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Lisa A. Hewartson

has been accepted towards fulfillment
of the requirements for
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**AN EVALUATION OF THE OVERALL EFFECTIVENESS OF SELECTED
CURRENT TAMPER RESISTANT PACKAGES**

BY

LISA A. HEWARTSON

A THESIS

**Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of**

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School of Packaging

1989

ABSTRACT**AN EVALUATION OF THE OVERALL EFFECTIVENESS OF CERTAIN
CURRENT TAMPER RESISTANT PACKAGES****BY****LISA A. HEWARTSON**

To measure the true overall effectiveness of tamper resistant packages, both consumer detectability and industrial factors were studied. A consumer survey was conducted in which participants were asked to look at a combination of four tampered and four untampered packages (eight packages in total), and comment on whether they believed the packages to be tampered.

A survey of packaging professionals was also conducted, to gain input on industry usage of tamper resistant package features, material handling procedures, and opinions on ease of package tampering and how well consumers could properly use tamper resistant package forms.

From the results of the two studies, a comprehensive evaluation procedure considering industry concerns, and especially emphasizing the performance of packages with consumers, was developed to determine the overall effectiveness of tamper resistant packages.

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DEDICATION

This thesis is dedicated to my grandmother, Mrs. Tula Maroulis, and my uncle, Mr. Nick Maroulis, for all the love and support they have always shown me, and for their constant belief in me.

This thesis is especially dedicated with love and appreciation to my parents, Harold and Helen Hewartson, who never taught me a single think about packaging, but taught me everything else. Without their support and encouragement, this thesis would not have been possible.

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INTRODUCTION

In the fall of 1982, a number of events occurred which had a startling effect on the field of consumer packaging. A series of malicious product tamperings occurred, resulting in seven deaths, and concern on the part of both manufacturers and consumers about the safety of packaged goods. The United States Food and Drug Administration took quick action in announcing a new regulation requiring tamper resistant packaging on November 5, 1982. The regulation affected Title 21 of the Code of Federal Regulations, parts 211.132, 314, 700.25, 800.12, and 200.50, and covered most over-the-counter drug products, such as capsules, oral liquid drugs, contact lens and ophthalmic solutions and preparations, and tablets. By definition, a tamper resistant package was "one having an indicator or barrier to entry which, if breached or missing, can reasonably be expected to provide visible evidence to the user that the package has been tampered with or opened."¹ Overall, the preamble to the regulation suggested eleven forms of tamper resistant features that manufacturers could use in their packaging.

The enactment of this regulation was not enough to stop

the future reoccurrence of product tamperings. Once again in 1986, another wave of malicious tamperings occurred, raising questions about tamper resistant packaging. This resulted in drug companies changing their product lines, food producers voluntarily going toward tamper "evident" packaging, and consumers becoming skeptical of the concept of tamper resistant packaging.

Since the regulation requiring tamper resistant packaging, a limited number of studies have been conducted to evaluate the effectiveness of tamper resistant packaging. The work done either concentrated on the ability of consumers to detect package tampering, or the ability of a tamperer to access repair materials to attempt to conceal package tampering. Both of these areas are important in analysis of the overall effectiveness of tamper resistant packaging, and must be considered together rather than separately in such evaluations.

The objective of this study is to analyze specific tamper resistant package forms in order to determine criteria for the ranking of their effectiveness in terms of the degree of difficulty to tamper and repair a package (its tamper resistance) and the degree to which tampering can be detected by consumers (the tamper evidence of the package).

In this work, a greater emphasis will be placed on consumer ability to detect tampering, because that is the actual measure of how effective a tamper resistant package is. The concerns of product manufacturers and package

suppliers are valid and must be considered, but what the industry considers effective tamper resistant packaging from system evaluations is really not pertinent unless consumers can properly and consistently use the tamper resistant feature in their package evaluations. Because of this, the evaluation system proposed consists of both consumer and industrial studies, with the major emphasis on consumer ability to properly use tamper resistant packaging to detect package tampering. With this approach, a true perspective of the actual effectiveness demonstrated by these package forms will be obtained. The information gained should also provide some general criteria for the modification of current tamper resistant package forms and for future designs for use within the packaging industry.

LITERATURE REVIEW

Regulations on tamper resistant packaging

Prior to any over-the counter pharmaceutical regulations requiring tamper resistant packaging, there were regulations in existence requiring tamper resistant packaging for certain products. One such product is milk, which is covered by a list of recommendations issued by the U.S. Department of Health, Education and Welfare in cooperation with the Food and Drug Administration entitled "Grade A Pasteurized Milk Ordinance (1978 Recommendations)." Among other recommendations made in this ordinance was Item 19p., entitled "Capping," which states that closures which are used on milk products "shall be designed and applied in such a manner that the pouring lip is protected to at least its largest diameter and, with respect to fluid product containers, removal cannot be made without detection."² This is, by current definition, an ordinance requiring tamper resistant packaging of milk, although the containers are not specifically called "tamper resistant" and were designed to protect the product from microbial and bacterial contamination more than from a malicious attempt at tampering.

Another grouping of products covered by an early tamper resistant packaging regulation are alcoholic beverages, as regulated by the Bureau of Alcohol, Tobacco and Firearms (BATF). Public Law 85-859, 72 Statute 1358; Title 27, part 19 of the Code of Federal Regulations requires that a revenue tax stamp appear on alcoholic beverages of capacities of 5 wine gallons or less. This also, by current definition, could be considered a tamper resistant device. This revenue stamp was initially designed to be placed on an alcoholic beverage container in such a manner as to seal the container so that the stamp "shall be broken when the container is opened, unless the container is one which cannot again be used after opening"³. Although tamper resistance was not a goal of this regulation, it can be considered tamper resistant by today's standards.

This requirement was later modified in 29 CFR 19.663, "Strip Stamps and Alternative Devices." The modification allowed the use of "alternative devices" approved by Bureau of Alcohol, Tobacco and Firearms' Directors rather than the stamps. These devices are such that they will securely seal the package and leave evidence after initial opening. Tamper resistance was not specifically stated, but was, by definition, required. In 1985, after definitions of tamper resistant packages were set, the Bureau specifically designed a new regulation, requiring that all distilled spirit containers with a capacity of one gallon or less have tamper resistant devices. This was done because of a

Congressional decision of the previous year which eliminated the requirement of strip stamps, and an industry desire to maintain tamper resistancy of alcoholic beverage containers.

The first over-the-counter drug products which were to be, in effect, tamper resistant were sterile ophthalmic preparations. These are regulated by the Food and Drug Administration in 21 CFR 200.50, and are to be packaged in containers which "shall be sterile at the time of filling and closing, and the container or individual carton shall be so sealed that the contents cannot be used without destroying the seal."⁴ This regulation was designed to insure the sterility and integrity of the product rather than to be implicitly tamper resistant. In later FDA tamper resistant packaging regulations detailed in 21 CFR 200.50 and 800.12, sterile ophthalmics were covered in terms of actual tamper resistance. These parts described distinctive design tamper resistant features which could be used, and outlined the labelling requirements for these features.

The first actual tamper resistant packaging regulation was established in 21 CFR, parts 211, 314 and 700 on November 5, 1982. This regulation, entitled "Tamper Resistant Packaging Requirements for Certain Over-The Counter Human Drug and Cosmetic Products," required tamper resistant packaging, and label statements informing consumers of these new tamper resistant features (these labelling requirements are covered in 21 CFR 314.8), on all over-the-counter human drug products except dermatologics,

dentifrices and insulin (21 CFR 211.132), and cosmetic liquid oral hygiene products and vaginal products (21 CFR 700.25). These regulations were primarily designed by the FDA to "...assure package integrity and product security in light of the recent cases of malicious adulteration of OTC drug products...",⁵ specifically the deaths which resulted from the Tylenol poisonings. In the preamble to the regulation, the FDA provided package manufacturers with a list of eleven different package features which were believed to be tamper resistant. Along with these suggested forms, the FDA left open the possibility for other existing package features and new packaging technologies being acceptable for tamper resistant package use. There were no concrete measurable standards for package compliance with the regulation stated by the FDA. Most over-the-counter drugs were required to be in tamper resistant packages by February 7, 1983, and all packages covered under the regulation were to have a description of the tamper resistant feature placed prominently on the package by May 5 of that same year.

Tamper Resistant Packaging of Pharmaceuticals

With the FDA regulation requiring tamper resistant packaging on over-the-counter drug products, pharmaceutical companies were quick to turn to tamper resistant package forms, especially the eleven forms specifically mentioned in

the preamble to the regulation published in the Federal Register of November 5, 1982. Pharmaceutical companies and package suppliers were also quick to promote their tamper resistant package types and systems, filling the trade journal literature of early 1983 with reports on current industry information on tamper resistant packaging.

Companies were using the literature to promote their own features and systems, as well as using the literature as a source of new package ideas. According to a Food and Drug Packaging survey of May-June 1983, companies were "...still open to new tamper-evident packaging systems that may be more efficient, cost effective or visible than those currently in use."⁶ In spite of the fact that pharmaceutical companies were forced to move quickly because of the regulation and were still, at that time, exploring other packaging possibilities, most of the companies questioned in the survey considered the tamper resistant packaging methods they had selected to be long-term solutions.

The vast majority of the literature from 1983-85 regarding tamper resistant packaging of pharmaceutical products continued to be of the variety which discussed and promoted the individual packaging concepts and systems of individual companies. The tone of the literature was positive, and companies felt secure with the state of tamper resistant packaging at the time. The tone suddenly changed in early 1986, with another series of drug tamperings,

primarily of products in capsule form. After this wave of product tamperings, industry opinions on tamper resistance changed. "There is also a pervasive feeling of futility -- that no package is tamperproof and that all products are at some degree of risk if a determined individual is bent on malice... When asked, 'what more can be done?' many manufacturers respond, 'Nothing.',"⁷ was the general opinion of the industry reflected in the literature of the time. The focus of the tampering problems also turned more to consumer opinions than in the previous tampering wave, where consumers were perceived by the industry to have a negative opinion of tamper resistant packaging and certain product forms. This especially held true for capsulated drugs, for which action was taken by four New York congressmen and one senator at the prompting of Westchester County (NY) Executive Andrew P. O'Rourke. They proposed a regulation to limit the sale of capsulated products, particularly over-the-counter capsules.

Tamper Evident Packaging for Food Products

Although tamper resistant features were not required on food products, many food producers decided to add tamper "evident" features to their food products at the same time their pharmaceutical counterparts were doing so on their packages. Much of the food-related tamper evident packaging literature since 1983 was of the same variety as the tamper

resistant drug package literature, where a specific tamper evident package feature used by a particular company was highlighted.

The other major form of literature on tamper evident food packaging consisted of editorials and commentaries in many packaging industry and food industry trade magazines. These articles discussed the trends in tamper resistant packaging in the pharmaceutical industry, and emphasized the importance of food producers incorporating tamper evident features into their packaging. In an article in the April 1987 Food and Drug Packaging magazine, Dr. Sanford Miller, director of the FDA's Center for Food Safety and Applied Nutrition, warns food producers of the importance of tamper evident packaging. "The issue is not whether all foods can be protected.," states Dr. Miller, "The fact is that foods can be, should be. What will happen when the first person gets hurt because a product was tampered with that should have been in TE packaging, but was not?"⁷ This tone is frequently repeated throughout the literature on the subject, and is still currently a major issue in tamper evident packaging literature to date.

Studies on Tamper Resistant and Tamper Evident Packaging

The first extended study of tamper resistant packaging was conducted in 1983 by John Sneden. In his Package Engineering article "Tamper Resistant Packaging : Is It

Really?," which was based on his Master of Science thesis "Testing of Tamper - Resistant Packaging" at Michigan State University, Sneden works with the consumer aspects of the tamper resistant packaging resulting from the Chicago Tylenol poisonings. Some of Sneden's work consists of attitude and perception surveys, where consumer's reactions and opinions of tamper resistant packaging are analyzed. The major portion of Sneden's study involves a consumer survey to evaluate tampering detectability. Sneden uses both a tampered and untampered package sample of eleven packages, representing the common tamper resistant features in use at the time. He asks consumers to inspect a grouping of sample packages including both tampered and untampered samples to see if the consumers could differentiate between the tampered and untampered packages. Sneden found that none of the packages could really be consistently and definitely considered tamper resistant based upon their survey performance, because of the inability of the consumers to be able to detect package tampering.

Sneden's work points out some major problems with early tamper resistant packages, and possible implications of these problems. He suggests that consumers be better informed of the proper usage of tamper resistant packaging, and that an evaluation system for tamper resistant packages be designed in the future to enable packagers to determine the true effectiveness of various tamper resistant packages.

An evaluation system of this type was developed in a

second study of tamper resistant packaging, conducted by J.L. Rosette in 1985. In his paper "Rating Tamper - Evident Package Features," presented to the Annual PI/INT'L Membership Conference of 1986, and his Food and Drug Packaging article "Is One TE Feature Better Than Another For Your Package?" from 1989, Rosette discusses his work and findings from his Master of Business Administration thesis "Development of an Index for Rating the Effectiveness of Tamper - Evident Packaging Features" at California Coast University in 1985.

Unlike Sneden's work, which correlates the overall effectiveness of tamper resistant packages to the ability of consumers to detect tampering, Rosette explores the actual factors involved in tampering with a package and detectability based upon industrial concerns. In his paper and article, Rosette details his plan to ranking the effectiveness of tamper resistant features. Rosette, having worked for a supplier of tamper resistant package features, realizes that there is a lack of set standards to rank the effectiveness of tamper resistant features in industry. Most product manufacturers who use tamper resistant features on their packages, according to Rosette, take the word of their package suppliers that they are using truly effective tamper resistant features and systems, without understanding what this effectiveness is based upon. Because of this, Rosette designed an effectiveness rating system for tamper resistant packages which can be used as a set ranking system

for all package types, and can be used and understood by both package suppliers and industry users. .

Rosette's study is one of evaluating the tampering of packages, from equipment needs, degree of packaging knowledge needed and time taken to tamper and adequately repair packages, and the ability to use both simple and more sophisticated materials and methods to repair tampered packages. In his system, Rosette has these tamper criteria evaluated by individuals who have no knowledge of packaging, a basic knowledge of manufacturing processes, and a high knowledge of these processes, with a specialty in packaging forms and processes.

Overall, Rosette's system creates evaluation criteria to rank the effectiveness of tamper resistant packages which are applicable for package suppliers and industrial users. The ranking is based upon industrial concerns, such as time, sophistication and knowledge requirements for tamper repair, material costs and availability, equipment needs, and feature visibility, rather than on consumer aspects.

A different sort of tamper evident packaging study was conducted in 1984 by Professors Joseph J. Hotchkiss, Ph.D., and Robert B. Gravani, Ph.D. at Cornell University. By surveying supermarket shelves, they categorized different food products, and determined the level of tamper evident packaging for these food groups as a whole. They concluded that less than 1 percent of all food products seen in these markets had tamper evident packaging which would meet the

FDA regulation tamper resistant packaging of over-the-counter pharmaceuticals.

MATERIALS AND METHODS

The development of a ranking system for the evaluation of tamper resistant packages required two separate areas of study. One study involved doing a survey to measure consumer's ability to correctly detect package tampering and to observe the ways they inspect packages. In the other study, the opinions and experiences of packaging professionals involved with tamper resistant packaging were gathered. The two studies were then correlated to develop a scale for ranking various tamper resistant types.

Consumer detection surveys

The consumer study was designed to test the ability of a random sampling of consumers from a variety of age groups, socio-economic classes and educational backgrounds to detect damage and disfigurement of tampered packages.

A. Sample Population

To obtain a true representation of how an average consumer observes packages, it was important to survey a

large number of people from varied backgrounds. In order to gain information from a random population of consumers, three survey sites at major Michigan events during the summer of 1988 were chosen. The sites were a rural county fair in Mason, the Michigan Festival on the Michigan State University campus in East Lansing, and the Michigan State Fair in Detroit. These three settings allowed for the sampling of a large number of people in a short time.

B. Products/Packages Used

Each of the three surveys consisted of two groupings of the same eight products and packages, of which four were untampered controls and four were tampered. The two groupings differed by the packages which were tampered; the four tampered products in the first grouping served as the untampered control packages in the second grouping, and vice versa. All tamperings consisted of opening the package either by hand or using a knife or blade through the normally designed route of entry, which involved defeating the tamper resistant features of the packages. All repairs done to tampered packages involved the use of commonly available materials, such as glue or tape.

The eight packages used, as they appeared in both the control and tampered condition, were the following:

1. Vitamin tablets

The tablets were contained in an amber plastic bottle with a printed polystyrene membrane seal over the mouth of the bottle which served as the tamper indicating device. This seal was of a larger circumference than the mouth of the bottle, resulting in a slight (approximately 1/8") overhang evenly distributed all the way around the bottle mouth. All the seals were printed with the words "sealed for your protection" in red ink against the white background. Each of the seals had a small glue spot/discolouration in the centre of the seal, and a crease in the seal along the inside edge of the bottle mouth.

The packages which were to serve as the tampered samples were chosen because their overhanging edges were slightly more ragged than the other samples, and that condition might have caused incorrect assessment of tampering in control packages. To tamper the container, one half of the seal was detached from the bottle by lifting upward on it and simultaneously cutting it away from the bottle mouth with a razor blade. The upward pulling on the seal helped to keep it intact and unbent while it was being removed. The cotton in the bottle was displaced, and one vitamin tablet was then removed from the bottle. The cotton was replaced, and the seal was reattached to the bottle mouth by applying Krazy glue to the bottle mouth and replacing the seal tightly with downward pressure over the

mouth of the bottle. The seal was held in place for about one minute to allow adhesion to occur between the seal and the bottle.

During the survey, both the control and the tampered forms of this package were displayed without the closure in order to direct the consumers attention to the membrane seal itself. Consumers were told that the closure was missing from the bottle so that they would be able to inspect the tamper resistant feature of the package, and that the fact that the closure was missing was not designed to be an indication that tampering had occurred.

2. Salad Dressing

This product was in a long necked glass bottle with a white paper neck band the entire length of the bottle neck. The bands were glued to the bottle neck and also lightly attached to the closure. Once this slight adhesion was broken between the closure and the band, the closure could be turned approximately one-quarter of a turn under the band without any damage to the band.

The packages to be tampered were chosen from the purchased samples based upon the band seam alignment. The samples to be tampered had the neatest alignment of the band. The tamper was conducted by slitting the top two-thirds of the band vertically along the seam with a razor blade. Once the seal was slit, the paper was detached from the closure of the bottle, and the closure was completely

removed and replaced. The repair to the band was done by lightly applying Elmer's glue (which was chosen because it would not penetrate the paper, and would not leave glue spots or discolourations which could be a sign of tampering) to the closure to reform the seam, and then applying a thin layer of glue to the seam of the band. The paper was flattened out and reattached along the seam, and held in place for approximately one minute to allow the glue to dry.

3. Amber Bottle

These glass bottles were filled with water and capped with black metal breakaway closures using the capping machinery at the Michigan State School of Packaging. These samples were fabricated and initially used in a consumer tamper detection survey in 1984. The tampers were done by unscrewing the closure to break the metal band at the bottom on the closure. The closure was replaced over the bottle, the metal ring was lifted up to the closure, and reattached to the closure using one drop of Krazy glue at two points 180 degrees apart.

Although the tampering was done four years before this survey, there appeared to be no evidence of aging or loosening of the glue used to repair the closure. In both the control and tampered samples, the closure could be turned approximately one-eighth of a turn without any damage to the ring or closure, but this did not appear to make the bottles seem unusual. These bottles did not have any label

or product identifying features on them when they were displayed in the survey. The consumers were informed that the absence of a label was intentional, and was not to be considered an indication of tampering.

4. Pizza Sauce

This product was in a glass jar with a vacuum button closure. The tamper was conducted by simply removing the closure from the jar, leaving it open for at least fifteen minutes, and reapplying the closure. No attempt was made to re-establish the vacuum, push the button down or hide the tampering in any way.

5. Aspirin

The aspirin tablets were contained in a plastic blister with a thick paper backing. The product originally came in a blister card of six blisters, but two blisters were removed from both the control and tamper samples, so that a card of only four blisters was used for display in the survey. The area along the perforation where the blisters were removed was smoothed out using the edge of a razor blade so that the card edge would not appear ragged.

The tamper was performed on one blister of the card. The backing material was peeled off starting at the centre corner, which is the normally designated opening area of the blister. The backing was lifted enough to pry one tablet out using a fingernail. To repair the tampering, the tablet

was replaced, Krazy glue applied to the lidstock along the edge of the blister, and the backing material reattached to the lidstock.

During the survey, this product was displayed in a card of four blisters. The card was left out of the paperboard sleeve it is normally contained in so that the blisters would be easier for the survey participants to observe. The consumers were told that this product was being displayed in this manner on purpose, and that the absence of a carton was not an indication that tampering had occurred.

6. Vegetable Oil

The vegetable oil was packaged in a clear plastic bottle with an induction heat sealed foil membrane over the mouth of the bottle. The survey packages were purchased from a grocery store, and each of the packages had a medium sized glue smudge on the top centre of the seal. This smudge was darker than the surrounding seal area, and gave the impression that the package was dirty. Since all the packages had the same smudges and since they could not be rubbed off or otherwise removed from the foil, they were left intact for the survey. This condition was monitored in the package assessments to determine if they would play a role in the tamper judgments.

For the package tamper, the seal was slit one-quarter of the circumference of the bottle mouth inside the finish with a razor blade. The seal was slit completely through at

this area, and no attempt was made to repair or conceal the tamper.

During the survey, both the control and the tampered forms of this package were displayed without its closure to direct the consumers attention to the membrane seal itself. Consumers were told that the closure was missing from the bottle so that they would be able to inspect the tamper resistant feature of the package, and that the fact that the closure was missing was not designed to be an indication that tampering had occurred.

7. Eye Drops

The eye drop package was a small, translucent plastic squeeze bottle which had a shrink band around its closure to serve as its tamper resistant device. The seal was imprinted with the message "sealed for your protection" in red type, and had two parallel perforations which ran vertically down the band. In all the package samples purchased from a grocery store, the band was not tightly shrunk around the closure, and it could be rotated around the closure without damage to the band. All the bands also had a "lip" in the top area of them, which likely resulted because the shrink material was not shrunk enough to tightly fit along the narrowed top of the closure.

For the tampered package sample, a slit was made with a razor blade along the full length of the left perforation of

the band. The band was then removed from and replaced onto the bottle. It was stretched out to realign the printed words and smooth out the band, and repaired using transparent tape wrapped along the full length of the band around the circumference of the cap. The taping was done so as to align the ends of the tape at the perforations to conceal the cut, and the tape was cut to match the exact width of the band to avoid an overhang of tape onto the bottle.

8. Yogurt Drink

This product is contained in a white, flexible plastic bottle with a white plastic snap cap. The cap has a plastic tear band at the bottom of the cap skirt, which is supposed to be torn off the closure to allow its removal. This tear band is designed to serve as the tamper resistant feature of the package, not specifically to enhance the package seal in any way. In spite of this extra ring, the snap cap can freely rotate around the mouth of the bottle. The closure is such that it bulges in the centre of the top panel (giving the appearance that it may possibly be a button type closure in which the seal has been broken). This feature had to be carefully monitored during the survey, because there was a tendency for people who were unfamiliar with the package or this kind of tamper resistant feature (plastic tear band) to confuse it with a button closure like they had seen previously in the survey on the pizza sauce jar.

The package tamper was done by inserting a knife blade under the tab and the closure and pushing upward to pry both the band and closure off the bottle. This allowed the bottle to be opened without any damage to the band or closure. The product was then removed from the bottle (to avoid possible off-odors resulting from product spoilage which could be a signal to consumers that tampering had occurred), and water was substituted in its place. The snap cap and tab were then snapped back into place to reclose the bottle, leaving little or no evidence of tampering.

C. Survey Format

Each of the eight packages were displayed on a table in a booth for the participants to view. There were two tables set up for viewing with the same packages in the same order. The tables differed by the packages which were tampered -- on one table, the vitamin, amber bottle, pizza sauce, and vegetable oil packages were tampered, and the salad dressing, aspirin, eye drops and yogurt were not tampered. The other table had the opposite arrangement, with the salad dressing, aspirin, eye drop and yogurt drink packages serving as the tampered samples, while the vitamins, amber bottle, pizza sauce and vegetable oil packages were untampered. Each survey participant was allowed to view the packages at only one of the tables, and were screened from seeing the package conditions at the

other table. In this way, the subject could not compare tampered and untampered samples of the same packages, and every subject saw each of the eight survey packages, either in a tampered or untampered form.

Each consumer was from the crowd of people passing the booth at the fairs, and was asked to volunteer a few moments of their time to take the survey. They were given a survey question form (Appendix A). The research being conducted and the survey format were explained to each participant before they were allowed to view the packages. It was emphasized that their cooperation in the survey was voluntary, and that the package they were about to see may or may not have been tampered with. They were instructed to make all assessments based solely on observations of the packages, and they were told that they could handle any of the packages in order to help them with their observations as long as they did not open or damage the package in any way.

In the first portion of the survey, each of the participants was asked to inspect the eight packages on the table before them. Based on these observations, they were asked the question "having observed this package, do you think it has been tampered with?", and were forced to make a definitive yes or no response to the question. This answer format did not leave room for indecision on the part of the participants. This created a situation which they would encounter if observing packages in a store for purchase.

All the participants were encouraged, especially if they believed the package had been tampered, to comment on the reasons for their response. From the responses, information could be gained about how consumers look at packages and the types of things they would consider evidence of tampering.

After observing all eight packages and making tamper judgments on them, the participants were asked the question "if you were considering the purchase of the above products, would you purchase them in the condition you have seen in the survey?". It was emphasized to the participants that their answers were to be based solely on package condition, and to ignore certain survey related package deficiencies (intentionally missing closures and labels, etc.) as best they could in their assessments. For example, the two membrane seal package samples were displayed without their closures in the survey so that the tamper resistant feature could be easily observed. This question was designed to monitor each participant's purchase decision and to see if it would agree with or contradict his/her tamper judgments. Furthermore, if it was contradictory to their previous judgement, the reasons for their purchase decision could be noted.

In the third portion of the survey, each participant was asked if they had encountered package forms such as the ones used in the survey within the past year. This part was included to determine if the participants were familiar with these common tamper resistant feature types, and if

familiarity with the package (or lack of it) has an effect on the correctness of tamper judgments.

In the final part of the survey, each participant was asked for demographic information, such as their age group, sex, and educational background. Of these, the one of particular importance in this survey was age, because of the desire to determine if tamper judgement correctness decreased as age increases. It was thought that the older individuals in the survey may not be as familiar with some of the tamper resistant features as some of the younger people, and that problems associated with aging, such as decreased visual acuity, might have an effect on the ability of the older survey participants to make correct tamper judgments.

D. Evaluation of Responses From the Survey

The tamper judgments made by the survey participants were evaluated using a statistic called the J index, which was initially developed by W.J. Youden for evaluating the diagnosis of disease in cancer research in 1950. In that instance, the statistic was normally distributed, and accounted for both correct and incorrect diagnosis of the presence or absence of cancer. In this survey, the J index was easily adapted to measure the correct and incorrect assessment of the presence and absence of tampering of a package. The J index has values distributed between +1, if

all the survey participants correctly identified both the control and tampered samples of a package (100% overall correctness), and -1, if all the participants were incorrect in their assessments of both the control and tampered package condition (100% overall incorrectness). The mathematical development of this statistic is described in the Results section of this report. A J value was determined for each package as a whole, and for the breakdown of each age group within each package observation. From the J indices for each age group for a package, a standard error calculation was done, and a test of significance was conducted which would show if there were significant differences between the age groups in their ability to detect tampering for each package.

The purchase decision data was tallied, and compared with each participant's individual tamper judgement for the same package to determine if their purchase decision was consistent with their tamper assessment, as well as the reasons for their decisions. That is to say, the comparison was made to determine if the participants were consistent in saying that they believed a package to be tampered, and that they would not buy the package if they saw it in a store in the same condition, and vice versa. In the cases where the participant's purchase decisions were inconsistent with their previous tamper judgments, the reasons for the inconsistency were determined as well as possible, and the percentage of the inconsistencies were noted.

Each participant's familiarity with the survey package forms was also tallied, and later compared with each individual's tamper judgments. From this comparison, it could be determined if and to what extent familiarity with a tamper resistant package form played a role in the correctness of tamper assessments.

Packaging professional's opinion survey

This survey was conducted using a sample population of packaging professionals with an interest and/or first hand knowledge of tamper resistant packaging. They were chosen from lists of attendees at tamper evident packaging conferences. They were mailed a letter explaining the research being conducted, along with a survey questionnaire (see Appendix E) to be filled out and returned. The survey was aimed at gaining insights, opinions and perceptions of current tamper resistant packaging forms, and assessments of the ease of tampering, ease of concealing tampering, and overall consumer effectiveness of these package forms.

A. Survey Format

The survey consisted of four questions for each participant to complete. Each participant was initially informed that the survey was designed to obtain their opinion of current tamper resistant packaging forms, and that they were to answer all the questions as completely as possible based on their own opinions, not necessarily those of their company. They were also informed that their cooperation in the survey was voluntary, and that the survey was developed to maintain anonymity, so that all answers would be kept confidential and could not in any way be correlated with their identity.

The first question asked each participant to report which types of tamper resistant devices appear on their company's products. This information was gathered to determine what types of features would be primarily targeted in the responses to the other questions in the survey. From there, each participant was asked his or her opinion of how easy or hard they felt it would be to tamper and repair one of their packages using commonly available materials, such as tapes and adhesives. This question was designed to gather opinions from professionals on how well they feel an "average" person (one not necessarily trained in packaging) could defeat particular tamper resistant features and repair tampering.

In the third survey question, each participant was asked to comment as to how easy or hard it would be for a potential tamperer to gain access to his or her company's tamper resistant feature materials, or similar materials from suppliers, if the tamperer desired to maliciously conceal package tampering. This question made the participants consider their company's material and scrap handling procedures, as well as the sales and material handling procedures of material suppliers. This question touched upon the previously described Rosette study involving evaluation of the effectiveness of tamper evident packages, and could be used in the overall evaluation of tamper methods and ease of tamper repair in this study.

The final question asked each participant to give his or her honest opinion as to how well he or she felt the average consumer could detect tampering in one of the packages produced by his or her company. The participants were asked to give their opinions of a consumer's ability on a five point scale, ranging from definitely being able to detect tampering to definitely not being able to detect tampering, with a midpoint response of not sure. This was designed to attempt to gain an accurate assessment of each participant's faith in the effectiveness of tamper resistant packaging from the professional's standpoint.

B. Evaluation of the Responses From the Survey

The responses to each question were tallied to get an overall numerical count of tamper resistant forms in use by the participants, and these were compared to the opinions about specifically mentioned tamper resistant features by the individual participants. Also, the general trends of opinions of industry professionals about currently available tamper resistant forms could be obtained to get ideas as to what these professionals saw as design strengths and problem areas, and what may need to be done from an industry standpoint to improve tamper resistant packaging as a whole.

RESULTS AND DISCUSSION

Consumer Survey Results

Both the control and tamper samples of each package had a sample size of over 100 participants during the surveys. The results of the tamper judgments for each package can be seen in Tables 1A-8A.

As previously mentioned, a statistical analysis of the numbers can be conducted using the J index. To calculate the J index, two ratios must first be found: the ratio of correctness of judgement for the control package (called Yc) and that for the tampered package (Yt). The Yc value is calculated by subtracting the number of participants who incorrectly judged that the control package was tampered from the number of participants who judged the control to be untampered, divided by the total number of participants who observed the control package, or

$$Yc = \frac{Cnt - Ct}{Ctotal}$$

where Yc = The correctness ratio for the control package
 Cnt = The number of participants who said the
 control package was not tampered

C_t = The number of participants who said the control package was tampered
 and C_{total} = The total number of participants who observed the control package.

Similarly, the Y_t value for the tampered package is calculated by subtracting the number of people who believed the tampered package was untampered from the number of correct judgments divided by the total number of participants who observed the tampered package, or

$$Y_t = \frac{T_t - T_{nt}}{T_{total}}$$

where Y_t = The correctness ratio for the tampered package

T_t = The number of participants who said the tampered package was tampered

T_{nt} = The number of participants who said the tampered package was untampered

and T_{total} = The total number of participants who observed the tampered package.

Both the Y_c and Y_t values can range from +1 (100% correctness) to -1 (0% correctness).

Once the Y_c and Y_t values for a package have been determined, the J index, or overall package judgement correctness ratio, can be determined. This is done by simply determining the average of the two previous ratios,

or

$$J = \frac{Y_c + Y_t}{2}$$

Where J = The overall package correctness ratio

Y_c = The control package correctness ratio

and Y_t = The tampered package correctness ratio

Examining the participants' control package judgments for the eight survey packages and the corresponding Y_c values (see Table 9), it can be concluded that the participants could correctly assess the control condition of a package. The Y_c values were all relatively high, ranging from values of .8899 to .4231. Remembering that this Y_c value is normally distributed and ranges from +1 to -1 with a 0 value being equivalent to 50% correctness, the participants were 70% and above correct in their judgments. When looking at the reasons for the incorrect judgments of the control package (Tables 1B-8B), most of the participants who believed the control package had been tampered did so because of manufacturer's "defects", such as loose caps, crooked seams and surface variations on seals and bands. These numbers are of particular interest, because they reflect packages which may be considered by consumers to have been tampered when the products they contain are actually untampered. The consumer can then be expected to return packages which are only damaged, or existing in normal conditions of production variation, because they

**Table 1A - Survey responses for vitamin package
with styrene menbrane seal.**

	NOT TAMPERED	TAMPERED	TOTAL
CONTROL	83	24	107
TAMPER	47	62	109

**Table 1B - Control package responses for vitamin
package with styrene membrane seal.**

CONTROL PACKAGE	
CORRECT - CORRECT REASON	83
INCORRECT - MANUFACTURING DEFECT	3
INCORRECT - SURVEY/HANDLING REASON	18
INCORRECT - REASON UNKNOWN	3
TOTAL CONTROL PACKAGE RESPONSES	107

**Table 1C - Tampered package responses for vitamin
package with styrene menbrane seal.**

TAMPERED PACKAGE	
CORRECT - CORRECT REASON	54
CORRECT - MANUFACTURING DEFECT	3
CORRECT - SURVEY/HANDLING DEFECT	5
INCORRECT - TAMPER SEEN	3
INCORRECT - MANUFACTURING DEFECT	0
INCORRECT - SURVEY/HANDLING DEFECT	1
INCORRECT - REASON UNKNOWN	43
TOTAL TAMPERED PACKAGE RESPONSES	109

**Table 2A - Survey responses for salad dressing
bottle with paper neck band.**

	NOT TAMPERED	TAMPERED	TOTAL
CONTROL	103	6	109
TAMPER	71	36	107

**Table 2B - Control package responses for salad
dressing bottle with paper neck band.**

CONTROL PACKAGE	
CORRECT - CORRECT REASON	103
INCORRECT - MANUFACTURING DEFECT	2
INCORRECT - SURVEY/HANDLING REASON	3
INCORRECT - REASON UNKNOWN	1
TOTAL CONTROL PACKAGE RESPONSES	109

**Table 2C - Tampered package responses for salad
dressing bottle with paper neck band.**

TAMPERED PACKAGE	
CORRECT - CORRECT REASON	31
CORRECT - MANUFACTURING DEFECT	2
CORRECT - SURVEY/HANDLING DEFECT	3
INCORRECT - TAMPER SEEN	6
INCORRECT - MANUFACTURING DEFECT	0
INCORRECT - SURVEY/HANDLING DEFECT	0
INCORRECT - REASON UNKNOWN	65
TOTAL TAMPERED PACKAGE RESPONSES	107

**Table 3A - Survey responses for amber bottle
with metal breakaway cap.**

	NOT TAMPERED	TAMPERED	TOTAL
CONTROL	74	30	104
TAMPER	49	59	108

**Table 3B - Control package responses for amber
bottle with metal breakaway cap.**

CONTROL PACKAGE		
CORRECT - CORRECT REASON	74	
INCORRECT - MANUFACTURING DEFECT	21	
INCORRECT - SURVEY/HANDLING REASON	5	
INCORRECT - REASON UNKNOWN	4	
TOTAL CONTROL PACKAGE RESPONSES	104	

**Table 3C - Tampered package responses for amber
bottle with metal breakaway cap.**

TAMPERED PACKAGE		
CORRECT - CORRECT REASON	35	
CORRECT - MANUFACTURING DEFECT	1	
CORRECT - SURVEY/HANDLING DEFECT	2	
INCORRECT - TAMPER SEEN	9	
INCORRECT - MANUFACTURING DEFECT	0	
INCORRECT - SURVEY/HANDLING DEFECT	0	
INCORRECT - REASON UNKNOWN	40	
TOTAL TAMPERED PACKAGE RESPONSES	108	

Table 4A - Survey responses for pizza sauce jar with button closure.

	NOT TAMPERED	TAMPERED	TOTAL
CONTROL	94	12	106
TAMPER	27	81	108

Table 4B - Control package responses for pizza sauce jar with button closure.

CONTROL PACKAGE	
CORRECT - CORRECT REASON	94
INCORRECT - MANUFACTURING DEFECT	2
INCORRECT - SURVEY/HANDLING REASON	1
INCORRECT - REASON UNKNOWN	9
TOTAL CONTROL PACKAGE RESPONSES	106

Table 4C - Tampered package responses for pizza sauce jar with button closure.

TAMPERED PACKAGE	
CORRECT - CORRECT REASON	79
CORRECT - MANUFACTURING DEFECT	0
CORRECT - SURVEY/HANDLING DEFECT	2
INCORRECT - TAMPER SEEN	4
INCORRECT - MANUFACTURING DEFECT	0
INCORRECT - SURVEY/HANDLING DEFECT	0
INCORRECT - REASON UNKNOWN	23
TOTAL TAMPERED PACKAGE RESPONSES	108

**Table 5A - Survey responses for aspirin product
in blister package.**

	NOT TAMPERED	TAMPERED	TOTAL
CONTROL	98	11	109
TAMPER	51	56	107

**Table 5B - Control package responses for aspirin
product in blister package.**

CONTROL PACKAGE	
CORRECT - CORRECT REASON	98
INCORRECT - MANUFACTURING DEFECT	5
INCORRECT - SURVEY/HANDLING REASON	4
INCORRECT - REASON UNKNOWN	2
TOTAL CONTROL PACKAGE RESPONSES	109

**Table 5C - Tampered package responses for aspirin
product in blister package.**

TAMPERED PACKAGE	
CORRECT - CORRECT REASON	54
CORRECT - MANUFACTURING DEFECT	2
CORRECT - SURVEY/HANDLING DEFECT	0
INCORRECT - TAMPER SEEN	5
INCORRECT - MANUFACTURING DEFECT	0
INCORRECT - SURVEY/HANDLING DEFECT	0
INCORRECT - REASON UNKNOWN	46
TOTAL TAMPERED PACKAGE RESPONSES	107

**Table 6A - Survey responses for vegetable oil
bottle with foil membrane seal.**

	NOT TAMPERED	TAMPERED	TOTAL
CONTROL	97	10	107
TAMPER	27	82	109

**Table 6B - Control package responses for vegetable
oil bottle with foil membrane seal.**

CONTROL PACKAGE	
CORRECT - CORRECT REASON	97
INCORRECT - MANUFACTURING DEFECT	3
INCORRECT - SURVEY/HANDLING REASON	5
INCORRECT - REASON UNKNOWN	2
TOTAL CONTROL PACKAGE RESPONSES	107

**Table 6C - Tampered package responses for vegetable
oil bottle with foil membrane seal.**

TAMPERED PACKAGE	
CORRECT - CORRECT REASON	76
CORRECT - MANUFACTURING DEFECT	2
CORRECT - SURVEY/HANDLING DEFECT	4
INCORRECT - TAMPER SEEN	4
INCORRECT - MANUFACTURING DEFECT	0
INCORRECT - SURVEY/HANDLING DEFECT	3
INCORRECT - REASON UNKNOWN	20
TOTAL TAMPERED PACKAGE RESPONSES	109

**Table 7A - Survey responses for eye drop
package with plastic shrink band.**

	NOT TAMPERED	TAMPERED	TOTAL
CONTROL	98	10	108
TAMPER	49	57	106

**Table 7B - Control package responses for eye drop
package with plastic shrink band.**

CONTROL PACKAGE	
CORRECT - CORRECT REASON	98
INCORRECT - MANUFACTURING DEFECT	9
INCORRECT - SURVEY/HANDLING REASON	0
INCORRECT - REASON UNKNOWN	1
TOTAL CONTROL PACKAGE RESPONSES	108

**Table 7C - Tampered package responses for eye drop
package with plastic shrink band.**

TAMPERED PACKAGE	
CORRECT - CORRECT REASON	41
CORRECT - MANUFACTURING DEFECT	14
CORRECT - SURVEY/HANDLING DEFECT	2
INCORRECT - TAMPER SEEN	5
INCORRECT - MANUFACTURING DEFECT	0
INCORRECT - SURVEY/HANDLING DEFECT	0
INCORRECT - REASON UNKNOWN	44
TOTAL TAMPERED PACKAGE RESPONSES	106

**Table 8A - Survey responses for yogurt drink
package with plastic tearaway tab.**

	NOT TAMPERED	TAMPERED	TOTAL
CONTROL	90	19	109
TAMPER	78	28	106

**Table 8B- Control package responses for yogurt
drink with plastic tearaway tab.**

CONTROL PACKAGE		
CORRECT - CORRECT REASON	90	
INCORRECT - MANUFACTURING DEFECT	12	
INCORRECT - SURVEY/HANDLING REASON	2	
INCORRECT - REASON UNKNOWN	5	
TOTAL CONTROL PACKAGE RESPONSES	109	

**Table 8C - Tampered package responses for yogurt
drink with plastic tearaway tab.**

TAMPERED PACKAGE		
CORRECT - CORRECT REASON	17	
CORRECT - MANUFACTURING DEFECT	4	
CORRECT - SURVEY/HANDLING DEFECT	7	
INCORRECT - TAMPER SEEN	2	
INCORRECT - MANUFACTURING DEFECT	0	
INCORRECT - SURVEY/HANDLING DEFECT	0	
INCORRECT - REASON UNKNOWN	76	
TOTAL TAMPERED PACKAGE RESPONSES	106	

believe them to be tampered. With better package processing control and more consistently "perfect" packages being placed on store shelves, this dimension of the Y_c value would be closer to +1, and there would be even higher correctness in regards to normal packages (the controls used in this survey), with a consequent reduction in potential package returns.

As well as the participants did in their assessment of the control packages, the opposite can be said about the tampered packages. Overall, the participants had a difficult time in correctly judging the tampered packages as being tampered, with the Y_t ratios ranging from .5046 to -.4717 (see Table 9). The ratios for each tampered package was considerably lower than the ratios for the corresponding control package. This difference reflects the extent to which participants could not differentiate the appearance of a tampered package from an untampered one.

From the Y_c and Y_t ratios, the overall correctness ratio, or J ratio, can be calculated. As seen in Table 9, the J index ranged from .66 for the foil membrane seal to .09 for the plastic tear band. In all calculations, the J value resulted from a high Y_c value which was brought down by the Y_t value for the resulting J score. Although the J value may suggest that the sample population of over 200 participants per package could do very well in correctly judging package condition, in reality the participants could correctly assess the control package, but did rather poorly

in judging a tampered package.

There were several instances where the participants were correct in saying that the packages were tampered, but did so for incorrect reasons. Some of these reasons included manufacturing defects (for example, loose bands and misaligned seams), survey design (packages which were intentionally missing the closures or labels for survey purposes) or handling problems (packages which became dirty because of constant handling by survey participants). In these cases, it must be recognized that the subjects missed the tamper and repair; and, by doing so, may have accepted the tampered package. For these reasons, a separate Y_t statistic, referred to as Y_t' , was calculated reflecting the ratio of correct judgments for the tampered package for the correct reasons only. When comparing the Y_t and Y_t' statistics (Table 9 and 10), it can be seen that the Y_t' is consistently lower, and, in certain instances such as the eye drop package, considerably lower than the initial Y_t value.

Another J type statistic, called the J' value, was calculated in the same manner as the original J index, but only considered judgments which were correct for the correct reasons (Table 10). For the control package, there was only one instance where a participant correctly identified the control for an incorrect reason, so the Y_c component did not change from the original J calculation. But, as previously discussed, there were several instances where people

correctly judged the tampered package as being tampered, but did so for incorrect reasons. This was taken into account in the Y_t' calculation. The J' index was calculated as the average of Y_c and Y_t' , and was therefore consistently lower than the regular J index. This sort of inconsistency was not expected, but is important because of the impact it could have on a food or drug producer. The implication is that, unless their packaging can be consistent and consistently good, packagers could have problems with consumers being able to detect actual tampering, or with their packages being returned as damaged (tampered) when they are not.

These results also characterize the difficulties consumers have with tamper resistant packages. Consumers are aware that these packages are "tamper resistant" and are supposed to be inspected to determine if they have been breached. Unfortunately, many consumers do not know what areas of the packages they should inspect, and what types of things they should look for to differentiate a tampered package from one which is not tampered.

This problem has two different aspects. Some consumers who know they are supposed to inspect packages have no idea how they should carry out this inspection; so when they are forced to observe packages (as they were in the survey), they will look for any clue of package abnormality they can find and consider it a sign of tampering. These individuals would be the consumers who would return untampered packages

Table 9 - J score statistics.

PRODUCT	Yc	Yt	J INDEX
Vitamins - Styrene membrane seal	.5514	.1376	.34
Salad dressing - Paper neck band	.8899	-.3271	.28
Amber bottle - Metal breakaway cap	.4231	.0926	.26
Pizza sauce - Button closure	.7736	.5000	.64
Aspirin - Blister	.7982	.0467	.42
Vegetable oil - Foil membrane seal	.8131	.5046	.66
Eye drops - Plastic shrink band	.8148	.0755	.45
Yogurt drink - Plastic tearaway tab	.6514	-.4717	.09

Table 10 - J' score statistics.

PRODUCT	Yc	Yt'	J' INDEX
Vitamins - Styrene membrane seal	.5514	-.0092	.27
Salad dressing - Paper neck band	.8899	-.4206	.23
Amber bottle - Metal breakaway cap	.4231	.0377	.23
Pizza sauce - Button closure	.7736	.4630	.62
Aspirin - Blister	.7982	.0093	.39
Vegetable oil - Foil membrane seal	.8131	.3945	.60
Eye drops - Plastic shrink band	.8148	-.2264	.29
Yogurt drink - Plastic tearaway tab	.6514	-.6792	-.01

as tampered, which could be very costly to the package producer, both monetarily (loss of profits and having to consider the materials used in the package as scrap) and in terms of goodwill (possible loss of future sales and negative publicity which may result if the package returns become a widespread action). Other consumers are so used to seeing damaged or otherwise imperfect packages in the stores, that they have convinced themselves that any deviation in packages is a result of what they consider "normal" circumstances, and do not consider the deviations to be a sign of tampering. These people stand a chance of being victims of a malicious package tamperer, and could lose their lives as a result.

To determine if a participant's age had an effect on the correctness of their tamper judgments, a J value was calculated for each of the four age groups which made up the total population which observed the survey packages (Appendix B). Once a J value was calculated for each age group for each package, the J indices were compared between age groups and between each age group and the overall J value for the package. A comparison of significance was done using the standard error calculation of each J value, and then doing a Z distribution calculation comparing the J and standard error calculation of the two compared groups. When this Z is compared to a Z distribution at a 95% confidence level (a value of 1.65), it was seen that there were no overall statistically significant differences

between the age groups in their ability to detect tampering. There were a few isolated cases where there was a significant difference in the tamper judgments of two age groups at the 95% confidence level, but there were no trend found, nor were any identifiable reason for the differences noted.

In the second portion of the survey, the participants were asked if they would purchase the eight products in the condition seen in the survey. This information was monitored and compared with the individuals' tamper judgement for each package to see if the purchase decisions were consistent with the tamper judgments (that is, if they would purchase a package they had earlier said was tampered, and vice versa). Overall, in 2 to 20% of the responses, the purchase decisions made were inconsistent with the tamper judgments of the participants (Appendix C). In certain cases, it could definitely be determined why the participants were inconsistent in their judgments. The common identifiable reason for such inconsistency dealt with certain aspects of the survey situation itself. Participants said they would not purchase packages which they believed to be not tampered because of missing labels and closures on the survey samples. These features were missing intentionally from the survey packages to make observation of the tamper resistant features easier for the participants, but some participants still refused to commit to buying packages in this condition in spite of reassurance

by the survey monitors that these should not be considered in the decision making process.

In the instances where the participants believed the package was tampered but said they would purchase them anyway, two primary explanations summed up their purchase assessments. Some said they would buy the packages because they would not have inspected them in the store, and would not have noticed any tampering before purchase. Others said that they would buy the packages because they were not sure of their tamper judgments; and, in spite of the bad condition of the package, they had seen packages in stores which were in similar condition, so they could not determine if the damage was really a result of tampering. This suggests serious problems with consumer perceptions of packages as seen in stores. The fact that they are used to seeing bad packages on the store shelves or in damaged goods bins, and that they are so trusting that they do not inspect packages and buy damaged packages really undermines the underlying fundamentals of tamper resistant packaging. A fundamental principle behind tamper resistant packaging is that packages should easily show tampering, and that package quality control should be such as to not cause consumers to see unacceptable but untampered packages in stores that a tampered (damaged) package would not stand out as being damaged.

An majority of the participants in the survey (in each instance, at least 201 of the 216 people) claimed to be

familiar with the tamper resistant features displayed. Because of the small number of participants who said they were unfamiliar, it was difficult to do a relevant statistical analysis of whether lack of familiarity played a role in incorrect tamper judgments. Looking at the overall trends and percentages of familiarity and unfamiliarity in correct or incorrect tamper judgments (Appendix D), it can be concluded that participant familiarity really did not play a role in the correctness of tamper judgments. In the instance of the paper neck band, 5 of the 6 people (83%) who claimed to be unfamiliar with the feature incorrectly believed the tampered package to be a control, but 65% (66 of 101) of participants who claimed to be familiar with the package were also incorrect in judging the tampered package to be a control. In most cases, the percentages of people incorrect in their tampered package assessment were similar between those who were familiar with the tamper resistant feature and those who said that they were not familiar with the form. Based on the similarity of the percentages calculated, it can be seen that familiarity with the package really did not play a role in the overall correctness of a participant's tamper judgments.

Packaging Professional Survey Results

Of the 60 survey forms sent to packaging professional, 30 forms (50%) were returned. This number, although smaller than expected, proved to be enough to show some identifiable trends. Since the questions asked had no definite predictable sets of answers and the sample was small, a statistical analysis as in-depth as the one used for the consumer survey analysis was not possible. Instead, analysis of the data was based upon the percentages of particular answers to the total number of responses (see Appendix F). From these percentages, opinion trends could be seen and analyzed.

The first question asked of the professionals dealt with the types of tamper resistant features they worked with. As expected, there was a wide range of tamper resistant types mentioned, both ones which they used on the products they produced (user information) and ones which they produce for a variety of user companies (supplier information). This information was gathered to help with comparisons of the answers in the later questions, with particular attention being paid to TR types mentioned which were the same or very similar to those used in the consumer survey portion of the study.

The professionals were then asked how easy they felt it would be to repair tampering of one of their products using

commonly available materials, such as tape or glue. These results are shown in Table 11 (page 59). In general, more respondents felt that the package types they mentioned would be hard to repair with the tampering being unnoticeable than felt that the tampering could be repaired easily and without detection.

Of the participants who felt tamper repair without detection would be difficult, most were package suppliers as opposed to users. They felt overall that tamper repair would be difficult to do without prior knowledge about packaging or about specific tamper resistant features; and that tampering would take much time and effort on the part of a tamperer, so it couldn't be done successfully if it was forced to be done quickly (such as in a store) or sloppily (without replicate materials). Tamper resistant forms such as aluminum induction heat seals, shrink overwraps and blister packages were thought by the professionals to be difficult to tamper and repair without detection. The package producers were especially confident of their tamper resistant features if they were of the variety which were made of "distinctive" materials or ones which, when breached, were designed to cause package or seal destruction (Table 14, page 61).

Those participants who believed certain package forms would be easy to repair without detection commented on particular tamper resistant package types, and on tamper methods which would not leave evidence of tampering. Tape

end sealed cartons and other sealed cartons were strongly believed by the professionals surveyed to be easily repaired without tamper detection. Tampering done using a syringes or done by someone with a knowledge of packaging was also considered to be undetectable. Some professionals expressed concern about the overall ability of consumers to correctly use tamper resistant forms and to detect tampering of any kind (Table 14).

The participants were also asked if they felt it would be possible for a potential tamperer to gain access to their tamper resistant package materials, or materials similar to the ones they use from a supplier, to use in a malicious attempt to conceal package tampering (See Table 12). One third of the professionals surveyed felt that their company had an extensive enough security system and strict enough controls to make it impossible for a tamperer to gain access to their materials, or obtain materials from their suppliers. These respondents were the same people who were very confident that their packages could not be tampered without leaving evidence which the average consumer could detect.

While these respondents believed this malicious tampering scenario would be impossible for their products, the other two thirds of the survey participants that this sort of situation could occur. Twenty percent of the respondents felt that a tamperer could easily gain access to their company's materials and/or could obtain the same or

similar materials from suppliers easily. In general, these were the same participants who expressed concern about the ease of tampering packages and lack of ability of consumers to detect tampering. Thirteen percent of the participants who felt that this kind of malicious tampering scenario could occur said it would be difficult for a tamperer to do, but would not be impossible. There was a special concern on the part of some (10%) of the participants that, while it may be impossible for a tamperer who does not work for the company to gain access to materials, an employee of the company could.

Lastly, the participants were asked to give their honest opinion of how well they feel an average consumer could detect tampering of one of the packages they produce, and the reasons for this belief. In this question, the participants were given a five point scale to express their opinion, consisting of (1) Definitely, (2) Probably, (3) Not Sure, (4) Probably Not, and (5) Definitely Not. This was done to force the participants into an answer which could be numerically analyzed and compared with the responses of other participants.

One half of the participants of the survey (15 of 30 respondents) were not confident of the ability of consumers to detect tampering, and replied either that the consumers probably could not or definitely could not detect tampering of one of their packages (Table 13). Some people mentioned that better consumer education about tamper resistant

packaging and correct ways to use it was necessary to help alleviate some of the problems which exist. These participants were primarily from food and drug producing companies, and had based their opinions on the reoccurring tampering problems over the last few years.

Thirty percent (9 of 30) of the participants were confident about the ability of consumers to detect package tampering, and responded either that people could definitely or probably detect any package tampering which occurs. These individuals were the same ones who exhibited confidence throughout the survey that consumers could detect any form of tampering, and that tampering with packages would be very difficult or impossible to do without user detection. These individuals were mostly packaging suppliers who used the survey as a way to defend their types of tamper resistant features, and some professionals from user companies who were trying to defend their elaborate and expensive security systems. Comments from participants referring to their packages as having "simple, self-evident features" and "high quality appearance" which would "be hard to duplicate" demonstrates this defensive, sales pitch approach seen in the survey answers. Their replies were interesting in the fact that, unlike the majority of the other respondents who gave lengthy, detailed answers and opinions, these participants gave short answers which sounded more like sales pitches and "bragging" than thought-out answers to the questions asked. The suppliers also

returned sales brochures about their products and letters describing the merits of their products along with their surveys.

Many of the package forms used in the consumer survey were mentioned by the professionals in their surveys. Overall, the professionals who used blister packages and plastic breakaway/tearaway closures were confident that these package forms would be hard to tamper without consumer detection. Ironically, those package forms were two of the worst ones in the consumer surveys as far as people being able to detect tampering and to differentiate a tampered package from a non-tampered one (low Yt scores). The vacuum button closure, when mentioned by some professionals in their survey, was believed to be a package which could easily tampered and repaired without detection. This package form was one of the best in the consumer survey in having tampering being detected, keeping in mind that no attempt was made to conceal the tampering or repair the package with this product. The professionals seemed split about how easily membrane seals could be tampered and repaired without detection. Some felt that any of them could be easily tampered and repaired, while others felt that the seals, especially induction seals, would be hard to repair without detection. In the consumer survey, the induction seal package was the best in terms of consumer detection (again, no attempt was made to repair or conceal the tampering of this product in the consumer survey), while

the styrene membrane seal did much worse, both in terms of consumers being able to detect tampering (low Y_t) and being able to differentiate a tampered from a non-tampered package (low Y_c and Y_t).

Overall, there tended to be a definite split among the packaging professionals surveyed. On one side, there were the professionals who exuded confidence about tamper resistant packaging, especially their own, and appeared to feel that there are no major problems with tamper resistance. The other side felt that there were serious potential problems with tamper resistance, and that action needed to be taken, primarily in the form of new package technologies and in proper consumer education about tamper resistant packages. These individuals felt that more tampering incidences could occur at any time in the future, and would continue to happen unless something new was done to try to alleviate some of the problems they perceived.

**TABLE 11 - PACKAGING PROFESSIONAL'S ASSESSMENTS
OF TAMPERING EASE AND DETECTABILITY**

----- ASSESSMENT/PACKAGE TYPE/REASON -----	# RESPONSES
EASY TO REPAIR	
Tape seals	6
Sealed End	3
Tamper anything with syringe	3
Membrane seals	2
Bags	2
Plastic Sleeves/Overwraps	2
Any tamper easy to repair with tape/glue	2
Vacuum buttons	1
"Pro" tamperer could fix any tamper	1

HARD TO REPAIR UNNOTICED	
Induction seals	4
Shrink bands	4
Blister packages	3
Hard to do without packaging knowledge	3
TRP hard to repair in general	3
Package destructs when tampered - ring cap	2
Hard because of distinctive materials	2
Consumers can detect tampering	2
Shrink overwraps	1
Foil pouches	1
Cans	1
Easy to do out-of-store, not in-store	1

**TABLE 12 - PROFESSIONAL'S OPINIONS ON EASE TO GAIN
ACCESS TO TAMPER RESISTANT MATERIALS**

OPINION	# RESPONSES
Extensive security/control makes it impossible	12
Easy to do	8
Difficult but possible	4
Difficult for outsider, but employee could	4
Could easily get material from suppliers	3

**TABLE 13 - PACKAGING PROFESSIONAL'S OPINIONS ON
CONSUMER DETECTABILITY OF PACKAGE TAMPERING**

TAMPERING DETECTED BY CONSUMERS	# RESPONSES
Definitely	4
Probably	7
Not Sure	4
Probably not	13
Definitely not	2

Table 14 - Additional comments made by packaging professionals during survey responses.

COMMENTS	# MENTIONS
Consumers can't detect tampering/ inspect packages	5
Distinctive materials make tamper repair harder	4
Consumers need education	4
Anything could be tampered with a syringe without detection	3
Repair without detection is hard to do without packaging knowledge	3
Tamper resistant packages are hard to repair without detection	3
Any tampering is easy to repair with tape, glue, etc.	2
Consumers can detect tampering	2
Tamper repair is easy to do out-of-store, but is difficult to do in-store	2
Professional tamperers can repair anything without detection	1

RECOMMENDATIONS

The consumers who participated in this survey did a poor job overall in correctly identifying packages which had been tampered. The sample as a whole did well in correctly identifying packages which had not been tampered, but could not correctly differentiate a tampered package from an untampered one.

The packaging professionals who participated in the study were split as to their opinions on the tamper evidence of packages. Some felt that the package forms they were familiar with were good indicators of possible tampering, and were difficult to tamper with and repair without detection by consumers. Others felt that many tamper resistant packages could be tampered and repaired without detection, and that better consumer education was needed to help consumers be able to inspect packages correctly for evidence of tampering.

The fact that packaging professionals were split on the issue of tamper resistance seems to point out some problems and confusion in the packaging industry. While some feel that there are no real problems with tamper resistant packaging, others see problem areas which must be addressed. When comparing this to the consumer survey results, it

becomes evident that there are problems with tamper resistant packaging, primarily in its ability to provide easily distinguishable evidence to consumers that tampering has occurred. In spite of the confidence displayed by knowledgeable professionals who work with this type of packaging on a daily basis, the average consumer who does not have a vast knowledge of packaging and who must rely on whatever direction he is given in the correct usage of tamper resistant packaging cannot correctly use this package form in its current state. He is at risk of being a victim of future malicious tampering incidences. All the knowledge and design capabilities of today's packaging professionals will not mean a thing if consumers cannot understand and correctly use these package features which are designed to help them.

For this reason, the industry should look into the possibility of conducting protocol testing with tamper resistant packaging, similar to that currently done on child resistant packages, as part of a program to determine the overall effectiveness of these packages. The following is a test proposal based on the results obtained in this study, as well as the Sneden and Rosette studies of tamper resistant packaging. It is intended to be a comprehensive protocol test method for evaluation of all current and future tamper resistant packages.

The evaluation method is broken down into two distinct parts: a consumer protocol-type test and an evaluation of

design and packaging management concerns. The major emphasis (at least 80% of the overall evaluation criteria) should be based on the consumer portion of the evaluation, since the ability of consumers to correctly use packages is the real indicator of the effectiveness of packages.

A true effectiveness test of tamper resistant packaging must consider industry concerns, such as ease of package tampering and repair, material concerns and costs. In reality, these concerns are all futile if an average consumer cannot detect package tampering. Consumers are the final judge of a tamper resistant package's effectiveness: all the planning and concern on the part of the packaging industry is wasted if consumers cannot detect tampering. This is true whether failure to detect tampering is because of ignorance or of negligence in properly inspecting packages, or because the packages fail to leave evidence of malicious tampering. If a consumer should be poisoned because he/she could not see that a product and package had been tampered, there is no consolation in the fact that the manufacturer and supplier believed the package to be effective from their professional standpoints. For this reason, an 80% consumer input to 20% industry input is recommended in order to cover all possible effectiveness criterion in an appropriate proportion of importance.

The proposed consumer evaluation would consist of a study of at least 300 consumers randomly chosen in a survey-type situation similar to that conducted in this study.

Packages would be displayed both in a control and in at least one tampered form. There should be examples of various repair methods: some using simple materials and processes and others with more complex and skillful repair materials and methods. Consumers would be asked to look at the packages and make an evaluation as to whether they think the package had been tampered or not. This should be controlled so that a group of at least one hundred people look at the control package, and approximately the same number look at each of the tamper variations used in the study.

From the data obtained, a statistical evaluation of consumer's ability to correctly identify an untampered package (Y_c value), a tampered package (Y_t value) and the overall ability of the consumers to differentiate a tampered from an untampered package (J value) could be conducted. A suggested set of initial target values for an acceptable package consists of the package obtaining both a Y_c and Y_t value of no less than .4 (70% correctness when applied to the -1 to +1 range for J values), and an overall J value of no less than .5 (75% overall correctness). From the research conducted, most packages would have no problem attaining a high Y_c value, but only certain tamper resistant packages would be able to attain a .4 Y_t value. The choice of a .4 Y_t value is arbitrary, and is probably not high enough for true effectiveness in showing package tampering, but it should be a good starting point. From the survey

work conducted in this research program, a Y_t value over .4 seemed to show a consumer population which liked the tamper resistant feature, and overall was confident with their ability to understand and use the feature to make correct tamper assessments. If the package could attain this Y_t level, it is very likely that it would also attain the required .5 J value of overall correctness, since the Y_c value for the package will be, in virtually every instance, far higher than .5.

If it attains the necessary levels in the consumer testing, other factors must then be considered in the overall evaluation of the package. At this point, an evaluation of the package and the tamper evident feature for other factors, such as packaging knowledge required to effectively tamper a package, feature cost/package cost relationships, tamper resistant feature material and visibility characteristics, and time and equipment requirements, similar to that developed by J.L. Rosette, should be conducted. Rosette (1985) conducted a comprehensive study of all of these factors, and how they correspond to development of a truly effective tamper resistant feature. Following Rosette's guidelines and ranking system, an index can be obtained which covers these more technical packaging considerations; and, when used in conjunction with the consumer indices obtained in a prescribed ratio (as suggested earlier, a ratio based 80% on consumer indices and 20% on the technical index), can give a

value which is a comprehensive measure of the total effectiveness of a tamper resistant package feature and the package as a whole.

FUTURE STUDIES

From the research conducted in this evaluation, the need for further study in specific areas became apparent. One such area deals with consumer evaluation of tamper resistant packaging using a survey method. Future surveys should be refined so as to give more definitive reasons why consumers are making correct and incorrect tamper assessments. If the reasoning could be determined why consumers make their judgments, especially their incorrect judgments, some clues could be gathered to make packages more tamper evident. Specific design changes, process control amendments, or other ideas may be brought to light which could make the tamper resistant features more consistent in appearance and function, and easier for consumers to use. Further studies could be done on specific tamper resistant package types to determine their overall effectiveness, using the system proposed in this report. By studying a number of variations of similar package features (for example, a study of shrink bands, which differ by their colour, printed surface size in proportion to the bottle neck, etc.), much could be learned about the overall effectiveness of the feature, as well as what types of variations are most advantageous, both from a consumer detectability standpoint and an industry view. Work in this area could possibly lead to more standardization between features (in the shrink band example, more standardized size

and overall appearance of all bands which appear on packages), which would greatly aid user companies from a cost standpoint. This potentially could also help consumers with their tamper detection ability. The consumer survey conducted in this study demonstrated how variation in features and between like features at times misled consumers into making incorrect tamper assessments, and further standardization between features could help to decrease the amount and types of variation, and aid consumer tamper detection ability.

ENDNOTES

- ¹ U.S. Food and Drug Administration. "21 Code of Federal Regulations Parts 211, 314 and 700 : Tamper-Resistant Packaging Requirements for Certain Over-The Counter Human Drugs and Cosmetic Products," Office of the Federal Register, vol. 47, no.215, 5 November, 1982, p.50444.
- ² U.S. Department of Health, Education and Welfare, Public Health Services/Food and Drug Administration. "Grade A Pasteurized Milk Ordinance (1978 Recommendations)," p.31.
- ³ U.S., Statutes at Large, Public Law 85-859, 72 Statute 1358.
- ⁴ U.S. Food and Drug Administration, "21 Code of Federal Regulations Part 200.50: Ophthalmic Preparations and Dispensers," revised April 1, 1987.
- ⁵ Food and Drug Administration, "21 CFR Parts 211, 314, and 700," p.50442
- ⁶ Forcenio, Hallie and Loomis, Bob, "TE Options Evolve into Long-Term Solutions," Food and Drug Packaging, vol.47, no.8, August, 1983, p.52.

- 7 FDP Staff Reports, "What More Can Drug Packagers Do?,"
Food and Drug Packaging, vol.50, no.4, April. 1986,
p.1.
- 8 Densford, Lynn, "People in Packaging:FDA'a Sanford A.
Miller," Food and Drug Packaging, vol.51, no.4,
April, 1987, p.20.

APPENDICIES

APPENDIX A

APPENDIX A
CONSUMER SURVEY FORM AND RAW DATA

MICHIGAN STATE UNIVERSITY

TAMPER EVIDENT PACKAGING STUDY

Please look at each sample container separately. The samples in this part of the study **MAY** or **MAY NOT** have been tampered with. You may pick up the samples, but please do not alter the package in any manner (that is, do not pick, peel or pluck at the display packages).

This survey should take approximately 3 minutes to complete. Your answers will be kept confidential. We want you to know that you are free not to answer any particular question and that your cooperation is voluntary.

SAMPLE CONTAINER : VITAMIN (GLASSINE MEMBRANE SEAL) ID# _____

Having observed this package, do you think it has been tampered with?

_____ NO _____ YES () Q1

Reason for above response: _____

_____ () Q2

SAMPLE CONTAINER : SALAD DRESSING (PAPER BAND) ID# _____

Having observed this package, do you think it has been tampered with?

_____ NO _____ YES () Q2

Reason for above response: _____

_____ () Q2A

SAMPLE CONTAINER : AMBER BOTTLE (BREAKAWAY METAL CAP) ID#

Having observed this package, do you think it has been tampered with?

_____ NO _____ YES () Q3

Reason for above response: _____

_____ ()Q3A

SAMPLE CONTAINER : RAGU SPAGHETTI SAUCE (BUTTON CLOSURE)
ID#

Having observed this package, do you think it has been tampered with?

_____ NO _____ YES () Q4

Reason for above response: _____

_____ ()Q4A

SAMPLE CONTAINER: BUFFERIN (BLISTER PACKAGE) ID#

Having observed this package, do you think it has been tampered with?

_____ NO _____ YES () Q5

Reason for above response:

() 05A

SAMPLE CONTAINER: VEGETABLE OIL (FOIL/PLASTIC MEMBRANE SEAL)

ID#

Having observed this package, do you think it has been tampered with?

 NO YES () Q6

Reason for above response: _____

() Q6A

SAMPLE CONTAINER : EYE DROPS (PLASTIC SHRINK BAND) ID#

Having observed this package, do you think it has been tampered with?

_____ NO _____ YES () Q7

Reason for above response: _____

() Q7A

SAMPLE CONTAINER : DANUP YOGURT DRINK (TEARAWAY PLASTIC CAP)

ID#

Having observed this package, do you think it has been tampered with?

NO YES () 08

Reason for above response:_____

() Q&A

If you were considering the purchase of the above products, would you purchase them in the condition you have seen in the survey? (Please base your answers on package condition only)

VITAMIN	_____YES	_____NO	()Q9
SALAD DRESSING	_____YES	_____NO	()Q10
AMBER BOTTLE	_____YES	_____NO	()Q11
RAGU SPAGHETTI SAUCE	_____YES	_____NO	()Q12
BUFFERIN	_____YES	_____NO	()Q13
VEGETABLE OIL	_____YES	_____NO	()Q14
EYE DROPS	_____YES	_____NO	()Q15
DANUP YOGURT	_____YES	_____NO	()Q16

Have you encountered the survey package forms on products you have used in the last year?

Shrink Bands _____YES _____NO ()Q17

(as seen on the EYE DROPS and SALAD DRESSING)

Membrane Seal _____YES _____NO ()Q18

(as seen on the VITAMIN and VEGETABLE OIL)

Breakaway/Tearaway Closure _____YES _____NO ()Q19

(as seen on the AMBER BOTTLE and DANUP YOGURT)

Blister Package _____YES _____NO ()Q20

(as seen with the BUFFERIN)

Button Top Closure _____YES _____NO ()Q21

(as seen on the RAGU SPAGHETTI SAUCE)

QUESTIONS ABOUT YOURSELF:

AGE: ☐ 18-30 ☐ 31-45 ☐ 46-65 ☐ Over 65 () Q22SEX: ☐ MALE ☐ FEMALE () Q23

EDUCATIONAL BACKGROUND: () Q24

☐ Some High School ☐ High School Graduate☐ Some College ☐ College Graduate

Thank you for your cooperation!

VITAMIN PACKAGE SURVEY RAW DATA

<u>SURVE</u>	<u>VITAMINS</u>	<u>MEMSEAL</u>	<u>AGE</u>	<u>SEX</u>	<u>ED</u>	
1001		2	1	2	1	4
1002		1	1	1	2	3
1003		1	1	2	2	2
1004		2	1	2	2	3
1005		1	1	3	1	4
1006		1	1	2	2	4
1007		1	1	1	1	4
1008		1	1	2	2	4
1009		1	1	2	1	4
1010		1	1	2	1	2
1011		1	1	2	1	4
1012		1	1	3	1	3
1013		2	1	2	1	3
1014		1	1	4	2	1
1015		1	1	1	2	3
1016		1	1	3	1	3
1017		1	1	2	1	4
1018		1	1	3	2	3
1019		1	1	1	1	3
1020		2	1	3	1	2
1021		1	1	1	2	4
1022		2	1	3	2	4
1023		2	1	3	2	2
1024		1	1	3	2	2
1025		2	1	3	1	2
1026		1	1	3	1	2
1027		2	1	2	1	3
1028		1	1	3	1	3
1029		1	1	1	2	4
1030		1	1	2	1	4
1031		1	1	2	2	3
1032		1	1	1	1	3
1033		1	1	1	1	4
1034		1	1	1	2	4
1035		2	1	2	2	3
1036		1	1	1	2	3
1037		1	1	2	1	3
3001		1	1	1	1	2
3002		2	1	1	1	4
3003		2	1	2	2	4
3004		1	1	1	2	1
3005		2	2	4	2	3
3006		1	1	1	1	3
3007		1	1	3	2	4
3008		1	1	2	2	3
3009		1	1	2	2	1
3010		1	1	3	2	4
3011		1	2	4	1	2
3012		2	1	2	2	3

SURVE	VITAMINS	MEMSEAL	AGE	SEX	ED
3013		1	1	3	2
3014		2	2	2	3
3015		1	1	3	1
3016		1	1	2	1
3017		2	1	1	1
3018		1	1	2	2
3019		1	1	1	1
3020		1	1	2	1
3021		2	1	2	2
3022		1	1	2	2
3023		1	1	2	2
3024		2	1	2	2
3025		2	1	1	2
3026		2	1	1	2
3027		2	1	3	2
3028		1	1	3	1
3029		2	1	1	2
3030		2	2	2	2
3031		2	1	2	1
3032		2	1	1	1
3033		2	1	2	1
3034		2	1	3	2
3035		1	1	3	1
3036		1	1	1	1
3037		2	1	4	1
3038		1	1	1	2
3039		2	1	1	2
3040		2	1	3	2
3041		1	1	4	1
3042		2	1	1	2
3043		2	1	1	2
3044		2	1	1	2
3045		2	1	3	2
3046		1	1	3	2
3047		1	1	4	1
3048		2	1	4	1
3049		2	1	4	2
3050		2	2	3	2
3051		2	1	4	2
3052		2	1	3	1
3053		2	2	3	2
3054		1	1	3	1
3055		1	1	3	2
3056		2	1	3	2
3057		2	1	2	2
3058		2	1	3	1
3059		2	1	3	2
3060		2	1	4	2
3061		1	1	4	2
3062		1	1	3	2
3063		2	1	3	2

SURVE	VITAMINS	MEMSEAL	AGE	SEX	ED
-----	-----	-----	---	---	---
3064		2	1	2	2
3065		1	1	3	2
3066		1	1	2	4
3067		2	1	1	3
3068		2	1	1	4
3069		2	1	1	4
3070		2	1	1	3
3071		2	1	2	2
3072		2	1	2	2
3073		2	1	2	2
3074		1	1	2	4
3075		1	1	3	2
3076		1	1	3	3
3077		1	1	4	2
3078		1	1	4	2
3079		2	1	3	4
3080		2	1	3	1
3081		2	1	3	3
3082		1	1	4	3
3083		1	1	2	4
3084		1	1	4	3
3085		1	1	4	3
3086		1	1	2	3
3087		1	1	3	2
3088		1	1	2	4
3089		1	1	4	2
3090		1	1	4	4
3091		1	1	4	2
3092		2	1	4	4
3093		2	1	4	3
3094		2	1	2	4
3095		1	1	3	4
3096		2	1	2	4
3097		2	1	3	4
3098		2	1	3	4
3099		2	1	2	2
3100		2	1	2	1
3101		2	1	2	4
3102		2	1	1	2
3103		2	1	4	2
3104		1	1	3	1
3105		2	1	2	2
3106		2	1	3	2
3107		1	1	3	4
3108		2	1	1	4
3109		2	1	2	4
1038		1	1	3	4
1039		1	1	3	2
1040		1	1	1	4
1041		2	1	2	3
1042		1	1	1	4

SURVE	VITAMINS	MEMSEAL	AGE	SEX	ED	
-----	-----	-----	---	---	---	
1043		1	1	2	1	4
1044		1	1	3	2	3
1045		1	1	2	1	4
1046		2	1	1	1	4
1047		2	1	1	1	4
1048		1	1	1	1	4
1049		1	1	3	2	1
1050		1	1	4	1	2
1051		1	1	3	2	1
1052		2	1	4	1	4
1053		1	2	3	2	3
1054		1	1	2	2	3
1055		1	1	4	2	3
1056		2	2	3	2	2
1057		1	1	4	1	2
1058		1	1	2	2	4
1059		1	1	4	2	2
1060		1	1	4	2	2
1061		2	1	4	2	4
1062		1	1	3	1	4
1063		1	1	4	2	2
1064		1	1	3	2	2
1065		1	1	3	2	2
1066		1	1	1	2	4
1067		1	1	2	1	4
1068		1	1	1	2	4
1069		1	1	2	2	2
1070		2	1	3	2	2
1071		1	1	2	2	3
1072		1	1	3	1	4
1073		1	1	2	2	2
1074		1	1	3	2	2
1075		1	1	3	2	2
1076		1	1	2	2	4
1077		1	1	1	2	3
1078		2	1	2	2	2
1079		2	1	3	2	2
1080		1	1	3	2	4
1081		1	1	1	1	4
1082		1	1	2	1	4
1083		2	1	3	2	4
1084		1	1	3	2	2
1085		2	1	4	1	4
1086		2	1	4	2	4
1087		1	1	3	1	3
1088		1	1	3	1	2
1089		1	1	3	2	2
1090		1	1	3	2	2
1091		1	1	4	2	1
1092		1	1	3	2	2
1093		1	1	2	2	2

<u>SURVE</u>	<u>VITAMINS</u>	<u>MEMSEAL</u>	<u>AGE</u>	<u>SEX</u>	<u>ED</u>
1094		2	1	1	2
1095		1	1	2	3
1096		1	1	2	1
1097		1	1	2	1
1098		1	1	1	4
1099		1	1	2	4
1100		1	1	3	2
1101		2	1	1	4
1102		1	1	2	2
1103		1	1	2	4
1104		1	1	3	3
1105		1	1	3	1
1106		2	1	3	2
1107		1	1	2	2
1108		1	1	3	1

TOTALS:

Printed 217 of the 217 records.

SALAD DRESSING PACKAGE SURVEY RAW DATA

<u>SURVE</u>	<u>DRESSING_PB</u>	<u>SHRIN</u>	<u>AGE</u>	<u>SEX</u>	<u>ED</u>
1001	1	1	2	1	4
1002	1	1	1	2	3
1003	1	1	2	2	2
1004	1	1	2	2	3
1005	2	2	3	1	4
1006	1	1	2	2	4
1007	1	1	1	1	4
1008	2	1	2	2	4
1009	2	1	2	1	4
1010	1	1	2	1	2
1011	1	1	2	1	4
1012	1	1	3	1	3
1013	1	1	2	1	3
1014	1	1	4	2	1
1015	1	1	1	2	3
1016	1	1	3	1	3
1017	2	1	2	1	4
1018	1	1	3	2	3
1019	2	1	1	1	3
1020	1	1	3	1	2
1021	1	1	1	2	4
1022	1	1	3	2	4
1023	2	1	3	2	2
1024	1	1	3	2	2
1025	1	1	3	1	2
1026	2	1	3	1	2
1027	1	1	2	1	3
1028	2	1	3	1	3
1029	1	1	1	2	4
1030	2	1	2	1	4
1031	2	1	2	2	3
1032	1	1	1	1	3
1033	2	1	1	1	4
1034	1	1	1	2	4
1035	2	1	2	2	3
1036	2	1	1	2	3
1037	1	1	2	1	3
3001	1	1	1	1	2
3002	1	1	1	1	4
3003	1	1	2	2	4
3004	1	2	1	2	1
3005	1	1	4	2	3
3006	1	1	1	1	3
3007	1	1	3	2	4
3008	1	1	2	2	3
3009	1	1	2	2	1
3010	1	1	3	2	4
3011	1	2	4	1	2
3012	1	1	2	2	3

<u>SURVE</u>	<u>DRESSING_PB</u>	<u>SHRIN</u>	<u>AGE</u>	<u>SEX</u>	<u>ED</u>
3013	1	1	3	2	2
3014	1	2	2	2	3
3015	1	1	3	1	4
3016	1	2	2	1	4
3017	2	1	1	1	4
3018	1	1	2	2	2
3019	2	1	1	1	4
3020	1	1	2	1	3
3021	1	1	2	2	3
3022	1	1	2	2	2
3023	1	1	2	2	4
3024	1	1	2	2	4
3025	1	1	1	2	3
3026	1	1	1	2	4
3027	1	1	3	2	3
3028	1	1	3	1	4
3029	1	1	1	2	3
3030	1	2	2	2	3
3031	1	1	2	1	4
3032	2	1	1	1	3
3033	1	1	2	1	4
3034	1	1	3	2	2
3035	1	1	3	1	3
3036	1	1	1	1	4
3037	1	1	4	1	2
3038	1	1	1	2	3
3039	1	1	1	2	3
3040	1	1	3	2	3
3041	1	1	4	1	4
3042	1	1	1	2	3
3043	1	1	1	2	2
3044	1	1	1	2	3
3045	1	1	3	2	2
3046	1	1	3	2	2
3047	1	1	4	1	2
3048	1	1	4	1	3
3049	1	1	4	2	2
3050	1	1	3	2	2
3051	1	1	4	2	2
3052	1	1	3	1	2
3053	1	1	3	2	2
3054	1	1	3	1	2
3055	1	1	3	2	2
3056	1	1	3	2	2
3057	1	1	2	2	3
3058	1	1	3	1	4
3059	2	1	3	2	2
3060	1	1	4	2	2
3061	1	1	4	2	2
3062	1	1	3	2	2
3063	1	1	3	2	2

SURVE	DRESSING_PB	SHRIN	AGE	SEX	ED
-----	-----	-----	-----	-----	-----
3064	1	1	2	2	2
3065	2	1	3	2	2
3066	2	1	2	2	4
3067	1	1	1	1	3
3068	1	1	1	2	4
3069	1	1	1	1	4
3070	1	1	1	1	3
3071	1	1	2	2	2
3072	1	1	2	2	2
3073	1	1	2	2	2
3074	1	1	2	1	4
3075	1	1	3	2	2
3076	1	1	3	2	3
3077	1	1	4	2	2
3078	1	1	4	2	2
3079	1	1	3	1	4
3080	1	1	3	2	1
3081	1	1	3	1	3
3082	1	1	4	2	3
3083	1	1	2	1	4
3084	1	1	4	2	3
3085	1	1	4	1	3
3086	1	1	2	2	3
3087	1	1	3	2	2
3088	1	1	2	2	4
3089	1	1	4	2	2
3090	1	1	4	1	4
3091	1	1	4	2	2
3092	1	1	4	1	4
3093	1	1	4	2	3
3094	1	1	2	2	4
3095	1	1	3	2	4
3096	1	1	2	1	4
3097	1	1	3	2	4
3098	1	1	3	1	4
3099	1	1	2	2	2
3100	1	1	2	1	2
3101	1	1	2	2	4
3102	1	1	1	2	2
3103	1	1	4	2	2
3104	1	1	3	1	3
3105	1	1	2	2	2
3106	1	1	3	2	3
3107	1	1	3	2	4
3108	1	1	1	1	4
3109	1	1	2	1	4
1038	1	1	3	2	4
1039	1	1	3	2	2
1040	1	1	1	1	4
1041	2	1	2	2	3
1042	2	1	1	2	4

SURVE	DRESSING_PB	SHRIN	AGE	SEX	ED
=====	=====	=====	=====	=====	=====
1043	1	1	2	1	4
1044	1	1	3	2	3
1045	1	1	2	1	4
1046	2	1	1	1	4
1047	1	2	1	1	4
1048	2	1	1	1	4
1049	1	1	3	2	1
1050	1	1	4	1	2
1051	1	1	3	2	1
1052	1	1	4	1	4
1053	1	2	3	2	3
1054	2	1	2	2	3
1055	1	1	4	2	3
1056	1	2	3	2	2
1057	1	1	4	1	2
1058	2	1	2	2	4
1059	1	1	4	2	2
1060	2	1	4	2	2
1061	2	1	4	2	4
1062	1	2	3	1	4
1063	1	1	4	2	2
1064	1	1	3	2	2
1065	2	1	3	2	2
1066	1	1	1	2	4
1067	1	1	2	1	4
1068	1	1	1	2	4
1069	2	1	2	2	2
1070	1	1	3	2	2
1071	2	1	2	2	3
1072	2	1	3	1	4
1073	2	1	2	2	2
1074	2	1	3	2	2
1075	2	1	3	2	2
1076	1	2	2	2	4
1077	1	1	1	2	3
1078	1	1	2	2	2
1079	1	1	3	2	2
1080	1	1	3	2	4
1081	1	1	1	1	4
1082	1	1	2	1	4
1083	2	1	3	2	4
1084	1	1	3	2	2
1085	1	1	4	1	4
1086	1	1	4	2	4
1087	2	1	3	1	3
1088	2	1	3	1	2
1089	1	1	3	2	2
1090	1	1	3	2	2
1091	1	1	4	2	1
1092	1	1	3	2	2
1093	2	1	2	2	2

SURVE	DRESSING_PB	SHRIN	AGE	SEX	ED
-----	-----	-----	---	---	---
1094	1	1	1	2	2
1095	2	1	2	2	3
1096	1	1	2	1	4
1097	1	1	2	2	1
1098	1	1	1	1	4
1099	2	1	2	2	4
1100	1	1	3	2	2
1101	2	1	1	1	4
1102	1	1	2	2	2
1103	1	1	2	2	4
1104	1	1	3	2	3
1105	2	1	3	1	4
1106	1	1	3	2	4
1107	1	1	2	2	4
1108	1	1	3	1	4

TOTALS:

Printed 217 of the 217 records.

AMBER BOTTLE SURVEY RAW DATA

SURVE	BOTTLE_RING	BAWAY_	AGE	SEX	ED	
----	-----	-----	----	----	----	
1001		1	1	2	1	4
1002		1	2	1	2	3
1003		2	1	2	2	2
1004		1	1	2	2	3
1005		2	1	3	1	4
1006		1	1	2	2	4
1007		2	1	1	1	4
1008		1	1	2	2	4
1009		2	1	2	1	4
1010		2	1	2	1	2
1011		2	1	2	1	4
1012		2	1	3	1	3
1013		2	1	2	1	3
1014		1	1	4	2	1
1015		1	1	1	2	3
1016		1	1	3	1	3
1017		1	1	2	1	4
1018		20	1	3	2	3
1019		2	1	1	1	3
1020		2	1	3	1	2
1021		1	1	1	2	4
1022		2	1	3	2	4
1023		1	1	3	2	2
1024		2	1	3	2	2
1025		1	1	3	1	2
1026		1	1	3	1	2
1027		1	1	2	1	3
1028		1	1	3	1	3
1029		1	1	1	2	4
1030		1	2	2	1	4
1031		1	1	2	2	3
1032		1	1	1	1	3
1033		2	1	1	1	4
1034		2	1	1	2	4
1035		1	1	2	2	3
1036		1	1	1	2	3
1037		1	1	2	1	3
3001		1	1	1	1	2
3002		2	1	1	1	4
3003		2	1	2	2	4
3004		1	1	1	2	1
3005		2	1	4	2	3
3006		2	1	1	1	3
3007		2	1	3	2	4
3008		1	1	2	2	3
3009		1	1	2	2	1
3010		1	1	3	2	4
3011		1	2	4	1	2
3012		1	1	2	2	3

SURVE	BOTTLE_RING	BAWAY_	AGE	SEX	ED
----	-----	-----	----	----	----
3013		2	1	3	2
3014		1	2	2	3
3015		20	1	3	4
3016		2	1	2	4
3017		1	1	1	4
3018		1	1	2	2
3019		2	1	1	4
3020		2	1	2	3
3021		2	1	2	3
3022		2	1	2	2
3023		1	1	2	4
3024		2	1	2	4
3025		2	1	1	3
3026		1	1	1	4
3027		2	2	3	3
3028		1	1	3	4
3029		1	1	1	3
3030		2	2	2	3
3031		2	1	2	4
3032		2	1	1	3
3033		2	1	2	4
3034		1	1	3	2
3035		2	1	3	3
3036		2	1	1	4
3037		1	1	4	2
3038		2	1	1	3
3039		2	1	1	3
3040		2	1	3	3
3041		1	1	4	4
3042		2	1	1	3
3043		2	1	1	2
3044		2	1	1	3
3045		2	1	3	2
3046		2	1	3	2
3047		1	1	4	2
3048		1	1	4	3
3049		2	1	4	2
3050		2	2	3	2
3051		2	1	4	2
3052		1	1	3	2
3053		2	1	3	2
3054		2	1	3	2
3055		2	1	3	2
3056		1	2	3	2
3057		2	1	2	3
3058		1	1	3	4
3059		2	1	3	2
3060		1	1	4	2
3061		1	1	4	2
3062		1	1	3	2
3063		1	1	3	2

SURVE	BOTTLE_RING	BAWAY_	AGE	SEX	ED
----	-----	-----	----	----	----
3013		2	1	3	2
3014		1	2	2	3
3015		20	1	3	1
3016		2	1	2	1
3017		1	1	1	1
3018		1	1	2	2
3019		2	1	1	1
3020		2	1	2	1
3021		2	1	2	2
3022		2	1	2	2
3023		1	1	2	2
3024		2	1	2	2
3025		2	1	1	2
3026		1	1	1	2
3027		2	2	3	2
3028		1	1	3	1
3029		1	1	1	2
3030		2	2	2	2
3031		2	1	2	1
3032		2	1	1	1
3033		2	1	2	1
3034		1	1	3	2
3035		2	1	3	1
3036		2	1	1	1
3037		1	1	4	1
3038		2	1	1	2
3039		2	1	1	2
3040		2	1	3	2
3041		1	1	4	1
3042		2	1	1	2
3043		2	1	1	2
3044		2	1	1	2
3045		2	1	3	2
3046		2	1	3	2
3047		1	1	4	1
3048		1	1	4	1
3049		2	1	4	2
3050		2	2	3	2
3051		2	1	4	2
3052		1	1	3	1
3053		2	1	3	2
3054		2	1	3	1
3055		2	1	3	2
3056		1	2	3	2
3057		2	1	2	2
3058		1	1	3	1
3059		2	1	3	2
3060		1	1	4	2
3061		1	1	4	2
3062		1	1	3	2
3063		1	1	3	2

SURVE	BOTTLE_RING	BAWAY_	AGE	SEX	ED
=====	=====	=====	=====	=====	=====
3064		1	1	2	2
3065		2	1	3	2
3066		2	1	2	4
3067		1	1	1	3
3068		2	1	1	4
3069		2	1	1	4
3070		2	1	1	3
3071		1	1	2	2
3072		1	1	2	2
3073		1	1	2	2
3074		2	1	2	4
3075		1	1	3	2
3076		1	1	3	3
3077		1	1	4	2
3078		2	1	4	2
3079		2	1	3	1
3080		2	1	3	1
3081		2	1	3	1
3082		1	1	4	3
3083		2	1	2	4
3084		1	1	4	3
3085		2	1	4	3
3086		2	1	2	3
3087		2	1	3	2
3088		2	1	2	4
3089		1	1	4	2
3090		1	1	4	1
3091		1	1	4	2
3092		1	1	4	1
3093		1	1	4	2
3094		1	1	2	4
3095		1	2	3	2
3096		1	1	2	1
3097		2	1	3	2
3098		2	1	3	1
3099		2	1	2	2
3100		2	1	2	1
3101		2	1	2	2
3102		2	1	1	2
3103		1	1	4	2
3104		1	1	3	1
3105		2	1	2	2
3106		1	1	3	2
3107		1	1	3	2
3108		1	1	1	1
3109		2	1	2	1
1038		1	1	3	2
1039		1	1	3	2
1040		1	1	1	1
1041		2	1	2	2
1042		1	1	1	2

SURVE	BOTTLE_RING	BAWAY	AGE	SEX	ED
-----	-----	-----	---	---	---
1043		1	1	2	1
1044		1	1	3	2
1045		1	1	2	1
1046		1	1	1	1
1047		2	1	1	1
1048		2	1	1	1
1049		1	1	3	2
1050		2	1	4	1
1051		1	1	3	2
1052		1	1	4	1
1053		2	2	3	2
1054		1	1	2	2
1055		1	1	4	2
1056		1	2	3	2
1057		1	1	4	1
1058		2	1	2	2
1059		2	1	4	2
1060		1	1	4	2
1061		1	1	4	2
1062		1	1	3	1
1063		1	1	4	2
1064		1	1	3	2
1065		1	1	3	2
1066		1	1	1	2
1067		1	1	2	1
1068		1	1	1	2
1069		2	1	2	2
1070		1	2	3	2
1071		1	1	2	2
1072		1	1	3	1
1073		2	1	2	2
1074		2	1	3	2
1075		2	2	3	2
1076		1	1	2	2
1077		2	1	1	2
1078		1	1	2	2
1079		1	1	3	2
1080		1	1	3	2
1081		1	1	1	1
1082		1	1	2	1
1083		2	1	3	2
1084		1	1	3	2
1085		1	1	4	1
1086		1	1	4	2
1087		2	1	3	1
1088		1	1	3	1
1089		1	1	3	2
1090		2	1	3	2
1091		2	2	4	2
1092		1	1	3	2
1093		1	1	2	2

<u>SURVE</u>	<u>BOTTLE_RING</u>	<u>BAWAY_</u>	<u>AGE</u>	<u>SEX</u>	<u>ED</u>
1094		1	1	2	2
1095		1	1	2	3
1096		1	1	1	4
1097		1	1	2	1
1098		1	1	1	4
1099		1	1	2	4
1100		1	1	2	2
1101		2	1	1	4
1102		1	1	2	2
1103		1	2	2	4
1104		2	1	2	3
1105		1	1	1	4
1106		1	1	2	4
1107		1	1	2	4
1108		1	1	1	4

TOTALS:

Printed 217 of the 217 records.

VACUUM BUTTON PACKAGE SURVEY RAW DATA

SURVE	RAGU_BUTTON	BUTTON	AGE	SEX	ED
-----	-----	-----	---	---	---
1001	1	1	2	1	4
1002	1	1	1	2	3
1003	1	1	2	2	2
1004	1	1	2	2	3
1005	1	1	3	1	4
1006	1	1	2	2	4
1007	1	1	1	1	4
1008	1	1	2	2	4
1009	1	1	2	1	4
1010	1	1	2	1	2
1011	1	1	2	1	4
1012	1	1	3	1	3
1013	1	1	2	1	3
1014	1	1	4	2	1
1015	1	1	1	2	3
1016	1	1	3	1	3
1017	1	1	2	1	4
1018	1	1	3	2	3
1019	1	1	1	1	3
1020	1	1	3	1	2
1021	1	1	1	2	4
1022	1	1	3	2	4
1023	1	1	3	2	2
1024	1	1	3	2	2
1025	1	1	3	1	2
1026	1	1	3	1	2
1027	2	1	2	1	3
1028	1	1	3	1	3
1029	1	1	1	2	4
1030	1	1	2	1	4
1031	20	1	2	2	3
1032	2	1	1	1	3
1033	1	1	1	1	4
1034	1	1	1	2	4
1035	1	1	2	2	3
1036	1	1	1	2	3
1037	1	1	2	1	3
3001	2	1	1	1	2
3002	2	1	1	1	4
3003	2	1	2	2	4
3004	2	1	1	2	1
3005	2	1	4	2	3
3006	2	1	1	1	3
3007	2	2	3	2	4
3008	2	1	2	2	3
3009	2	1	2	2	1
3010	2	1	3	2	4
3011	1	2	4	1	2
3012	2	1	2	2	3

<u>SURVE</u>	<u>RAGU_BUTTON</u>	<u>BUTTON</u>	<u>AGE</u>	<u>SEX</u>	<u>ED</u>
3013	2	1	3	2	2
3014	2	2	2	2	3
3015	20	1	3	1	4
3016	1	1	2	1	4
3017	2	1	1	1	4
3018	2	1	2	2	2
3019	2	1	1	1	4
3020	2	1	2	1	3
3021	2	1	2	2	3
3022	2	1	2	2	2
3023	2	1	2	2	4
3024	1	1	2	2	4
3025	2	1	1	2	3
3026	2	1	1	2	4
3027	2	1	3	2	3
3028	1	1	3	1	4
3029	2	2	1	2	3
3030	2	2	2	2	3
3031	2	1	2	1	4
3032	2	1	1	1	3
3033	2	1	2	1	4
3034	2	1	3	2	2
3035	2	1	3	1	3
3036	2	1	1	1	4
3037	2	1	4	1	2
3038	2	1	1	2	3
3039	2	1	1	2	3
3040	1	1	3	2	3
3041	2	1	4	1	4
3042	2	1	1	2	3
3043	2	1	1	2	2
3044	2	1	1	2	3
3045	2	1	3	2	2
3046	2	1	3	2	2
3047	1	1	4	1	2
3048	2	2	4	1	3
3049	2	1	4	2	2
3050	1	2	3	2	2
3051	1	1	4	2	2
3052	1	1	3	1	2
3053	1	1	3	2	2
3054	1	1	3	1	2
3055	1	1	3	2	2
3056	1	1	3	2	2
3057	2	2	2	2	3
3058	1	1	3	1	4
3059	1	1	3	2	2
3060	2	1	4	2	2
3061	2	1	4	2	2
3062	2	1	3	2	2
3063	2	1	3	2	2

<u>SURVE</u>	<u>RAGU_BUTTON</u>	<u>BUTTON</u>	<u>AGE</u>	<u>SEX</u>	<u>ED</u>
3064	2	1	2	2	2
3065	2	1	3	2	2
3066	2	1	2	2	4
3067	2	1	1	1	3
3068	2	1	1	2	4
3069	2	1	1	1	4
3070	2	1	1	1	3
3071	2	1	2	2	2
3072	2	1	2	2	2
3073	2	1	2	2	2
3074	2	1	2	1	4
3075	2	1	3	2	2
3076	2	1	3	2	3
3077	2	1	4	2	2
3078	1	1	4	2	2
3079	2	1	3	1	4
3080	1	1	3	2	1
3081	1	1	3	1	3
3082	1	1	4	2	3
3083	1	1	2	1	4
3084	2	1	4	2	3
3085	1	1	4	1	3
3086	2	1	2	2	3
3087	1	1	3	2	2
3088	2	1	2	2	4
3089	1	1	4	2	2
3090	2	2	4	1	4
3091	2	1	4	2	2
3092	1	1	4	1	4
3093	1	1	4	2	3
3094	2	1	2	2	4
3095	1	2	3	2	4
3096	2	1	2	1	4
3097	2	1	3	2	4
3098	2	1	3	1	4
3099	2	1	2	2	2
3100	2	1	2	1	2
3101	2	1	2	2	4
3102	2	1	1	2	2
3103	2	1	4	2	2
3104	1	1	3	1	3
3105	2	1	2	2	2
3106	2	1	3	2	3
3107	2	1	3	2	4
3108	2	1	1	1	4
3109	2	1	2	1	4
1038	1	1	3	2	4
1039	2	1	3	2	2
1040	1	1	1	1	4
1041	2	1	2	2	3
1042	1	1	1	2	4

<u>SURVE</u>	<u>RAGU_BUTTON</u>	<u>BUTTON</u>	<u>AGE</u>	<u>SEX</u>	<u>ED</u>
1043	1	1	2	1	4
1044	1	1	3	2	3
1045	1	1	2	1	4
1046	1	1	1	1	4
1047	1	1	1	1	4
1048	1	1	1	1	4
1049	1	1	3	2	1
1050	1	1	4	1	2
1051	1	1	3	2	1
1052	1	1	4	1	4
1053	1	1	3	2	3
1054	1	1	2	2	3
1055	1	1	4	2	3
1056	2	2	3	2	2
1057	1	1	4	1	2
1058	1	1	2	2	4
1059	1	1	4	2	2
1060	1	1	4	2	2
1061	1	1	4	2	4
1062	2	1	3	1	4
1063	1	1	4	2	2
1064	1	1	3	2	2
1065	1	1	3	2	2
1066	1	1	1	2	4
1067	1	1	2	1	4
1068	1	1	1	2	4
1069	1	1	2	2	2
1070	1	1	3	2	2
1071	1	1	2	2	3
1072	1	1	3	1	4
1073	2	1	2	2	2
1074	1	1	3	2	2
1075	1	1	3	2	2
1076	1	1	2	2	4
1077	2	1	1	2	3
1078	1	1	2	2	2
1079	1	1	3	2	2
1080	1	1	3	2	4
1081	1	1	1	1	4
1082	1	1	2	1	4
1083	1	1	3	2	4
1084	1	1	3	2	2
1085	1	1	4	1	4
1086	1	1	4	2	4
1087	1	1	3	1	3
1088	1	1	3	1	2
1089	1	1	3	2	2
1090	1	2	3	2	2
1091	1	2	4	2	1
1092	1	1	3	2	2
1093	1	1	2	2	2

<u>SURVE</u>	<u>RAGU_BUTTON</u>	<u>BUTTON</u>	<u>AGE</u>	<u>SEX</u>	<u>ED</u>
1094	1	1	1	2	2
1095	1	1	2	2	3
1096	1	1	2	1	4
1097	1	1	2	2	1
1098	1	1	1	1	4
1099	1	1	2	2	4
1100	1	1	3	2	2
1101	2	1	1	1	4
1102	2	1	2	2	2
1103	2	2	2	2	4
1104	1	1	3	2	3
1105	1	1	3	1	4
1106	2	1	3	2	4
1107	1	1	2	2	4
1108	1	1	3	1	4

TOTALS:

Printed 217 of the 217 records.

BLISTER PACKAGE SURVEY RAW DATA

SURVE	BUFFERIN_BL	BLISTER	AGE	SEX	ED	
----	-----	-----	----	----	----	
1001		1	1	2	1	4
1002		2	2	1	2	3
1003		2	1	2	2	2
1004		1	1	2	2	3
1005		2	1	3	1	4
1006		1	1	2	2	4
1007		2	1	1	1	4
1008		2	1	2	2	4
1009		2	1	2	1	4
1010		2	1	2	1	2
1011		1	1	2	1	4
1012		2	1	3	1	3
1013		2	1	2	1	3
1014		1	1	4	2	1
1015		2	1	1	2	3
1016		2	1	3	1	3
1017		1	1	2	1	4
1018		1	1	3	2	3
1019		2	1	1	1	3
1020		2	1	3	1	2
1021		2	1	1	2	4
1022		2	1	3	2	4
1023		2	1	3	2	2
1024		2	1	3	2	2
1025		2	1	3	1	2
1026		2	1	3	1	2
1027		2	1	2	1	3
1028		1	1	3	1	3
1029		2	1	1	2	4
1030		2	1	2	1	4
1031		2	1	2	2	3
1032		1	1	1	1	3
1033		2	1	1	1	4
1034		1	1	1	2	4
1035		1	1	2	2	3
1036		2	1	1	2	3
1037		1	1	2	1	3
3001		1	1	1	1	2
3002		1	1	1	1	4
3003		1	1	2	2	4
3004		1	1	1	2	1
3005		1	1	4	2	3
3006		1	1	1	1	3
3007		1	1	3	2	4
3008		1	1	2	2	3
3009		1	1	2	2	1
3010		1	1	3	2	4
3011		2	2	4	1	2
3012		1	1	2	2	3

SURVE	BUFFERIN_BL	BLISTER	AGE	SEX	ED
----	-----	-----	---	---	---
3013		1	3	2	2
3014		1	2	2	3
3015		1	3	1	4
3016		1	2	1	4
3017		1	1	1	4
3018		1	2	2	2
3019		1	1	1	4
3020		1	2	1	3
3021		2	2	2	3
3022		1	2	2	2
3023		1	2	2	4
3024		2	2	2	4
3025		1	1	2	3
3026		1	1	2	4
3027		2	3	2	3
3028		1	3	1	4
3029		1	1	2	3
3030		1	2	2	3
3031		1	2	1	4
3032		1	1	1	3
3033		1	2	1	4
3034		1	3	2	2
3035		1	3	1	3
3036		1	1	1	4
3037		1	4	1	2
3038		1	1	2	3
3039		2	1	2	3
3040		1	3	2	3
3041		2	4	1	4
3042		1	1	2	3
3043		1	1	2	2
3044		2	1	2	3
3045		1	3	2	2
3046		1	3	2	2
3047		1	4	1	2
3048		1	4	1	3
3049		1	4	2	2
3050		1	3	2	2
3051		1	4	2	2
3052		1	3	1	2
3053		1	3	2	2
3054		1	3	1	2
3055		1	3	2	2
3056		2	3	2	2
3057		1	2	2	3
3058		1	3	1	4
3059		1	3	2	2
3060		1	4	2	2
3061		1	4	2	2
3062		1	3	2	2
3063		1	3	2	2

SURVE	BUFFERIN_BL	BLISTER	AGE	SEX	ED
-----	-----	-----	---	---	---
3064		1	2	2	2
3065		1	3	2	2
3066		1	2	2	4
3067		1	1	1	3
3068		1	1	2	4
3069		1	1	1	4
3070		1	1	1	3
3071		1	2	2	2
3072		1	2	2	2
3073		1	2	2	2
3074		1	2	1	4
3075		1	3	2	2
3076		1	3	2	3
3077		1	4	2	2
3078		1	4	2	2
3079		1	3	1	4
3080		1	3	2	1
3081		1	3	1	3
3082		1	4	2	3
3083		1	2	1	4
3084		1	4	2	3
3085		1	4	1	3
3086		1	2	2	3
3087		1	3	2	2
3088		1	2	2	4
3089		1	4	2	2
3090		1	4	1	4
3091		1	4	2	2
3092		1	4	1	4
3093		1	4	2	3
3094		1	2	2	4
3095		1	3	2	4
3096		1	2	1	4
3097		2	3	2	4
3098		1	3	1	4
3099		1	2	2	2
3100		1	2	1	2
3101		1	2	2	4
3102		2	1	2	2
3103		1	4	2	2
3104		2	3	1	3
3105		1	2	2	2
3106		1	3	2	3
3107		1	3	2	4
3108		1	1	1	4
3109		1	2	1	4
1038		1	3	2	4
1039		1	3	2	2
1040		1	1	1	4
1041		2	2	2	3
1042		1	1	2	4

SURVE	BUFFERIN_BL	BLISTER	AGE	SEX	ED	
----	-----	-----	---	---	---	
1043		2	1	2	1	4
1044		1	1	3	2	3
1045		1	1	2	1	4
1046		1	1	1	1	4
1047		2	1	1	1	4
1048		2	1	1	1	4
1049		1	1	3	2	1
1050		2	1	4	1	2
1051		1	1	3	2	1
1052		1	1	4	1	4
1053		2	2	3	2	3
1054		2	1	2	2	3
1055		1	1	4	2	3
1056		2	2	3	2	2
1057		1	1	4	1	2
1058		2	1	2	2	4
1059		1	1	4	2	2
1060		2	1	4	2	2
1061		1	1	4	2	4
1062		1	1	3	1	4
1063		2	1	4	2	2
1064		1	1	3	2	2
1065		2	1	3	2	2
1066		2	1	1	2	4
1067		1	1	2	1	4
1068		2	1	1	2	4
1069		2	1	2	2	2
1070		1	2	3	2	2
1071		2	1	2	2	3
1072		1	1	3	1	4
1073		2	1	2	2	2
1074		1	1	3	2	2
1075		1	1	3	2	2
1076		2	1	2	2	4
1077		2	1	1	2	3
1078		2	1	2	2	2
1079		2	1	3	2	2
1080		1	1	3	2	4
1081		2	1	1	1	4
1082		2	1	2	1	4
1083		2	1	3	2	4
1084		1	1	3	2	2
1085		2	1	4	1	4
1086		2	1	4	2	4
1087		2	1	3	1	3
1088		1	1	3	1	2
1089		1	1	3	2	2
1090		2	1	3	2	2
1091		1	1	4	2	1
1092		1	1	3	2	2
1093		1	1	2	2	2

SURVE	BUFFERIN_BL	BLISTER	AGE	SEX	ED
-----	-----	-----	---	---	---
1094		1	1	2	2
1095		1	1	2	3
1096		1	1	2	1
1097		1	1	2	1
1098		2	1	1	4
1099		1	1	2	4
1100		1	1	3	2
1101		1	1	1	4
1102		1	1	2	2
1103		1	1	2	4
1104		2	1	3	3
1105		2	1	3	1
1106		1	1	3	2
1107		1	1	2	2
1108		1	1	3	1

TOTALS:

Printed 217 of the 217 records.

VEGETABLE OIL PACKAGE SURVEY RAW DATA

SURVE	VEG OIL	MEMSEAL	AGE	SEX	ED	
1001		1	1	2	1	4
1002		2	1	1	2	3
1003		1	1	2	2	2
1004		1	1	2	2	3
1005		1	1	3	1	4
1006		1	1	2	2	4
1007		1	1	1	1	4
1008		1	1	2	2	4
1009		1	1	2	1	4
1010		1	1	2	1	2
1011		1	1	2	1	4
1012		1	1	3	1	3
1013		1	1	2	1	3
1014		1	1	4	2	1
1015		1	1	1	2	3
1016		1	1	3	1	3
1017		1	1	2	1	4
1018		1	1	3	2	3
1019		1	1	1	1	3
1020		2	1	3	1	2
1021		1	1	1	2	4
1022		1	1	3	2	4
1023		1	1	3	2	2
1024		1	1	3	2	2
1025		1	1	3	1	2
1026		2	1	3	1	2
1027		1	1	2	1	3
1028		1	1	3	1	3
1029		1	1	1	2	4
1030		1	1	2	1	4
1031		1	1	2	2	3
1032		1	1	1	1	3
1033		1	1	1	1	4
1034		2	1	1	2	4
1035		1	1	2	2	3
1036		2	1	1	2	3
1037		1	1	2	1	3
3001		2	1	1	1	2
3002		2	1	1	1	4
3003		2	1	2	2	4
3004		2	1	1	2	1
3005		1	2	4	2	3
3006		2	1	1	1	3
3007		2	1	3	2	4
3008		2	1	2	2	3
3009		2	1	2	2	1
3010		1	1	3	2	4
3011		2	2	4	1	2
3012		2	1	2	2	3

SURVE	VEG OIL	NEMSEAL	AGE	SEX	ED
3013		1	1	3	2
3014		2	2	2	3
3015		2	1	3	1
3016		2	1	2	1
3017		2	1	1	1
3018		1	1	2	2
3019		2	1	1	1
3020		2	1	2	1
3021		2	1	2	2
3022		2	1	2	2
3023		2	1	2	2
3024		2	1	2	2
3025		2	1	1	2
3026		2	1	1	2
3027		2	1	3	2
3028		2	1	3	1
3029		2	1	1	2
3030		2	2	2	2
3031		2	1	2	1
3032		2	1	1	1
3033		2	1	2	1
3034		2	1	3	2
3035		1	1	3	1
3036		2	1	1	1
3037		1	1	4	1
3038		2	1	1	2
3039		1	1	1	2
3040		1	1	3	2
3041		2	1	4	1
3042		1	1	1	2
3043		2	1	1	2
3044		1	1	1	2
3045		2	1	3	2
3046		2	1	3	2
3047		2	1	4	1
3048		2	1	4	1
3049		2	1	4	2
3050		2	2	3	2
3051		2	1	4	2
3052		2	1	3	1
3053		2	2	3	2
3054		2	1	3	1
3055		2	1	3	2
3056		2	1	3	2
3057		1	1	2	2
3058		2	1	3	1
3059		2	1	3	2
3060		2	1	4	2
3061		2	1	4	2
3062		1	1	3	2
3063		2	1	3	2

SURVE	VEG OIL	MEMSEAL	AGE	SEX	ED
-----	-----	-----	---	---	---
3064		2	1	2	2
3065		2	1	3	2
3066		2	1	2	4
3067		2	1	1	3
3068		2	1	1	4
3069		2	1	1	4
3070		2	1	1	3
3071		2	1	2	2
3072		2	1	2	2
3073		2	1	2	2
3074		2	1	2	1
3075		2	1	3	2
3076		2	1	3	2
3077		2	1	4	2
3078		2	1	4	2
3079		2	1	3	1
3080		1	1	3	2
3081		1	1	3	1
3082		1	1	4	2
3083		1	1	2	1
3084		1	1	4	2
3085		1	1	4	1
3086		2	1	2	2
3087		2	1	3	2
3088		1	1	2	2
3089		1	1	4	2
3090		2	1	4	1
3091		1	1	4	2
3092		1	1	4	1
3093		2	1	4	2
3094		2	1	2	2
3095		1	1	3	2
3096		1	1	2	1
3097		1	1	3	2
3098		2	1	3	1
3099		2	1	2	2
3100		2	1	2	1
3101		1	1	2	2
3102		2	1	1	2
3103		2	1	4	2
3104		2	1	3	1
3105		2	1	2	2
3106		2	1	3	2
3107		1	1	3	2
3108		2	1	1	1
3109		2	1	2	1
1038		1	1	3	2
1039		1	1	3	2
1040		1	1	1	1
1041		1	1	2	2
1042		1	1	1	2

SURVE	VEG OIL	MEMSEAL	AGE	SEX	ED	
1043		2	1	2	1	4
1044		1	1	3	2	3
1045		1	1	2	1	4
1046		1	1	1	1	4
1047		1	1	1	1	4
1048		1	1	1	1	4
1049		1	1	3	2	1
1050		1	1	4	1	2
1051		1	1	3	2	1
1052		1	1	4	1	4
1053		1	2	3	2	3
1054		1	1	2	2	3
1055		1	1	4	2	3
1056		1	2	3	2	2
1057		1	1	4	1	2
1058		1	1	2	2	4
1059		1	1	4	2	2
1060		1	1	4	2	2
1061		1	1	4	2	4
1062		1	1	3	1	4
1063		1	1	4	2	2
1064		1	1	3	2	2
1065		1	1	3	2	2
1066		1	1	1	2	4
1067		1	1	2	1	4
1068		1	1	1	2	4
1069		1	1	2	2	2
1070		1	1	3	2	2
1071		1	1	2	2	3
1072		1	1	3	1	4
1073		1	1	2	2	2
1074		1	1	3	2	2
1075		1	1	3	2	2
1076		1	1	2	2	4
1077		2	1	1	2	3
1078		1	1	2	2	2
1079		1	1	3	2	2
1080		1	1	3	2	4
1081		1	1	1	1	4
1082		1	1	2	1	4
1083		1	1	3	2	4
1084		1	1	3	2	2
1085		1	1	4	1	4
1086		1	1	4	2	4
1087		1	1	3	1	3
1088		1	1	3	1	2
1089		1	1	3	2	2
1090		1	1	3	2	2
1091		1	1	4	2	1
1092		1	1	3	2	2
1093		1	1	2	2	2

SURVE	VEG OIL	MEMSEAL	AGE	SEX	ED	
1043		2	1	2	1	4
1044		1	1	3	2	3
1045		1	1	2	1	4
1046		1	1	1	1	4
1047		1	1	1	1	4
1048		1	1	1	1	4
1049		1	1	3	2	1
1050		1	1	4	1	2
1051		1	1	3	2	1
1052		1	1	4	1	4
1053		1	2	3	2	3
1054		1	1	2	2	3
1055		1	1	4	2	3
1056		1	2	3	2	2
1057		1	1	4	1	2
1058		1	1	2	2	4
1059		1	1	4	2	2
1060		1	1	4	2	2
1061		1	1	4	2	4
1062		1	1	3	1	4
1063		1	1	4	2	2
1064		1	1	3	2	2
1065		1	1	3	2	2
1066		1	1	1	2	4
1067		1	1	2	1	4
1068		1	1	1	2	4
1069		1	1	2	2	2
1070		1	1	3	2	2
1071		1	1	2	2	3
1072		1	1	3	1	4
1073		1	1	2	2	2
1074		1	1	3	2	2
1075		1	1	3	2	2
1076		1	1	2	2	4
1077		2	1	1	2	3
1078		1	1	2	2	2
1079		1	1	3	2	2
1080		1	1	3	2	4
1081		1	1	1	1	4
1082		1	1	2	1	4
1083		1	1	3	2	4
1084		1	1	3	2	2
1085		1	1	4	1	4
1086		1	1	4	2	4
1087		1	1	3	1	3
1088		1	1	3	1	2
1089		1	1	3	2	2
1090		1	1	3	2	2
1091		1	1	4	2	1
1092		1	1	3	2	2
1093		1	1	2	2	2

SURVE	VEG OIL	MEMSEAL	AGE	SEX	ED
=====	=====	=====	=====	=====	=====
1094		1	1	2	2
1095		1	1	2	3
1096		1	1	2	4
1097		1	1	2	1
1098		1	1	1	4
1099		1	1	2	4
1100		1	1	3	2
1101		2	1	1	4
1102		1	1	2	2
1103		1	1	2	4
1104		1	1	3	3
1105		2	1	3	4
1106		1	1	3	4
1107		1	1	2	4
1108		2	1	3	4

TOTALS:
Printed 217 of the 217 records.

EYE DROP PACKAGE SURVEY RAW DATA

<u>SURVE</u>	<u>EYE DROPS - SB</u>	<u>SHRINKBD</u>	<u>AGE</u>	<u>SEX</u>	<u>ED</u>
1001	1	1	2	1	4
1002	2	1	1	2	3
1003	2	1	2	2	2
1004	2	1	2	2	3
1005	1	2	3	1	4
1006	1	1	2	2	4
1007	2	1	1	1	4
1008	2	1	2	2	4
1009	2	1	2	1	4
1010	1	1	2	1	2
1011	1	1	2	1	4
1012	2	1	3	1	3
1013	1	1	2	1	3
1014	1	1	4	2	1
1015	2	1	1	2	3
1016	1	1	3	1	3
1017	2	1	2	1	4
1018	1	1	3	2	3
1019	2	1	1	1	3
1020	1	1	3	1	2
1021	2	1	1	2	4
1022	2	1	3	2	4
1023	1	1	3	2	2
1024	2	1	3	2	2
1025	1	1	3	1	2
1026	2	1	3	1	2
1027	1	1	2	1	3
1028	1	1	3	1	3
1029	2	1	1	2	4
1030	1	1	2	1	4
1031	20	1	2	2	3
1032	2	1	1	1	3
1033	1	1	1	1	4
1034	2	1	1	2	4
1035	2	1	2	2	3
1036	1	1	1	2	3
1037	2	1	2	1	3
3001	1	1	1	1	2
3002	1	1	1	1	4
3003	1	1	2	2	4
3004	1	2	1	2	1
3005	1	1	4	2	3
3006	1	1	1	1	3
3007	1	1	3	2	4
3008	1	1	2	2	3
3009	1	1	2	2	1
3010	1	1	3	2	4
3011	1	2	4	1	2
3012	1	1	2	2	3

SURVE	EYE DROPS - SB	SHRINKBD	AGE	SEX	ED
=====	=====	=====	=====	=====	=====
3013	1	1	3	2	2
3014	2	2	2	2	3
3015	2	1	3	1	4
3016	1	2	2	1	4
3017	1	1	1	1	4
3018	1	1	2	2	2
3019	1	1	1	1	4
3020	1	1	2	1	3
3021	1	1	2	2	3
3022	1	1	2	2	2
3023	1	1	2	2	4
3024	1	1	2	2	4
3025	1	1	1	2	3
3026	2	1	1	2	4
3027	1	1	3	2	3
3028	1	1	3	1	4
3029	1	1	1	2	3
3030	1	2	2	2	3
3031	1	1	2	1	4
3032	1	1	1	1	3
3033	1	1	2	1	4
3034	2	1	3	2	2
3035	1	1	3	1	3
3036	1	1	1	1	4
3037	1	1	4	1	2
3038	1	1	1	2	3
3039	1	1	1	2	3
3040	1	1	3	2	3
3041	1	1	4	1	4
3042	1	1	1	2	3
3043	1	1	1	2	2
3044	1	1	1	2	3
3045	2	1	3	2	2
3046	1	1	3	2	2
3047	1	1	4	1	2
3048	1	1	4	1	3
3049	1	1	4	2	2
3050	1	1	3	2	2
3051	1	1	4	2	2
3052	1	1	3	1	2
3053	1	1	3	2	2
3054	1	1	3	1	2
3055	1	1	3	2	2
3056	2	1	3	2	2
3057	1	1	2	2	3
3058	1	1	3	1	4
3059	1	1	3	2	2
3060	1	1	4	2	2
3061	1	1	4	2	2
3062	1	1	3	2	2
3063	1	1	3	2	2

SURVE	EYE DROPS - SB	SHRINKBD	AGE	SEX	ED
=====	=====	=====	=====	=====	=====
3064	1	1	2	2	2
3065	2	1	3	2	2
3066	1	1	2	2	4
3067	1	1	1	1	3
3068	2	1	1	2	4
3069	1	1	1	1	4
3070	1	1	1	1	3
3071	1	1	2	2	2
3072	1	1	2	2	2
3073	1	1	2	2	2
3074	1	1	2	1	4
3075	1	1	3	2	2
3076	1	1	3	2	3
3077	1	1	4	2	2
3078	1	1	4	2	2
3079	1	1	3	1	4
3080	1	1	3	2	1
3081	1	1	3	1	3
3082	1	1	4	2	3
3083	1	1	2	1	4
3084	1	1	4	2	3
3085	1	1	4	1	3
3086	1	1	2	2	3
3087	2	1	3	2	2
3088	1	1	2	2	4
3089	2	1	4	2	2
3090	1	1	4	1	4
3091	1	1	4	2	2
3092	1	1	4	1	4
3093	1	1	4	2	3
3094	1	1	2	2	4
3095	1	1	3	2	4
3096	1	1	2	1	4
3097	1	1	3	2	4
3098	1	1	3	1	4
3099	1	1	2	2	2
3100	1	1	2	1	2
3101	1	1	2	2	4
3102	2	1	1	2	2
3103	1	1	4	2	2
3104	1	1	3	1	3
3105	1	1	2	2	2
3106	1	1	3	2	3
3107	1	1	3	2	4
3108	1	1	1	1	4
3109	1	1	2	1	4
1038	1	1	3	2	4
1039	1	1	3	2	2
1040	1	1	1	1	4
1041	2	1	2	2	3
1042	2	1	1	2	4

SURVE	EYE DROPS - SB	SHRINKBD	AGE	SEX	ED
=====	=====	=====	=====	=====	=====
1043	2	1	2	1	4
1044	1	1	3	2	3
1045	1	1	2	1	4
1046	2	1	1	1	4
1047	2	2	1	1	4
1048	2	1	1	1	4
1049	1	1	3	2	1
1050	1	1	4	1	2
1051	1	1	3	2	1
1052	1	1	4	1	4
1053	2	2	3	2	3
1054	1	1	2	2	3
1055	1	1	4	2	3
1056	1	2	3	2	2
1057	1	1	4	1	2
1058	2	1	2	2	4
1059	1	1	4	2	2
1060	2	1	4	2	2
1061	2	1	4	2	4
1062	2	2	3	1	4
1063	1	1	4	2	2
1064	1	1	3	2	2
1065	2	1	3	2	2
1066	2	1	1	2	4
1067	1	1	2	1	4
1068	2	1	1	2	4
1069	2	1	2	2	2
1070	1	1	3	2	2
1071	1	1	2	2	3
1072	2	1	3	1	4
1073	1	1	2	2	2
1074	2	1	3	2	2
1075	2	1	3	2	2
1076	2	2	2	2	4
1077	2	1	1	2	3
1078	2	1	2	2	2
1079	2	1	3	2	2
1080	1	1	3	2	4
1081	2	1	1	1	4
1082	1	1	2	1	4
1083	2	1	3	2	4
1084	2	1	3	2	2
1085	1	1	4	1	4
1086	2	1	4	2	4
1087	1	1	3	1	3
1088	2	1	3	1	2
1089	2	1	3	2	2
1090	2	1	3	2	2
1091	1	1	4	2	1
1092	1	1	3	2	2
1093	2	1	2	2	2

SURVE	EYE DROPS - SB	SHRINKBD	AGE	SEX	ED
=====	=====	=====	---	---	---
1094	2	1	1	2	2
1095	2	1	2	2	3
1096	2	1	2	1	4
1097	2	1	2	2	1
1098	2	1	1	1	4
1099	2	1	2	2	4
1100	2	1	3	2	2
1101	1	1	1	1	4
1102	1	1	2	2	2
1103	1	1	2	2	4
1104	2	1	3	2	3
1105	1	1	3	1	4
1106	1	1	3	2	4
1107	1	1	2	2	4
1108	1	1	3	1	4

TOTALS:

Printed 217 of the 217 records.

PLASTIC TEARAWAY CLOSURE PACKAGE RAW DATA

<u>SURVE</u>	<u>DANUP_TEAR</u>	<u>BAWAY_</u>	<u>AGE</u>	<u>SEX</u>	<u>ED</u>
-----	-----	-----	-----	-----	-----
1001	2	1	2	1	4
1002	2	2	1	2	3
1003	1	1	2	2	2
1004	1	1	2	2	3
1005	1	1	3	1	4
1006	1	1	2	2	4
1007	2	1	1	1	4
1008	2	1	2	2	4
1009	2	1	2	1	4
1010	2	1	2	1	2
1011	1	1	2	1	4
1012	2	1	3	1	3
1013	2	1	2	1	3
1014	2	1	4	2	1
1015	2	1	1	2	3
1016	1	1	3	1	3
1017	2	1	2	1	4
1018	2	1	3	2	3
1019	2	1	1	1	3
1020	2	1	3	1	2
1021	1	1	1	2	4
1022	1	1	3	2	4
1023	1	1	3	2	2
1024	2	1	3	2	2
1025	1	1	3	1	2
1026	1	1	3	1	2
1027	1	1	2	1	3
1028	1	1	3	1	3
1029	1	1	1	2	4
1030	2	2	2	1	4
1031	1	1	2	2	3
1032	1	1	1	1	3
1033	2	1	1	1	4
1034	2	1	1	2	4
1035	1	1	2	2	3
1036	2	1	1	2	3
1037	1	1	2	1	3
3001	2	1	1	1	2
3002	1	1	1	1	4
3003	1	1	2	2	4
3004	1	1	1	2	1
3005	1	1	4	2	3
3006	2	1	1	1	3
3007	1	1	3	2	4
3008	2	1	2	2	3
3009	1	1	2	2	1
3010	2	1	3	2	4
3011	1	2	4	1	2
3012	1	1	2	2	3

SURVE	DANUP_TEAR	BAWAY_	AGE	SEX	ED
----	-----	-----	----	----	----
3013	2	1	3	2	2
3014	1	2	2	2	3
3015	1	1	3	1	4
3016	1	1	2	1	4
3017	1	1	1	1	4
3018	1	1	2	2	2
3019	1	1	1	1	4
3020	1	1	2	1	3
3021	1	1	2	2	3
3022	1	1	2	2	2
3023	2	1	2	2	4
3024	1	1	2	2	4
3025	1	1	1	2	3
3026	2	1	1	2	4
3027	1	2	3	2	3
3028	1	1	3	1	4
3029	1	1	1	2	3
3030	1	2	2	2	3
3031	1	1	2	1	4
3032	1	1	1	1	3
3033	1	1	2	1	4
3034	1	1	3	2	2
3035	1	1	3	1	3
3036	1	1	1	1	4
3037	1	1	4	1	2
3038	1	1	1	2	3
3039	1	1	1	2	3
3040	1	1	3	2	3
3041	1	1	4	1	4
3042	2	1	1	2	3
3043	1	1	1	2	2
3044	2	1	1	2	3
3045	2	1	3	2	2
3046	1	1	3	2	2
3047	1	1	4	1	2
3048	1	1	4	1	3
3049	1	1	4	2	2
3050	1	2	3	2	2
3051	1	1	4	2	2
3052	1	1	3	1	2
3053	1	1	3	2	2
3054	1	1	3	1	2
3055	1	1	3	2	2
3056	1	2	3	2	2
3057	1	1	2	2	3
3058	1	1	3	1	4
3059	1	1	3	2	2
3060	1	1	4	2	2
3061	1	1	4	2	2
3062	1	1	3	2	2
3063	1	1	3	2	2

SURVE	DANUP_TEAR	BAWAY_	AGE	SEX	ED
=====	=====	=====	=====	=====	=====
3064	1	1	2	2	2
3065	2	1	3	2	2
3066	1	1	2	2	4
3067	1	1	1	1	3
3068	2	1	1	2	4
3069	2	1	1	1	4
3070	1	1	1	1	3
3071	1	1	2	2	2
3072	1	1	2	2	2
3073	1	1	2	2	2
3074	1	1	2	1	4
3075	1	1	3	2	2
3076	1	1	3	2	3
3077	1	1	4	2	2
3078	1	1	4	2	2
3079	1	1	3	1	4
3080	1	1	3	2	1
3081	1	1	3	1	3
3082	1	1	4	2	3
3083	1	1	2	1	4
3084	1	1	4	2	3
3085	1	1	4	1	3
3086	1	1	2	2	3
3087	2	1	3	2	2
3088	1	1	2	2	4
3089	2	1	4	2	2
3090	1	1	4	1	4
3091	1	1	4	2	2
3092	1	1	4	1	4
3093	1	1	4	2	3
3094	1	1	2	2	4
3095	1	2	3	2	4
3096	1	1	2	1	4
3097	1	1	3	2	4
3098	1	1	3	1	4
3099	1	1	2	2	2
3100	1	1	2	1	2
3101	1	1	2	2	4
3102	1	1	1	2	2
3103	2	1	4	2	2
3104	1	1	3	1	3
3105	1	1	2	2	2
3106	2	1	3	2	3
3107	1	1	3	2	4
3108	2	1	1	1	4
3109	2	1	2	1	4
1038	1	1	3	2	4
1039	1	1	3	2	2
1040	1	1	1	1	4
1041	2	1	2	2	3
1042	1	1	1	2	4

SURVE	DANUP_TEAR	BAWAY_	AGE	SEX	ED
=====	=====	=====	=====	=====	=====
1043	2	1	2	1	4
1044	1	1	3	2	3
1045	1	1	2	1	4
1046	1	1	1	1	4
1047	1	1	1	1	4
1048	1	1	1	1	4
1049	1	1	3	2	1
1050	2	1	4	1	2
1051	1	1	3	2	1
1052	1	1	4	1	4
1053	1	2	3	2	3
1054	1	1	2	2	3
1055	1	1	4	2	3
1056	1	2	3	2	2
1057	1	1	4	1	2
1058	2	1	2	2	4
1059	1	1	4	2	2
1060	1	1	4	2	2
1061	1	1	4	2	4
1062	1	1	3	1	4
1063	1	1	4	2	2
1064	1	1	3	2	2
1065	1	1	3	2	2
1066	1	1	1	2	4
1067	1	1	2	1	4
1068	2	1	1	2	4
1069	1	1	2	2	2
1070	1	2	3	2	2
1071	1	1	2	2	3
1072	1	1	3	1	4
1073	1	1	2	2	2
1074	1	1	3	2	2
1075	1	2	3	2	2
1076	1	1	2	2	4
1077	2	1	1	2	3
1078	1	1	2	2	2
1079	1	1	3	2	2
1080	1	1	3	2	4
1081	1	1	1	1	4
1082	1	1	2	1	4
1083	1	1	3	2	4
1084	1	1	3	2	2
1085	2	1	4	1	4
1086	2	1	4	2	4
1087	1	1	3	1	3
1088	1	1	3	1	2
1089	1	1	3	2	2
1090	1	1	3	2	2
1091	1	2	4	2	1
1092	1	1	3	2	2
1093	1	1	2	2	2

<u>SURVE</u>	<u>DANUP_TEAR</u>	<u>BAWAY_</u>	<u>AGE</u>	<u>SEX</u>	<u>ED</u>
1094	2	1	1	2	2
1095	1	1	2	2	3
1096	1	1	2	1	4
1097	1	1	2	2	1
1098	1	1	1	1	4
1099	1	1	2	2	4
1100	1	1	3	2	2
1101	1	1	1	1	4
1102	1	1	2	2	2
1103	1	2	2	2	4
1104	2	1	3	2	3
1105	1	1	3	1	4
1106	1	1	3	2	4
1107	1	1	2	2	4
1108	1	1	3	1	4

TOTALS:

Printed 217 of the 217 records.

APPENDIX B

APPENDIX B
AGE BREAKDOWN OF CONSUMER SURVEY DATA

Table 15 - Age comparisons using J index for vitamin
package with styrene membrane seal.

CATEGORY	J SCORE	SE _J
OVERALL	.34	.0623
AGE 18-30	.55	.1256
AGE 31-45	.43	.1091
AGE 46-65	.26	.1100
AGE 65+	.10	.1737

COMPARISON	Z VALUE	95% CONFIDENCE
Age 18-30 vs. Age 31-45	0.7213	NO
Age 18-30 vs. Age 46-65	1.7370	YES
Age 18-30 vs. Age 65+	2.0990	YES
Age 31-45 vs. Age 46-65	1.0973	NO
Age 31-45 vs. Age 65+	1.6088	NO
Age 46-65 vs. Age 65+	0.7782	NO
Age 18-30 vs. Overall	1.4978	NO
Age 31-45 vs. Overall	0.7164	NO
Age 46-65 vs. Overall	-0.6328	NO
Age 65+ vs. Overall	-1.3006	NO

Table 16 - Age comparisons using J index for salad dressing package with paper neck band.

CATEGORY	J SCORE	SE _J
OVERALL	.28	.0506
AGE 18-30	.18	.1233
AGE 31-45	.40	.0891
AGE 46-65	.26	.0855
AGE 65+	.17	.1076

COMPARISON	Z VALUE	95% CONFIDENCE
Age 18-30 vs. Age 31-45	-1.4539	NO
Age 18-30 vs. Age 46-65	-0.5361	NO
Age 18-30 vs. Age 65+	0.0614	NO
Age 31-45 vs. Age 46-65	1.1337	NO
Age 31-45 vs. Age 65+	1.6464	NO
Age 46-65 vs. Age 65+	0.6549	NO
Age 18-30 vs. Overall	-0.7555	NO
Age 31-45 vs. Overall	1.1711	NO
Age 46-65 vs. Overall	-0.2013	NO
Age 65+ vs. Overall	-0.9251	NO

Table 17 - Age comparisons using J index for amber
bottle with black metal breakaway cap.

CATEGORY	J SCORE	SE _J
OVERALL	.26	.0653
AGE 18-30	.32	.1428
AGE 31-45	.39	.1123
AGE 46-65	.27	.1153
AGE 65+	-.01	.1558

COMPARISON	Z VALUE	95% CONFIDENCE
Age 18-30 vs. Age 31-45	-0.3853	NO
Age 18-30 vs. Age 46-65	0.2724	NO
Age 18-30 vs. Age 65+	1.5614	NO
Age 31-45 vs. Age 46-65	0.7456	NO
Age 31-45 vs. Age 65+	2.0827	YES
Age 46-65 vs. Age 65+	1.4446	NO
Age 18-30 vs. Overall	0.3821	NO
Age 31-45 vs. Overall	1.0001	NO
Age 46-65 vs. Overall	0.0755	NO
Age 65+ vs. Overall	-1.5983	NO

**Table 18 - Age comparisons using J index for pizza
sauce package with vacuum button closure.**

CATEGORY	J SCORE	SE _J
OVERALL	.64	.0518
AGE 18-30	.86	.0732
AGE 31-45	.76	.0797
AGE 46-65	.44	.1000
AGE 65+	.57	.1080

COMPARISON	Z VALUE	95% CONFIDENCE
Age 18-30 vs. Age 31-45	0.9241	NO
Age 18-30 vs. Age 46-65	3.3891	YES
Age 18-30 vs. Age 65+	2.2227	YES
Age 31-45 vs. Age 46-65	2.5024	YES
Age 31-45 vs. Age 65+	1.4155	NO
Age 46-65 vs. Age 65+	-0.8832	NO
Age 18-30 vs. Overall	2.4533	YES
Age 31-45 vs. Overall	1.2624	NO
Age 46-65 vs. Overall	-1.7759	YES
Age 65+ vs. Overall	-0.5844	NO

**Table 19 - Age comparisond using J index for
aspirin product in blister package.**

CATEGORY	J SCORE	SE _J
OVERALL	.42	.0562
AGE 18-30	.55	.1233
AGE 31-45	.45	.0947
AGE 46-65	.36	.0981
AGE 65+	.32	.1561

COMPARISON	Z VALUE	95% CONFIDENCE
Age 18-30 vs. Age 31-45	0.6465	NO
Age 18-30 vs. Age 46-65	1.2056	NO
Age 18-30 vs. Age 65+	1.1562	NO
Age 31-45 vs. Age 46-65	0.6601	NO
Age 31-45 vs. Age 65+	0.7120	NO
Age 46-65 vs. Age 65+	0.2170	NO
Age 18-30 vs. Overall	0.9594	NO
Age 31-45 vs. Overall	0.2724	NO
Age 46-65 vs. Overall	-0.5307	NO
Age 65+ vs. Overall	-0.6027	NO

Table 20 - Age comparisons using J index for vegetable oil package with foil membrane seal.

CATEGORY	J SCORE	SE _J
OVERALL	.66	.0500
AGE 18-30	.64	.1155
AGE 31-45	.78	.0745
AGE 46-65	.60	.0927
AGE 65+	.62	.1060

COMPARISON	Z VALUE	95% CONFIDENCE
Age 18-30 vs. Age 31-45	-1.0186	NO
Age 18-30 vs. Age 46-65	0.2701	NO
Age 18-30 vs. Age 65+	0.1276	NO
Age 31-45 vs. Age 46-65	1.5135	NO
Age 31-45 vs. Age 65+	1.2349	NO
Age 46-65 vs. Age 65+	-0.1420	NO
Age 18-30 vs. Overall	-0.1589	NO
Age 31-45 vs. Overall	1.3374	NO
Age 46-65 vs. Overall	-0.5697	NO
Age 65+ vs. Overall	-0.3413	NO

Table 21 - Age comparisons using J index for eye drop package with plastic shrink band.

CATEGORY	J SCORE	SE _J
OVERALL	.45	.0559
AGE 18-30	.68	.1101
AGE 31-45	.53	.0856
AGE 46-65	.30	.1041
AGE 65+	.20	.1334

COMPARISON	Z VALUE	95% CONFIDENCE
Age 18-30 vs. Age 31-45	1.0756	NO
Age 18-30 vs. Age 46-65	2.5079	YES
Age 18-30 vs. Age 65+	2.7751	YES
Age 31-45 vs. Age 46-65	1.7066	YES
Age 31-45 vs. Age 65+	2.0820	YES
Age 46-65 vs. Age 65+	0.5910	NO
Age 18-30 vs. Overall	1.8627	YES
Age 31-45 vs. Overall	0.7825	NO
Age 46-65 vs. Overall	-1.2695	NO
Age 65+ vs. Overall	-1.7284	YES

**Table 22 - Age comparisons using J index for yogurt
drink package with plastic tearaway tab.**

CATEGORY	J SCORE	SE _J
OVERALL	.09	.0562
AGE 18-30	.06	.1489
AGE 31-45	.19	.0921
AGE 46-65	-.04	.0853
AGE 65+	.24	.1504

COMPARISON	Z VALUE	95% CONFIDENCE
Age 18-30 vs. Age 31-45	-0.7425	NO
Age 18-30 vs. Age 46-65	0.5827	NO
Age 18-30 vs. Age 65+	-0.8505	NO
Age 31-45 vs. Age 46-65	1.8322	YES
Age 31-45 vs. Age 65+	-0.2835	NO
Age 46-65 vs. Age 65+	-1.6194	NO
Age 18-30 vs. Overall	-0.1885	NO
Age 31-45 vs. Overall	0.9268	NO
Age 46-65 vs. Overall	-1.2726	NO
Age 65+ vs. Overall	0.9342	NO

Table 23 - Package J score vs. survey participant
age correlations.

COMPARISON	CORELATION
Vitamin package vs. age	-0.992
Salad dressing package vs. age	-0.187
Amber bottle vs. age	-0.778
Pizza sauce package vs. age	-0.867
Aspirin blister vs. age	-0.994
Vegetable oil package vs. age	-0.409
Eye drop package vs. age	-0.999
Yogurt drink package vs. age	0.229

APPENDIX C

APPENDIX C
CONSUMER SURVEY PURCHASE DECISION DATA ANALYSIS

Table 24 - Consumer survey purchase decision analysis for
vitamin package with styrene menbrane seal.

PRODUCT	WOULD BUY	WOULD NOT BUY
VITAMINS - STYRENE MEMBRANE SEAL		
Consistant with tamper decision	111	71
Inconsistant with tamper decision		
Survey related reason	0	13
Reason unknown	14	7
% of responses inconsistant*	11.2%	20.0%

Table 25 - Consumer survey purchase decision analysis
for salad dressing package with paper
neck band.

PRODUCT	WOULD BUY	WOULD NOT BUY
SALAD DRESSING - PAPER NECK BAND		
Consistant with tamper decision	169	35
Inconsistant with tamper decision		
Survey related reason	0	0
Reason unknown	7	5
% of responses inconsistant*	4.0%	12.5%

* This percentage reflects the number of participants inconsistant with their purchase decisions compared to the total number of participants who made that purchase decision.

**Table 26 - Consumer survey purchase decision analysis
for amber bottle with metal breakaway cap.**

PRODUCT	WOULD BUY	WOULD NOT BUY
AMBER BOTTLE - METAL BREAKAWAY CAP		
Consistant with tamper decision	95	95
Inconsistant with tamper decision		
Survey related reason	0	4
Reason unknown	11	10
% of responses inconsistant*	10.4%	12.8%

**Table 27 - Consumer survey purchase decision analysis
for pizza sauce jar with button closure.**

PRODUCT	WOULD BUY	WOULD NOT BUY
PIZZA SAUCE - BUTTON CLOSURE		
Consistant with tamper decision	115	89
Inconsistant with tamper decision		
Survey related reason	0	0
Reason unknown	6	6
% of responses inconsistant*	5.0%	6.3%

* This percentage reflects the number of participants inconsistant with their purchase decisions compared to the total number of participants who made that purchase decision.

Table 28 - Consumer survey purchase decision analysis
for aspirin product in blister package.

PRODUCT	WOULD BUY	WOULD NOT BUY
ASPIRIN - BLISTER		
Consistant with tamper decision	136	58
Inconsistant with tamper decision		
Survey related reason	0	3
Reason unknown	10	9
% of responses inconsistant*	7.4%	17.1%

Table 29 - Consumer survey purchase decision analysis
for vegetable oil package with foil membrane
seal..

PRODUCT	WOULD BUY	WOULD NOT BUY
VEGETABLE OIL - FOIL MEMBRANE SEAL		
Consistant with tamper decision	110	80
Inconsistant with tamper decision		
Survey related reason	0	5
Reason unknown	10	10
% of responses inconsistant*	9.1%	15.8%

* This percentage reflects the number of participants inconsistant with their purchase decisions compared to the total number of participants who made that purchase decision.

**Table 30 - Consumer survey purchase decision analysis
for eye drop package with plastic shrink band.**

PRODUCT	WOULD BUY	WOULD NOT BUY
EYE DROPS - PLASTIC SHRINK BAND		
Consistant with tamper decision	142	60
Inconsistant with tamper decision		
Survey related reason	0	0
Reason unknown	9	5
% of responses inconsistant*	6.0%	7.7%

**Table 31 - Consumer survey purchase decision analysis
for yogurt drink with plastic tear tab.**

PRODUCT	WOULD BUY	WOULD NOT BUY
YOGURT DRINK - PLASTIC TEAR TAB		
Consistant with tamper decision	162	43
Inconsistant with tamper decision		
Survey related reason	0	0
Reason unknown	4	7
% of responses inconsistant*	2.4%	14.0%

* This percentage reflects the number of participants inconsistant with their purchase decisions compared to the total number of participants who made that purchase decision.

APPENDIX D

APPENDIX D
CONSUMER SURVEY PACKAGE FEATURE FAMILIARITY DATA ANALYSIS

Table 32 - Consumer familiarity with membrane seals
and its effect on tamper judgement of
vitamins with styrene membrane seal

PRODUCT/CONDITION/JUDGEMENT	FAMILIAR		UNFAMILIAR	
	n	%*	n	%*
VITAMINS - STYRENE MEMBRANE SEAL				
Control package/Correct answer	82	78	1	50
Control package/Incorrect answer	23	22	1	50
Tampered package/Correct answer	57	55	5	83
Tampered package/Incorrect answer	46	45	1	17
Total familiar with package form	208		8	

*Percent of participants who observed this package condition

Table 33 - Consumer familiarity with neck bands
and its effect on tamper judgement of
salad dressing package with paper
neck band.

PRODUCT/CONDITION/JUDGEMENT	FAMILIAR		UNFAMILIAR	
	n	%*	n	%*
SALAD DRESSING - PAPER NECK BAND				
Control package/Correct answer	98	96	5	100
Control package/Incorrect answer	6	4	0	0
Tampered package/Correct answer	35	35	1	17
Tampered package/Incorrect answer	66	65	5	83
Total familiar with package form	205		11	

*Percent of participants who observed this package condition

**Table 34 - Consumer familiarity with breakaway caps
and its effect on tamper judgement of
amber bottle with metal breakaway cap.**

PRODUCT/CONDITION/JUDGEMENT	FAMILIAR		UNFAMILIAR	
	n	%*	n	%*
AMBER BOTTLE - METAL BREAKAWAY CAP				
Control package/Correct answer	70	71	5	62
Control package/Incorrect answer	28	29	3	38
Tampered package/Correct answer	56	55	3	43
Tampered package/Incorrect answer	46	45	4	57
Total familiar with package form	201		15	

*Percent of participants who observed this package condition

**Table 35 - Consumer familiarity with button closures
and its effect on tamper judgement of
pizza sauce jar with button closure.**

PRODUCT/CONDITION/JUDGEMENT	FAMILIAR		UNFAMILIAR	
	n	%*	n	%*
PIZZA SAUCE - BUTTON CLOSURE				
Control package/Correct answer	92	90	2	50
Control package/Incorrect answer	11	10	2	50
Tampered package/Correct answer	74	75	7	70
Tampered package/Incorrect answer	25	25	3	30
Total familiar with package form	202		14	

*Percent of participants who observed this package condition

**Table 36 - Consumer familiarity with blister packages
and its effect on tamper judgement of
aspirin product in blister package.**

PRODUCT/CONDITION/JUDGEMENT	FAMILIAR		UNFAMILIAR	
	n	%*	n	%*
ASPIRIN - BLISTER				
Control package/Correct answer	95	90	3	75
Control package/Incorrect answer	10	10	1	25
Tampered package/Correct answer	53	51	3	75
Tampered package/Incorrect answer	50	49	1	25
Total familiar with package form	208		8	

***Percent of participants who observed this package condition**

Table 37 - Consumer familiarity with membrane seals and its effect on tamper judgement of vegetable oil package with foil membrane seal.

PRODUCT/CONDITION/JUDGEMENT	FAMILIAR		UNFAMILIAR	
	n	%*	n	%*
VEGETABLE OIL - FOIL MEMBRANE SEAL				
Control package/Correct answer	95	90	2	100
Control package/Incorrect answer	10	10	0	0
Tampered package/Correct answer	77	75	5	83
Tampered package/Incorrect answer	26	25	1	17
Total familiar with package form	208		8	

*Percent of participants who observed this package condition

Table 38 - Consumer familiarity with shrink bands and its effect on tamper judgement of eye drop package with plastic shrink band.

PRODUCT/CONDITION/JUDGEMENT	FAMILIAR		UNFAMILIAR	
	n	%*	n	%*
EYE DROPS - PLASTIC SHRINK BAND				
Control package/Correct answer	94	90	4	80
Control package/Incorrect answer	11	10	1	20
Tampered package/Correct answer	54	53	4	67
Tampered package/Incorrect answer	47	47	2	33
Total familiar with package form	205		11	

*Percent of participants who observed this package condition

Table 39 - Consumer familiarity with breakaway/tearaway caps and its effect onn tamper judgement of yogurt drink with plastic tear tab.

PRODUCT/CONDITION/JUDGEMENT	FAMILIAR		UNFAMILIAR	
	n	%*	n	%*
YOGURT DRINK - PLASTIC TEAR TAB				
Control package/Correct answer	83	81	7	100
Control package/Incorrect answer	19	19	0	0
Tampered package/Correct answer	27	27	2	25
Tampered package/Incorrect answer	72	73	6	75
Total familiar with package form	201		15	

*Percent of participants who observed this package condition

APPENDIX E

APPENDIX E

MICHIGAN STATE UNIVERSITY

TAMPER RESISTANT PACKAGING STUDY

The following questions are designed to obtain information from packaging professionals on their opinions of current tamper resistant/evident packaging forms. Please answer all questions as completely as possible, and based on your own (not necessarily your company's) opinions on the subject.

This survey should take approximately 3 minutes to complete. Your answers will be kept confidential. You are free not to answer any particular question, and your cooperation is voluntary.

1. What types of tamper resistant devices appear on your products? (Please give specific descriptions of the devices ... type of material, any graphics which may appear on the feature, etc.)
2. In your opinion, how easy would it be to repair tampering of one of your products with common materials (tape, glue, etc.)? Please be specific.

3. Do you think it would be possible for a potential tamperer to gain access to your TRP materials, or materials similar to the ones you use from a supplier, to use in a malicious attempt to conceal package tampering? Please describe your opinions based on your experience in these areas.

4. In your honest opinion, how well do you think the average consumer could detect tampering in one of your packages? (Please check one).

Definitely Probably Not Sure Probably Not Definitely Not

Please comment on why you believe this.

Thank you for your cooperation!

Please return completed surveys to:

Lisa Hewartson
School of Packaging
Michigan State University
East Lansing, MI 48824-1223

APPENDIX F

APPENDIX F **PACKAGING PROFESSIONAL SURVEY RAW DATA**

- # 1 TYPE Printed acetate seal over both ends of sealed end carton;
Printed shrink band.
- # 2 TYPE Bottle finish OD sec. seal-Al foil/induction HS plastic,
printed; PKG shrink sleeve-PVC, printed; Push through
blister package
- # 3 TYPE MFRS -heat shrink TE seals; directionally oriented PVC
tubing, printed distinctively w/up to 8 colours.
- # 4 TYPE Paper and glassine tac seals (from CR caps)
- # 5 TYPE Induction inner seals; Custom printed tapes; Special
construction TE tapes, Adhesives, Shrink overwraps.
- # 6 TYPE None to date. Are testing shrink wrap material for OTC
trays, and better polymer adhesives for individual pkgs.
within the tray.
- # 7 TYPE Polyethylene destructive seals.
- # 8 TYPE PVC shrink bands; Induction sealed Al. innerseals
printed with product name.
- # 9 TYPE Cellophane wrapped carton with tear tape opening.
- # 10 TYPE Shrink wrap with company ID film - seams at bottom and
top.
- # 11 TYPE Full PP shrink film - no printing; PVC shrink bands -
general print and custom; PET/PE membrane inner seal -
general print and custom.
- # 12 TYPE Don't use TE devices.
- # 13 TYPE Two-ply glassine innerseal with logo, Shrink band +
bottle label
- # 14 TYPE PVC body bands, Poly overwraps, Blisters, Al. foil
innerseals - all imprinted with company trademark.
- # 15 TYPE Shrink bands on neck of bottle with company logo, banded
capsules , Glassine innerseals printed with company logo

- # 16 TYPE Induction printed foil liner (from 3M), Shrink bands with company logo, Glued end cartons on secondary packages, Push through blister packages.
- # 17 TYPE Blister packages
- # 18 TYPE Heat sealed pouches, Heat shrink bands, Heat seal membrane, Glued carton, Heat seal poly coated carton, Shrink overwraps
- # 19 TYPE Fort Howard PKG - brochure
- # 20 TYPE Shrink bands and vacuum release buttons, Breakaway plastic screw cap, Overwraps, Glued cartons, Sealed inner bags (bag-in-box)
- # 21 TYPE Intregal plastic ring - part of lid.
- # 22 TYPE Induction seals printed with coloured logo, Aerosol cans, Blister packages, PVC shrink bands printed with logo.
- # 23 TYPE Al. induction seals, Printed tape on shipping cartons, Heat seal foil pouches, Blisters (unit dose and carded)
- # 24 TYPE Shrink seals, glued and HS cartons, sealed pouches, Foil and film lids sealed on plastic cups and trays.
- # 25 TYPE Double seam metal can, Vacuum button cap, PVC shrink bands, Sealed cartons
- # 26 TYPE Tamper bands, Foil membranes, Cartons
- # 27 TYPE Printed or plain polyethylene bags - no TE feature.
- # 28 TYPE Body bands, Neck bands, Overwraps, Foil seals
- # 29 TYPE Composite fibre cans, Vacuum packed glass jars, Plastic/metal "Tamper Guard" tear tab. No graphics telling of TR aspect of closure.
- # 30 TYPE Poly overwrap film folded and sealed with tear tape.

- # 1 OPINION Tape seal is easily repaired; neck band more difficult but repairable.
- # 2 OPINION Sec.seal could repair with heat/glue; Shrink sleeve by reheating or glue; Blister not easy to repair unnoticed
- # 3 OPINION May be repaired with self-adhesive tape, but consumers should be able to tell tampering
- # 4 OPINION not difficult
- # 5 OPINION Difficult for a layman without special equipment, materials and knowledge.
- # 6 OPINION Very easy for current package, can repair with cello tape and glue.
- # 7 OPINION Not possible - opening the package would result in its destruction.
- # 8 OPINION Would be fairly difficult
- # 9 OPINION Cellophane can easily be opened at sealed points and resealed using heat (iron)
- # 10 OPINION Easy to fair to detect. Alert consumers should be able to detect tamper, but "based on my experience, this is usually not the case."
- # 11 OPINION Pro tamperer would have no problem duplicating a seal out of the store - it is a grazing and non-pro tamperer discouragement.
- # 12 OPINION Think it is very easy for tampering to be repaired.
- # 13 OPINION It is very difficult to get printed components, so it is difficult to repair tampering.
- # 14 OPINION Unlikely - due to printing and smooth appearance of the finished surface.

- # 15 OPINION Could do in 30 minutes with proper tools and 2 or 3 containers to work with.

- # 16 OPINION Relatively easy - foil subst. for inner seal, cut blister open, heat glued end carton, opening pkg. at different point other than normal opening.

- # 17 OPINION Fairly difficult - blisters well sealed and fibre tear results from opening

- # 18 OPINION Very difficult in store on all but glued carton. Not difficult if taken out of store.

- # 19 OPINION Extremely difficult

- # 20 OPINION Bottle devices difficult, overwraps and glued cartons moderately difficult, inner bags slightly difficult

- # 21 OPINION Impossible - must remove ring to get into product.

- # 22 OPINION Very difficult

- # 23 OPINION Difficult to do with induction seals, tape seals easy, foil pouches and blisters hard. TR needs hi-tech - UV scanning compounds, etc.

- # 24 OPINION Cartons easy if taken out of store.

- # 25 OPINION Cans - difficult and obvious; Buttons - easy to repair, Shrink band fairly difficult, but can be fixed with tape, label must indicate presence of band, Carton easy

- # 26 OPINION Very easy, and easy to do with syringe

- # 27 OPINION Quite easily - using syringe, or just entry to reclosable bags undetectable.

- # 28 OPINION Very easy - glue, reverse heat application process

29 OPINION Difficult, but could be done by person familiar with container or processes. Syringe can get into fibre can without detection.

30 OPINION Not too easily - film tears when opened.

1 ACCESS Difficult but possible

2 ACCESS Very difficult but possible - material components not as controlled as labels, brochures, etc.

3 ACCESS Extensive security system -TV cameras,destruction of waste material, shipping cartons sealed w/TE tapes. Prevent material being taken from prod. facility.

4 ACCESS Items are controlled, so not likely

5 ACCESS Difficult for an outside person, but could be done by an existing employee.

- # 6 ACCESS If TE devices taken off, consumers won't know they're missing. Need better "consistency" (education) and better TE means (destructive when opened).
- # 7 ACCESS Highly doubtful.
- # 8 ACCESS Extremely difficult. Suppliers are required to certify that all scrap and excess production has been destroyed before acceptance of a shipment.
- # 9 ACCESS Could gain access to materials. Tamperer can gain access to any package on the market using kitchen tools.
- # 10 ACCESS Only if tamperer was an employee or a visitor; general public would not be able to obtain material.
- # 11 ACCESS Suppliers getting better with disposal, but are very bad with sending samples - a knowledgeable tamperer would find it easily.
- # 12 ACCESS Of course - suppliers are always willing to help people out with supplies.
- # 13 ACCESS Very difficult to get material with printing
- # 14 ACCESS A skilled but deranged person could do it, but normal person could not. No TR package will stop these people.
- # 15 ACCESS Not too easily
- # 16 ACCESS Yes - would be easier for packaging professional or someone with knowledge.
- # 17 ACCESS An insider or employee could gain access.

- # 18 ACCESS Highly unlikely with all but glued end carton.
- # 19 ACCESS No
- # 20 ACCESS Difficult to obtain from supplier, especially if printed
- # 21 ACCESS No - ring is part of lid, and can't be duplicated.
- # 22 ACCESS Most products they product aren't OTC
- # 23 ACCESS Only employee could get access, would be easy to get some materials from some vendors. Caution their suppliers against this.
- # 24 ACCESS Relatively easy if scrap dump was discovered.
- # 25 ACCESS Yes - anything is possible
- # 26 ACCESS Yes. Consumers must know how to look and what to look for. They don't necessarily use all the same logos on the same TE materials.
- # 27 ACCESS No TE materials
- # 28 ACCESS Is possible but highly unlikely - use uniquely printed materials, highly controlled
- # 29 ACCESS Yes - common materials
- # 30 ACCESS Yes - film is readily available

- # 1 DETECT PROBABLY NOT. - if tamperer attempted to repair seals.
- # 2 DETECT NOT SURE - Rx packages, distributed by pharmacists
- # 3 DETECT DEFINITELY - average consumer who inspects pkgs. should be able to see when tampering has occurred.
- # 4 DETECT NOT SURE.
- # 5 DETECT PROBABLY NOT. Consumers are not yet educated on what to look for - most don't even know they should examine packages.
- # 6 DETECT DEFINITELY NOT. Tamperer could easily get into ends of pkgs, and consumer's wouldn't know because they don't enter the package that way.
- # 7 DETECT DEFINITELY. - reason given above.
- # 8 DETECT PROBABLY. They are simple, self-evident features.
- # 9 DETECT PROBABLY NOT. Their packages aren't specifically wrapped to be TR, more to look clean and sanitary.
- # 10 DETECT PROBABLY NOT. Has seen pkgs. which look tampered in store but store personnel brush it off when brought to their attention. Consumer will have faith in their opinion.
- # 11 DETECT PROBABLY (casual) and PROB. NOT (pro) - have extensive in-house tests that show this. Used everything they could to make pkgs TE and professionally defeated everyone.
- # 12 DETECT PROBABLY NOT. Think few would detect.
- # 13 DETECT All products are RX - tampering problem is minimal.
- # 14 DETECT Dependent on skills of tamperer. Unskilled tamper work would be detectable.
- # 15 DETECT Depends on time spent by tamperer.
- # 16 DETECT PROBABLY NOT. Need better education.
- # 17 DETECT PROBABLY NOT. Consumers need to be educated.

- # 18 DETECT PROBABLY. Detectable in most packages of in-store tampering. Some folks wouldn't notice unless flagrant.
- # 19 DETECT DEFINITELY. Would have to destroy package to tamper.
- # 20 DETECT PROBABLY. Consumers know what to look for, and shy away from bad looking pkgs.
- # 21 DETECT DEFINITELY - market research
- # 22 DETECT PROBABLY NOT.
- # 23 DETECT PROBABLY NOT. Most consumers don't inspect packages, couldn't detect good repair job, expect tamperers to be clever and patient.
- # 24 DETECT PROBABLY NOT. Average consumer trusting, doesn't look, assume distribution damage.
- # 25 DETECT NOT SURE. Some tampering which he thinks is obvious isn't detected by consumers.
- # 26 DETECT PROBABLY NOT. Consumers are poorly informed of what to look for
- # 27 DETECT DEFINITELY NOT. Consumers, even well-educated pros, would not be able to detect well repaired tamperers.
- # 28 DETECT PROBABLY NOT. Consumers are very passive, don't expect or look for tampering.
- # 29 DETECT PROBABLY NOT.
- # 30 DETECT PROBABLY. - High quality appearance would be hard to duplicate by someone not skilled in art.

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