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MANUFACTURER ATTITUDES ABOUT OPEN DATING TECHNIQUES FOR PACKAGED FOODS AND AN EVALUATION OF REGULATORY IMPLICATIONS

By

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ABSTRACT

MANUFACTURER ATTITUDES ABOUT OPEN DATING TECHNIQUES FOR PACKAGED FOODS AND AN EVALUATION OF REGULATORY IMPLICATIONS

By

Bridgette Michele Johnson

The purpose of this study was to reveal manufacturer attitudes about open dating techniques for packaged foods and to evaluate related regulatory implications. Twenty-six manufacturers were surveyed. Major findings include the following:

1) Manufacturers use open and closed dates on packaging and they feel justified in their date code choice.

2) There is no common approach to open date coding terminology among the manufacturers.

3) Manufacturers supported industry self-regulation programs for date coding.

4) A standard method to determine the shelf-life of a product does not exist.

5) A regulation for open dating will be difficult to enact without first establishing a standard determination of shelf-life in the industry and coming to agreement on standard terminology for open dating.

DEDICATION

This thesis is dedicated to my mother Rosemary and my brother Joseph who taught me more about life, faith and perseverance than they will ever know. I love you and miss you dearly.

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Writing this thesis was truly a labor of love and one of the hardest tests of my life. I would not have completed this project without the steadfast support of several people. I would like to give a very special acknowledgment to Dr. Hugh Lockhart, my major professor and chairman of my graduate committee. Dr. Lockhart, I am forever grateful to you for fighting on my behalf and for being my eyes and strength when I thought I felt I could go no further. I would like to acknowledge my graduate committee: Dr. Diana Twede and Dr. Bob Lowry. You were patient and kind and I am grateful for your support. I would like to thank the University Administrators who directly and indirectly supported the completion of this work. I would like to thank my father Joseph for passing on his work ethic by example. Finally, I would like to acknowledge my best friend and husband Reg. Finishing my thesis was possible because you pushed me to make the dream a reality. I would not trade our bond for all the light at end of tunnels and pots of gold at end of rainbows. Our love is my reality and I am blessed to share my life with you.

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CHAPTER I

Introduction

Often as consumers, we make demands about what we want in a product or service. We participate in surveys to get our opinions known. We even work with legislators to affect public policy to ensure that a change we want is enacted and enforced. Manufacturers of consumer products face a dilemma where consumers are concerned. While on one hand satisfying consumer desires and needs is a priority, making financial profits is also a necessity.

Manufacturers of food products compete in a saturated market. With this, we understand competition is abundant and any edge a manufacturer can develop will prove useful and profitable.

One of the latest trends to develop in the past few decades is "open dating". An open date informs consumers about the shelf-life of a product by telling them "when the product was packaged or processed, when the product should be sold by the store, or when the product should be used by the consumer"(Food Technology, 1981, p.62). With an open dating code system, consumers are reassured that the product they are using is fresh and safe for consumption.

Open dating is the opposite of current manufacturing practice to use codes that are not easily understood by the consumer. These codes are used more for stock rotation

and assisting in a product recall than for informing the consumer about the product. While information provided by open dating is useful to consumers, is it necessary?

Statement of the Problem

Food endures a lengthy set of activities before it reaches us in useable form. Raw materials are secured and manufacturing plants are engaged to convert the raw materials into products to be sold at retail. Once products are manufactured, trucks carry them to all parts of the country and they are stored in distribution centers awaiting orders from retailers. The final phase in distribution occurs when the retailer secures product, stocks the shelf and awaits purchase by the consumer. There are many steps in the process and therefore lots of opportunity for something to go wrong. A consumer, when purchasing a food item, may want assurance that the product purchased is safe for consumption. Because there are so many activities in the food distribution process, providing consumers information about the life of the product in the form of open dating may help in ensuring its safe consumption.

Purpose of the Study

The purpose of this study was to assess manufacturer perceptions of the use of code date systems as related to consumers and regulatory activity. In order to make such an assessment, several questions were asked. The questions revealed information about the

manufacturer, its demographics, business practices and opinions of legal implications in the food industry. A survey was created to obtain information about the manufacturer. The objectives of the survey were to:

1. Analyze manufacturer awareness and perception of the open dating system
2. Investigate consistency among manufacturers within the food industry in identifying date-related information on packages.
3. Investigate consistency among manufacturers within the food industry in calculating shelf life of products
4. Determine support for open dating regulation

Need for the Study

The Office of Technology Assessment (OTA) conducted a survey in 1978 which found ninety-one percent of consumers interviewed felt that the open date was the most vital piece of information on the package label for fresh meat, and fifty percent thought it was important for frozen vegetables. In another survey, the U.S. Food and Drug Administration (FDA) concluded that in 1979 three-quarters of the consumers participating used an open date when making decisions about product purchases (Food Technology, 1981).

In 1995, Packaging Digest conducted its annual consumer traits survey. The survey revealed "forty-six percent of consumers rely extremely/very much on package labeling when buying a product" (Packaging Digest, 1995). This number has steadily decreased since 1992 when more than fifty-nine percent of consumers rated labeling information as extremely important information. Some may wonder why consumers'

attitudes have changed. Many attribute this effect to consumers becoming more suspicious of label language (although the government is now regulating both health and environmental claims) and therefore, rely less on what the package promises and more on what the package delivers.

Currently, manufacturers mark date codes in different ways: purchase by; use by; enjoy until; fresh for so many days after opening. Some packages state that a product should be used by X number of days after opening, yet, how many people actually write down the date on which they open a package?

More than four-fifths of the surveyed households indicated they would like more information about date codes relative to product usage. When asked about the safety of eating a product after the date code expired, twenty-five percent believed a fresh product should be thrown out on the day of expiration, and sixty percent said it should be tossed within three days. For refrigerated foods, however, only fourteen percent thought the products went bad on its date code expiration, and forty-one percent within three days. With processed foods, consumers are willing to continue using a product well beyond its expiration date code (Packaging Digest, July 1995, pp.23-24).

With so much information about the consumer, how will the manufacturer meet the challenge of satisfying consumer needs? Will it take a regulation or some form of legal impact to show the manufacturer the way to meeting consumer needs?

Federal regulations have been established for many areas of food disclosure, but not open dating. The open dating system has remained a voluntary program at the federal level and there is no universally accepted open dating system for food in the United States. Some areas of the country require no open dating while others require an open

date as specified by state law.

Regulation on the state level typically involves perishable products (breads, milk, dairy, fruits, and vegetables) or infant formula. The state of Michigan defines perishable products as those having a significant risk of spoilage, loss of value, or loss of palatability within ninety days of the date of packaging (Michigan Dept. of Agriculture). Open dating of perishable products is regulated for the determination of the date designation and placement of the information on packages.

Consumers today are continuing to pressure federal agencies to provide as much information about food products as possible, especially information vital to human health. These consumer pressures take on many forms, i.e. economic, political, and social. The need for this research is driven by consumer needs and similar research preceding it. The intention of this project is to research the need to pursue regulatory adoption of date coding, specifically an open date coding system.

Research Questions

The research questions presented in this study were designed to discover manufacturer perceptions and beliefs about open dates on packages. The following were questions that prompted the development of the survey instrument:

1. What are manufacturer perceptions of common open date coding terminology?
2. Do the perceptions vary within the industry?

3. Does the food industry have a consistent measurement and definition of shelf-life?

4. In general, is there support for regulating open dating practices?

CHAPTER II

Review of Literature

Packaging serves many functions for a product. A package may convey a message, it may convince a consumer to make a purchase, and it may protect the product inside. As a result, packaging serves as probably the single most important aspect of a product beyond the physical component of the product itself. Often, we concern ourselves with physical structure as it relates to packaging. It is my intent to use this discussion to address the issue of date coding in the United States.

Date coding is the next step in the process. We must do more than create packaging to protect the product. We must convey useful information to the consumer so that an informed decision can be made with the resources available.

Date coding has often been a source of confusion for consumers. The Food and Drug Administration (FDA) "encourages manufacturers to put product codes on packaging, especially for products with a long shelf life. This code enables the manufacturer to convey a relatively large amount of information with a few small letters, numbers and symbols." (FDA Consumer, April 1995). The first part of the confusion lies in de-coding the manufacturer date code, thereby prompting a move toward open dating.

An open date system is perceived to be a more consumer friendly date system for measuring shelf-life quality.

For the purpose of this research study, the code date terms are defined as follows (Kim, 1996):

Pack date

The pack date informs the consumer when the finished product was packaged, nothing about the age of specific ingredients used to manufacture.

Sell-by date or Pull date

The "sell-by" or "pull" date indicates the last date that a product should remain on the grocer's shelf for sale. Generally a sell-by date anticipates a period of home storage during which the product remains at acceptable quality. The use of this phrase is so popular it was even discussed on the Oprah Winfrey Show in a segment on "Dangerous Foods" which aired April 16, 1996 on the ABC network. The purpose of the show was to evaluate common household food items and their shelf-life.

Ms. Winfrey asked a panel member if it was risky to eat a food product after the sell-by date? The panel member, who was a nutritionist, responded that the sell-by date was an indication for the grocer to pull the product from the shelf. Further, if a consumer bought a product with a sell-by date of today, the food could still be used for another week; up to a week. Later the panel member replied that a use-by date means a product must be used by the date indicated. (Oprah, Harpo, 4/16/96)

"Use-by" / "Best if used by" date

The use-by date is the date in which food becomes inedible or unsafe once the date has been exceeded. After this date, food is no longer at an acceptable level of quality. This

category also includes expiration dates. Expiration dates are regulated by state government agencies for perishable items such as milk, bread, and eggs. FDA regulates only the expiration dates of infant formula.

Considering proper storage and handling of the product, the purpose of open dating is to provide the consumers with information related to expected shelf-life and quality of the product. However, consumers are often unable to detect any quality changes in a product until the protective packaging is removed prior to use. While these quality changes may not endanger health, consumers may find varying degrees of dissatisfaction. "Lower product quality affects consumers, who do not receive full value for their food dollar". (Food Technology, 1991) Obviously, the consumer is looking for some reassurance as to the freshness of a product.

Open dating may help with providing useful information to the consumer, but it may also distort value judgments. In a related article, a mother had this to say: "I can always judge a store by the quality of its meats and I didn't like the meat in that store (referring to an urban market). It didn't smell fresh. And if I don't like the meat, I'm suspicious of everything else in the store". (Food Processing, July 1997) For grocers, it may seem that it is of critical importance that the meat and produce they sell is fresh. However, a consumer may try to assess this question: how can identical prices equitably be assigned to products, which are not identical in age? The question is quite relevant. If we can assume that consumers are more knowledgeable about nutrition and that they are able to read labels more easily, then what comes to question is the consumer's overall understanding of product nutrition as it relates to shelf-life. A consumer will need to

understand what transpires in the food distribution process and what factors are considered by the manufacturer.

Money is a concern of the manufacturer. In all honesty, bottom line profits determine who will stay in business and who will fold. Inevitably, providing useful information to consumers in the form of open dating will require added costs to the food industry. In addition to existing direct costs related to waste, returns, and expenses in quality control, (pinpointing and handling the detected quality problems) other costs will be incurred. "The retailers or wholesalers have no incentive to move products through the stores because they usually make any incremental profit when they receive the shipment, via promotional payments. They could care less if it sells, and if it doesn't, they will just return it to the manufacturer. This may be why about twenty-five percent of products turn less than one unit per month in grocery stores". (Food Processing, October 1997) This quote points to the need for the manufacturer to get involved in this issue. The manufacturer cannot simply rely on the retailer to move product through proper stock rotation, as ultimately, in the consumer's mind, the manufacturer is responsible for the product.

Often, manufacturers ship their products from a single plant facility to a regional distribution center. The regional centers are then responsible for selling the products to food brokers or supermarket chains, which in turn deliver the products to various warehouses in the distribution system. At this point, the product is delivered to a supermarket storeroom, then to the grocery shelf, and finally to the consumer's home, where it is further stored prior to consumption. At various points in the distribution channel, abuse to food products due to changes in temperature or humidity may cause

loss of quality. For example, a food product may change trucks four times before appearing on a grocer's shelf. This does not include the final trip of removing product from a store shelf and driving it home for later consumption. How can a consumer be certain that each truck was refrigerated properly (in the case of perishable or frozen products) during each phase of the distribution process? They can't. The manufacturer does not even have control over this process. In the consumer's mind, the responsibility for quality product lies with the manufacturer, even if quality defects are due to poor handling in the distribution chain or at the retail level.

Some manufacturers are finding benefits to using an open date system. In 1994, Pepsi Co. started a media blitz when it introduced "freshness dating" for its soda product line. The freshness stamp was created to give consumers information about the product. "With freshness dating, consumers will understand why a product may taste off. The investment in consumer education will not come wholly free, some product will have to be pulled". (Magiera 1994) The attention given this marketing strategy along with updated packaging graphics, means bottlers must dedicate even more resources to checking in-store codes. Some bottlers fear freshness dating will lead consumers to pull apart neatly stacked displays in search of the freshest package. However, other manufacturers may have a different strategy.

The premise behind open dating is that consumers can use dates that are given on food packaging to obtain useful information. In contrast, a closed date will not give the consumer information desired. The Anheuser-Busch Company looks at the scenario a bit differently by openly providing open date information to consumers. On the heels on

the Pepsi "freshness dating" campaign, Anheuser-Busch highlights the following activities to ensure the consumer is getting the freshest product possible.

1) Minimize shipping time by establishing a series of regional breweries rather than concentrating all brewing operations at one or two national sites.

2) Store fresh beer in warehouses and other holding areas that are environmentally controlled and maintained.

3) Mark each can and bottle with a brew date or 'pull date' and establish a rigid policy defining a "freshness standard" time between time of brewing and time of consumption.

4) Create and maintain a full-time, no-exceptions rotation management system, which makes sure that all unsold beer is taken off the shelf or out of the cooler as soon as it reaches the time limits of quality and freshness.

Before rolling out this program, Anheuser-Busch published de-coding information on the internet's world wide web for consumers to use. The information provided clues to determine or de-code the pack dates of several beer manufacturers. The web site was a success, which transcended into the advertising arena. "Our senior management felt that a clearly marked freshness date would enhance the consumer appeal of Miller products." (Http://www.budweiser.com) If some manufacturers have found such measurable success, why is this practice not adopted industry wide?

History of Regulations

Technology has advanced civilization in such a way that it is hard to imagine a world without modern conveniences. Consumers take food safety for granted. It is our expectation that the manufacturer and retailer are doing what is necessary to provide us

with food that is wholesome and safe. While many organizations exist today to ensure food safety, the concept was unknown at the end of the nineteenth century.

America was booming and an agricultural economy was being introduced to an industrial economy. More and more people moved to urban-populated areas, which changed the nature of food distribution. Gone were the days of growing food on private land to provide for the family. America was more industrialized, and as such, new food distribution efforts became necessary.

As people moved away from agriculture and farm land, something new was needed to ensure food distribution to the urban areas. Food would travel over longer distances and in this time in history, the only means of refrigeration was ice. Sophisticated trucks and chemical preservation were unmanaged and uncontrolled and consumers were not protected from adulterated food as we are today. However, food was not the only product affected.

Medical knowledge was limited and consumers often resorted to "Kick-a-poo Indian Sagwa" and "Warner's Safe Cure for Diabetes" as remedies for various ills (Burkholz 1994). There were no laws for labeling products. Many medicines were laced with drugs such as opium, heroine, cocaine, and morphine. These products made many claims, and eager consumers were going to realize that change was needed, unfortunately very painfully.

"Food is adulterated if it is produced in an unsanitary plant, contains ingredients or additives harmful to human consumption, or contains decomposed, putrid, or filthy portions." (Meier 1995) The first law on the books for adulteration dates back to 1784 when Massachusetts enacted a general law against food adulteration. However, Wallace

F. Janssen (FDA Historian) notes that as far back as 1630, the Massachusetts Bay Colony convicted Nicholas Knopf of "selling a water of no worth nor value as a cure for scurvy" (Burkholz 1994). He was sentenced to pay a fine or be whipped. More and more, states began to create food and drug statutes but it soon became apparent that a national law would be required. However, the national government seemed to carefully avoid the federal responsibility and jurisdiction of food and drug laws.

During the Mexican War (1846 - 1848), a crisis developed over medicines for the troops and Congress was forced to action. Congress enacted a law that banned adulterated drugs from being offered for import. It would be another thirty years before Congress would consider a general food law, and it may have never happened without the work of Harvey Washington Wiley.

Dr. Harvey Wiley became chief of the Bureau of Chemistry of the U.S. Department of Agriculture in 1883, after leaving a post at Purdue University. In this new role, Wiley worked with a group of chemists to obtain evidence of widespread adulteration in food and drugs. "Twelve young male employees of the Department of Agriculture volunteered to test the safety of food additives. The group became known as the 'Poison Squad' because they ate meals laced with substances and were tested for adverse effects"(Meier 1995). After going public with their findings, many national publications aroused public opinion with the reports. One major book, which is still referenced today, changed the way consumers looked at food products and helped Wiley in his campaign for a federal food and drug law.

Upton Sinclair's, *The Jungle*, described vividly the filthy conditions under which the nation's meat supply was prepared. Consumers were displeased and public signs of

indignation became apparent when meat sales dropped by half. Opposition to food and drug laws came primarily from food manufacturers and makers of patent medicines. Due to overwhelming consumer outcry, then president Theodore Roosevelt helped to push a meat inspection bill and a food and drug law through Congress. The law became known as the Pure Food and Drug Act of 1906.

Jurisdiction over the new law was assigned to Dr. Wiley and the Bureau of Chemistry. This group enforced the 1906 law until 1927 when the Food, Drug, and Insecticide Administration was formed, later renamed the Food and Drug Administration in 1931. In 1940, the FDA was transferred from the U.S. Department of Agriculture to the Federal Security Agency. In 1953, the Federal Security Agency became known as the Department of Health, Education, and Welfare and later the Department of Health and Human Services.

"The United States Department of Agriculture (USDA) specifically the Food Safety and Inspection Service (FSIS) is responsible for enforcing regulations on meat and poultry, and the Food and Drug Administration (FDA) is responsible for all other food products. The mission of the FDA is to ensure that: (1) foods are safe, wholesome, and sanitary; human and veterinary drugs, biological products, and medical devices are safe and effective; cosmetics are safe; and electronic products that emit radiation are safe; (2) regulated products are in compliance with the law and FDA regulations; noncompliance is identified as corrected; and any unsafe or unlawful products are removed from the market" (Meier 1995)

There have been many critics of the FDA over the years and even more of the laws they enforced. The 1906 Pure Food Law, while strong for its time, was filled with

loopholes which made it hard for judges to prosecute manufacturers. The Roosevelt Administration made attempts to revise the law, but it would take another disaster before anything would be accomplished. In 1937, the Massengill Company came under fire when a drug it produced caused the death of many people.

In an effort to create a new "wonder drug", the Massengill Company shipped 240 gallons of "Elixir Sulphanilamide", an ethylene glycol/water mixture flavored with raspberry extract. Shortly thereafter, people started dying and the count was up to 107 when the last bottle was recovered in a recall. Massengill had not tested its new product, but relied on the knowledge of each of its components. What Massengill learned was that "two purportedly safe ingredients were highly lethal in combination." Within months of the "Elixir" disaster, Congress finally passed the Federal Food, Drug, and Cosmetic Act. The law became effective June 1938.

The new Act was a vast improvement over the Pure Food Law of 1906, although compromises were made to ensure passage. The improvements are outlined as follows:

- Cosmetics and therapeutic devices were regulated for the first time.
- Proof of fraud was no longer required to stop false claims for drugs.
- Drug manufacturers were required to provide scientific proof that new products could be safely used before putting them on the market.
- The addition of poisonous substances to foods was prohibited except where unavoidable tolerances were authorized for residues of such substances, as in the case of pesticides.
- Specific authority was provided for factory inspections.
- Food standards were required to be set up when needed to promote honesty and fair dealing in the interest of consumers.

- Federal court injunctions against violations were added to the previous legal remedies of product seizures and criminal prosecutions. (Burkholz 1995)

Now that testing new "wonder drugs" fell under the jurisdiction of the new Act, the FDA's workload was expanded. Consumers were still being used as human guinea pigs for a number of chemical compounds of unknown safety. The FDA made many efforts to stop the practice, but the research effort needed to prove that all food chemicals were safe was clearly beyond its resources. Congress would be asked to take action again. Representative James T. Delaney of New York chaired a series of hearings on the dangers of chemicals in food. From these hearings came the following amendments, which changed the character of the existing food and drug, laws: the Pesticide Amendment of 1954, the Food Additives Amendment of 1958, and the Color Additive Amendment of 1960.

The responsibility for research fell on the manufacturer. What once seemed unmanageable became manageable and consumers had been given an immeasurable amount of improved protection. Gone were the days when violations could only be proven after injuries had been reported. It was a good time for America and consumer protection. For the first time, a consumer could rest assured that no substance could be legally introduced in the U.S. food supply unless there had been a prior determination that it was safe. The trend was now moving toward preventative law, and activity continued.

Although the Food, Drug, and Cosmetic Act of 1938 served its purpose, it requires constant revision in order to keep in line with current scientific, economic, and social realities. In 1980, serious illness in babies due to mineral deficiency caused

Congress to pass an Infant Formula Act requiring strict controls to ensure the national content and safety of commercial baby foods. Just two years later in 1982, the FDA developed and issued regulations requiring tamper-resistant packaging. Congress passed a law making it a crime to tamper with packaged consumer products after seven people died of cyanide poisoning traced to Tylenol pain-relief capsules. Not many years pass without some change to the Act as evidenced by historical activity. With the passage of the original law and its continuing amendments, the federal government confirmed the need of people to protect themselves from the commercial adventures of others.

It was this previous regulatory activity which eventually led to the proposed ruling of the Food and Drug Administration in December 1979. *Docket No. 78N-0158 of the Federal Register* outlines the agency desire to regulate ingredient labeling, nutrition labeling, open date labeling, food fortification, safe and suitable ingredients and the total food label. After more than a decade of debates and public hearings, only a small portion of the proposed ruling became an Act. The Nutrition Labeling and Education Act was the direct result of the proposed ruling and focused primarily on nutrition labeling and educating consumers. The FDA issued a final rule on January 4, 1990 outlining requirements for manufacturer compliance. Finally, the public had access to information regarding the foods they were consuming.

CHAPTER III

Research Methodology

The Research Questions

The following six questions provided the foundation to create a survey instrument which would provide open and critical feedback from manufacturers. From these, thirty-four questions were developed to measure manufacturers awareness of date coding systems and their acceptance of the practice of using date codes. The questions are:

1. Are manufacturers aware of open dating and how it is used?
2. What do manufacturers know or believe about consumer product usage trends?
3. What are manufacturer's perceptions of open date coding terminology?
4. Do the perceptions vary within the industry?
5. Is there a consistent model used among food industry manufacturers in calculating shelf life of products?
6. In general, is there support for regulating open dating practices?

The Survey Instrument

The instrument was created to obtain information about the manufacturer's understanding of date coding and their perception of related activities associated with the use of date codes. The investigator developed it with input from the thesis committee and

feedback from industry representatives participating in research programs sponsored by Michigan State University. The survey was distributed by mail to packaging professionals in various segments of the food industry, including snackfoods, main meal, infant products, and confection. A follow-up letter was sent to each participant who received the initial survey instrument in order to encourage participation. The survey was initially distributed in August 1996 and closed with final feedback received in December 1996.

The survey instrument was divided into six sections including a section on manufacturer profiles. Profiles were assessed by using the following categories: size, annual sales, products manufactured, opinion of store selling practices, and opinion of consumer use of products. The remaining sections are outlined as follows:

Section One: Use of Date Codes

Section one of the survey evaluated a manufacturer's use of date codes by asking if they are used. An affirmative response required the survey participant to complete the section by answering questions about the benefits and drawbacks of the specific date code used by the manufacturer. The responses, when provided, were open-ended.

Section Two: Search for Date Code Processes

Section two of the survey evaluated a manufacturer's choice not to use date codes. This section was only to be completed if a manufacturer answered no in section one. None of the survey participants completed section two of the survey.

Section Three: Date Code Terminology

Section three of the survey asked participants to evaluate various types of date codes for each product category. The date code types were; date packaged, sell-by date, use-by date, and a time-temperature indicator. Manufacturers were asked which date code method was most appropriate for the following product categories: perishable, semi-perishable, and shelf-stable products.

Section Four: Shelf-Life

Section four of the survey instrument evaluated each manufacturer's method of establishing shelf-life. The participants were asked to describe what method the manufacturer used. The information was gathered to determine if a standardized method exists in the industry.

Section Five: Regulatory Impact

Section five asked the participants to evaluate the necessity of regulatory influence on the use of date codes. Participants were asked to highlight known current initiatives and the success of these initiatives.

Population and Sampling

The sample for the study consisted of twenty-six manufacturers in the food industry population. The manufacturers produced products in each food category; perishable, semi-perishable, and shelf-stable. The survey participants were selected

randomly using the 1995 Who's Who and What's What Among Packaging Professionals, a publication resource published by the Institute of Packaging Professionals. The overall industry of choice was food. However, products manufactured represented meats, snackfoods, infant formulas, cereal/breakfast items, beverages, main meal, and others.

The data were collected over a period of twenty weeks. Initial mailings of the survey instrument were distributed to fifty manufacturers with a deadline eight weeks away. The fifty manufacturers represented a target group of the overall population of food manufacturers. As the deadline approached and response was low (10 responses), a reminder letter and an additional copy of the survey instrument were distributed to those manufacturers who had not responded. In the end, more than half of the solicited target group responded with completed surveys and the sample size was determined to be 26 manufacturers.

Data Analysis

This investigator used the Statistical Package for the Social Sciences (SPSS) for data analysis. The results of the data analysis are reported in the next chapter.

Limitation of the Study

The study to evaluate manufacturer's use of date codes was limited to those company representatives who received the survey instrument between August and October of 1996. The results may not represent the food industry entirely, since a small percentage of manufacturers in various segments were sampled. The responses given by the company representatives are assumed to be valid and the perceptions may be those of

the individual and not the company represented. The study is limited to information obtained from manufacturer responses to the survey instrument and a review of literature. The survey instrument was assumed to be a valid mechanism of obtaining specific information from survey participants. Some of the companies were producers in two or three categories of perishability. It became necessary to interpret their responses as representing the company in each of the categories. Therefore, for some perishability questions, the sample size was taken as 34 rather than 26. The survey instrument used in this study can be found in Appendix A.

CHAPTER IV

Analysis and Interpretation of the Data

Demographic Data

The food manufacturing industry is a huge one indeed, with 9,329 companies and a total value of shipments of more than $406 billion reported in 1992. The 1992 Census of Manufactures, Subject Series – Manufacturing (http://www.census.gov) categorizes food and kindred products into nine areas: meat, dairy, preservatives, grains, bakery, sugar, beverage, and miscellaneous. Participants in this study represented eight of the nine categories. Following is a discussion about the profiles of the manufacturers, looking at sales, size, and product portfolio.

Table 1 shows that the annual sales of manufacturers participating in the study were in the ($1 million - $1 billion) and ($1 billion +) range:

Table 1. Distribution of Manufacturers by Annual Sales

Sales	Frequency	Percent of Sample
$1 billion +	14	53.8
$1 million-$1 billion	12	46.2
Total	***26***	***100***

Table 2 shows that the majority of manufacturers participating in the study had a company size over 1,000. About 31% were in the 1,000 - 4,999 category, and about 39%

had a company size greater than 5000. The remaining responses were probably divisions of a larger company or small private firms.

Table 2. **Distribution of Manufacturers by Number of Employees**

Number of Employees	Frequency	Percent of Sample
5000+	10	38.5
1000-4999	8	30.8
500-999	6	23.1
0-500	2	7.7
Total	***26***	***100***

Survey participants were asked to classify products manufactured into three categories: perishable, semi-perishable and shelf-stable. Perishable products were described as fluid milk products, fresh baked goods, fresh meats, fish, poultry, fruits and vegetables. Semi-perishable products included snack foods, cheese, ice cream and packaged meats. Shelf-stable products were described as dried legumes, nuts and grains, pasta, cereals, and canned goods. In responding to the survey, twenty participants reported manufacturing products in one category, four participants reported manufacturing products in two categories and two participants reported manufacturing products in all three categories. This created a situation in which six participants reported as if they represented a separate company for each category. As a result, the data will show thirty-four category responses from twenty-six survey participants.

Table 3 shows the distribution of products manufactured by survey participants. Most of the survey participants manufactured semi-perishable and shelf-stable products.

Table 3. **Distribution of Products Manufactured**

Product Category	Frequency	Percent of Sample
Shelf-Stable	14	41.2
Semi-Perishable	14	41.2
Perishable	6	17.6
Total	***34***	***100***

Distribution system pipeline timing describes the amount of time from the point the product is manufactured to the point where a consumer purchases the product at retail. This timing would include storage at the manufacturing site, transportation to a distribution site, delivery to a customer warehouse, and stocking the product on the store shelf (distribution pipeline activities). Table 4 shows the majority of manufacturers allow more than six months from the time of production for products to be sold at the store.

Table 4. **Time Allowed for Products to be Sold At the Grocery Store**

Time in Food Distribution Channel	Frequency	Percent of Sample
6 months +	16	61.5
1-6 months	8	30.8
Missing Data	2	7.7
Total	***26***	***100***

It is expected that perishable and semi-perishable manufacturers would allow less time for their products to be sold at the grocery store than shelf-stable manufacturers. To test this theory, a Chi-square test was used to determine if there was a contributing effect of product category manufactured on time allowed for products to be sold at the grocery store (with a null hypothesis = no effect). The results yield p= .009. A value of $p < 0.05$ means that the effect tested does affect the result. Therefore, the food category produced by a manufacturer was a contributing factor in the time allowed for products to flow through the distribution channel to be sold at the store. In the cross-tabulation evaluating time for products to be sold at the grocery store and the food product category manufactured, shelf-stable and semi-perishable manufacturers accounted for most of the responses. As expected, the more shelf-stable the product, more time is allowed to sell the product at retail. Table 5 shows the results:

Table 5. **Category Manufactured vs. Time to Sell Product**

Category Manufactured	1-6 months	6 months +	Missing Data	Total
Shelf-Stable		12	2	14 (41.2%)
Semi-Perishable	6	6	2	14 (41.2%)
Perishable	3	2	1	6 (17.6%)
Total	***9 (26.5%)***	***20 (58.8%)***	***5 (14.7%)***	***34 (100%)***

Table 6 shows that half of the manufacturers reported their products remained in consumer's homes 1-6 months after purchase. This is consistent with the demographics showing the majority of participants manufactured semi-perishable and shelf-stable products.

Table 6. **Length of Time a Consumer Stores Product in their Home**

Time to Store Product	Frequency	Percent of Sample
1-6 months	13	50.0
1-2 weeks	7	26.9
2-3 weeks	2	7.7
3-4 weeks	1	3.85
6 months +	1	3.85
1-6 months, 6 months +	1	3.85
Missing data	1	3.85
Total	***26***	***100***

One might assume perishable manufacturers expect consumers to store their product for 1-2 weeks, while semi-perishable and shelf-stable manufacturers would expect longer storage. A Chi-square test of product category manufactured vs. time allowed for consumers to store products at home was used to determine if the product category was a contributing factor. The results yield $p = .017$. Since $p < 0.05$, we can say the product category manufactured was a contributing factor in the choice of time allowed for consumers to store product at home. Table 7 shows the results in a cross tabulation.

Table 7. **Time to Store Products at Home vs. Product Category Manufactured**

Category Manufactured	1-3 weeks	3-4 weeks	1-6 months	Missing Data	**Total**
Shelf-Stable		1	12	1	**14**(41.2%)
Semi-Perishable	8		5	1	**14**(41.2%)
Perishable	2		3	1	**6** (17.6%)
Total	***10 (29.4%)***	***1 (3%)***	***20 (58.8%)***	***3 (8.8%)***	***34 (100%)***

Table 7 shows that a majority of the study participants expected consumers to store their products for one to six months after purchase. The results suggest there is a relationship between manufacturer expectations of product storage and categories of products manufactured.

Section One: Use of Date Codes

The first section of the survey asked about manufacturer use of date code systems and their opinions about the effectiveness of date coding. Manufacturers often date a product to inform consumers of its shelf-life or for use as an internal tracking system. All respondents use a date code on their products. The choice of date code style varied with almost as many manufacturers choosing open dating as closed dating. Many manufacturers used open and closed dating. The results are displayed in Tables 8 and 9:

Table 8. **Manufacturers Who Use Date Codes On Products**

Use Date Code?	Frequency	Percent of Sample
Yes	26	100
No	0	0.0
Total	***26***	***100***

Table 9. **Manufacturers Date Code Choice of Style**

Style of Date Code	Frequency	Percent of Sample
Closed Date	10	38.5
Open Date	9	34.6
Open & Closed Date	7	26.9
Total	***26***	***100***

The following were manufacturer responses when asked why a specific date code style was used:

For manufacturers who chose open dating, the following were given as reasons:

- Marketing advantage....only brewer to do so
- Consumer needs it for safe use of products
- Product shelf-life
- Informs consumer
- Assist retailers with stock rotation
- Force good internal inventory practices
- Provide fresher products to consumer
- Competitors made conversion to open dating
- It is a company policy to use open dating

- Driven by retail pressure and competition
- There is a "good" quality perception by consumers

For manufacturers who chose closed dating, the following were given as reasons:

- Product traceability in case of a recall
- It's what the leading manufacturer in our industry does
- Minimize buy-back costs
- Shelf-life exceeds 2 years
- Traceability of production/shelf-life of product

For manufacturers who chose open and closed dating, the following responses were given as reasons:

- Depends on the marketing strategy of our customer (retailer)
- Our customers (retailers) dictate what coding system to use
- Open date reassures consumers about product safety while closed dating provides batch and production information
- At times we will use both on a product for our tracking and consumer use
- Consumer/retailer demand dictates it

Table 10 shows most manufacturers believe there is an advantage to using one date code system over the other.

Table 10. **Advantages of Open vs. Closed Date Codes**

Advantage?	Frequency	Percent of Sample
Yes	18	69.2
No	5	19.2
Missing Data	3	11.5
Total	***26***	***100***

To determine if the choice of date code was a contributing factor in the perceived advantage of using one code system over the other, a Chi-square test was used. The test evaluated date code choice of the manufacturer vs. advantage of using one code system over the other. The results yield $p = .267$. Since $p > 0.05$, we cannot say that the date code choice of the manufacturer was a contributing factor in the perceived advantage of using one date code system over the other. The feedback from manufacturers indicates a perceived advantage regardless of the date code choice selected. The following were manufacturer responses regarding the perceived advantage of using one system over the other:

- Less returned product (closed)
- Consumer ease of use and safety (open)
- Open codes provides consumers with the freshest product
- Product performance and flavor are best when used by sell date
- Closed date is more confidential to the manufacturer, allows tracibility
- Closed dates may save costs if inventory controls are poor

The information above shows that the choice of date code style can be rationalized both positively and negatively. The results are shown below in Table 11.

Table 11. **Choice of Date Code vs. Advantage of One Coding System Over the Other**

Date Code Used	No	Yes	Missing Data	Total
Closed	1	7	2	10 (38.5%)
Open	1	7	1	9 (34.6%)
Both	3	4	0	7 (26.9%)
Total	**5 (19.2%)**	**18 (69.2%)**	**3 (11.5%)**	***26 (100%)***

Table 11 shows that manufacturers who used open, closed, or both date code styles perceived an advantage of using their code style over another. The choice of date code does not affect the perception of advantage of using one date code system over the other.

Next, manufacturers were asked if sales of their products have been affected by providing consumers with date information. Table 12 shows that the majority of manufacturers perceived no effect on sales by providing date codes to consumers.

Table 12. Manufacturer's Perception of the Effect on Sales

Affect Sales?	Frequency	Percent of Sample
No	16	61.5
Yes	4	15.4
Missing Data	6	23.1
Total	***26***	***100***

While most manufacturers did not perceive an effect on sales of their date code choice, contrary comments received from manufacturers were: "too soon to tell, but positive trend" and "absolutely, we are moving product every week." There was one participant who indicated sales had been affected, but the situation was not positive. It turns out that store returns of unsold product affected sales negatively.

Next, manufacturers were asked to respond to open-ended questions based on their previous responses. The question assessed the manufacturers perceived benefits/drawbacks of the date code system utilized by their company. A semi-perishable

manufacturer responded to the draw-backs of open dating. "The consumer is free to choose product with most/longest code date, therefore, product with less date often expires before it is sold." A shelf-stable manufacturer responded similarly, "open date codes result in products being pulled from the store shelves at the expiration date. Grocery chains take credit for product and charge disposal fees through reclamation centers." Another shelf-stable manufacturer recognized the benefits of stock rotation. "The benefits would be to clearly identify shelf-life and pull dates for the sales force." Overall, manufacturers who used open dating believed consumers perceived they were getting the freshest product available.

A manufacturer who used closed dating considered the possibilities as a benefit. "The manufacturer can re-evaluate product acceptability near end of shelf-life and consider extending shelf-life." Another benefit noted was that closed dates were good for internal purposes, allowing "effective auditing and production control." For manufacturers who used closed dates, the benefits were mostly in the area of product traceability (in the event of a recall) and internal tracking. However, there were many comments about the drawbacks of using a closed date. The consensus was that closed date codes did not provide useful information to the consumer.

The final question in section one asked manufacturers to rate public opinion of their choice to use date codes. Almost half of the manufacturers responded that consumers were "indifferent" to their choice to use date codes, as seen below in Table 13. About 19% believed consumers were "somewhat favorable" and approximately 35% believed consumers were "favorable" to their use of date codes on products.

Table 13. Manufacturer's Perception of Public Opinion

Public Opinion	Frequency	Percent of Sample
Indifferent	12	46.2
Favorable	9	34.6
Somewhat Favorable	5	19.2
Total	***26***	***100***

It is interesting to note that no survey participant indicated public opinion about their use of date codes would be unfavorable. Earlier, eighteen manufacturers indicated a perceived advantage to using a date code. As such, it might be expected that some of the consumers would have an unfavorable or somewhat unfavorable opinion, especially when considering closed date codes. However, a Chi-square test of date code choice style vs. public opinion of choice yields: $p = .012$. Since $p < 0.05$, the results show that the choice of date code style is correlated with the perception of public opinion of that choice. Table 14 shows that manufacturers using closed dates perceived consumers public opinion would be indifferent, while manufacturers using open dates perceived a favorable or somewhat favorable public opinion about their choice of date code by the consumer.

Table 14. **Manufacturer's Date Code Choice vs. Perception of Public Opinion**

Date Code Used:	Indifferent	Somewhat Favorable	Favorable	Total
Closed	8	2		10 (38.5%)
Open	1	3	5	9 (34.6%)
Both	3		4	7 (26.9%)
Total	***12 (46.2%)***	***5 (19.2%)***	***9 (34.6%)***	***26 (100%)***

Section Two: Why Not Use Date Codes?

Section two of the survey instrument evaluated companies who did not use date codes. Participants who completed section one were asked to skip section two and proceed to section three. The five questions in section two were designed to assess the opinion of manufacturers who did not use date codes. Similar to section one, the investigator was looking for the manufacturer to provide information about the effect on sales and public opinion, considering their choice not to use date codes. There were no respondents in this section. Each survey participant indicated use of date codes.

Section Three: Open Date Techniques

Several surveys have been conducted to assess consumer knowledge of date codes and their usefulness. Many reports have concluded that consumers, in general, are confused about which designation is most useful for a particular food category. Section three of the survey evaluated manufacturer responses to questions about open date designations on packages. The purpose of the questions was for the manufacturer to classify each designation by product category, drawing on his or her own expertise in the food category. Responses to the questions are expected to give consumers useful information about how the open date designations should be used.

Four open date categories were described for the participants:

- ⇒ A ***date packaged*** is the day, month, and year the product was processed and packaged for retail sale.
- ⇒ A ***sell-by date*** (best if sold by) is the last date a product should be sold in order to allow a reasonable length of time for consumer use.
- ⇒ A ***use-by date*** (best if used by, recommended last consumption date, expiration date) is the date after which the product is no longer at its most acceptable level of quality.
- ⇒ A ***time-temperature indicator*** changes its color or shape to let you know whether the product has been exposed to temperatures or conditions that would make it go bad.

Manufacturers were asked to choose the most appropriate open date designation, using the preceding descriptors, for each product category. The survey participants were

asked to respond in each product category, although the manufacturer may not produce food items in each category. For the perishable category, the majority responded that a "use-by date" is most appropriate as seen in Table 15:

Table 15. Distribution of Open Date Designations for Perishable Products

Category Designation	Frequency	Percent of Sample
Use-By Date	15	57.7
Sell-By Date	5	19.2
Time Temperature Indicator	2	7.7
Missing Data	2	7.7
Date Pkg'd + TTI	1	3.8
Use-By + TTI	1	3.8
Total	***26***	***100***

For the semi-perishable category, the responses were more mixed. Table 16 shows that the majority chose a "use-by date" for this category, while many chose a "sell-by date". Manufacturers are divided on which designation is best for this product category.

Table 16. Distribution of Open Date Designations for Semi-Perishable Products

Category Designation	Frequency	Percent of Sample
Use-By Date	12	46.2
Sell-By Date	10	38.5
Date Packaged	1	3.85
Time Temperature Indicator	1	3.85
Missing Data	2	7.7
Total	***26***	***100***

For the shelf-stable category, more manufacturers chose a "use-by date" but many chose a "date packaged" designation. Table 17 outlines the results for the shelf-stable category as follows:

Table 17. Distribution of Open Date Designations for Shelf-Stable Products

Category Designation	Frequency	Percent of Sample
Use-By Date	11	42.3
Date Packaged	8	30.8
Sell-By Date	4	15.4
Time Temperature Indicator	1	3.8
Missing Data	2	7.7
Total	***26***	***100***

The remaining questions assessed manufacturer opinion of consumer use of products. For a particular food category and open date designation, participants were asked if they expected consumers to use a product after the open date designation.

Manufacturer opinions of consumer use of a product were evaluated in each food category. Table 18 summarizes the results below:

Table 18. Expect Consumer to Use Product After Expiration?

	No	Yes	No Response	Total
Perishables	**14** (53.8%)	**7** (26.9%)	**5** (19.2%)	26
Semi-Perishables	**9** (34.6%)	**11** (42.3%)	**6** (23%)	26
Shelf-Stable	**11** (42.3%)	**12** (46.2%)	**3** (11.5%)	26
Overall Total	***34*** ***(43.6%)***	***30*** ***(38.5%)***	***14*** ***(17.9%)***	***78*** ***(100%)***

Overall, table 18 shows more manufacturers did not expect consumers to use their products after the expiration date. The results were more mixed when looking at the semi-perishable and shelf-stable categories. However, about 54% of the manufactures did not expect consumers to use perishable products after the use-by date.

Section Four: Shelf-Life

Section four evaluated manufacturers use of shelf-life techniques. Shelf-life is often defined as the term or period during which a stored product remains effective, useful, or suitable for consumption. Generally, there are three models employed when determining shelf-life: real time, accelerated time, or predicted time. The real time model evaluates product shelf-life by observing product during its actual use. The product is measured over a period of time of its actual use to determine how long it takes for the product to spoil. An accelerated time model utilizes equipment that is able to expose the product to high or low temperatures, by subjecting it to vibration, dropping or stacking at levels higher than normally encountered. Shelf-life is established based on the results of these accelerated tests. Finally, a predicted time model uses a calculation to determine shelf-

life. Knowing information about variables to be evaluated (e.g. time, characteristics of the product, and packaging), theoretical assumptions regarding shelf-life can be determined by using an equation. There are also computer models that can be used to aid in shelf-life prediction.

Shelf-life is affected by many variables. These variables include production environments, packaging materials, product characteristics, shipping, and storage. The manufacturer will want to establish a shelf-life for his product that mirrors his distribution process. Doing so will efficiently deplete inventory and allow for the product to be sold at retail in a reasonable amount of time. While the consumer will want the shelf-life to be long enough to include the amount of time required to use the product, this may not be a goal of the manufacturer because it is hard to determine the length of time required and consumer use patterns.

Manufacturers were asked to share the process they use to determine shelf-life. Almost half of the respondents commented on the confidentiality of providing shelf-life methods. Table 19 shows half of the respondents used a real-time model to determine shelf-life. The results further show there is not one consistent method of determining shelf-life of food.

Table 19. Distribution of Manufacturer Shelf-life Process

Shelf-Life Process	Frequency	Percent of Sample
Real Time	13	50
Accelerated Time	3	11.5
Combination of the above	6	23.1
Other	3	11.5
Missing Data	1	3.85
Total	***26***	***100***

A Chi-square test of product category manufactured vs. manufacturer choice of shelf-life method yields: $p = .392$. Since $p > 0.05$, the product category manufactured is not a contributing factor in the choice of shelf-life method used. Although the majority of manufacturer's responses show real time shelf-life method as the preferred calculation, Table 20 shows that the use of a specific shelf-life method was not consistent in a food product category:

Table 20. Product Category vs. Shelf-Life Method Used

Products Manufactured	Real Time	Accelerated Time	Other	Combinatio	Missing	Total
Semi-Perishable	9	1	1	3		14 (41.2%)
Shelf-Stable	7	1	2	4		14 (41.2%)
Perishable	2	2	1		1	6 (17.6%)
Total	***18 (52.9%)***	***4 (11.8%)***	***4 (11.8%)***	***7 (20.5%)***	***1 (2.9%)***	***34 (100%)***

Section Five: Regulatory Implications

Section five is the final section in the survey instrument. This section asked questions in the area of regulatory support and legislation as it relates to the topic of date coding. The first question in section five is a follow-up to section four. Participants were asked if it was necessary to have a standardized formula or test method when calculating shelf life. The question was asked of each manufacturer for each product category. Table 21 shows the majority of manufacturers responded that it was necessary to have a standardized formula or test method to calculate shelf-life in each product category:

Table 21. Standardized Formula or Test Method to Determine Shelf-Life?

Product Category	No	Yes	Missing Data	Total
Perishable	9 (34.6%)	12 (46.2%)	5 (19.2%)	26
Semi-Perishable	8 (30.8%)	13 (50%)	5 (19.2%)	26
Shelf-Stable	10 (38.5%)	12 (46.2%)	4 (15.4%)	26

The next question in this section assessed the support for using a standardized format (printing, language, location on package, similar to NLEA) when identifying date information on packages.

Table 22 shows that the majority of manufacturers responded it was necessary to use a standardized format for identifying date information on packages in perishable and semi-

perishable food categories. However, the majority of manufacturers did not support the necessity to have a standardized format for packages in the shelf-stable food category.

Table 22. Standardized Format for Identifying Date Information on Packages?

Product Category	No	Yes	Missing Data	Total
Perishable	10 (38.5%)	14 (53.8%)	2 (7.7%)	26
Semi-Perishable	11 (42.3%)	13 (50%)	2 (7.7%)	26
Shelf-Stable	15 (57.7%)	11 (42.3%)	0	26

Participants were asked if they would support legislation to require open dating for each of the product categories. Table 23 shows that the majority of manufacturers would support legislation requiring open dating for the perishable food category. While manufacturers were divided on the issue of supporting legislation in the semi-perishable category, most manufacturers would not support legislation for the shelf-stable food category.

Table 23. Support Legislation Requiring Open Dating for Each Product Category?

Product Category	No	Yes	Missing Data	Total
Perishable	9 (34.6%)	16 (61.5%)	1 (3.85%)	26
Semi-Perishable	12 (46.2%)	13 (50%)	1 (3.85%)	26
Shelf-Stable	20 (76.9%)	6 (23.1%)	0	26

Table 24 shows that the majority of manufacturers believed that there would be no change in sales as a potential effect of regulation requiring open dating on food packages.

Table 24. Potential Effect on Sales if Required to Use of Open Dates

Potential Effects	Frequency	Percent of Sample
No Change	17	65.4
Slightly Decreased Sales	5	19.2
Slightly Increased Sales	2	7.7
Missing Data	2	7.7
Total	***26***	***100***

Table 25 shows the results for manufacturers responding to the issue of self-regulation. Overwhelmingly, manufacturers supported the concept of industry self-regulation instead of government agency intervention. This is not surprising since most manufacturers are not fans of regulation.

Table 25. Manufacturer Response to Industry Self-Regulation

Favor Industry Self-Regulation?	Frequency	Percent of Sample
Yes	23	88.5
No	2	7.7
Missing Data	1	3.8
Total	***26***	***100***

To assess the current efforts in the area of self-regulation programs, participants were asked of their awareness of on-going programs and their success. Table 26 shows that most of the manufacturers were not aware of on-going programs in the area of self-

regulation. As a result, it is probably not realistic for one to assume a self-regulation program will actually work. More accountability and enforcement will need to be addressed.

Table 26. **Manufacturer Awareness of On-Going Industry Self-Regulation Programs**

Industry Self-Regulation Awareness?	Frequency	Percent of Sample
No	23	88.5
Yes	2	7.7
Missing Data	1	3.8
Total	***26***	***100***

CHAPTER V

Summary & Conclusions

The research for this study utilized survey responses from a small sample, and so may not represent perfectly the overall perception of the food manufacturing industry. However, the results do summarize the perceptions of manufacturers in three particular food categories for the purpose of determining the need to pursue legislative activity to support date coding. The data in this study represents perceptions of manufacturers participating in the study. While the data and references are more than four years old, the information is valid today. In fact, my current experience as an employee at one of the largest food manufacturers in the country allows me to observe first-hand the current applicability of experiences and perceptions shared by the study participants, years earlier.

Summary of the Results:

1. Manufacturers use both open and closed date codes on packages. A single manufacturer may use both, in different applications.

2. Manufacturers perceived an advantage of using one date code system over the other and the date code choice being used was not a contributing factor in the perception of advantage of one date code system over the other.

3. Manufacturers believed the use of date codes would not have an effect on product sales.

4. Manufacturers believed public opinion about their date code choice ranged from indifferent to favorable. Manufacturers did not report unfavorable public opinion of their date code choice.

5. Manufacturers preferred a "use-by" open date designation for perishable products.

6. Manufacturers were about evenly divided between a "use-by" and a "sell-by" date when selecting the most appropriate open date designation for semi-perishable products.

7. Manufacturers preferred a "use-by" date for shelf-stable products.

8. The majority of manufacturers did not expect consumers to use perishable products after the "use-by" date. The data also indicated manufacturers did expect consumers to use products after the "best if used by" and "better if used before" open date designations for semi-perishable and shelf-stable categories respectively.

9. Most manufacturers used some form of real-time test to determine shelf-life.

10. No standard method exists to determine the shelf-life of food products, although the results show manufacturers may support standardization efforts in this area.

11. Most participants believe that revealing their use of shelf-life calculation techniques was not possible as the information was considered proprietary. Therefore, although support for standardizing methods may exist, getting started may prove difficult.

12. More manufacturers believe it is necessary to use a standardized formula or test method to calculate shelf-life for each of the food categories.

13. More manufacturers do not believe it is necessary to use a standardized format to identify date information on shelf-stable products.

14. Manufacturers would support legislation requiring open dating of perishable products.

15. There was no expectation of a change in sales if a regulation were enacted to require open dates.

16. Manufacturers support industry self-regulation programs.

17. Manufacturers are not aware of any current industry self-regulations, as it relates to this study.

Conclusions

Given the results of the survey and literature review, the following conclusions can be reached:

1. Manufacturers are aware of date coding techniques and utilize them in the manner deemed appropriate by their respective organizations. Many manufacturers use open dating techniques. However, closed dating is used just as much and with many manufacturers, at the same time. There is no evidence in this research to support that using one date coding technique over another provides a benefit to the consumer or the food industry, although some consumers may believe information obtained from an open date would be useful. Manufacturers are aware of consumer needs, but are realistic about the real benefit of providing information that does not consider all the variables in producing food items.

2. Finding a consistent means of identifying open date codes may prove difficult as 'date packaged', 'use-by', 'sell-by', 'best if used by', and 'better if used by' have different applications to each manufacturer. There is no common approach to open date coding terminology among the manufacturers. The use of various date code terminologies in a particular food category varied amongst the food manufacturers participating in the survey. Consumers will not be able to get useful information from date codes as the terminology and the use of various code date techniques is not consistent in the food industry. The information given in a date code gives no indication of the handling the food experienced in the distribution cycle.

3. The survey results revealed there was not a common method of determining shelf-life of products in a food category. Companies keep confidential information, which may give them a competitive edge in the marketplace. Determining shelf-life and shelf-life studies will give a company information which may allow them to get to market sooner with a product. Therefore, to standardize a test method will prove difficult but useful.

4. The survey results were surprising in the area of regulatory support. From the information gathered in this study, completing the process of getting a regulation enacted to support open dating will be difficult. The research did not reveal any overwhelming support of legislation of open date labeling. Industry self-regulation may be possible if enforced. It is apparent from manufacturer responses that enforcing self-regulation will prove difficult. More time is needed to understand how all the factors in the product manufacturing process interact in order to provide consumers useful information. Once additional data is known, efforts should turn to educating the consumer with information that explains the

steps in the manufacturing process so that the consumer can make informed choices and a regulation is developed which manufacturers support.

Discussion and Recommendations

This study has revealed there is a need to further evaluate consumer/manufacturer interaction. If the manufacturers have different methods of calculating shelf-life, how can we be sure the date codes are accurate and not meaningless? While more manufacturers supported standardizing formulas and test methods to calculate shelf-life, it will not be an easy task. Most of the participants were reluctant to share information about their shelf-life calculations. Comments in the section were consistent in their statement that the information is proprietary and could not be shared. Given this information, we are a long way from having a consistent approach to the determination of shelf-life, therefore regulating label content which is dependent upon this information will be very challenging.

When I first began this research, I was convinced that the only solution to the problem of consumer confusion at retail was the development of a regulation. I was looking to force compliance by the manufacturers to standardize the information provided to consumers on a label related to product shelf-life. I now understand this to be a very difficult task. A regulation requires constant revision. Lack of resources at federal agencies makes enforcing a regulation very difficult. However, given the importance of the subject, I recommend a regulation to address open dating. Proposing such activity will initiate dialogue between government, manufacturer and consumer. There are many groups working to influence the process and support consumerism.

Groups such as the Center for Science in the Public Interest are currently participating in efforts to affect legal matters and promote consumer welfare by educating consumers.

As a result of the conclusion drawn from this research study, the following are recommended:

1) Find ways to create a standardized shelf-life determination
2) Standardize terminology used for open date designations
3) Promote voluntary industry self-regulation
4) At the same time, seek ways to mobilize educated consumers in support of open dates.
5) Influence manufacturer's industry-wide standardization, development of procedures and good manufacturing practices.

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Appendix A

The Survey Instrument

An Evaluation of Regulatory Adoption of Shelf-Life Dating on Packaged Foods

The following survey is being conducted to examine manufacturer awareness of shelf-life dating on consumer products and to investigate consistency within the food industry when using codes on products. Feedback from the survey will be used to justify whether or not a regulation should be created to require open dating on food packages.

Manufacturer Demographics:

(1) Size (number of employees)
1. __ (0-500) 2. __ (500-999) 3. __ (1000-4999) 4. __ (5000+)

(2) Sales (annually in U.S. dollars)
1. __ (0-1 million) 2. __ (1 million - 1 billion) 3. __ (1 billion+)

(3) Products Manufactured:

1. __ ***perishable*** (fluid milk products, fresh baked goods, fresh meats, fish, poultry, fruits, vegetables)

2. __ ***semi-perishable*** (snack foods, cheese, ice cream, packaged meats)

3. __ ***shelf-stable*** (dried legumes, nuts and grains, pasta, cereals, canned goods)

(4) From the time of production, what is the longest amount of time allowed for your finished product to be sold at the grocery store?

1. __ (1-2 weeks) 2. __ (2-3 weeks) 3. __ (3-4 weeks)

4. __ (1-6 months) 5. __ (6 months+)

(5) From the time of purchase, what is the average length of time a consumer keeps your product in their home?

1. __ (1-2 weeks) 2. __ (2-3 weeks) 3. __ (3-4 weeks)

4. __ (1-6 months) 5. __ (6 months+)

Section One

Manufacturers often date a product to inform consumers of its shelf-life or for use as an internal tracking system to be utilized by grocers and retailers for stock rotation.

(6) Do you use a date code on your products? 1. __ No 2. __ Yes

If you answered NO to question 6, go to section two of this survey. If you answered YES, please complete section one.

An open date gives useful information to the consumer about product shelf-life, while a closed date code provides information for the manufacturer/grocer to determine the source of production, batch code, etc.

(7) Which form of date coding does your company use?
1. __ open date 2. __ closed date

Why?

_____

_____

_____

_____

(8) Is there an advantage to using one coding system over the other?
1. __ No 2. __ Yes

Explain:

_____

_____

_____

_____

(9) Have sales of your product(s) been affected by providing customers with date information?

1. __ No 2. __ Yes

Explain:

_____

_____

_____

_____

(10) If open dating is used, what are the benefits/drawbacks? Why do you choose not to use a closed date? Explain:

_____

_____

(11) If a closed date is used, what are the benefits/drawbacks? Why do you choose not to use an open date?

Explain:

_____

_____

_____

_____

(12) What, in your opinion, has public opinion been regarding your choice to use a date code?

1. __ unfavorable
2. __ somewhat unfavorable
3. __ indifferent
4. __ somewhat favorable
5. __ favorable

Section Two

NOTE: If you completed section one, skip section two and proceed to section three.

(13) Why do you choose not to use a date coding system for your product?

1. __ expensive 2. __ unnecessary 3. __ not sure
4. __ other (specify) _____

(14) Have you investigated costs associated with establishing a date coding system, including labor, machinery, research, etc.?

1. __ No 2. __ Yes
If yes, what was the result in dollars: _____

An open date gives useful information to the consumer about product shelf-life, while a closed date code provides information for the manufacturer/grocer to determine the source of production, batch code, etc.

(15) In your opinion, will a change to using an open date affect product sales?

1. __ No 2. __ Yes

If yes, please rate the previous response:

(16) 1. __ greatly decreased sales 2. __ slightly decreased sales 3. __ no change
4. __ slightly increased sales 5. __ greatly increased sales

Explain:

_____

_____

_____

(17) What, in your opinion, would be the impact on public opinion of customers if you switched to using a date coding system?

1. __ unfavorable 2. __ somewhat unfavorable 3. __ indifferent
4. __ somewhat favorable 5. __ favorable

(Proceed to section three)

Section Three

Here are four ways to describe open dating on packages:

⇒ (A) A ***date packaged*** is the day, month, and year the product was processed and packaged for retail sale.

⇒ (B) A ***sell-by date*** (best if sold by) is the last date a product should be sold in order to allow a reasonable length of time for consumer use.

⇒ (C) A ***use-by date*** (best if used by, recommended last consumption date, expiration date) is the date after which the product is no longer at its most acceptable level of quality.

⇒ (D) A ***time-temperature indicator*** changes its color or shape to let you know whether the product has been exposed to temperatures or conditions that would make it go bad.

For the following product categories, please choose the most appropriate open date designation, using the above descriptors:

(18) ***perishable*** (fluid milk products, fresh baked goods, fresh meats, fish, poultry, fruits, vegetables)

1. __ (A) 2. __ (B) 3. __ (C) 4. __ (D)

(19) ***semi-perishable*** (snack foods, cheese, ice cream, packaged meats)

1. __ (A) 2. __ (B) 3. __ (C) 4. __ (D)

(20) ***shelf-stable*** (dried legumes, nuts and grains, pasta, cereals, canned goods)

1. __ (A) 2. __ (B) 3. __ (C) 4. __ (D)

(21) A "use by" date often appears on **perishable** food products such as milk. Do you expect consumers to use your product after this date?

1. __ No 2. __ Yes

Explain why or why not:

_____

_____

_____

(22) Do you manufacture perishable products? 1. __ No 2. __ Yes

(23) A "sell-by" or "best if used by" date often appears on **semi-perishable** food products such as cheese and snack products. Do you expect consumers to use your product after this date?

1. __ No 2. __ Yes

Explain why or why not:

_____

_____

_____

(24) Do you manufacture semi-perishable products? 1. __ No 2. __ Yes

(25) A "better if used before" date often appears on **shelf stable** products such as cereal.

Do you expect consumers to use your product after this date?

1. __ No 2. __ Yes

Explain why or why not:

_____

_____

_____

(26) Do you manufacture shelf-stable products? 1. __ No 2. __ Yes

Section Four

Shelf-life is often defined as the term or period during which a stored product remains effective, useful, or suitable for consumption.

(27) What process is most often used to determine shelf-life of your product?

1. __ real time 2. __ accelerated time 3. __ predicted time
4. other: _____

Please use space provided to describe your process, or attach additional information if needed.

Section Five

(28) For the following product categories, is it necessary to have a standardized formula or test method to calculate shelf-life?

		(1) = No	(2) = Yes
1)	perishables	(1) __	(2) __
2)	semi-perishables	(1) __	(2) __
3)	shelf stable	(1) __	(2) __

Explain:

_____

_____

(29) For the following product categories, is it necessary to have a standardized format (similar to NLEA requirements) for identifying date information on food packages?:

		1) = No	(2) = Yes
1)	perishables	(1) __	(2) __
2)	semi-perishables	(1) __	(2) __
3)	shelf stable	(1) __	(2) __

Explain:

_____

_____

(30) Would you support legislation to require open dating on products included in the following product categories?:

		(1) = No	(2) = Yes
1)	perishables	(1) __	(2) __
2)	semi-perishables	(1) __	(2) __
3)	shelf stable	(1) __	(2) __

Explain:

_____

_____

_____

(31) What, in your opinion, are the potential effects of a regulation requiring open date information on food packages?

1. __ greatly decreased sales 2. __ slightly decreased sales 3. __ no change
4. __ slightly increased sales 5. __ greatly increased sales

Explain:

_____

_____

_____

(32) Would you favor industry self-regulation as an alternative to legislation?
1. __ No 2. __ Yes

(33) Are you aware of any on-going efforts to support industry self-regulation in the area of date coding or shelf-life?

1. __ No 2. __ Yes

Please describe:

_____

_____

_____

_____

(34) If you answered yes to the previous question, how successful are these efforts?

1. __ not successful 2. __ somewhat successful 3. __ successful
4. __ very successful

Explain:

_____

_____

_____

This concludes the survey. Thank you very much for participating in our research. Please use the space on the next page to provide any additional information or feedback.

Appendix B

SIZE	SALES	PRODMFG	SOLD	STORE	USEDATE	WHICHDT	CODEADVT
3	2	1	4	4	2	2	.
4	3	1	5	1	2	2	2
4	3	1	4	4	2	1	2
3	3	2	4	2	2	1	2
2	2	2	5	2	2	2	.
1	3	2	4	1	2	1	2
3	2	2	5	4	2	1	.
4	3	2	4	1	2	1	2
4	3	2	4	1	2	2	1
2	2	2	4	1	2	12	1
3	3	2	5	1	2	2	2
2	2	3	5	3	2	12	2
4	3	3	5	4	2	1	2
2	2	3	5	4	2	2	2
3	3	3	5	4	2	12	1
2	2	3	5	4	2	2	2
1	2	3	5	5	2	1	1
3	2	3	5	4	2	1	2
4	3	3	5	4	2	2	2
2	2	3	5	4	2	12	2
4	3	123	5	4	2	1	2
4	3	23	5	4	2	2	2
4	3	23	.	45	2	2	2
3	2	23	5	4	2	12	2
4	3	123	.	.	2	12	1
3	2	12	4	1	2	12	2

SALESAFF	PUBOPIN	PERDATE	SEMIDATE	SHLFDATE	XAFTPER	MANPER
1	3	3	2	1	.	1
1	3	3	2	1	1	1
2	5	14	3	3	2	2
.	5	3	3	2	1	1
1	3	4	3	2	.	1
2	5	4	3	4	1	1
.	4	.	2	.	1	1
2	5	3	2	3	1	2
1	3	3	2	1	2	1
1	3	2	3	3	2	1
.	3	3	2	2	2	1
1	5	3	3	2	1	1
1	4	3	3	3	2	1
1	3	2	2	.	.	1
1	3	.	.	3	.	1
1	3	34	3	1	1	1
1	3	2	3	1	1	1
1	4	2	2	3	.	1
1	4	3	3	3	1	1
.	5	3	3	3	1	1
.	5	3	.	3	1	1
1	3	3	2	1	2	1
.	4	3	4	3	2	1
1	3	2	1	1	1	1
2	5	3	3	3	1	2
1	5	3	2	1	1	2

XAFTSEMI	MANSEMI	XAFTSHLF	MANSHLF	SHELFLIF	PERSHELF	SEMISHLF
.	2	.	1	.	.	.
2	2	1	1	2	2	2
2	1	2	1	2	2	2
2	2	.	1	1	1	1
1	1	1	2	123	.	.
1	2	1	1	1	2	2
1	2	1	1	1	1	1
2	2	1	1	1	1	1
2	2	2	1	1	1	1
2	2	2	2	123	2	2
2	2	2	2	1	2	2
2	2	2	2	4	2	2
2	1	2	2	1	1	1
.	1	2	2	12	2	2
.	1	.	2	1	.	.
1	1	2	2	12	2	2
1	1	1	2	4	2	2
.	1	1	2	1	.	.
.	1	2	.	1	1	2
1	1	1	2	12	1	1
.	1	1	2	1	.	.
2	1	2	2	1	1	1
2	2	2	2	12	2	2
1	2	2	2	2	1	1
1	2	1	2	1	2	2
1	2	1	1	4	2	2

SHLFSHLF	STFMTPER	STFMTSEM	STFMTSHF	SUPLEGPE	SUPLEGSM
.	2	2	2	2	1
1	2	2	2	2	2
2	1	1	1	1	1
1	2	2	2	1	1
.	2	1	1	2	1
2	1	1	2	2	2
1	2	2	2	1	1
1	2	2	1	2	2
1	1	1	1	1	1
2	2	2	2	1	1
2	2	2	2	2	2
1	2	2	1	2	2
1	1	1	1	2	2
2	1	1	1	1	1
2	.	.	1	.	.
2	2	2	1	2	2
2	1	1	1	2	2
.	2	2	2	2	2
2	2	2	2	2	2
1	1	1	1	2	1
2	.	.	2	2	2
1	1	1	1	1	1
2	2	2	2	2	2
1	2	2	1	2	2
2	1	1	1	1	1
.	1	1	1	1	1

SUPLEGSS	POTEFREG	FAVSELF	AWAREFF	YHOWSUC
1	3	2	1	.
1	3	2	1	.
1	4	2	1	.
1	3	2	2	2
1	.	2	1	.
2	3	2	2	3
1	3	2	1	.
1	3	2	1	.
1	3	2	1	.
1	3	2	1	.
2	3	1	1	.
1	2	2	1	.
2	3	2	1	.
1	3	2	1	.
1	3	2	1	.
1	2	.	1	.
2	3	2	1	.
1	3	2	1	.
2	3	2	.	.
1	4	2	1	.
2	.	2	1	.
1	3	2	1	.
1	2	2	1	.
1	3	2	1	.
1	2	2	1	.
1	2	1	1	.