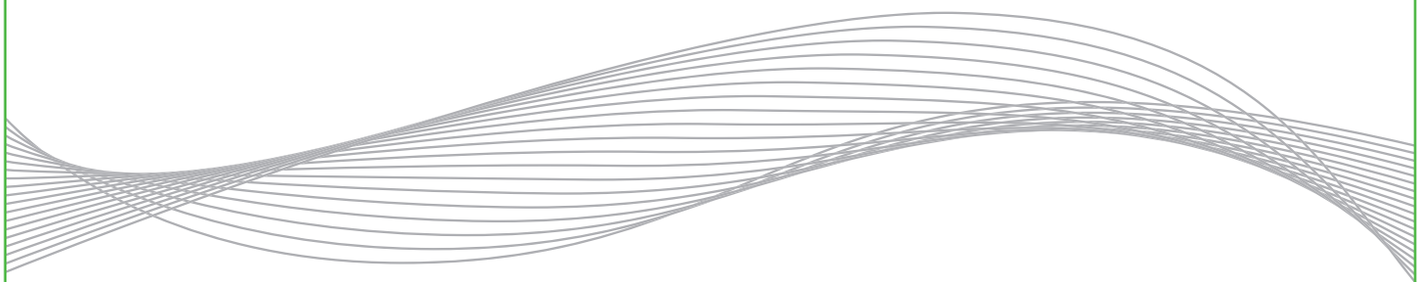
The Impact of Open Code Dating on Expired Food Products

An Industry White Paper from Inmar

May 2006



inmar sm

Inmar
2601 Pilgrim Court
Winston-Salem, NC 27106
866-440-6917
cls.solutions@inmar.com

Executive Summary

Except for infant formula and some varieties of baby food, there are presently no Federal requirements for open date labeling of food products in the United States. Thirty states have some form of labeling requirement pertaining to dates although there is no uniformity or consistency to the regulations from state to state.

The result is a variety of methods and formats in use to identify a date representative of one of the following: the date of manufacture; the date when a product should be pulled from the point-of-sale; the date by when a product should be purchased; and the date by when a product should be used or consumed to name a few examples. Confused? It isn't surprising that there is mounting momentum, led by some very influential retailers and consumer advocates, to move toward a standardized format that is easily read and interpreted by a typical consumer.

The question for manufacturers as well as for retailers of private label is how to balance shelf life with the date code and format that should be placed on the product. Choosing the wrong date code can drive up expired returns as shown in Case Study D, positively or negatively influence consumers, and even change the brand image of the product. For all these reasons and more, the decision to move from closed to open code dating requires careful analysis to determine the right choice for your business.

The purpose of this white paper is to provide guidelines to help you determine if moving from closed to open code dating is right for you. The following elements will be examined:

- The impact of shelf life on establishing the date code
- The ideal date code format for consumer, retailer and manufacturer
- The implementation considerations to minimize returns

The analysis will consider the impact to consumers, retailers and manufacturers as each has a different perspective on the pros and cons of date codes. Various case studies are included to provide some insight into the following:

- Impact of date code on product attribute rankings
- Impact of shelf life combined with open versus closed date on the percentage of expired product at the retail shelf
- Impact of closed versus open date on rate of expired product
- Impact of expired product at retail based on closed code format and the age of the expired product

Open Code Date: This format can be read by the consumer and typically represents sell by or pull by date, best if used by date, or use by date.

Closed or Coded Date: This format cannot be read by the consumer and typically represents a packing date used by the manufacturer of the product but may represent the end date for shelf life.

Several recommendations are made that will balance the analytical insights with basic common sense to help create a solid foundation on which to build a decision model.

A Basic Understanding of Open vs Closed Date Code

Until recently, open code dating was used primarily on perishable foods such as meats, poultry, dairy products and eggs. Closed code dating was typically used on shelf-stable products such as boxed or canned foods. Over the last few years, a number of boxed or canned food product manufacturers that traditionally used a closed code date have converted to an open format of one type or another.

It is possible that a closed code format has been used on canned foods because they typically have a relatively lengthy shelf life. In fact, generally, high-acid canned foods including tomatoes, grapefruits, pineapples and those food products containing them can be stored on the shelf for 12 to 18 months before use. Low-acid foods including meat, poultry, fish and many vegetables can be stored for 2 to 5 years before use without problem as long as the storage conditions are appropriate, including being in a cool, clean and dry environment.

The Basic Starting Point - Shelf Life

Before you can decide whether to have open or closed date codes, you must first have a good understanding of your product shelf life. But what exactly is shelf life? Most consumers believe that shelf life refers to the time when a product becomes potentially unsafe to consume or becomes inedible. Most manufacturers view shelf life as the time in which a product no longer achieves the standards for expected quality for the consumer or end user. Retailers view shelf life as the period of time in which the products may be safely offered for sale to the consumer. One accepted industry definition for shelf life is “the period, starting on the day that a product is packaged for retail sale, during which the product, when stored under appropriate conditions, will retain, without any appreciable deterioration, its normal wholesomeness, palatability, nutritional value, and any other qualities claimed for it by the manufacturer.”

A survey of food products at retail conducted in 2002 by Eastern Research Group, Inc. determined that less than 50% of name brand food products use an open date format while more than 70% of private label food products use an open date format.

There are several factors that affect the shelf life of a product. Some of the most significant are:

- Original quality level of the product
- Harshness of the processing method to create the product
- Effectiveness of packaging materials as a barrier and physical protector of the product
- Appropriateness of the product's storage environment

The actual shelf life for a product is determined by a laboratory testing process in conjunction with sensory evaluation of the product. Each product manufacturer has established its own set of standards by which shelf life may be calculated. The standards include the degree to which certain characteristics can change and continue to maintain an acceptable level of consumer satisfaction. These characteristics often include spoilage, flavor, texture, appearance and functionality. To put the concept into another frame of reference, consider the fact that it is unrealistic to expect that a product that is one-year old will have the same characteristics of a product produced an hour ago. So the goal for a manufacturer is to minimize the changes that do occur and to maintain acceptable food safety.

Shelf Life - Product Quality Engineer's View or the Consumer's View?

This leads us to a point where the quandary for food manufacturers becomes more apparent. What is the perception of the consumer related to how long a food product can be stored and retain its desired qualities? What images form in the consumer's mind when they see that a product has a 5-year shelf life? Is there a difference in the perception of quality and palatability from the consumer's view when compared to the manufacturer's product quality engineer's view? The difficulty attached to the dating decision becomes greater with each layer of complexity the topics we have raised add to the mix.

To illustrate the point here, let's re-examine some of the product attributes, the quality of which shelf life standards are designed to preserve.

Flavor, texture, aroma and appearance are each attributes, by which perceived product quality can be measured. The key word is "perceived" since it is ultimately the consumer's perception of the attribute that translates into a satisfying or dissatisfying experience. Bear in mind, the consumer's perception may or may not have a direct relationship to the quality engineer's definition of product quality.

Engineer Standards: The engineer's standards are based on measurable characteristics related to chemical or physical criteria whereas the consumer's preference or perception is based on how he or she feels about the product attribute.

The quality engineer sets shelf life standards based on the retention of at least a specific percentage of the original specifications. For example, the shelf life standard for a specific product might be related to the length of time beyond which a product is not assured to retain at least 98% of its original flavor. Another shelf life standard might be related to the length of time beyond which a product is not assured to retain at least 95% of its original color.

Consumer Standards: The consumer, on the other hand, relates a sensory feeling or experience to the product attribute, typically ranging from Wow! on the positive side to Ugh! on the negative side. Interestingly enough, retention of the original chemical or physical properties does not always translate into the most favorable consumer perception of the product attribute. As a result, a disconnect may occur when the consumer's preferences and perceptions related to the standards for the attribute are not involved in the decision process used to establish the shelf life.

Case Study A- Face Off between the Engineer and the Consumer

An example of this type of disconnect is shown in the table on the following page that represents the results of a small-scale sensory test conducted by Inmar CLS Supply Chain Services for a specific group of five different food products. The panelists were asked to describe their feelings about each of the products individually with regard to appearance, aroma, texture, flavor, and overall perception using a nine-point scale ranging from like extremely to dislike extremely.

The product samples used represented four categories related to the age of the product as compared to its shelf life – 3 months prior to pull date, at pull date, 3 months after pull date and 6 months after pull date. In each case the pull date was established by the product quality engineers.

The products included in the sensory test were all in a single food product category. Each product was from an individual sub-category of the main food category and represented a broad cross-section of the products within the main food category. The panel was chosen based on an affirmative response to the question, "Do you purchase and use products in the following food categories on at least a monthly frequency?"

The table shows the ranking, 1 being the favorite and 4 being the least favorite, of each of the samples within each attribute and from an overall perspective. Some of the products did not use all four age categories. Where a particular age sample for a product was not used the table shows a value of N/A.

Product Attribute Rankings for Sensory Panel				
Product One	3 Months Before Pull Date	At Pull Date	3 Months After Pull Date	6 Months After Pull Date
Appearance	1	2	3	4
Aroma	1	2	3	4
Flavor	1	3	2	4
Texture	1	4	2	3
Overall	1	3	2	4
Product Two	3 Months Before Pull Date	At Pull Date	3 Months After Pull Date	6 Months After Pull Date
Appearance	3	1	4	2
Aroma	2	1	4	3
Flavor	2	3	4	1
Texture	1	3	4	2
Overall	1	3	4	2
Product Three	3 Months Before Pull Date	At Pull Date	3 Months After Pull Date	6 Months After Pull Date
Appearance	2	3	1	N/A
Aroma	1	2	1	N/A
Flavor	1	2	1	N/A
Texture	2	3	1	N/A
Overall	2	3	1	N/A
Product Four	3 Months Before Pull Date	At Pull Date	3 Months After Pull Date	6 Months After Pull Date
Appearance	2	1	N/A	N/A
Aroma	2	1	N/A	N/A
Flavor	2	1	N/A	N/A
Texture	2	1	N/A	N/A
Overall	2	1	N/A	N/A
Product Five	3 Months Before Pull Date	At Pull Date	3 Months After Pull Date	6 Months After Pull Date
Appearance	1	1	N/A	N/A
Aroma	2	1	N/A	N/A
Flavor	1	2	N/A	N/A
Texture	2	1	N/A	N/A
Overall	2	1	N/A	N/A

Ranking Scale: 1 - Favorite 4 - Least Favorite

The panelists were also asked to identify the sample they liked the most. The following table shows the results, with 1 representing the top choice:

Overall Product Rankings for Sensory Panel				
Product Number	3 Months Before Pull Date	At Pull Date	3 Months After Pull Date	6 Months After Pull Date
Product One	1	4	1	3
Product Two	2	2	4	1
Product Three	2	3	1	N/A
Product Four	1	2	N/A	N/A
Product Five	2	1	N/A	N/A

Using the data in either table, one can see the disconnect between retention of original criteria for product attributes, based on the shelf life determined by the product quality engineer, and the consumer's perception of the product attribute.

Consideration: To further demonstrate how this whole phenomenon is impacted by the shelf life decision, consider the following. Every one of the products included in the sensory test currently uses a closed date code format. If the products converted to an open code date format without considering the consumer perception and preference factor, every product, which had samples to test past the pull date, would potentially have the consumer's favorite sample pulled from the shelf based on the quality engineer's data.

Decision Point - Open or Closed Date?

Once you are comfortable that you have appropriately included the consumer's perception into the shelf life determination, you are at the decision point related to open or closed date format.

Open Code Format Options

Once the shelf life of a product is determined, the next step is to decide the appropriate vehicle for "publishing" this information to be used by the retailer and the consumer. Dating on products can serve two significant purposes:

- Assist the retailer in deciding how long to display the product for sale
- Assist the consumer in knowing the time limit in which to purchase or use the product at its best level of quality

Several code dating formats are in use today:

- **Sell By or Pull By Date:** This format informs the retailer how long to display the product for sale and informs the consumer by when to purchase the product.
- **Best if Used By or Best if Used Before Date:** This format informs the consumer of the date to use the product by to receive the best quality or flavor.
- **Use By Date:** This format informs the consumer of the last date that the manufacturer recommends it for use.

While there are no standards today on the formats, it is logical to assume that significant benefits would result from open code formats for the manufacturer, retailer, and consumer.

Balanced Perspective - Manufacturer, Retailer, Consumer

There are three constituencies that are served and receive benefits through a standardized open code dating format – manufacturers, retailers and consumers. Each group brings some unique perspectives related to the purpose and value of open code dating.

Manufacturers

Manufacturers tend to view the value of code dating as quality assurance protection for the consumer and safeguarding of the investment in the brand or product's reputation. With regard to each of these factors, the likelihood of using open code dating is directly and inversely related to the shelf life of a product. The shorter the shelf life, the higher the likelihood of an open code date. One might question the rationale for this trait.

The answer ties directly back to the two values listed above. With products having shorter shelf lives, providing an open code date gives the consumer the guidance to purchase a product with the highest quality, thus protecting the consumer and the brand from the negative impact of using or eating a product with lower quality attributes.

Conversely, shelf-stable products with a longer shelf life are less likely to have an open dated format. This is somewhat driven by the characteristic that time is not always the factor having the greatest impact on the shelf life of many shelf stable products. Temperature and humidity may play a greater role in the determination of the shelf life of many shelf-stable food products.

Remember that product quality deterioration occurs in many ways – physical changes such as appearance or texture, chemical changes such as flavor, odor, and nutritional content, and microbiological such as spoilage and mold growth. Therefore, as previously noted for shelf-stable products with a shelf life of three years or more, manufacturers believe that consumers would be skeptical regarding a food product's ability to retain its quality with regard to the deterioration factors over such a long period of time. Thus, the decision to use a closed code date format.

Recently, in a move to further safeguard their investment in their brands, some food manufacturers have introduced open code dating on canned food products with an extended shelf life. This is viewed as a method for favorably differentiating their products from others to compete on a non-price basis. This is a direct result of receiving survey data that suggests that consumers do prefer open code dating on food products.

Retailers

Retailers bring another perspective to the value proposition related to code dating. Retailers may view open code dating on food products as a means for them to protect their investment in the consumer's image of their store and trade name and might explain the greater usage of open date coding on private label products.

Having a consistent, standardized open code format can facilitate the process of monitoring the age of food products on the retail shelf and ultimately ensuring a greater success rate for consumer satisfaction related to the products purchased at the retail store. The key to this success is linked to the retailer's ability to translate the open code format into a shelf inventory management strategy. The current variety of formats presents another potential set of challenges.

For example, products with a sell by date can be simply translated into an operating procedure that requires removing food products from the retail shelf on that date. However, products with a best if used by, best if used before or use by date format are not as easily translated into store operations instructions. Retailers are challenged to determine how long before the use by date they should remove the products from the shelf in order to ensure consumer satisfaction.

This is important to understand because a "stale" product purchased and consumed leaves a negative image in the consumer's mind of both the brand and the store. It would seem prudent for manufacturers and retailers to work together to establish guidelines related to translating product dating into store operations instructions to ensure maximum consumer satisfaction.

Consumers

Consumers bring the most valued perspective to the open code dating. The consumer is the common customer of both the manufacturer and the retailer, both of which have a vested interest in ensuring a positive consumer experience. The consumer may be the most difficult to serve within the framework of date coding because personal preference plays a significant role in the consumer's satisfaction with a product.

Implementation Considerations

There are many data sources available to assist in the process of determining the appropriate date coding format and to augment the shelf life determination process. Three that readily come to mind are product age assessments at the retail shelf, market share data, competitive product data, and consumer complaint activity. Over the past ten years, Inmar has conducted numerous studies related to product age and condition at the retail shelf. The studies reveal some interesting data related to date code format and product age on the shelf.

Case Study B- Impact of Shelf Life and Code Type on Percentage of Expired Product

The table below illustrates the incidence of expired product on the retail shelf, expressed as a percentage of the total of each individual product, related to food and beverage products segmented into two categories – products with a shelf life of 90 days or less and products with a shelf life of more than 90 days. Some of the products employed an open code dating format and others employed a closed code dating format. The shelf life category and code date format are indicated for each manufacturer and product category.

Percentage of Expired Product on the Retail Shelf				
Manufacturer	Product Category	Code Type	Lowest Incidence	Highest Incidence
A	Shelf Life < 90 Days	Open	0.60%	7.43%
	Shelf Life 90+ Days	Open	1.11%	10.70%
B	Shelf Life < 90 Days	Open	1.32%	4.70%
	Shelf Life 90+ Days	Open	0.38%	6.67%
C	Shelf Life < 90 Days	Open	0.02%	0.36%
	Shelf Life 90+ Days	Open	0.05%	1.18%
D	Shelf Life 90+ Days	Open	2.35%	3.46%
E	Shelf Life 90+ Days	Open	0.43%	2.80%
F	Shelf Life 90+ Days	Open	0.23%	0.69%
	Shelf Life 90+ Days	Closed	0.08%	0.93%
G	Shelf Life < 90 Days	Open	0.00%	0.51%
H	Shelf Life 90+ Days	Open	0.11%	6.99%
	Shelf Life 90+ Days	Closed	1.48%	6.22%

Consideration: In general, the data suggests that code dating is not necessarily being used to drive shelf management practices since it appears that product past the posted sell, use or pull date exists on the retail shelf regardless of the shelf life or code date format. Again, perhaps this is due to the lack of standardization and consistency that exists today.

Case Study C- Impact of Converting to Open Date from Closed Date on Percentage of Expired Product (A Competitive Comparison Analysis)

Inmar has also worked with manufacturers to evaluate their products in comparison to their direct competitor's products and to determine the level of exposure to expired product when converting to an open date format from a closed date format. The case studies described below provide further insight into the challenges presented by date coding decisions.

An Inmar manufacturer client wanted to compare the age and condition of its products to its major competitor's products on the retail shelf. A study was conducted across a representative sample of retail stores throughout the U.S. in multiple trade channels. Age and condition data was collected on the manufacturer's products and the top competitive product in multiple categories. The competitor used an open code dating format while the client manufacturer used a closed code dating format. While this paper is not focused on product damage, both the rate of damage and the rate of expired is provided in the table below.

Competitive Product Age and Condition Comparison at the Retail Shelf		
Manufacturer	Rate of Expired Product	Rate of Damaged Product
Client – Closed Code Format	4.66%	0.48%
Competitor – Open Code Format	3.28%	0.35%

Consideration: The table indicates that the closed coded product had a rate of expired product on the shelf that was 42% higher than the open coded product. The manufacturer now has data to use in a cost-benefit analysis on the potential advantages of using an open code format when weighed against the costs involved.

Case Study D- Impact of Converting to Open Date from Closed Date on Percentage of Expired Product (Exposure Analysis)

Another Inmar manufacturer client wanted to assess its exposure for expired product if they converted to an open code format. The first step involved capturing data on the age of its products on the retail shelf under the current closed code format that represented the date by which the product should be sold. A representative cross-section of retail stores, across region, volume and channel, was used to collect the data on products in four categories. The table below represents the results of the assessment.

Incidence of Expired Product at Retail – Closed Code Format			
Product Category	Past Sell-By Date	<30 Days Before Sell-By Date	31-60 Days Before Sell-By Date
Overall	6.22%	4.87%	9.89%
Category One	5.82%	6.30%	10.76%
Category Two	1.49%	2.49%	0.00%
Category Three	7.05%	4.43%	9.80%
Category Four	5.11%	3.45%	8.81%

The incidence of product past its sell-by date prompted the manufacturer to review its consumer complaint call database. They found a surprising situation – the incidence of consumer complaint calls related to product quality associated with freshness was nearly non-existent. This further prompted the manufacturer to review its share-of-market data where they learned that their share of market had consistently increased or remained stable over time.

Consideration: Based on the information learned through this study, the manufacturer decided to investigate its shelf life standards before making a decision to convert to an open code date format. Its initial belief was that consumers were purchasing product past its sell-by date since a significant portion of the product available was past that date, were reasonably satisfied with the product quality since complaints were minimal, and were increasing purchases since market share was increasing. After completing its research, the manufacturer extended the shelf life of the products by 25% and is currently in the process of converting to an open date code format with confidence.

Recommendations

The decisions related to shelf life and date coding are certainly complex and affect many entities. The examples presented in this paper help to point out just how complex the decisions really are. There are some basic guidelines that will assist in making the decisions the right ones. In many cases, applying a heavy dose of common sense will create a solid foundation on which to build the decision model. The following is a brief description of some recommended practices to follow during the decision-making process.

1. **Establish an appropriate shelf life by balancing consumer and quality engineer view.** Shelf life should not be determined by the scientific evidence compiled in the laboratory alone. After all, the consumer is the ultimate constituency being served by the process and, rightfully so, the consumer's perceptions and preferences must be included in the process. Involve real consumers of the specific products in more in-depth sensory evaluation panels which include products beyond the quality laboratory's recommended standards. As we found in our study, consumers may actually prefer products with some "age" on them. The results of involving more sensory evaluation testing by consumers might include a longer effective shelf life than originally thought possible while maintaining consumer satisfaction. An extended shelf life also increases the probability of sell-through. On the flip side, be cognizant of the consumer's perception of an exceptionally extended shelf life. Be aware that suspicion may be created in the mind of the consumer regarding the types of preservatives used if a shelf life exceeds what the consumer views as a reasonable period of time.

2. **Employ a format for publishing the date on the product that facilitates the retailer's shelf management operating procedures and ensures a high likelihood of consumer understanding and satisfaction.** Whatever format is chosen, the burden of interpreting the format falls on the retailer and the consumer. It makes sense to choose a format that will best serve both constituencies. The two dates that appear to be most important to both constituencies are the "sell-by" date and the "use-by" date. A format that is in use in the U.K. today incorporates both into an open code style. The format divides the date panel into two sections, one labeled as "display until" and the other as "use by" (see sample below). This format seems to answer both the need for the retailer to decide when to remove the product from the shelf and the need for the consumer to know when to discard if the product has not been consumed. It does require a solid understanding of the typical consumer's use patterns to effectively calculate how far in advance of the use-by date the product should be removed from the shelf.

3 **Collaborate with retail trading partners to determine appropriate inventory quantities.** Even with the best practices for shelf life and date coding employed, success will not be achieved if excessive quantities of product are placed into the supply chain pipeline. Working together can help solve the riddle. First, map out the supply chain process and document some key data points such as how much shelf life remains at time of receipt at the retail distribution center, how long products are stored in the distribution center before delivery to the retail store, and, using point-of-sale data, how long products remain at retail before being sold. Using these data points, an appropriate shelf inventory quantity can be established which helps prevent products from expiring before sale. As a word of caution, when addressing the consumer's perception of shelf life with regard to long shelf lives, shortening the "published" shelf life to fit the consumer's perception standards may require a heightened program for inventory management from both a shelf quantity and rotation practices standpoint.

4 **Use consumer incentives, in coordination with the retailers, to move product that is close to reaching its pull date.** Many types of consumer incentives exist that can help sell products before they expire and become of no use to anyone. Temporary price reductions, point-of-sale cents-off coupons, buy-one-get-one-free are all promotional vehicles that can help reduce the overall level of expired product. This type of strategy requires close communication between manufacturer and retailer to coordinate the process to a successful conclusion and, when done well, provides desirable benefits. In fact, some companies have reported as much as a 40-50% reduction in the overall cost of expired products when using this approach.

These guidelines are not intended to be all-inclusive. Each manufacturer must evaluate its individual products and situation to determine the right steps to take. However, it is certain that improvements and success will only be achieved with focused effort that involves the manufacturer, the retailer and the consumer.

Research Sources

Current State of Food Product Open Dates in the U.S., July 18, 2003, Eastern Research Group, Inc., Lexington, MA.

The Food Technology Web Site, http://www.netcomuk.co.uk/~media/fooddates.htm