud-based databases and web services InteliCloud™ provide the stakeholders with the necessary reports and dashboards and high security access control. These databases and services will directly feed the necessary information about the food distribution chain to the Predictive Shelf Life model, InteliLife™, in order to calculate the remaining Shelf Life at any point in the distribution chain. The relevant information about the product’s shelf life and quality validation can be assigned ‘gatekeeper’ access to strategically disseminate the data accordingly; getting the right information to the right person at the right time.

Information where you need it and when you need it. It’s on your tablet or on your phone.