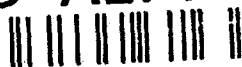


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TECHNICAL REPORT
NATICK/TR-94/004

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**EFFECT OF STORAGE ON SENSORY
AND NUTRITIONAL QUALITY OF
MEAL, READY-TO-EAT, INDIVIDUAL (MRE-1)**

By
**Margaret T. Branagan
and
Lauri R. Pruskin**

December 1993



**FINAL REPORT
September 1980 - December 1986**

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PREFACE

This study was conducted to determine the effects of storage on the stability and acceptability of the 1980 procurement of the Meal, Ready-to-Eat, Individual.

This effort was undertaken under 1980:O&MA PR 728012.19, work unit 03146558000, Storage Stability of Rations and Subsistence Items.

Sample storage, preparation, nutrient analysis and sensory evaluation described in this report was performed in-house by the U.S. Army Natick Research, Development and Engineering Center. The majority of the nutrient analyses (proximate and vitamin) were performed by Shankman Laboratories, Los Angeles, California, under contract number DAAG60-79-D-0003. The effort was conducted from September 1980 to December 1986.

The authors gratefully acknowledge the contributions of Dr. Edward W. Ross, Food Engineering Directorate (FED), for his data analysis support, Ms. Bonita M. Atwood, Mr. Jerry Jarboe and Ms. Margaret Robertson, of FED, for their assistance with nutrient data, Ms. Karen Conca, FED, for her assistance in conducting technological panel tests and Mr. Robert Kluter, Ms. Ruth Roth, and Ms. Joan Kalick, of Soldier Science Directorate (SSD), for their assistance in conducting consumer panel tests.

Following the retirement of Margaret T. Branagan, this technical report was completed through the publication process by Ms. Lauri R. Pruskin.

EFFECT OF STORAGE ON
SENSORY AND NUTRITIONAL QUALITY OF
MEAL, READY-TO-EAT, INDIVIDUAL
(MRE-1)

INTRODUCTION

A five year storage study of the first procurement of the Meal, Ready-to-Eat, Individual (MRE-1) was undertaken to:

- a. determine the nutritional content of the overall MRE ration and of each of the twelve (12) individual menus as procured from two different sources and
- b. assess the changes in nutritional content during storage.
- c. determine the sensory quality and consumer acceptance of MRE components as procured and
- d. assess the effect of storage time on both quality and consumer acceptance.

The variables in this study were:

1. Storage time - 0, 6, 12, 18, 24, 36, 48 and 60 months
2. Storage temperature - 4°, 21°, 30°, 38°C

The packaged MRE's were procured directly from the manufacturers and had not been previously stored. They were evaluated prior to storage and at withdrawals at predetermined timed intervals as indicated in Table A-2.

EXPERIMENTAL METHODS AND PROCEDURES

Materials

The MRE procured in 1980 was a lightweight meal, providing all components in flexible packages, and consisted mainly of thermally-processed foods in retortable pouches and ready-to-eat dehydrated foods. The entire meal was contained in a 0.010 to 0.012 inch polyethylene bag, 7 1/8 by 11 7/8 inches. The retort pouch components were over-wrapped in a paperboard folder.

The MRE consisted of 12 different menus packed in a shipping case. Table A-1 lists the food components in each menu.

Methods

The withdrawal plan for sensory and nutritional evaluations is shown in Table A-2. All sensory evaluations were performed at Natick. Before placement in storage, all cases and components were inspected to insure completeness of menus and to assess package integrity. Missing components or initial product failures were replaced to insure only products meeting initial quality specifications were stored. For example, the original cheese spread provided was determined to be unacceptable and was deleted from testing. Cheese spread from a later procurement was ordered for separate tests later. Prior to each sensory evaluation, all food packages were checked for integrity. All nutrient analyses were performed under contract by the same laboratory (Shankman Laboratories, Los Angeles, California). For the nutrient analyses, each of the 12 menus (meals) from the two vendors was composited in a blender at Natick and frozen for shipment to the contractor for nutrient analysis by standard chemical or microbiological methods (see Appendix D, Table D-1).

1. Storage Protocol for Sensory Acceptability and Quality Evaluations

Shipping case lots of MREs were stored 5 years at 4°C (40°F) and at 21°C (70°F), 3 years at 30°C (85°F) and 2 years at 38°C (100°F). Food components of each menu were rated by a consumer panel for acceptability at preplanned intervals for items stored at 4°C, 21°C, 30°C and 38°C. These food items were also rated by a trained technological panel for five quality attributes at the same withdrawal periods. For purposes of record-keeping and reporting, each item was assigned an index number; these indices are specified in food components listed in Appendix A, Table A-3.

A. Consumer panel tests - Panels consisted of 36 untrained Natick employees selected randomly from a 400 member roster of the Food Acceptance Panel. The role of this panel was to react as consumers to the foods over time without necessarily explaining the basis for their opinions. Data from these panels frequently correlate with reactions obtained from military personnel under actual use conditions. Panelists received special instructions for the test (See Figure A-3) and were given rating cards pre-labeled with the food name of each item to be rated for acceptability (See Figure A-1 for sample of the rating card). Panelists were asked to rate the degree of liking or disliking for an item on a 9-point hedonic scale. (9=like extremely; 1=dislike extremely).

In each test, panelists were served each component of the MRE meal being tested, which were four to six items served one at a time in random order. Mouth-rinsing was recommended between items. All items were tempered to room temperature and dispensed from the package, except for the dehydrated items, which were rehydrated in 60°C water before serving. The tests took place in the Food Acceptance Test Area at Natick in semi-isolated booths under standard, fluorescent lighting conditions. At most, two meals were tested each day, one in the morning and one in the afternoon, and care was taken that no panelist was used twice in the same day. For each withdrawal, as many as 48 sessions (twelve menus at four temperatures) were required. All components, except those reconstituted before being served (beef, pork sausage, potato patties and beverages), were at room temperature at the time of serving. Details of sample preparation and serving procedures are provided in Table A-4. During the study, 36 different food items were evaluated.

B. Technological panel tests - Two food technologist panels (A and B) were used for the testing. Panels consisted of 14 technologists trained and experienced in quality evaluation of food products. Panel A rated all entree items, peanut butter, jelly, cocoa beverage and catsup; Panel B rated the fruits, cakes, crackers and candies. The role of this panel was to score and describe quality changes over time, without regard to liking or disliking. Forty-one MRE components total were rated for appearance, odor, flavor, texture, and overall quality, initially and at intervals during storage at the same preplanned intervals as for the consumer tests for items stored at 4°C, 21°C, 30°C and 38°C. A 9-point quality rating scale (9=excellent; 1=extremely poor) was used. A sample evaluation form is provided in Figure A-2. Salient characteristics describing the initial quality of each attribute (appearance, odor, flavor and texture) for each product was given to each panelist at each test session (see Table B-1). The technological panel tests were conducted on partitioned tables in a dining room-type facility. Each panelist was served portions of each of the MRE components. Usually, two like MRE components were served at any single test session. Prior to the evaluations, each MRE component was precoded with a unique three-digit number (selected from a table of random numbers) that identified not only its food item name but also its storage duration and temperature.

2. Nutrient Analysis

Nutritional analysis was conducted initially on samples of each component. Sufficient product to provide a one pound sample of each component was thoroughly blended together (composited) before analyses. Nutritional analyses were also performed on composites of contents of each of the 12 MRE menus and composites of the cases (not including contents of the accessory packet: coffee, cream substitute, sugar, salt, candies, gum), both initially and after each withdrawal from 4°, 21°, 30° and 38°C storage. Two enriched chocolate bars and one each of vanilla cream and chocolate fudge bar were added to the case composite in order to insure that the same candies were consistent throughout the study. Initial menu and case composites were analyzed for proximate, mineral and selected vitamin and fatty acid content. Due to financial constraints, menu composites were analyzed in-house for only moisture (water), fat and thiamin initially and after each withdrawal. A decrease in thiamin, a labile vitamin, indicates a decrease in overall nutritional value. Initially, chemical analyses were conducted on six case composites (three replicates from each contractor). Case composites were analyzed for vitamin A, carotene, thiamin, riboflavin, niacin, pyridoxine, vitamin E and vitamin B₁₂ content initially and at each withdrawal. Results of the initial analyses are shown in the Record of Nutritive Values of MRE-1, Table D-2.

3. Statistical Analysis

A. Sensory data - For each item at each combination of time and temperature, the data, comprised of the consumer panel sensory ratings (N=36) and the technical panel ratings (N=15), were maintained on a Natick computer file. This file was updated at each withdrawal. Statistical computations were done after each updating. At each withdrawal all the data were fitted by a least-squares regression line (i.e. it is in a sense the line that best fits the data). If the slope of the line was significantly (90% level) negative, the latest data values were marked with an asterisk.

B. Nutrient data - All nutrient data from storage tests were analyzed using a one-way analysis of variance (ANOVA), and the significant differences between mean ratings were determined by a Duncan's Multiple Range test. All statistical analyses of the vitamin data were performed on a moisture-free, fat-free basis as well as on an as-is basis. Analysis of variance presented in this report represent the moisture free-fat free values. For comparison with initial data, Table D-3 shows values on an as-is basis.

RESULTS AND DISCUSSION

1. Effect of Storage on Acceptability and Sensory Quality

A. Consumer panel tests. All mean ratings, standard deviations, and the results of statistical comparisons for the MRE components rated by the consumer panels throughout storage at 4°C, 21°C, 30°C and 38°C, respectively, are presented in Appendix C, Table C-1. An asterisk (*) indicates significant overall tendency to decrease at 90% confidence level. Fifty-one components were tested by the consumer panel at each withdrawal period. Initially, all components were considered acceptable (5.0 or higher) when evaluated by consumer panels, with the exception of Frankfurters. No other entree item rated lower than 5.3 (like slightly) except for Catsup (2). No other item rated lower than 6.5 except for Brownies (A and B samples), Ham and Chicken Loaf, Beef with Spiced Sauce, Beef with Gravy and Crackers with Cheese. Thirty-two items rated 6.6 (like moderately) or higher on the hedonic scale.

The MRE exceeded the minimum military requirement for ration shelf life of 6 months at 38°C (100°F). Even after storage for 24 months at 38°C, ratings of 16 of the 51 components (31%) were not significantly different from their respective initial ratings. Of the 35 components that showed significant decline, only crackers (Right Away) rated below 5.0, the neutral rating of "neither like nor dislike" that had been preestablished as the minimum acceptable rating for this study. Brownies (A and B), Strawberries (A and B), Catsup (1 and 2) and Chocolate Fudge had been removed from the study at the 24 month storage period at 38°C due to poor product quality. A specification change was made on January 27, 1983 to the

document for Brownies to lower the moisture content from a maximum of 10.5% to 8.0% in the end product, which produced an acceptable product.

After 36 months storage at 30°C, 78% of the total samples were rated acceptable. Ignoring inexplicable single session fluctuations in mean ratings that occasionally occurred at the 12, 24 or 36 month withdrawal, 32 of the 51 samples (63%) declined significantly in acceptance. Only five products (Ham and Chicken Loaf, Frankfurters, Meatballs, Crackers (Right Away) and Crackers with Cheese) rated below 5.0. Six products were not tested at this withdrawal period.

After 48 months storage at 21°C, all samples except for frankfurters were rated acceptable, although 24 samples declined significantly in acceptance. Twenty-two foods did not decline significantly in acceptance during this period. Eight foods rated higher than their initial rating: Beef with Gravy, Crackers with Cheese, Cookies (menu 12), Chocolate Nut Cake, Potato Patties (1) and (2), Strawberries (A) and Catsup (1). Five foods were not rated for this storage period due to insufficient or unavailable product.

After storage at 21°C for 60 months, 20 of the components showed no significant decline. Of these, seven foods (Pineapple Nut Cake, Maple Nut Cake, Cherry Nut Cake, Cocoa (B), Strawberries (A), Applesauce, and Fruit Mix) were rated "like moderately" (6.6-7.5) and 11 were rated "like slightly" (5.6-6.5). All products were rated acceptable except for Chocolate with Toffee, which was described as having a stale, medicinal odor and rancid flavor. Twenty-six components showed a significant decline from their initial rating but were still rated acceptable. Five foods were not tested at this withdrawal period; Brownies rated acceptable after 36 months at 21°C, but were not tested beyond this period because of their poor quality at higher temperatures.

After 60 months storage at 4°C, all components rated acceptable except for frankfurters; 34 components showed no substantial decline in acceptance. Twelve components declined significantly but still rated above the 5.0 cutoff level. Eight components (Ham and Chicken Loaf, Meatballs, Chocolate Nut Cake, Crackers with Cheese (1), Crackers with Peanut Butter, Crackers (So. Pkg.), Catsup (2) and Chocolate with Toffee) rated higher than their initial rating. Five items were not available for testing.

B. Technological panel tests. Table C-3 provides the mean technological panel ratings for each quality attribute for each food item at each withdrawal period. Asterisks (*) are used to designate statistically significant changes in the ratings with time.

Following 60 month storage at 4°C, of the 40 foods rated, the vast majority (85%) rated acceptable (5.0 or higher) in sensory quality, although significant changes occurred. Applesauce and Crackers (So. Pkg.) showed no significant differences. Seven foods rated 6.5 to 7.4 ("good") and 13 foods rated 5.5 to 6.4 ("below good/above fair"). Only six

foods rated below 5.0 ("fair"): Pork Sausage Patties rated 4.9 in flavor and were described as being slightly rancid by panelists; Frankfurters rated 4.6 in flavor and 4.1 in texture, and were described as being salty and soft; Turkey with Gravy rated 4.7 in flavor and was slightly bitter and metallic; Chicken ala King rated 4.9 in both flavor and texture, and was described as being slightly bitter and scorched in flavor with a slightly stringy texture; Beef with Spiced Sauce, rating 4.9 in flavor, was described as being slightly soapy; Instant Catsup rated 4.8 in flavor. Two items were not available for testing at this withdrawal; Brownies were not rated after 30 months due to their poor quality.

For MRE components stored for 60 months at 21°C, 28 foods (70%) were rated acceptable. Six of these products rated "below good" to "good": Cookies, Beans with Tomato Sauce (A), Potato Patties (A and B), Cocoa and Peanut Butter. Significant changes were noted in attributes of 21 components, although these rated 5.0 or higher in quality. Of these, seven rated "fair", eight rated "above fair", two rated "below good" and four rated "good". Nine components rated less than 5.0 (below fair) in one or more attribute: one of these foods, Chocolate with Toffee, was judged of poor quality after 36 months and as noted before, developed a medicinal odor and a rancid flavor. Although maintaining acceptable quality ratings, Chocolate Coated Brownies and Vanilla Cream Bars were removed from the study due to low ratings at higher temperature storage. Chocolate Fudge was rated only initially; insufficient product was available to continue technological evaluations.

After 36 months storage at 30°C, 23 of the 40 foods (58%) rated acceptable in all attributes. No significant decline was noted in five components (Pork Sausage Patties, Beef Patties, Chocolate Covered Cookies, Instant Coffee and Vanilla Cream Bar); all of these items rated "fair" to "good". Nineteen foods declined significantly but were judged of acceptable overall quality. Four samples (Beans with Tomato Sauce (A and B), Cocoa Beverage and Peanut Butter) rated "good" (6.5 to 7.4). Potato Patties (A) were rated "below good". Five foods (Maple Nut Cake, Peaches (A and B), Potato Patties (B), and Ham Slices) rated "above fair" (5.5 to 5.9). Ten foods rated "fair" (5.0 to 5.4). Fifteen food items had declined significantly, rating below 5.0 in one or more attribute. Beef Slices rated 4.3 in flavor and texture and were described as dark in color, with a bitter, slightly scorched, slightly oxidized flavor; Frankfurters, rating 4.5 in texture, were always soft throughout the study; Turkey with Gravy, rating 4.7 in flavor, showed significant quality decline after 24 months storage, and was described as having a slightly metallic, slightly bitter, metallic flavor with a sour, slightly oxidized note developing over time; Chicken ala King was rated 3.7 (above poor) in flavor and panelists described it as being bitter, slightly metallic and scorched; Crackers were slightly darker in color and had a rancid, musty, stale flavor.

Twenty-six of the 40 products (65%) were rated acceptable in all attributes after 24 months storage at 38°C.

No significant decline in quality was noted in eight components. One, Black Coffee, rated "good" (6.4) in flavor; Four foods (Pork Sausage Patties, Cocoa Beverage, Chocolate with Toffee and Coffee with Cream Substitute) rated "below good" (6.0-6.4); Peaches (A and B) rated "above fair" (5.5-5.9); Beef with Spiced Sauce rated fair in quality. Nineteen components showed a significant decline in quality. Although the Fruit Mix rated 5.4 in flavor after 24 months, it rated 4.4 and 4.2 after storage at 12 and 18 months, respectively. This earlier decline in quality may have been due to loss of packaging integrity. Twelve foods scored significantly below the 5.0 level. Of these, Chicken ala King rated 3.8 (above poor) in flavor; Brownies rated 4.3 (below fair) in flavor at 18 months but started a significant decline after 6 months and were not rated at 24 months; Strawberries (A) rated "poor" (3.3); Strawberries (B) were not rated at 24 months - their previous rating was 4.0 in flavor at 18 months, and they were then withdrawn from the study. After 12 months storage, Strawberries (B) were described as bitter, slightly fermented and slightly oxidized. After 24 months, panelists found the Chicken ala King to have a dark color, bitter, scorched flavor and dry, tough texture; Brownies were described as soapy, bitter, and slightly medicinal; Strawberries (A) had a bitter, scorched, fermented flavor.

2. Nutrient Content.

A. Nutrient content before storage. The proximate composition and mineral/vitamin content of the MREs, reported on the basis of the menu composite weight, are presented in Table D-2 of Appendix D. Carbohydrate values have been computed by difference (i.e., menu composite weight (g) minus the combined weights (g) of water, protein, fat and ash contents equals total grams of carbohydrate). Calories have been computed using the general 4, 9, 4 calorie factors for protein, fat and carbohydrate, respectively. The applicable nutrient standards (AR 40-25) in effect at the time this study was conducted are included at the bottom of the summary page of Table D-2. No data are included for folacin. The data collected did not permit a reliable assessment of the levels of folacin present in the MRE, although results did show that this vitamin was present in a measurable level. The data were particularly erratic and showed a need for an improved analytical procedure. The data in Table D-2 were derived from the analysis of five replicates. Prior to menu compositing and analysis, each menu was inspected to insure that all components were present. Then the coffee, cream substitute, sugar, salt and gum components were removed and discarded. These accessory pack items, including the coffee and candy, were not included in the nutrient analyses of the menu composites, but were included in the nutrient analyses of the case composites.

Examination of Table D-2 shows that the average initial MRE-1 menu provides 1/3 of the AR 40-25 requirements for thiamin (B₁), riboflavin (B₂), niacin, pyridoxine (B₆),

calcium, iron and calories. Analysis of the MRE menus indicates that the mean of the 12 menus meets the AR 40-25 requirement for calcium, although 6 of the 12 individual menus do not. Menu 2 meets 91% of the recommended 267 mg calcium per meal; menu 4, 88%; menus 5 and 10, 73%; menu 7, 97%; menu 12, 56%. Also, menu 7 (at 77%) and menu 9 (at 93.5%) do not meet the 6.0 mg requirement for iron; four menus are below the recommended requirement for 1067 calories (menu 4 at 95%, menu 6 at 90%, menu 8 at 98% and menu 12 at 98%). It is important to note that the mean value of the 12 menus is being compared to the AR 40-25 minimum meal requirement value for each proximate and vitamin.

B. Nutrient Retention After Storage. Table D-3 provides the data derived through the chemical analyses of case composites (three replicates for each case) for eight vitamins, performed after each withdrawal from storage at 4°C, 21°C, 30°C and 38°C, and the results of the statistical analysis of these data. Data are provided on an "as-is" basis. Table D-4 shows the results on a "moisture free - fat free" basis per 100 grams of product (this comparable basis removes any differences due to moisture and fat content). Means followed by different small-case letters are significantly different ($P < 0.05$). The Coffee, Cream Substitute, Sugar, Salt and Gum components are not included in the composite. Since the candies varied in menus, all were removed and four candies (two Vanilla Cream Bars, one Chocolate Fudge Bar and one Chocolate Bar with Toffee) per case were added back for comminution before analysis.

The one-way analysis of variance (ANOVA) of the nutritional data of the MRE case composites (Table D-4) at 4°C shows a significant decline in vitamin A after 60 months storage, and in riboflavin after 48 months storage. No significant decline was noted in carotene. Thiamin values showed a decline after 60 months.

After 60 months storage at 21°C, a significant decline was noted in vitamin A, thiamin, riboflavin and vitamin B₁₂. Carotene and niacin values did not decline significantly. Vitamin B₁₂ and thiamin losses were significant after 36 months at 30°C. No significant decline was noted in carotene, riboflavin, niacin, pyridoxine and vitamin E.

After 24 months at 38°C, significant losses were noted in vitamin A (Right Away Foods (RA)), thiamin, riboflavin (RA), pyridoxine and vitamin B₁₂. No losses were shown for vitamin A (So. Packaging (So. Pkg.)), riboflavin (So. Pkg.) and niacin. Vitamin E values appeared to increase over time.

The reason for high levels of vitamins after storage is unclear. Possible explanations for the apparent increase may be attributed to differences due to laboratory analytical procedures, changes in personnel conducting the analyses, or the development of an interfering compound in storage that results in an apparent increase, and that may even mask a decrease, of the vitamin during storage. It has been reported that large fluctuations in riboflavin content often occur in assays after storage.

Each menu (1-12) was also analyzed for thiamin content throughout storage at 4°C, 21°C, 30°C and 38°C. Results of the analysis of variance on a moisture-free and fat-free basis are shown in Table D-5. Only menus 6 and 7 have a significant loss after 60 months at 4°C. Thiamin levels decline significantly in menus 9 and 11 after 60 months at 21°C. No significant loss is noted after 36 months at 30°C in menus 4, 5, 7, 10 or 12. All but three of the menus (5, 10 and 12) show a significant loss after 24 months at 38°C. Note that all menus are still above 1/3 of the AR 40-25 meal requirement of 0.53 mg for thiamin. The lowest values for thiamin are in menu 8, which also has the lowest percent retention (57% after 60 months at 21°C; 57% after 36 months at 30°C; 65% after 24 months at 38°C).

Table D-6 provides a quick assessment of the vitamin adequacy of the 1980 meals based on results of case composite analyses of each contractor (So. Pkg. and RA), following storage for 60 months at 4°C and 21°C, 36 months at 30°C and 24 months at 38°C. As in Table D-4, the Coffee, Cream, Sugar and Gum components are not included in the composite data used to prepare this table. Four candies (Chocolate with Toffee, Chocolate Fudge Bar and two Vanilla Cream Bars) were included in the composite analyses. The AR 40-25 nutrient standards have been added to Table D-6. Note that in each case AR 40-25 standards for vitamins have been met throughout storage. Note that each of the 12 MRE menus contain at least two vitamin-fortified carriers, which had demonstrated in earlier studies their stability as carriers. The Cocoa Beverage Powder, enriched Sweet Chocolate Bar, Peanut Butter, Cheese Spread and the chocolate coating on the Brownie, Cookie, Chocolate Fudge Bar and Vanilla Cream Bar were fortified with vitamin A, ascorbic acid, thiamin and pyridoxine. Crackers, which are present in every menu, are fortified with thiamin, riboflavin, niacin, pyridoxine and calcium carbonate. Even after adverse storage, the MRE met the AR 40-25 nutritional standards, therefore attesting to the adequacy of the added vitamin fortification.

3. Effect of Storage on Acceptability and Sensory Attributes of Cheese Spread

A. Consumer panel tests. Consumer panel ratings for Cheese Spread stored at 4°C, 21°C, 30°C and 38°C are presented in Appendix C, Table C-2. Significant differences are noted after 30 and 36 months at 4°C and after 12 months at 21°C and 30°C, although no ratings fall below the acceptable level (5.0), except for at 18 months at 21°C. Later withdrawal ratings from 21°C storage rate above 5.0, explained by either a slight change in the sample at this time period or by a lower rating by different panelists. Ratings decline to below 5.0 after 18 months at 38°C, but remain stable beyond the requirement of 6 months at 38°C.

B. Technological panel tests. Results of the technological panel tests are shown in Appendix C, Table C-4. No significant differences are noted in any attribute (appearance, odor, flavor and texture) after 60 months storage at 4°C. After 60 months storage at 21°C, a significant difference is noted only in appearance, although the rating is still above the cut off of 5.0 for quality. Ratings for appearance, odor and flavor are significantly lower after 36 months storage at 30°C and both appearance and flavor rate below 5.0 in quality. After 24 months at 38°C, ratings for appearance, flavor and texture are significantly lower. Appearance and flavor also rate below 5.0 for quality at this point. Panelists described the product as darkened in color, with a bitter flavor.

4. Nutrient Content of Cheese Spread

A. Nutrient content before storage. Table D-7 shows the vitamin and mineral content and proximate composition of Cheese Spread reported on a 100-gram basis. Cheese spread is fortified with vitamin A (2500 I.U. per 1.5 ounce of product), ascorbic acid (38mg per 1.5 ounce of product), pyridoxine (1.0mg per 1.5 ounce of product) and thiamin (0.80mg per 1.5 ounce of product).

B. Nutrient retention after storage. Table D-7 shows the nutrient data of Cheese Spread on an "as-is" basis. Table D-8 shows the analysis of variance (ANOVA) on a "moisture-fat free" basis after storage at 4°C, 21°C, 30°C and 38°C. The product had been analyzed, at each withdrawal period, for vitamin A, ascorbic acid, thiamin and pyridoxine. No significant losses are noted for vitamin A throughout storage. Vitamin A values after storage are higher than initial values at all temperatures. Ascorbic acid values also do not decline. Thiamin values decline significantly after 60 months at 21°C, 36 months at 30°C and 24 months at 38°C; it remains stable through 18 months at 21°C. No significant losses are noted for pyridoxine throughout storage; values tend to increase over time and then decline in later storage periods. In conclusion, aside from some thiamin loss, the Cheese Spread remained stable throughout storage.

CONCLUSIONS

Analysis of acceptance data from consumer panels and quality evaluations by trained technological panels, and nutritional stability tests from controlled storage studies conducted over a five year period show that the 1980 procurement of the MRE meets the operational criteria for stability. Based on data obtained in this study, it is concluded that the MRE can be stored for a minimum of six months at 38°C, and up to five years at 21°C and below, and maintain its nutritional adequacy and acceptability.

RECOMMENDATIONS

It is recommended that:

1. The storage study be repeated on components of future production MREs for sensory evaluations, and on case composites of future production samples for nutrient evaluations to ascertain if stability can be maintained. This study is essential in view of menu component changes.

2. Both consumer and technical panels should be conducted on components in order to acquire technical panel ratings and comments to support and/or explain consumer ratings.

This document reports research undertaken at the US Army Natick Research, Development and Engineering Center and has been assigned No. NATICK/TR-94/004 in the series of reports approved for publication.

APPENDICES

APPENDIX A

Item A-1	Technical Characteristics for Meal, Ready-To-Eat, Individual
Table A-1	Food Components in Each Menu
Table A-2	Plan for withdrawal of MRE for Sensory and Nutritional Evaluation
Table A-3	Food Components and Sources
Figure A-1	Sample Rating Card for Consumer Panel Acceptability Tests
Figure A-2	Food Quality Evaluation Form
Figure A-3	Special Instructions for Consumer Test
Table A-4	Sample Preparation and Serving Procedures

APPENDIX A

Item A-1. Technical Characteristics for Meal, Ready-to-Eat, Individual

Technical Requirements for Nutritional Adequacy, Acceptability and Stability for Meal, Ready-to-Eat, Individual

1. General

a. Scope: These characteristics pertain to the technical aspects of the development of the Ready-to-Eat Individual Meal to fulfill the military characteristics of operational rations.

b. Purpose: The MRE will be issued to individuals for operational conditions which permit planned resupply. For maximum flexibility of the use as the tactical situation changes and the tactical commander requires, the MRE will be capable of interchangeability and/or use in conjunction with the other operational rations described by the military characteristics.

c. Non-common characteristics: Technical characteristics provided herein pertain to the MRE only and, in general, are not common to other operational rations.

d. Using elements: Theater of operations.

2. Design: The MRE will meet the following design standards:

a. Nutritional adequacy: Meals will be designed so that any three provide the daily nutritional requirements set forth in AR 40-25 (including 3600 calories) for one man, and any one meal provides 1/3 the daily nutritional requirement (including 1200 calories) for one man.

b. Acceptability: At least 12 meals will be designed so that any one meal is suitable for breakfast, dinner or supper and any three are suitable as a ration. Food components will be developed in terms of maximum acceptability when eaten cold; variety will be sufficient to avoid rejection when the MRE is consumed as the sole diet over a period of one week. Human engineering principles will be applied throughout development of food components.

c. Stability: All food components, in the packaging used for the individual MRE, will be capable of withstanding at least six months at 100°F without significant loss of nutritional adequacy, edibility, acceptability or utility; all food components will be capable

of withstanding repeated freezing and thawing involving exposure, in the ration case, to temperatures as high as 125°F for as long as two hours per day, and as low as minus 65°F, without significant loss of nutritional adequacy, acceptability and utility.

d. Utility: The meals will require no preparation other than the opening of packages and will require no reconstitution except of beverage components.

APPENDIX A

Table A-1. Food Components in Each MRE Menu

Menu 1

Pork Patties - FD
Applesauce, wet
Cookies, choc covered
Cheese Spread
Crackers
Cocoa Beverage Powder
Accessory D (Catsup)

Menu 2

Ham and Chicken Loaf
Strawberries - FD
P.A. Nut Cake
Peanut Butter
Crackers
Accessory A

Menu 3

Beef Patties - FD
Beans in Tomato Sauce
Brownies
Cheese Spread
Crackers
Accessory B (Candy)

Menu 4

Beef Slices in BBQ Sce
Peaches - FD
Cookies, choc covered
Peanut Butter
Crackers
Accessory E (Candy,
Catsup)

Menu 5

Beef Stew
Fruit Mix - FD
Cherry Nut Cake
Peanut Butter
Crackers
Cocoa Beverage Powder
Accessory A

Menu 6

Frankfurters
Beans in Tomato Sauce
Jelly
Crackers
Cocoa Beverage Powder
Accessory E (Candy,
Catsup)

Menu 7

Turkey and Gravy
Potato Patties - FD
Maple Nut Cake
Jelly
Crackers
Cocoa Beverage Powder
Accessory A

Menu 8

Beef Diced with Gravy
Beans in Tomato Sauce
Brownies
Cheese Spread
Crackers
Accessory A

Menu 9

Chicken ala King
Fruitcake
Cheese Spread
Crackers
Cocoa Beverage Powder
Accessory D (Catsup)

Menu 10

Meatballs in BBQ Sauce
Potato Patties - FD
Chocolate Nut Cake
Jelly
Crackers
Cocoa Beverage Powder
Accessory A

Menu 11

Ham Slices
Peaches - FD
Orange Nut Cake
Cheese Spread
Crackers
Cocoa Beverage Powder
Accessory A

Menu 12

Chicken Loaf
Strawberries - FD
Cookies, choc covered
Peanut butter
Crackers
Accessory C (Candy)

APPENDIX A

TABLE A-2. Plan for Withdrawal of MRE for Sensory and Nutrient Evaluation

Storage Temperature	<u>MONTHS IN STORAGE</u>								
	0	6	12	18	24	30	36	48	60
4 °C			X			X	X	X	X
21 °C	X		X	X	X	X	X	X	X
30 °C		X	X	X	X	X	X		
38 °C		X	X	X	X				

APPENDIX A

TABLE A-3. Food Components and Sources

FOOD NAME	FOOD NUMBER	MANUFACTURER
PORK SAUSAGE PATTIES, DEHYD.	1	RIGHT AWAY
HAM AND CHICKEN LOAF	2	MARNAT
BEEF PATTIES, DEHY.	3	RIGHT AWAY
BEEF SLICES W/BBQ SAUCE	4	MARNAT
BEEF STEW	5	FRESH FLAVOR
FRANKFURTERS	6	GREEN GIANT
TURKEY WITH GRAVY	7	GREEN GIANT
BEEF WITH GRAVY	8	HORMEL
CHICKEN ALA KING	9	MARNAT
MEATBALLS IN BBQ SAUCE	10	FRESH FLAVOR
HAM SLICES	11	HORMEL
BEEF WITH SPICED SAUCE	12	HORMEL
BROWNIES, CHOC.COV. MENU 3	13	STERLING BAKERY
BROWNIES, CHOC.COV. MENU 8	14	STERLING BAKERY
COOKIES, CHOC.COV. MENU 1	15	STERLING BAKERY
COOKIES, CHOC.COV. MENU 4	16	STERLING BAKERY
COOKIES, CHOC.COV. MENU 12	17	STERLING BAKERY
PINEAPPLE NUT CAKE	18	STERLING BAKERY
CHERRY NUT CAKE	19	STERLING BAKERY
MAPLE NUT CAKE	20	STERLING BAKERY
FRUITCAKE	21	STERLING BAKERY
CHOCOLATE NUT CAKE	22	STERLING BAKERY
ORANGE NUT CAKE	23	STERLING BAKERY
BEANS IN TOMATO SAUCE MENU 3	24	FRESH FLAVOR
BEANS IN TOMATO SAUCE MENU 3	25	MARNART
BEANS IN TOMATO SAUCE MENU 8	26	FRESH FLAVOR
POTATO PATTIES, DEHY	27	OREGON FREEZE DRY
POTATO PATTIES, DEHY	28	RIGHT AWAY
PEACHES, DEHY	29	INNOVATIVE
PEACHES, DEHY	30	RIGHT AWAY
STRAWBERRIES, DEHY	31	INNOVATIVE
STRAWBERRIES, DEHY	32	RIGHT AWAY
APPLESAUCE	33	GREEN GIANT
FRUIT MIX, DEHY.	34	RIGHT AWAY
CHEESE SPREAD	35	REAL FRESH
PEANUT BUTTER	36	KERN FOODS
JELLY	37	KERN FOODS

APPENDIX A

TABLE A-3. Food Components and Sources (continued)

FOOD NAME	FOOD NUMBER	MANUFACTURER
-----	-----	-----
COCOA BEVERAGE MENU 1	38	SANNA DAIRY
COCOA BEVERAGE MENU 7	39	SANNA DAIRY
COCOA BEVERAGE MENU 9	40	SANNA DAIRY
COFFEE, INSTANT, BLACK	41	
CHOCOLATE WITH TOFFEE	42	WILBUR CHOCOLATE CO.
CHOCOLATE FUDGE	43	FALCON CANDIES
VANILLA CREME	44	FALCON CANDIES
CATSUP, INSTANT MENU 1	45	TRANS PACKERS
CATSUP, INSTANT MENU 6	46	TRANS PACKERS
CRACKERS MENU 2	47	SO PAK CO
CRACKERS MENU 11	48	RIGHT AWAY
CRACKERS WITH PEANUT BUTTER	49	
CRACKERS WITH CHEESE SPREAD	50	
CRACKERS WITH CHEESE SPREAD	51	
CRACKERS WITH JELLY	52	
COFFEE WITH CREAM		

TESTER										(1-10)
PRODUCT										(20-45)
INSTRUCTIONS: Please indicate number for quality scores in the box and make comments in the remaining space. Disregard the small numbers on this form; they are for data processing.										
REJECT				BORDERLINE		ACCEPT				
Extremely Poor 1	Very Poor 2	Poor 3	Below Fair Above Poor 4	Fair 5	Below Good Above Fair 6	Good 7	Very Good 8	Excellent 9		

SAMPLE (47-49)	APPEARANCE (55)	ODOR (61)	FLAVOR (67)	TEXTURE (73)	OVERALL QUALITY (79)

STSNL Form 964
1 Jul 74

FOOD QUALITY EVALUATION

EDITION OF 1 MAY 74 WILL BE USED UNTIL EXHAUSTED.

Fig. A-2. Food Quality Evaluation Form

APPENDIX A

Today you will be evaluating foods from an individual combat ration. These foods are designed to be eaten directly from the package without heating. This ration contains some dehydrated fruits, meats and beverages. These have been rehydrated for this test. Please rate the foods in the order that they are received. Take a drink of water at the beginning of the test and in-between the samples.

Fig. A-3. Special Instructions for Consumer Test

APPENDIX A

Table A-4. Sample Preparation and Serving Procedures

<u>Item</u>	<u># Required Packages</u>	<u>Portion</u>	<u>Serving Temp.</u>	<u>Notes</u>
Freeze-dried Fruit	9	1/4 pkg	Ambient	Serve "as is" - keep well covered.
Potato Pattie	18	1/2 pattie	60°C (140°F)	Reconstitute by covering with 90°C water. Let soak 3 min. Drain. Hold in 71°C bainmarie for serving.
Pork Sausage Pattie and Beef Pattie	18	1/2 pattie	60°C (140°F)	Reconstitute by covering with 90°C water. Let soak 2 min. Drain, hold in 71°C bainmarie for serving.
Entrees	9	1/4 pkg	Ambient	
Cakes	6	1/6 pkg	Ambient	
Chocolate Covered Cookies	18	1 cookie	Ambient	
Chocolate Covered Brownies	9	1/2 brownie	Ambient	
Caramels	6	1/2 caramel	Ambient	
Starch Jelly Bar	9	1 section	Ambient	
Chocolate Fudge	9	1/4 bar	Ambient	
Chocolate Bar with Almonds	9	1/4 disc	Ambient	
Coconut Bar	9	1/4 bar	Ambient	

APPENDIX A

Table A-4. Sample Preparation and Serving Procedures (continued)

<u>Item</u>	<u># Required Packages</u>	<u>Portion</u>	<u>Serving Temp.</u>	<u>Notes</u>
Cocoa	16	2 oz.	66°C (150°F)	Add 96 oz. 90°C water to contents of 16 pkg. Stir. Hold in 71°C bain-marie. Serve as needed in porcelain cup.
Coffee, Black	12	2 oz.	66°C (150°F)	Add 96 oz. 90°C water to content of 12 pkg. Stir. Hold in 71°C bain-marie. Serve as needed in porcelain cup.
Coffee with Cream	12 instant coffee & 12 cream substitute	2 oz.	66°C (150°F)	Add 96 oz. 90°C water to contents of pkgs. Stir. Hold in 71°C bain-marie. Serve as needed in porcelain cup.
Catsup Mix	36	1/2 oz.	Ambient	Add 11 ml (2 tsp.) water per each pkg. used. Mix. Serve in 1 oz. paper souffle cup.
Chewing Gum	36	2 pieces	Ambient	Serve in 1 oz. paper souffle cup.
Cheese Spread	9	1/2 oz.	Ambient	Serve in 1 oz. paper souffle cup.
Peanut Butter	12	1/2 oz.	Ambient	Serve in 1 oz. paper souffle cup.
Jelly (apple & grape)	18	1/2 oz.	Ambient	Serve in 1 oz. paper souffle cup.
Crackers	9	1 cracker	Ambient	

APPENDIX B

Table B-1 Salient Characteristics of Each Food
Component

APPENDIX B

Table B-1. Salient Characteristics of Each Food Component

The following pages contain the appearance, odor, flavor, and texture characteristics of each component of MRE-1.

Applesauce

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Light yellow color, very fine pulp, very slight weeping

ODOR: Canned applesauce, slightly sour

FLAVOR: Tart, sweet apple

TEXTURE: Smooth, fine pulp

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Apple Jelly

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Amber color, slight weeping

ODOR: Sweet, apple, slight fermented

FLAVOR: Moderately sweet, apple

TEXTURE: Smooth, firm gel

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Beans with Tomato Sauce

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Intact pea bean in smooth glossy red-orange tomato sauce which clings to beans

ODOR: Canned beans with tomato sauce

FLAVOR: Canned beans, sweet, slightly spicy tomato sauce

TEXTURE: Firm, tender beans smooth sauce

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Beef with BBQ Sauce

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Smooth, medium thick, red-brown tomato sauce,
no visible oil, sliced chunked and formed beef
roll

ODOR: Sweet sour, canned tomato, catsup odor

FLAVOR: Spicy, sweet, sour, tomato sauce

TEXTURE: Tender chewy dry meet, smooth fluid sauce

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Beef with Gravy

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Thick light brown gravy, adheres to diced beef

ODOR: Typical canned beef and gravy

FLAVOR: Processed beef flavor

TEXTURE: Smooth thick gravy, tender beef pieces

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Beef Patties

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Gray brown ground beef pattie with browned top surface

ODOR: Stale boiled beef odor

FLAVOR: Moderately salty, slight pepper note, cooked beef flavor

TEXTURE: Coarse textured chewy ground beef

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Beef Stew

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Medium thick brown-orange gravy, mashed diced carrots, diced potatoes, lima beans, diced beef pieces

ODOR: Typical canned beef stew

FLAVOR: Processed beef stew, tomato base, moderate pepper

TEXTURE: Moist, tender chewy beef, mushy carrots, firm, tender potatoes and lima beans

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Brownies

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Smooth,, glossy chocolate coating, dense dark brown cake with nuts

ODOR: Chocolate odor, trace of medicinal note

FLAVOR: Sweet, chocolate, nutty brownie

TEXTURE: Dense brownie with nuts, smooth, very slightly waxy chocolate coating.

NOTE: High melting point in the chocolate

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Catsup, dehydrated, reconstituted

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Thick, pulpy, dark red paste

ODOR: Tomato, spicy, sweet, vinegar

FLAVOR: Low sweet, vinegar, hot pepper, moderate spice
tomato

TEXTURE: Smooth pulpy taste

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Cheese Spread

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Smooth, pasty, dull orange-yellow color

ODOR: Cheddar cheese, cooked milk

FLAVOR: Cheddar cheese, salty, bitter, scorched

TEXTURE: Smooth, thick, pasty

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Cherry Nut Cake

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Pink cherries and nuts in pink-purple cake

ODOR: Bitter almond - cherry, sweet

FLAVOR: Sweet, bitter almond - cherry and nuts

TEXTURE: Dense chewy cake with cherries and nut pieces

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Chicken Ala King

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Canned medium thick tan sauce with apparent pieces of light and dark chicken, peas, pimentos and mushrooms

ODOR: Canned chicken ala king

FLAVOR: Cooked chicken, peas and sauce, pimento

TEXTURE: Tender chewy chicken, overcooked vegetables smooth fluid sauce

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Chocolate Fudge Bar

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Smooth, dull, dark chocolate surface with
fudge center

ODOR: Sweet chocolate

FLAVOR: Sweet chocolate

TEXTURE: Smooth waxy chocolate coating - typical of high
melting point compound, smooth, chewy fudge
center

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Chocolate Nut Cake

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Small chocolate bits and nuts in tan dense cake

ODOR: Chocolate, vanillin, sweet

FLAVOR: Vanillin, semi-sweet chocolate

TEXTURE: Dense chewy cake with small pieces of grainy chocolate and nuts

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Cocoa Beverage

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Milk chocolate, fluid, well blended, good body

ODOR: Sweet, milk chocolate, slight coffee creamer

FLAVOR: Sweet, milk chocolate

TEXTURE: Good body, smooth, full rich mouthfeel

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Coffee, Black

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Very dark brown liquid

ODOR: Low coffee, roasted bean

FLAVOR: Low coffee, high bitter

TEXTURE: Fluid

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Cookies, Chocolate-Coated

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Open textured light brown cookie, smooth
glossy chocolate coating with dull areas

ODOR: Sweet, chocolate

FLAVOR: Sweet, chocolate, oatmeal

TEXTURE: Crisp cookie with slightly waxy coating

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Crackers (A)

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Light tan square cracker, random perforations, salted top

ODOR: Very slight toasted cracker

FLAVOR: Slightly salty, toasted, buttery flavor

TEXTURE: Crisp, firm, dense cracker

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Frankfurters

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Pink-brown with tan brown edges, firm appearance

ODOR: Slightly smoky frankfurter

FLAVOR: Salty, smoky, mildly spiced frankfurter

TEXTURE: Uniform emulsion, firm bite, slightly soft interior

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Fruit Mix

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Irregular pieces of pink cherries, deep yellow peaches, white pears, peaches look spongy

ODOR: Sweet, fruity

FLAVOR: Sweet, fruity

TEXTURE: Soft, spongy cherries and peaches, tender pears

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Grape Jelly

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Burgundy colored jelly with weeping

ODOR: Sweet, grape, slight fermented

FLAVOR: Sweet, low grape

TEXTURE: Smooth, soft gel

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Ham and Chicken Loaf

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Pink tan loaf of minced chicken and diced ham, slight oily coating

ODOR: Canned ham

FLAVOR: Slightly bland, canned ham

TEXTURE: Chewy ham pieces in ground chicken matrix

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Ham, Sliced

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Surface fat and gelatin on pink brown ham
slice

ODOR: Slightly smoky, canned ham

FLAVOR: Moderately salty, smoked canned ham

TEXTURE: Soft, tender, fibrous

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Maple Nut Cake

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Tan dense cake with nut pieces

ODOR: Maple, sweet, pecan

FLAVOR: Sweet, maple, pecan

TEXTURE: Dense, tender cake with nuts

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Meatballs in BBQ Sauce

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Smooth, medium thick, red-brown tomato sauce,
no visible oil, bite-size meatballs

ODOR: Sweet sour, canned tomato, catsup odor

FLAVOR: Spicy, sweet, sour, tomato sauce

TEXTURE: Chewy, firm, tender, dry, fine textured meat
balls, smooth sauce

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Orange Nut Cake

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Dense cake with fruit and nut pieces

ODOR: Orange oil, sweet

FLAVOR: Candied orange peel (slightly bitter) and nuts in sweet cake

TEXTURE: Dense chewy cake with orange peel and nuts

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Peaches (A)

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Bright yellow color, variable piece size

ODOR: Moderately sweet fresh peach color

FLAVOR: Moderate peach flavor, sweet, very slight SQ,

TEXTURE: Spongy

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Peaches (B)

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Bright yellow with some redness, variable piece size

ODOR: Slightly fruity, peach odor

FLAVOR: Slightly sour-sweet fresh peach

TEXTURE: Chewy, slightly spongy

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Peanut Butter

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Light brown, smooth, glossy, thin peanut butter

ODOR: Fresh roasted peanuts

FLAVOR: Fresh roasted peanuts, good balance of sweet-salty-peanut, no bitterness

TEXTURE: Slightly grainy, sticky mouthfeel

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Pineapple Nut Cake

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Light brown dense cake with nuts and small pieces of fruit

ODOR: Sweet, slightly fruity

FLAVOR: Sweet, pecan, fruity

TEXTURE: Dense, tender cake with nuts and fruit

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Pork Sausage Patties

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Pale gray-tan color, cohesive pattie

ODOR: Mild pork odor, mild sausage spice

FLAVOR: Slightly bland, mild sausage spice, slight pork fat

TEXTURE: Tender, chewy, rehydrated sausage pattie

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Potato Patties (A)

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Intact golden brown rehydrated potato pattie,
small white potato pieces

ODOR: Moderate onion, fried potato

FLAVOR: Moderate onion, hash brown potato

TEXTURE: Soft, crunchy pieces of potato

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Potato Patties (B)

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Intact golden brown rehydrated potato pattie,
small white potato pieces

ODOR: Slight onion, fried potato

FLAVOR: Slight onion, hash brown potato

TEXTURE: Soft, crunchy pieces of potato

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Turkey and Gravy

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Translucent gravy, diced turkey pieces

ODOR: Canned turkey odor

FLAVOR: Heat-processed turkey and gravy, very slightly
metallic

TEXTURE: Tender, dry turkey, smooth, thin gravy

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

Vanilla Cream Bar

You will be testing a food product that has been developed for and is part of the new procurement of the Meal, Ready-to-Eat, Individual. Below are descriptive phrases that may be helpful in evaluating this product. Feel free to use your own descriptive terms for the product evaluation.

APPEARANCE: Smooth dark dull chocolate coating, tan grainy center

ODOR: Vanillin, sweet

FLAVOR: Sweet, vanillin

TEXTURE: Firm waxy chocolate, typical of high melting point coating compound, smooth, firm, pasty filling

Your rating and comments will indicate the quality of the product. Any change in rating should be explained in your comments.

Your own rating and description will be the basis for your future evaluations.

APPENDIX C

- Table C-1 Consumer Panel Mean Acceptability Ratings for Components of the Meal, Ready-to-Eat, Individual (MRE-1) After Storage at 4^o, 21^o, 30^o and 38^oC
- Table C-2 Consumer Panel Mean Ratings for Cheese Spread After Storage at 4^o, 21^o, 30^o and 38^oC.
- Table C-3 Trained Panel Mean Ratings of Quality Attributes for Components of the Meal, Ready-to-Eat, Individual (MRE-1) After Storage at 4^o, 21^o, 30^o and 38^oC
- Table C-4 Trained Panel Mean Ratings of Quality Attributes for Cheese Spread After Storage at 4^o, 21^o, 30^o and 38^oC

TABLE C-1. CONSUMER PANEL MEAN ACCEPTABILITY RATINGS FOR COMPONENTS OF THE MEAL, READY-TO-EAT, (MRE-1)
AFTER STORAGE AT 4°, 21°, 30° AND 38°C

	PORK SAUSAGE PATTY					HAM AND CHICKEN LOAF			
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
	---	---	---	---		---	---	---	---
INITIAL	6.6 ± 1.58	6.6 ± 1.58	6.6 ± 1.58	6.6 ± 1.58	:	INITIAL	5.8 ± 1.66	5.8 ± 1.66	5.8 ± 1.66
6 MOS			6.8 ± 1.43	6.6 ± 1.72	:	6 MOS		6.0 ± 1.57	5.6 ± 1.75
12 MOS	5.5 ± 2.06 *	6.0 ± 2.25 *	6.8 ± 1.38	5.5 ± 2.00 *	:	12 MOS	5.8 ± 1.69	5.6 ± 1.54 *	5.1 ± 2.42 *
18 MOS		6.4 ± 1.71	5.6 ± 2.19 *	6.4 ± 1.77	:	18 MOS		5.6 ± 1.86	5.4 ± 1.75 *
24 MOS		6.4 ± 1.71	6.4 ± 1.58	5.4 ± 1.93 *	:	24 MOS		5.6 ± 1.88	4.8 ± 2.11 *
30 MOS	6.7 ± 1.69 *	6.4 ± 1.72	6.1 ± 1.48 *		:	30 MOS	5.0 ± 2.12 *	5.6 ± 1.93	5.4 ± 1.57 *
36 MOS	6.1 ± 1.55 *	6.3 ± 1.73	6.3 ± 1.75 *		:	36 MOS	5.4 ± 1.86 *	5.6 ± 1.90	4.4 ± 2.00 *
48 MOS	6.6 ± 1.28	6.3 ± 1.76			:	48 MOS	5.5 ± 1.86 *	5.6 ± 1.89	
60 MOS	5.2 ± 2.09 *	5.6 ± 1.92 *			:	60 MOS	6.2 ± 1.79 *	5.6 ± 1.86	
					:				
	BEEF PATTY					BEEF SLICES IN BBQ SAUCE			
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
	---	---	---	---		---	---	---	---
INITIAL	6.2 ± 1.59	6.2 ± 1.59	6.2 ± 1.59	6.2 ± 1.59	:	INITIAL	6.6 ± 1.53	6.6 ± 1.53	6.6 ± 1.53
6 MOS			6.3 ± 1.91	5.9 ± 1.58 *	:	6 MOS		6.3 ± 1.71	6.2 ± 1.33 *
12 MOS	5.8 ± 1.85 *	5.3 ± 1.78 *	5.6 ± 1.96 *	6.1 ± 1.29 *	:	12 MOS	6.4 ± 1.53 *	6.1 ± 1.50 *	5.3 ± 1.89 *
18 MOS		6.6 ± 1.72 *	6.1 ± 1.81	6.0 ± 1.77	:	18 MOS		6.3 ± 1.49 *	5.3 ± 1.76 *
24 MOS		5.0 ± 2.29 *	5.8 ± 2.05 *	5.9 ± 1.86	:	24 MOS		6.4 ± 1.59 *	5.4 ± 1.72 *
30 MOS	6.0 ± 1.74	5.4 ± 1.95 *	5.4 ± 1.88 *		:	30 MOS	6.5 ± 1.59	6.3 ± 1.57	5.1 ± 1.97 *
36 MOS	5.9 ± 1.77	5.8 ± 2.14 *	6.0 ± 1.86		:	36 MOS	5.8 ± 1.39 *	5.5 ± 1.38 *	5.6 ± 1.57 *
48 MOS	5.9 ± 1.71	5.5 ± 1.71 *			:	48 MOS	5.9 ± 1.56 *	5.9 ± 1.69 *	
60 MOS	5.9 ± 1.76	5.3 ± 2.36 *			:	60 MOS	5.8 ± 1.96	5.7 ± 1.73 *	
					:				
	BEEF STEW					FRANKS			
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
	---	---	---	---		---	---	---	---
INITIAL	6.6 ± 1.28	6.6 ± 1.28	6.6 ± 1.28	6.6 ± 1.28	:	INITIAL	4.1 ± 1.90	4.1 ± 1.90	4.1 ± 1.90
6 MOS			6.9 ± 1.21 *	6.4 ± 1.48	:	6 MOS		5.6 ± 1.75 *	5.5 ± 1.95 *
12 MOS	6.4 ± 1.52	6.7 ± 1.36	6.1 ± 1.78 *	6.6 ± 1.86 *	:	12 MOS	5.1 ± 1.70 *	4.8 ± 1.71	5.2 ± 1.85
18 MOS		6.6 ± 1.32	6.4 ± 1.28 *	6.9 ± 1.25 *	:	18 MOS		5.6 ± 1.72 *	5.2 ± 1.93 *
24 MOS		6.6 ± 1.36	6.4 ± 1.78 *	6.1 ± 1.73 *	:	24 MOS		5.1 ± 2.01 *	4.3 ± 2.00 *
30 MOS	6.4 ± 1.51	6.6 ± 1.41	6.1 ± 1.71		:	30 MOS	4.5 ± 1.96	5.6 ± 2.12 *	5.1 ± 2.27 *
36 MOS	6.3 ± 1.50	6.6 ± 1.40	6.3 ± 1.45 *		:	36 MOS	4.6 ± 1.94	5.2 ± 2.05 *	4.4 ± 2.20 *
48 MOS	6.4 ± 1.44	6.6 ± 1.36			:	48 MOS	4.7 ± 1.87	4.8 ± 2.00	
60 MOS	6.3 ± 1.52	6.5 ± 1.43			:	60 MOS	4.7 ± 1.86	5.1 ± 1.97	

* Meant ± S.D.; N=36; Significant differences are indicated by an asterisk *

TABLE C-1. CONSUMER PANEL MEAN ACCEPTABILITY RATINGS FOR COMPONENTS OF THE MEAL, READY-TO-EAT, (MRE-1)
AFTER STORAGE AT 4°, 21°, 30° AND 38°C

TURKEY W/ GRAVY					BEEF W/ GRAVY				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	6.2 ± 1.70	6.2 ± 1.70	6.2 ± 1.70	6.2 ± 1.70	INITIAL	5.3 ± 1.89	5.3 ± 1.89	5.3 ± 1.89	5.3 ± 1.91
6 MOS			6.2 ± 1.68	6.0 ± 1.78	6 MOS			5.4 ± 1.79	5.9 ± 1.91
12 MOS	5.9 ± 1.56 *	6.6 ± 1.02 *	5.7 ± 1.68	6.3 ± 1.44	12 MOS	5.3 ± 1.87	5.5 ± 1.82	5.5 ± 1.47	5.9 ± 1.90
18 MOS		6.1 ± 1.66	6.2 ± 1.60	6.0 ± 1.65	18 MOS		6.1 ± 1.75	6.2 ± 1.45 *	5.8 ± 1.80
24 MOS		6.0 ± 1.72	6.2 ± 1.57	6.1 ± 1.60	24 MOS		6.0 ± 1.64	5.2 ± 1.95 *	6.1 ± 1.78 *
30 MOS	6.1 ± 1.59	5.9 ± 1.80	6.1 ± 1.58		30 MOS	5.2 ± 1.97	5.7 ± 1.86	5.9 ± 1.71 *	
36 MOS	6.2 ± 1.63	5.4 ± 2.09 *	5.5 ± 1.38 *		36 MOS	5.2 ± 1.97	5.7 ± 1.86	5.8 ± 1.76 *	
48 MOS	6.2 ± 1.61	5.8 ± 1.90 *			48 MOS	5.3 ± 1.93	5.7 ± 1.82		
60 MOS	6.1 ± 1.65	5.8 ± 1.85			60 MOS	5.3 ± 1.88	5.7 ± 1.78		
CHICKEN ALA KING					MEATBALLS				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	6.7 ± 1.68	6.7 ± 1.68	6.7 ± 1.68	6.7 ± 1.68	INITIAL	6.0 ± 1.74	6.0 ± 1.74	6.0 ± 1.74	6.0 ± 1.74
6 MOS			6.8 ± 1.48	6.1 ± 1.65 *	6 MOS			5.6 ± 1.61 *	5.9 ± 1.58
12 MOS	6.7 ± 1.60	6.4 ± 1.47	6.3 ± 1.39 *	6.6 ± 1.50	12 MOS	6.0 ± 1.66	6.3 ± 1.35	5.8 ± 1.64	6.0 ± 1.44
18 MOS		6.6 ± 1.51	6.2 ± 1.43 *	5.9 ± 1.51 *	18 MOS		6.1 ± 1.59	5.9 ± 1.94 *	5.8 ± 1.66
24 MOS		6.7 ± 1.46	6.1 ± 1.36 *	5.5 ± 1.97 *	24 MOS		6.0 ± 1.69	5.7 ± 1.91 *	5.1 ± 1.84 *
30 MOS	6.6 ± 1.51	6.2 ± 1.55 *	6.1 ± 1.84 *		30 MOS	6.2 ± 1.62	5.9 ± 1.70	5.9 ± 1.85	
36 MOS	6.5 ± 1.68	6.0 ± 1.38 *	5.8 ± 1.77 *		36 MOS	6.1 ± 1.66	5.9 ± 1.71	4.9 ± 1.55 *	
48 MOS	6.5 ± 1.63	5.8 ± 1.90 *			48 MOS	6.1 ± 1.67	6.0 ± 1.70		
60 MOS	6.5 ± 1.60	5.9 ± 1.65 *			60 MOS	6.1 ± 1.71	5.9 ± 1.75		
HAM SLICES					BEEF W/ SPICED SAUCE				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	6.9 ± 0.88	6.9 ± 0.88	6.9 ± 0.88	6.9 ± 0.88	INITIAL	5.7 ± 2.07	5.7 ± 2.07	5.7 ± 2.07	5.7 ± 2.07
6 MOS			7.0 ± 1.54 *	6.9 ± 1.20	6 MOS			5.4 ± 1.71 *	5.8 ± 1.92
12 MOS	6.3 ± 1.63 *	6.9 ± 1.52	6.8 ± 1.55	6.1 ± 2.20 *	12 MOS	5.2 ± 1.96 *	4.9 ± 2.05 *	6.0 ± 1.84	5.7 ± 2.15
18 MOS		6.2 ± 1.85 *	6.6 ± 1.66 *	6.8 ± 1.40	18 MOS		5.6 ± 2.04	5.7 ± 2.03 *	5.6 ± 1.89
24 MOS		7.1 ± 1.20 *	6.3 ± 1.64 *	6.1 ± 1.97 *	24 MOS		5.6 ± 2.06	6.2 ± 1.57 *	5.0 ± 2.30 *
30 MOS	6.8 ± 1.29	6.7 ± 1.61	6.7 ± 1.51 *		30 MOS	5.5 ± 2.04	5.5 ± 2.10	6.0 ± 1.44 *	
36 MOS	6.7 ± 1.44	6.6 ± 1.67	6.8 ± 1.48		36 MOS	5.6 ± 2.00	5.5 ± 2.10	6.3 ± 1.32 *	
48 MOS	6.6 ± 1.50	6.6 ± 1.40 *			48 MOS	5.6 ± 1.98	5.7 ± 2.06		
60 MOS	6.6 ± 1.47	6.6 ± 1.28 *			60 MOS	5.6 ± 1.97	5.7 ± 2.04		

* Meant ± S.D.; N=36; Significant differences are indicated by an asterisk *

TABLE C-1. CONSUMER PANEL MEAN ACCEPTABILITY RATINGS FOR COMPONENTS OF THE MEAL, READY-TO-EAT, (MRE-1)
AFTER STORAGE AT 4°, 21°, 30° AND 38°C

	COOKIES MENU 1					COOKIES MENU 4			
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
	---	---	---	---		---	---	---	---
INITIAL	7.4 ± 1.34	7.4 ± 1.34	7.4 ± 1.34	7.4 ± 1.34	:	INITIAL	7.5 ± 1.32	7.5 ± 1.32	7.5 ± 1.32
6 MOS			7.4 ± 1.18	7.5 ± 1.25	:	6 MOS		7.7 ± 1.18	7.6 ± 0.72 *
12 MOS	6.8 ± 1.79 *	7.5 ± 0.62 *	7.7 ± 0.68 *	6.7 ± 1.58 *	:	12 MOS	7.3 ± 0.91 *	7.6 ± 0.88	7.6 ± 0.80
18 MOS		7.4 ± 1.11	7.3 ± 1.14	7.3 ± 1.32	:	18 MOS		7.1 ± 1.16 *	7.1 ± 1.40 *
24 MOS		7.3 ± 1.10 *	7.3 ± 1.14	7.3 ± 1.29	:	24 MOS		7.2 ± 1.26 *	6.9 ± 1.05 *
30 MOS	7.1 ± 1.53	7.1 ± 1.34 *	7.3 ± 1.14		:	30 MOS	7.4 ± 1.15	7.3 ± 1.17	6.9 ± 1.42 *
36 MOS	7.2 ± 1.45	7.3 ± 1.12 *	7.3 ± 1.16		:	36 MOS	7.4 ± 1.10	6.6 ± 1.36 *	7.2 ± 1.03 *
48 MOS	7.2 ± 1.40	7.4 ± 1.16 *			:	48 MOS	6.9 ± 1.18 *	6.8 ± 1.83 *	
60 MOS	7.2 ± 1.33	7.1 ± 1.44 *			:	60 MOS	7.4 ± 1.11 *	6.9 ± 1.40 *	
	COOKIES MENU 12					PINEAPPLE NUT CAKE			
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
	---	---	---	---		---	---	---	---
INITIAL	7.2 ± 1.22	7.2 ± 1.22	7.2 ± 1.22	7.2 ± 1.22	:	INITIAL	6.6 ± 1.13	6.6 ± 1.13	6.6 ± 1.13
6 MOS			7.2 ± 1.20	7.3 ± 1.08	:	6 MOS		7.0 ± 0.91 *	6.5 ± 1.33
12 MOS	7.2 ± 1.32	7.2 ± 1.15	7.2 ± 1.12	7.2 ± 1.16	:	12 MOS	6.7 ± 1.23	6.2 ± 1.64 *	6.1 ± 1.50 *
18 MOS		7.4 ± 0.89 *	7.2 ± 1.20	7.3 ± 1.02	:	18 MOS		6.5 ± 1.55	6.6 ± 1.19 *
24 MOS		7.3 ± 1.11 *	7.2 ± 1.17	7.3 ± 1.09	:	24 MOS		6.5 ± 1.51	6.5 ± 1.76 *
30 MOS	7.2 ± 1.37	7.3 ± 1.04	7.2 ± 1.12		:	30 MOS	6.6 ± 1.32	6.6 ± 1.48	6.8 ± 1.34 *
36 MOS	7.2 ± 1.27	7.3 ± 1.02	7.2 ± 1.12		:	36 MOS	6.7 ± 1.32	6.6 ± 1.48	5.7 ± 1.56 *
48 MOS	7.2 ± 1.26	7.3 ± 1.11			:	48 MOS	6.6 ± 1.34	6.6 ± 1.44	
60 MOS	7.1 ± 1.28	6.9 ± 0.98 *			:	60 MOS	6.6 ± 1.35	6.6 ± 1.42	
	CHERRY NUT CAKE					MAPLE NUT CAKE			
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
	---	---	---	---		---	---	---	---
INITIAL	6.9 ± 1.54	6.9 ± 1.54	6.9 ± 1.54	6.9 ± 1.54	:	INITIAL	6.7 ± 1.22	6.7 ± 1.22	6.7 ± 1.22
6 MOS			6.9 ± 1.54	6.8 ± 1.41	:	6 MOS		6.8 ± 1.27	6.7 ± 1.11
12 MOS	6.7 ± 1.65	6.6 ± 1.70	6.6 ± 1.68	5.7 ± 1.84 *	:	12 MOS	6.7 ± 1.43	6.4 ± 1.49	6.4 ± 1.37
18 MOS		6.8 ± 1.68	6.3 ± 1.58 *	6.4 ± 1.64 *	:	18 MOS		6.6 ± 1.61	6.8 ± 1.29
24 MOS		6.7 ± 1.62	6.3 ± 1.65 *	6.6 ± 1.55	:	24 MOS		6.7 ± 1.53	6.8 ± 1.26
30 MOS	6.7 ± 1.46	6.1 ± 1.91 *	6.8 ± 1.08 *		:	30 MOS	6.7 ± 1.40	6.7 ± 1.53	6.8 ± 1.23
36 MOS	6.7 ± 1.57	6.5 ± 1.48 *	6.5 ± 1.60		:	36 MOS	6.6 ± 1.54	6.6 ± 1.53	6.1 ± 1.29 *
48 MOS	6.7 ± 1.53	6.5 ± 1.46 *			:	48 MOS	6.6 ± 1.54	6.6 ± 1.52	
60 MOS	6.6 ± 1.58	6.6 ± 1.63			:	60 MOS	6.5 ± 1.57	6.6 ± 1.57	

* Mean ± S.D.; N=36; Significant differences are indicated by an asterisk *

TABLE C-1. CONSUMER PANEL MEAN ACCEPTABILITY RATINGS FOR COMPONENTS OF THE MEAL, READY-TO-EAT, (MRE-1)
AFTER STORAGE AT 4°, 21°, 30° AND 38°C

FRUIT CAKE					CHOCOLATE NUT CAKE				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	7.0 ± 1.43	7.0 ± 1.43	7.0 ± 1.43	7.0 ± 1.43	INITIAL	6.5 ± 1.50	6.5 ± 1.50	6.5 ± 1.50	6.5 ± 1.50
6 MOS			6.8 ± 1.43	6.6 ± 1.29 *	6 MOS			6.7 ± 1.28	6.5 ± 1.54
12 MOS	7.1 ± 1.24	7.0 ± 1.21	7.0 ± 1.04	6.3 ± 1.65 *	12 MOS	6.4 ± 1.54	6.9 ± 0.85 *	6.4 ± 1.26	6.5 ± 1.54
18 MOS		6.9 ± 1.41	6.7 ± 1.58	6.2 ± 1.96 *	18 MOS		7.1 ± 1.08 *	6.7 ± 1.24	6.5 ± 1.62
24 MOS		6.9 ± 1.42	6.3 ± 1.69 *	5.9 ± 1.87 *	24 MOS		6.1 ± 1.75 *	6.7 ± 1.28	6.4 ± 1.60
30 MOS	6.2 ± 1.83 *	6.9 ± 1.45	6.3 ± 1.93 *		30 MOS	6.5 ± 1.65	6.6 ± 1.50 *	6.7 ± 1.29	
36 MOS	6.2 ± 1.92 *	6.8 ± 1.46	6.5 ± 1.86 *		36 MOS	6.5 ± 1.67	6.6 ± 1.52	6.6 ± 1.34	
48 MOS	6.7 ± 1.76 *	6.3 ± 1.69 *			48 MOS	6.6 ± 1.59	6.6 ± 1.40 *		
60 MOS	6.2 ± 1.70 *	6.3 ± 1.56 *			60 MOS	6.6 ± 1.55	6.1 ± 1.65 *		
ORANGE NUT CAKE					BEANS W/TOMATO SAUCE MENU 3				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	7.0 ± 1.25	7.0 ± 1.25	7.0 ± 1.25	7.0 ± 1.25	INITIAL	6.7 ± 1.41	6.7 ± 1.41	6.7 ± 1.41	6.7 ± 1.41
6 MOS			6.9 ± 1.29	6.7 ± 1.48 *	6 MOS			6.7 ± 1.41	6.9 ± 1.20
12 MOS	7.0 ± 1.18	7.0 ± 1.74	7.0 ± 1.48	7.5 ± 0.81 *	12 MOS	6.4 ± 1.16 *	6.3 ± 1.65 *	6.7 ± 1.28	6.8 ± 1.17
18 MOS		6.8 ± 1.59	6.5 ± 1.79 *	6.8 ± 1.44	18 MOS		6.7 ± 1.40	6.6 ± 1.48	6.8 ± 1.30
24 MOS		6.9 ± 1.47	6.4 ± 1.57 *	6.1 ± 1.65 *	24 MOS		6.6 ± 1.55	7.0 ± 1.19	6.8 ± 1.37
30 MOS	6.9 ± 1.42	6.8 ± 1.58	6.7 ± 1.60		30 MOS	6.4 ± 1.34	6.6 ± 1.54	6.6 ± 1.45	
36 MOS	6.9 ± 1.33	6.7 ± 1.63	5.8 ± 1.92 *		36 MOS	6.4 ± 1.42	6.6 ± 1.53	6.7 ± 1.42	
48 MOS	6.9 ± 1.33	6.4 ± 1.59 *			48 MOS	6.4 ± 1.41	6.6 ± 1.53		
60 MOS	6.8 ± 1.32	5.8 ± 1.69 *			60 MOS	6.5 ± 1.41	5.8 ± 1.92 *		
BEANS W/ TOMATO SAUCE MENU 6					BEANS W/ TOMATO SAUCE MENU 8				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	6.4 ± 1.32	6.4 ± 1.32	6.4 ± 1.32	6.4 ± 1.32	INITIAL	6.6 ± 1.13	6.6 ± 1.13	6.6 ± 1.13	6.6 ± 1.13
6 MOS			6.4 ± 1.42	6.3 ± 1.49	6 MOS			6.6 ± 1.26	6.6 ± 1.19
12 MOS	6.3 ± 1.33	6.5 ± 1.31	6.6 ± 1.57	5.6 ± 1.40 *	12 MOS	6.0 ± 1.45 *	6.6 ± 1.08	6.5 ± 1.29	7.1 ± 1.41 *
18 MOS		6.4 ± 1.34	6.3 ± 1.54	6.3 ± 1.45	18 MOS		6.9 ± 1.34 *	6.6 ± 1.36	6.6 ± 1.39
24 MOS		6.4 ± 1.34	6.3 ± 1.52	6.3 ± 1.51	24 MOS		6.6 ± 1.18 *	6.6 ± 1.38	6.7 ± 1.38
30 MOS	6.2 ± 1.47	6.5 ± 1.34	6.3 ± 1.55		30 MOS	5.5 ± 1.99 *	6.7 ± 1.38	6.6 ± 1.42	
36 MOS	6.3 ± 1.49	6.4 ± 1.43	6.3 ± 1.60		36 MOS	6.0 ± 1.74 *	6.6 ± 1.43	6.6 ± 1.38	
48 MOS	6.3 ± 1.46	6.4 ± 1.51			48 MOS	6.4 ± 1.36 *	6.6 ± 1.42		
60 MOS	5.4 ± 1.80 *	6.4 ± 1.51			60 MOS	6.3 ± 1.41 *	6.3 ± 1.43 *		

* Mean ± S.D.; N=36; Significant differences are indicated by an asterisk *

TABLE C-1. CONSUMER PANEL MEAN ACCEPTABILITY RATINGS FOR COMPONENTS OF THE MEAL, READY-TO-EAT, (MRE-1)
AFTER STORAGE AT 4°, 21°, 30° AND 38°C

POTATO PATTY					PEACHES				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	6.6 ± 1.51	6.6 ± 1.51	6.6 ± 1.51	6.6 ± 1.51	INITIAL	6.4 ± 1.52	6.4 ± 1.52	6.4 ± 1.52	6.4 ± 1.52
6 MOS			5.7 ± 1.75 *	6.6 ± 1.38	6 MOS			6.2 ± 1.80 *	6.5 ± 1.45
12 MOS	6.3 ± 1.73	6.4 ± 1.60	6.0 ± 1.72	4.9 ± 1.88 *	12 MOS	5.8 ± 1.84 *	6.4 ± 1.38	6.1 ± 1.89 *	6.3 ± 1.69
18 MOS		6.6 ± 1.91 *	6.9 ± 1.38 *	6.4 ± 1.58	18 MOS		6.6 ± 1.38 *	6.2 ± 1.65	5.7 ± 2.04 *
24 MOS		5.8 ± 2.05 *	6.7 ± 1.93 *	6.0 ± 1.83 *	24 MOS		6.3 ± 1.46 *	6.3 ± 1.67	5.5 ± 1.76 *
30 MOS	6.6 ± 1.65	6.4 ± 1.75	7.2 ± 1.32 *		30 MOS	6.2 ± 1.69	6.4 ± 1.59	6.2 ± 1.69	
36 MOS	6.6 ± 1.60	6.4 ± 1.73	6.7 ± 1.61 *		36 MOS	6.2 ± 1.63	6.3 ± 1.66	6.1 ± 1.71	
48 MOS	7.1 ± 1.36	7.1 ± 1.55			48 MOS	6.1 ± 1.66	6.3 ± 1.65		
60 MOS	5.9 ± 1.53 *	6.5 ± 1.68			60 MOS	6.2 ± 1.65	6.2 ± 1.67		
PEACHES					STRAWBERRIES				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	6.6 ± 1.54	6.6 ± 1.54	6.6 ± 1.54	6.6 ± 1.54	INITIAL	7.2 ± 1.39	7.2 ± 1.39	7.2 ± 1.39	7.2 ± 1.41
6 MOS			5.9 ± 1.74 *	6.3 ± 1.65	6 MOS			7.1 ± 1.26	6.1 ± 1.67
12 MOS	5.9 ± 1.84 *	5.6 ± 1.71 *	6.1 ± 1.69 *	5.9 ± 1.57 *	12 MOS	7.5 ± 1.38 *	6.6 ± 1.96 *	6.8 ± 2.04 *	5.2 ± 1.99 *
18 MOS		6.2 ± 1.66	6.0 ± 2.06 *	6.1 ± 1.81	18 MOS		6.6 ± 1.62 *	7.0 ± 1.41	5.4 ± 2.06
24 MOS		6.2 ± 1.70	6.0 ± 1.82	5.5 ± 1.92 *	24 MOS		6.4 ± 1.55 *	6.5 ± 1.50	NOT TESTED
30 MOS	4.8 ± 2.33 *	6.1 ± 1.81	6.1 ± 1.82		30 MOS	7.2 ± 1.57	6.6 ± 1.55 *	5.8 ± 1.86 *	
36 MOS	6.1 ± 1.60 *	6.2 ± 1.81	6.1 ± 1.81		36 MOS	7.2 ± 0.92 *	6.4 ± 1.98 *	6.4 ± 1.66 *	
48 MOS	6.0 ± 1.88 *	6.2 ± 1.77			48 MOS	7.3 ± 1.08 *	6.6 ± 1.76 *		
60 MOS	6.0 ± 1.87	5.3 ± 2.00 *			60 MOS	6.6 ± 1.69 *	6.3 ± 1.71 *		
STRAWBERRIES					APPLESAUCE				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	6.8 ± 1.82	6.8 ± 1.82	6.8 ± 1.82	6.8 ± 1.82	INITIAL	7.4 ± 0.99	7.4 ± 0.98	7.4 ± 0.98	7.4 ± 0.98
6 MOS			6.8 ± 1.64	5.4 ± 1.76 *	6 MOS			7.5 ± 1.40 *	7.3 ± 1.45 *
12 MOS	6.7 ± 1.76	6.4 ± 2.14	6.7 ± 1.42	5.3 ± 1.92 *	12 MOS	7.1 ± 1.49 *	7.3 ± 1.08 *	7.7 ± 1.00 *	7.3 ± 1.06 *
18 MOS		6.8 ± 1.75	6.8 ± 1.55	5.3 ± 2.19 *	18 MOS		7.3 ± 1.21	6.9 ± 1.20 *	7.3 ± 1.15
24 MOS		6.8 ± 1.73	6.8 ± 1.54	NOT TESTED	24 MOS		7.8 ± 0.72 *	7.4 ± 0.96 *	6.5 ± 1.09 *
30 MOS	6.6 ± 1.68	6.7 ± 1.73	6.7 ± 1.61		30 MOS	7.2 ± 1.41 *	7.4 ± 1.10	6.6 ± 1.29 *	
36 MOS	6.6 ± 1.62	6.8 ± 1.70	6.8 ± 1.32 *		36 MOS	7.2 ± 1.30	7.3 ± 1.11	7.4 ± 1.21 *	
48 MOS	5.9 ± 1.66 *	7.4 ± 1.46			48 MOS	7.2 ± 1.28	7.3 ± 1.13		
60 MOS	6.5 ± 1.61	6.9 ± 1.64			60 MOS	7.2 ± 1.24	7.3 ± 1.13		

* Meant ± S.D.; N=36; Significant differences are indicated by an asterisk *

TABLE C-1. CONSUMER PANEL MEAN ACCEPTABILITY RATINGS FOR COMPONENTS OF THE MEAL, READY-TO-EAT, (MRE-1)
AFTER STORAGE AT 4°, 21°, 30° AND 38°C

FRUIT MIX					PEANUT BUTTER				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	7.2 ± 1.24	7.2 ± 1.24	7.2 ± 1.24	7.2 ± 1.24	INITIAL	7.3 ± 1.17	7.3 ± 1.17	7.3 ± 1.17	7.3 ± 1.17
6 MOS			6.8 ± 1.64 *	7.1 ± 1.15 *	6 MOS			7.3 ± 1.42	7.2 ± 1.41
12 MOS	6.7 ± 1.30 *	5.9 ± 2.00 *	7.1 ± 1.60	6.1 ± 1.53 *	12 MOS	7.2 ± 1.33	7.3 ± 0.91	6.6 ± 1.54 *	7.3 ± 1.07
18 MOS		7.0 ± 1.44	6.4 ± 1.71 *	6.3 ± 1.92 *	18 MOS		7.2 ± 1.15	6.7 ± 1.66 *	7.1 ± 1.48
24 MOS		6.9 ± 1.48	6.6 ± 1.79 *	6.1 ± 1.60 *	24 MOS		7.2 ± 1.21	6.4 ± 1.62 *	7.1 ± 1.41
30 MOS	6.9 ± 1.32	6.9 ± 1.55	6.2 ± 1.54 *		30 MOS	7.1 ± 1.32	7.2 ± 1.22	5.8 ± 2.08 *	
36 MOS	6.8 ± 1.54	6.9 ± 1.54	6.3 ± 1.65 *		36 MOS	7.1 ± 1.33	7.1 ± 1.18	7.1 ± 1.20 *	
48 MOS	6.9 ± 1.47	6.9 ± 1.55			48 MOS	7.1 ± 1.30	7.0 ± 1.25 *		
60 MOS	6.8 ± 1.48	6.9 ± 1.60			60 MOS	7.0 ± 1.34	6.8 ± 1.64 *		
JELLY					COCOA A				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	6.9 ± 1.52	6.9 ± 1.52	6.9 ± 1.52	6.9 ± 1.52	INITIAL	7.7 ± 0.78	7.7 ± 0.78	7.7 ± 0.78	7.7 ± 0.78
6 MOS			7.0 ± 1.38	6.7 ± 1.47	6 MOS			7.3 ± 1.02 *	7.6 ± 0.90
12 MOS	7.0 ± 1.33	6.7 ± 1.49	5.7 ± 1.66 *	5.9 ± 1.78 *	12 MOS	7.3 ± 1.20 *	7.9 ± 0.72 *	6.7 ± 1.69 *	7.4 ± 0.97 *
18 MOS		6.8 ± 1.58	6.5 ± 1.36 *	6.1 ± 1.58	18 MOS		7.5 ± 1.14	7.0 ± 1.51 *	7.0 ± 1.45
24 MOS		6.8 ± 1.59	6.7 ± 1.62 *	6.4 ± 1.72 *	24 MOS		7.6 ± 1.11	7.6 ± 1.34 *	6.9 ± 1.46 *
30 MOS	7.0 ± 1.21	6.8 ± 1.58	6.7 ± 1.46		30 MOS	7.5 ± 1.00	7.5 ± 1.09	7.0 ± 1.21 *	
36 MOS	7.0 ± 1.25	6.4 ± 1.80 *	6.4 ± 1.57 *		36 MOS	6.9 ± 1.36 *	7.1 ± 1.40 *	7.1 ± 1.26 *	
48 MOS	7.0 ± 1.21	5.9 ± 1.60 *			48 MOS	6.9 ± 1.39 *	6.9 ± 1.45 *		
60 MOS	6.9 ± 1.29	6.3 ± 1.50 *			60 MOS	7.4 ± 1.03 *	7.1 ± 1.53 *		
COCOA B					COCOA C				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	7.4 ± 0.92	7.4 ± 0.92	7.4 ± 0.92	7.4 ± 0.92	INITIAL	7.7 ± 0.62	7.7 ± 0.62	7.7 ± 0.62	7.7 ± 0.62
6 MOS			7.5 ± 0.93	7.5 ± 1.00	6 MOS			7.8 ± 1.06	7.4 ± 1.48 *
12 MOS	7.5 ± 0.98	7.3 ± 0.70	7.3 ± 0.98	7.2 ± 1.28	12 MOS	7.8 ± 1.04	7.3 ± 0.74	6.7 ± 1.00 *	6.7 ± 1.84
18 MOS		7.7 ± 0.78	7.5 ± 0.99	7.4 ± 1.17	18 MOS		7.6 ± 1.12 *	7.2 ± 1.26 *	7.2 ± 1.05 *
24 MOS		7.9 ± 0.84	7.4 ± 1.14	7.2 ± 1.66 *	24 MOS		7.2 ± 1.63 *	7.3 ± 0.94 *	6.4 ± 1.85 *
30 MOS	6.8 ± 1.63 *	7.6 ± 0.93	7.4 ± 1.14		30 MOS	7.4 ± 0.89 *	7.6 ± 0.98 *	7.4 ± 1.08 *	
36 MOS	7.3 ± 1.28	7.0 ± 1.48 *	6.9 ± 1.08		36 MOS	6.7 ± 1.61 *	7.1 ± 1.16 *	6.7 ± 1.66 *	
48 MOS	7.3 ± 1.24	7.2 ± 1.51 *			48 MOS	7.5 ± 1.19 *	7.5 ± 0.93 *		
60 MOS	7.3 ± 1.22	6.8 ± 1.60			60 MOS	6.9 ± 1.55 *	7.2 ± 1.28 *		

* Mean ± S.D.; N=36; Significant differences are indicated by an asterisk *

TABLE C-1. CONSUMER PANEL MEAN ACCEPTABILITY RATINGS FOR COMPONENTS OF THE MEAL, READY-TO-EAT, (MRE-1)
AFTER STORAGE AT 4°, 21°, 30° AND 38°C

COFFEE					:	CRACKERS (50 PKG)				
	4°C	21°C	30°C	38°C	:		4°C	21°C	30°C	38°C
INITIAL	6.2 ± 1.98	6.2 ± 1.98	6.2 ± 1.98	6.2 ± 1.98	:	INITIAL	6.6 ± 1.34	6.6 ± 1.34	6.6 ± 1.34	6.6 ± 1.34
6 MOS			6.0 ± 1.94	5.7 ± 1.87 *	:	6 MOS			6.8 ± 1.31 *	6.7 ± 1.25
12 MOS	5.4 ± 2.13 *	5.7 ± 1.78 *	6.0 ± 1.72	6.3 ± 1.81 *	:	12 MOS	6.7 ± 1.43	7.1 ± 1.30	6.1 ± 1.98 *	5.7 ± 1.84 *
18 MOS		5.4 ± 1.69 *	5.9 ± 2.02	5.9 ± 1.92	:	18 MOS		6.1 ± 1.41 *	6.6 ± 1.28 *	5.9 ± 1.29 *
24 MOS		5.6 ± 2.24 *	5.2 ± 1.96 *	5.5 ± 1.79 *	:	24 MOS		5.9 ± 1.81 *	6.2 ± 1.75 *	6.0 ± 1.68 *
30 MOS	5.8 ± 2.03	5.7 ± 1.75 *	5.3 ± 1.96 *		:	30 MOS	6.8 ± 1.39	6.8 ± 1.70 *	5.8 ± 1.64 *	
36 MOS	5.6 ± 1.97	6.0 ± 1.83 *	5.2 ± 2.13 *		:	36 MOS	6.7 ± 1.38	6.7 ± 1.58 *	5.9 ± 1.56 *	
48 MOS	5.3 ± 1.81 *	5.5 ± 1.69			:	48 MOS	6.8 ± 1.19 *	6.5 ± 1.34 *		
60 MOS	5.5 ± 1.92	5.9 ± 1.62 *			:	60 MOS	6.7 ± 1.37	6.3 ± 1.39 *		
CRACKERS (RIGHT AWAY)					:	CRACKERS W/PEANUT BUTTER				
	4°C	21°C	30°C	38°C	:		4°C	21°C	30°C	38°C
INITIAL	6.7 ± 1.17	6.7 ± 1.17	6.7 ± 1.17	6.7 ± 1.17	:	INITIAL	6.8 ± 1.42	6.8 ± 1.42	6.8 ± 1.44	6.8 ± 1.44
6 MOS			6.6 ± 1.44	6.2 ± 1.68 *	:	6 MOS			7.0 ± 1.03	7.1 ± 1.06
12 MOS	6.3 ± 1.20 *	6.9 ± 0.99	6.7 ± 1.59	5.1 ± 2.00 *	:	12 MOS	6.9 ± 1.41	6.7 ± 1.63	6.9 ± 1.28	6.4 ± 1.44 *
18 MOS		6.6 ± 1.31	5.9 ± 1.71 *	5.6 ± 1.80 *	:	18 MOS		7.0 ± 1.25	6.3 ± 1.41	6.4 ± 1.67
24 MOS		6.7 ± 1.22	5.2 ± 1.94 *	4.5 ± 2.15 *	:	24 MOS		7.0 ± 1.23	5.8 ± 1.58	6.2 ± 1.58 *
30 MOS	6.4 ± 1.50	6.6 ± 1.33	4.8 ± 2.24 *		:	30 MOS	7.0 ± 1.39	7.0 ± 1.23	6.4 ± 1.49 *	
36 MOS	6.5 ± 1.46	6.6 ± 1.47	4.9 ± 2.26 *		:	36 MOS	6.9 ± 1.45	6.9 ± 1.26	6.0 ± 1.82 *	
48 MOS	6.6 ± 1.47	5.9 ± 1.49 *			:	48 MOS	6.9 ± 1.40	6.5 ± 1.32 *		
60 MOS	6.5 ± 1.44	5.4 ± 1.90 *			:	60 MOS	6.9 ± 1.40	6.7 ± 1.54 *		
CRACKERS W/CHEESE					:	CRACKERS W/CHEESE				
	4°C	21°C	30°C	38°C	:		4°C	21°C	30°C	38°C
INITIAL	5.6 ± 2.21	5.6 ± 2.21	5.6 ± 2.21	5.6 ± 2.21	:	INITIAL	6.5 ± 1.44	6.5 ± 1.44	6.5 ± 1.44	6.5 ± 1.44
6 MOS			6.1 ± 1.64 *	5.6 ± 1.97	:	6 MOS			5.9 ± 1.60 *	6.3 ± 1.59
12 MOS	6.8 ± 1.29 *	6.7 ± 1.30 *	6.0 ± 1.77	6.9 ± 1.29 *	:	12 MOS	6.6 ± 1.54	6.6 ± 1.40	6.2 ± 1.45	6.4 ± 1.64
18 MOS		6.6 ± 1.54 *	5.3 ± 1.56 *	5.4 ± 1.55 *	:	18 MOS		7.0 ± 1.14 *	6.3 ± 1.82 *	5.9 ± 1.75 *
24 MOS		6.1 ± 1.77 *	5.2 ± 1.89 *	5.6 ± 1.40 *	:	24 MOS		7.1 ± 1.32	6.1 ± 1.54 *	5.4 ± 2.00
30 MOS	6.0 ± 1.48 *	6.2 ± 1.84	5.4 ± 1.92 *		:	30 MOS	6.5 ± 1.50	6.6 ± 1.59	6.2 ± 1.62	
36 MOS	6.6 ± 1.28 *	6.2 ± 1.78	4.7 ± 1.89 *		:	36 MOS	6.4 ± 1.56	6.0 ± 1.92 *	5.7 ± 1.68 *	
48 MOS	6.6 ± 1.34	6.1 ± 1.74 *			:	48 MOS	6.4 ± 1.50	5.7 ± 1.71 *		
60 MOS	6.6 ± 1.18 *	6.1 ± 1.70			:	60 MOS	6.4 ± 1.47	6.4 ± 1.29		

* Mean ± S.D.; N=36; Significant differences are indicated by an asterisk *

TABLE C-1. CONSUMER PANEL MEAN ACCEPTABILITY RATINGS FOR COMPONENTS OF THE MEAL, READY-TO-EAT, (MRE-1)
AFTER STORAGE AT 4°, 21°, 30° AND 38°C

CRACKERS W/JELLY				
	4°C	21°C	30°C	38°C
INITIAL	6.6 ± 1.42	6.6 ± 1.42	6.6 ± 1.42	6.6 ± 1.42
6 MOS		6.6 ± 1.42	6.6 ± 1.52	6.5 ± 1.38
12 MOS	6.7 ± 1.28	6.7 ± 1.40	6.5 ± 1.52	5.8 ± 1.45
18 MOS		6.6 ± 1.54	6.2 ± 1.57	6.2 ± 1.30
24 MOS		6.6 ± 1.57	5.9 ± 1.51	5.9 ± 1.42
30 MOS	6.6 ± 1.33	5.9 ± 1.25 *	6.0 ± 1.47 *	
36 MOS	6.8 ± 1.37	6.5 ± 1.48	6.0 ± 1.40 *	
48 MOS	7.1 ± 1.02	6.2 ± 1.21 *		
60 MOS				

* Mean ± S.D.; N=36; Significant differences are indicated by an asterisk *

TABLE C-1. CONSUMER PANEL MEAN ACCEPTABILITY RATINGS FOR COMPONENTS OF THE MEAL, READY-TO-EAT, (MRE-1)
AFTER STORAGE AT 4°, 21°, 30° AND 38°C

BROWNIES A					BROWNIES B				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	6.3 ± 1.35	6.3 ± 1.35	6.3 ± 1.35	6.3 ± 1.35	INITIAL	5.6 ± 1.96	5.6 ± 1.96	5.6 ± 1.96	5.6 ± 1.96
6 MOS					6 MOS				
12 MOS	5.8 ± 1.85 *	5.9 ± 1.88 *	5.7 ± 1.79 *	5.9 ± 1.52	12 MOS	5.8 ± 1.86 *	6.3 ± 1.61 *	5.8 ± 1.52 *	5.8 ± 1.95
18 MOS		5.6 ± 2.21 *	5.5 ± 1.66 *	4.5 ± 1.53	18 MOS		5.8 ± 1.83	6.3 ± 1.18 *	4.3 ± 1.92 *
24 MOS				5.1 ± 1.89	24 MOS	NOT TESTED	NOT TESTED	5.0 ± 1.72 *	5.5 ± 2.09
30 MOS	5.9 ± 1.69	6.0 ± 1.90	6.0 ± 1.44 *	NOT TESTED	30 MOS			NOT TESTED	NOT TESTED
36 MOS	6.0 ± 1.63	6.0 ± 1.85	NOT TESTED		36 MOS		5.6 ± 1.72		
48 MOS	NOT TESTED	NOT TESTED			48 MOS				
60 MOS	NOT TESTED	NOT TESTED			60 MOS				

* Mean ± S.D.; N=36; Significant differences are indicated by an asterisk *

TABLE C-1. CONSUMER PANEL MEAN ACCEPTABILITY RATINGS FOR COMPONENTS OF THE MEAL, READY-TO-EAT, (MRE-1)
AFTER STORAGE AT 4°, 21°, 30° AND 38°C

CHOCOLATE W/TOFFEE					CHOCOLATE FUDGE				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	6.0 ± 1.55	6.0 ± 1.55	6.0 ± 1.55	6.0 ± 1.55	INITIAL	6.9 ± 1.96	6.9 ± 1.47	6.9 ± 1.47	6.9 ± 1.47
6 MOS			6.6 ± 1.70 *	6.6 ± 1.59	6 MOS			6.7 ± 1.61 *	6.7 ± 1.61
12 MOS	6.1 ± 1.63	5.7 ± 1.69	6.4 ± 1.82	6.7 ± 1.61	12 MOS	6.8 ± 1.86	5.4 ± 1.78 *		
18 MOS		5.6 ± 1.81	6.4 ± 1.67 *	6.2 ± 1.72	18 MOS	6.8	6.4 ± 1.73 *		
24 MOS		5.6 ± 1.83	5.4 ± 1.66	6.2 ± 1.72	24 MOS	NOT TESTED	5.8 ± 2.01 *	5.3 ± 2.11 *	NOT TESTED
30 MOS	6.1 ± 1.79	5.6 ± 1.80	5.7 ± 1.83 *		30 MOS		5.9 ± 1.69 *	5.4 ± 1.83 *	
36 MOS	6.1 ± 1.68	4.5 ± 1.50 *	5.7 ± 1.92		36 MOS		NOT TESTED	NOT TESTED	
48 MOS	6.1 ± 1.66	5.2 ± 1.94 *			48 MOS				
60 MOS	6.1 ± 1.64	4.7 ± 1.73 *			60 MOS				
VANILLA CREME					CATSUP (1)				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	6.4 ± 1.80	6.4 ± 1.80	6.4 ± 1.80	6.4 ± 1.80	INITIAL	6.0 ± 1.99	6.0 ± 1.99	6.0 ± 1.99	6.0 ± 1.99
6 MOS			6.8 ± 1.59 *	6.5 ± 1.75	6 MOS			6.0 ± 1.99 *	6.0 ± 1.99
12 MOS			6.7 ± 1.61 *	6.7 ± 1.61	12 MOS			6.2 ± 1.58 *	6.7 ± 1.61 *
18 MOS			6.1 ± 1.91 *	6.1 ± 1.91	18 MOS		5.7 ± 1.95 *	6.1 ± 1.82 *	6.1 ± 1.91
24 MOS			NOT TESTED	5.7 ± 1.95	24 MOS		5.9 ± 2.07 *	NOT TESTED	NOT TESTED
30 MOS	6.3 ± 1.74	5.9 ± 1.69 *	5.4 ± 1.83 *		30 MOS	6.2 ± 1.88	5.9 ± 1.69 *	5.4 ± 1.83	
36 MOS					36 MOS	6.2 ± 1.75	6.1 ± 1.91	NOT TESTED	
48 MOS	6.3 ± 1.84				48 MOS	NOT TESTED	6.1 ± 1.87		
60 MOS	6.2 ± 1.91	5.6 ± 1.54 *			60 MOS		6.0 ± 1.86		
CATSUP (2)					POTATO PATTIE				
	4°C	21°C	30°C	38°C		4°C	21°C	30°C	38°C
INITIAL	5.2 ± 2.14	5.2 ± 1.35	5.2 ± 2.14	5.2 ± 2.14	INITIAL	6.6 ± 1.53	6.6 ± 1.53	6.6 ± 1.53	6.6 ± 1.53
6 MOS				NOT TESTED	6 MOS			6.5 ± 1.36	5.3 ± 2.25 *
12 MOS	5.3 ± 2.00 *	5.5 ± 1.88			12 MOS	7.1 ± 1.07 *	6.2 ± 1.42	6.0 ± 1.74	6.2 ± 1.59
18 MOS		5.1 ± 2.21	5.1 ± 2.17		18 MOS		6.7 ± 1.40	4.9 ± 2.25 *	6.0 ± 1.67 *
24 MOS		5.1		NOT TESTED	24 MOS		7.1 ± 1.56 *	6.4 ± 1.71 *	6.0 ± 1.88
30 MOS	5.3 ± 2.00	NOT TESTED			30 MOS	6.6 ± 1.61	7.1 ± 1.58 *	6.9 ± 1.56 *	
36 MOS	NOT TESTED	NOT TESTED	NOT TESTED		36 MOS	6.7 ± 1.57	6.8 ± 1.46	6.8 ± 1.14 *	
48 MOS	5.4 ± 1.92	NOT TESTED			48 MOS	6.7 ± 1.54	6.8 ± 1.50		
60 MOS	5.3 ± 1.99	NOT TESTED			60 MOS	5.1 ± 2.04 *	6.1 ± 1.33 *		

* Mean ± S.D.; N=36; Significant differences are indicated by an asterisk *

TABLE C-2. CONSUMER PANEL MEAN ACCEPTABILITY RATINGS FOR CHEESE SPREAD
AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

	4°C	21°C	30°C	38°C
INITIAL	6.0 ± 1.61	6.0 ± 1.61	6.0 ± 1.61	6.0 ± 1.61
6 MOS				
12 MOS	5.9 ± 1.62	5.0 ± 2.12 *	5.3 ± 1.97 *	5.4 ± 1.96
18 MOS		4.8 ± 2.22 *	5.7 ± 1.80	4.7 ± 1.88 *
24 MOS		5.4 ± 1.96 *	5.7 ± 1.78	3.9 ± 1.78 *
30 MOS	5.1 ± 1.84 *	5.3 ± 1.99	5.7 ± 1.80	
36 MOS	5.0 ± 1.64 *	5.4 ± 1.95	5.0 ± 1.92 *	
48 MOS	5.6 ± 1.64	5.5 ± 1.59		
60 MOS	5.5 ± 1.77	5.4 ± 1.62		

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL (MRE-1) AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

PORK SAUSAGE PATTIES

	APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C				
INITIAL	5.7 ± 0.98	6.3 ± 1.16	6.1 ± 1.41	5.9 ± 1.44
12 MOS	5.6 ± 0.86	5.8 ± 0.70 *	5.5 ± 1.01	6.0 ± 1.18
30 MOS	5.6 ± 0.95	6.0 ± 0.99	5.3 ± 1.41	6.0 ± 1.12
36 MOS	5.6 ± 1.00	6.0 ± 1.00	5.9 ± 1.64	6.0 ± 1.16
48 MOS	5.5 ± 1.04	6.0 ± 1.08	5.1 ± 1.58	6.1 ± 1.16
60 MOS	5.4 ± 1.14	5.9 ± 1.12	4.9 ± 1.64	6.0 ± 1.18
21°C				
INITIAL	5.7 ± 0.98	6.3 ± 1.16	6.1 ± 1.41	5.9 ± 1.44
12 MOS	5.6 ± 0.85	6.2 ± 0.94	6.0 ± 1.16	6.0 ± 1.24
18 MOS	5.7 ± 0.78	6.1 ± 0.86	6.1 ± 1.09	6.0 ± 1.18
24 MOS	5.7 ± 0.75	6.1 ± 0.80	6.0 ± 1.14	6.0 ± 1.10
30 MOS	5.7 ± 0.83	6.1 ± 0.79	5.2 ± 1.47 *	6.0 ± 1.09
36 MOS	5.7 ± 0.89	6.1 ± 0.82	5.9 ± 1.30	6.0 ± 1.13
48 MOS	5.6 ± 0.95	6.1 ± 0.85	5.8 ± 1.34	6.0 ± 1.14
60 MOS	5.0 ± 1.26 *	6.1 ± 0.87	5.3 ± 1.90	6.0 ± 1.21
30°C				
INITIAL	5.7 ± 0.98	6.3 ± 1.16	6.1 ± 1.41	5.9 ± 1.44
6 MOS	5.9 ± 0.96	6.2 ± 0.98	6.0 ± 1.16	6.0 ± 1.16
12 MOS	5.5 ± 0.84 *	6.1 ± 0.92	5.9 ± 1.14	6.1 ± 1.07
18 MOS	5.7 ± 0.61 *	6.1 ± 0.89	5.9 ± 1.10	6.1 ± 1.02
24 MOS	5.7 ± 0.62 *	6.1 ± 0.84	5.9 ± 1.06	6.1 ± 0.98
30 MOS	5.7 ± 0.87	6.1 ± 0.86	5.8 ± 1.10	6.1 ± 0.96
36 MOS	5.7 ± 0.91	6.0 ± 0.87	5.8 ± 1.12	6.1 ± 1.01
38°C				
INITIAL	5.7 ± 0.98	6.3 ± 1.16	6.1 ± 1.41	5.9 ± 1.44
6 MOS	5.7 ± 0.89	6.3 ± 0.93	6.2 ± 1.19	6.2 ± 1.19
12 MOS	5.7 ± 0.87	5.7 ± 0.99 *	5.4 ± 1.00 *	5.6 ± 1.27
18 MOS	5.7 ± 0.81	6.1 ± 0.96	5.9 ± 1.03	6.2 ± 0.77
24 MOS	5.7 ± 0.79	6.1 ± 0.90	6.0 ± 0.60	6.1 ± 1.08

HAM AND CHICKEN LOAF

	APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C				
INITIAL	6.3 ± 0.80	6.1 ± 0.64	6.0 ± 0.93	5.9 ± 1.44
12 MOS	5.6 ± 1.50 *	5.3 ± 1.07 *	5.2 ± 1.29 *	6.0 ± 1.18
30 MOS	5.9 ± 1.12	4.8 ± 1.03 *	4.9 ± 1.29 *	6.0 ± 1.12
36 MOS	5.5 ± 1.03 *	5.4 ± 1.36 *	5.2 ± 1.60 *	6.0 ± 1.16
48 MOS	5.8 ± 1.06	5.4 ± 0.92 *	5.1 ± 0.94 *	6.1 ± 1.16
60 MOS	5.8 ± 1.06	5.1 ± 1.30 *	5.0 ± 1.55 *	6.0 ± 1.18
21°C				
INITIAL	6.3 ± 0.80	6.1 ± 0.64	6.0 ± 0.92	5.9 ± 1.44
12 MOS	5.6 ± 1.33 *	5.5 ± 1.28 *	5.3 ± 1.38 *	6.0 ± 1.24
18 MOS	6.0 ± 1.12	5.7 ± 0.82 *	5.2 ± 1.25 *	6.0 ± 1.18
24 MOS	5.5 ± 1.08 *	5.5 ± 0.89 *	5.5 ± 0.78 *	6.0 ± 1.10
30 MOS	5.6 ± 0.69 *	5.2 ± 1.13 *	5.2 ± 1.03 *	6.0 ± 1.09
36 MOS	5.7 ± 1.01 *	5.6 ± 1.20 *	5.5 ± 1.20 *	6.0 ± 1.13
48 MOS	5.5 ± 0.92 *	5.4 ± 1.20 *	4.9 ± 1.38 *	6.0 ± 1.14
60 MOS	5.3 ± 1.55 *	5.1 ± 1.58 *	4.9 ± 1.38 *	6.0 ± 1.21
30°C				
INITIAL	6.3 ± 0.80	6.1 ± 0.64	6.0 ± 0.93	5.9 ± 1.44
6 MOS	6.3 ± 0.78	6.0 ± 0.78	5.9 ± 0.91	6.0 ± 1.16
12 MOS	5.8 ± 0.70 *	5.5 ± 0.75 *	5.2 ± 0.97 *	6.1 ± 1.07
18 MOS	5.5 ± 0.63 *	5.6 ± 0.63 *	4.9 ± 0.83 *	6.1 ± 1.02
24 MOS	5.5 ± 0.66 *	5.5 ± 0.78 *	5.0 ± 0.85 *	6.1 ± 0.98
30 MOS	5.4 ± 1.07 *	5.2 ± 1.13 *	5.0 ± 1.41 *	6.1 ± 0.96
36 MOS	5.5 ± 0.67 *	5.4 ± 1.36 *	5.0 ± 1.67 *	6.1 ± 1.01
38°C				
INITIAL	6.3 ± 0.80	6.1 ± 0.64	6.0 ± 0.93	5.9 ± 1.44
6 MOS	6.2 ± 0.80	5.9 ± 1.00 *	5.9 ± 1.00	6.2 ± 1.19
12 MOS	6.2 ± 0.84	5.1 ± 1.21 *	5.2 ± 1.41	5.6 ± 1.27 *
18 MOS	5.8 ± 0.97 *	5.3 ± 0.72 *	5.9 ± 1.03 *	6.2 ± 0.77 *
24 MOS	5.7 ± 0.75 *	5.4 ± 0.98 *	5.1 ± 1.27 *	6.1 ± 1.08

Means ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL (MRE-1)
AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

BEEF PATTIE

BEEF SLICES IN BBQ SAUCE

	APPEARANCE	ODOR	FLAVOR	TEXTURE		APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C					4°C				
INITIAL	5.7 ± 1.11	5.7 ± 1.10	5.5 ± 1.77	6.0 ± 1.07	INITIAL	6.4 ± 0.83	6.6 ± 0.51	6.5 ± 0.52	6.3 ± 0.82
12 MOS	5.6 ± 1.02	5.7 ± 0.92	5.3 ± 0.91 *	5.8 ± 1.00	12 MOS	6.3 ± 0.75 *	6.3 ± 0.46 *	5.7 ± 0.91 *	5.9 ± 0.66 *
30 MOS	5.6 ± 0.94	5.7 ± 0.90	5.3 ± 1.45	5.8 ± 0.98	30 MOS	6.3 ± 0.74	6.1 ± 0.51	6.3 ± 0.62 *	5.8 ± 0.72 *
36 MOS	5.5 ± 0.97	5.6 ± 0.96	5.3 ± 1.41	5.8 ± 0.97	36 MOS	6.3 ± 0.76 *	6.1 ± 0.64 *	6.2 ± 0.80 *	5.8 ± 1.09 *
48 MOS	5.5 ± 0.99	5.6 ± 0.97	5.4 ± 1.37	5.8 ± 1.03	48 MOS	6.2 ± 0.77	5.8 ± 0.58 *	5.4 ± 1.07 *	5.5 ± 0.89 *
60 MOS	5.4 ± 1.01	5.6 ± 0.96	5.3 ± 1.37	5.7 ± 1.04	60 MOS	6.2 ± 0.76	5.9 ± 0.57 *	5.4 ± 1.17 *	5.3 ± 0.82 *
21°C					21°C				
INITIAL	5.7 ± 1.11	5.7 ± 1.10	5.5 ± 1.77	6.0 ± 1.07	INITIAL	6.4 ± 0.83	6.6 ± 0.51	6.5 ± 0.52	6.3 ± 0.82
12 MOS	5.4 ± 0.84 *	5.7 ± 0.93	5.0 ± 0.78 *	5.9 ± 0.92	12 MOS	6.3 ± 0.85	6.5 ± 0.50	6.1 ± 0.83 *	6.2 ± 0.82
18 MOS	5.5 ± 0.84 *	5.7 ± 0.87	5.2 ± 1.03 *	5.9 ± 0.84	18 MOS	6.4 ± 0.76	6.2 ± 0.66 *	6.2 ± 0.76 *	6.3 ± 0.74
24 MOS	5.4 ± 0.77 *	5.6 ± 0.93	5.1 ± 1.38 *	6.0 ± 0.81	24 MOS	6.3 ± 0.80	6.0 ± 0.60 *	6.2 ± 0.70	6.2 ± 0.77
30 MOS	5.7 ± 0.67 *	5.6 ± 0.95	5.2 ± 1.29	6.0 ± 0.80	30 MOS	6.3 ± 0.80	5.7 ± 0.96 *	5.7 ± 1.05 *	5.6 ± 0.98 *
36 MOS	5.3 ± 0.79 *	5.6 ± 0.98	5.3 ± 1.29	5.9 ± 0.83	36 MOS	5.9 ± 0.86 *	6.0 ± 0.82 *	5.6 ± 1.12 *	5.3 ± 1.11 *
48 MOS	5.5 ± 0.88	5.6 ± 1.01	5.3 ± 1.32	5.5 ± 1.23 *	48 MOS	5.9 ± 0.51 *	5.8 ± 0.58 *	5.6 ± 1.15 *	5.4 ± 0.98 *
60 MOS	5.4 ± 0.89	5.5 ± 1.01	5.2 ± 1.36	5.2 ± 0.98 *	60 MOS	5.8 ± 0.79 *	5.7 ± 0.82 *	5.3 ± 1.25 *	5.3 ± 1.16 *
30°C					30°C				
INITIAL	5.7 ± 1.11	5.7 ± 1.10	5.5 ± 1.77	6.0 ± 1.07	INITIAL	6.4 ± 0.83	6.6 ± 0.51	6.5 ± 0.52	6.3 ± 0.82
6 MOS	5.6 ± 1.06	5.6 ± 1.14	5.3 ± 1.62	5.3 ± 1.62	6 MOS	6.4 ± 0.76	6.6 ± 0.50	±	±
12 MOS	5.4 ± 1.04	5.6 ± 1.08	5.3 ± 1.50	5.9 ± 1.03	12 MOS	6.3 ± 0.77	6.3 ± 0.61 *	5.8 ± 0.86 *	5.9 ± 0.83
18 MOS	5.5 ± 1.00	5.6 ± 1.01	5.4 ± 1.39	5.9 ± 0.98	18 MOS	6.3 ± 0.80	6.2 ± 0.58 *	5.5 ± 1.01 *	5.7 ± 0.82 *
24 MOS	5.5 ± 0.97	5.6 ± 0.98	5.3 ± 1.33	5.9 ± 0.94	24 MOS	5.8 ± 0.58 *	6.1 ± 0.51 *	5.5 ± 0.89 *	5.5 ± 0.99 *
30 MOS	5.5 ± 0.94	5.6 ± 0.96	5.3 ± 1.31	5.9 ± 0.94	30 MOS	5.1 ± 1.08 *	5.5 ± 1.16 *	4.6 ± 1.43 *	4.3 ± 0.96 *
36 MOS	5.5 ± 0.97	5.6 ± 1.01	5.3 ± 1.31	5.9 ± 0.99	36 MOS	5.1 ± 1.07 *	5.5 ± 1.12 *	4.3 ± 1.48 *	4.3 ± 1.01 *
38°C					38°C				
INITIAL	5.7 ± 1.11	5.7 ± 1.10	5.5 ± 1.77	6.0 ± 1.07	INITIAL	6.4 ± 0.83	6.6 ± 0.51	6.5 ± 0.52	6.3 ± 0.82
6 MOS	5.5 ± 1.23	5.7 ± 1.16	5.5 ± 1.56	5.5 ± 1.56	6 MOS	6.4 ± 0.66	6.5 ± 0.56	±	±
12 MOS	5.5 ± 1.17	5.7 ± 1.05	5.4 ± 1.50	6.0 ± 0.98	12 MOS	5.5 ± 1.15 *	6.3 ± 0.61 *	5.1 ± 0.92 *	4.8 ± 1.03
18 MOS	5.5 ± 1.09	5.7 ± 1.00	5.4 ± 1.47	5.9 ± 0.94	18 MOS	6.1 ± 0.62 *	6.1 ± 0.47 *	5.2 ± 0.97 *	5.2 ± 0.86 *
24 MOS	5.5 ± 1.04	5.7 ± 0.98	4.6 ± 1.49 *	5.9 ± 0.95	24 MOS	4.7 ± 1.14 *	5.2 ± 0.83 *	4.4 ± 0.98 *	4.5 ± 0.98 *

Means ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL (MRE-1) AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

BEEF STEW

: FRANKFURTERS

	APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C				
INITIAL	6.1 ± 0.70	6.1 ± 0.74	6.1 ± 0.88	6.2 ± 0.94
12 MOS	5.0 ± 0.96 *	5.8 ± 0.58 *	5.9 ± 0.88	5.3 ± 0.72
30 MOS	5.0 ± 1.04 *	5.9 ± 0.74	5.5 ± 0.78 *	5.6 ± 0.77
36 MOS	4.7 ± 1.14 *	5.4 ± 0.64 *	5.0 ± 1.28 *	5.3 ± 1.05
48 MOS	5.4 ± 1.15 *	5.5 ± 0.78 *	5.6 ± 1.23 *	5.6 ± 0.77
60 MOS	5.0 ± 1.25 *	5.6 ± 0.96 *	5.2 ± 1.13 *	5.4 ± 0.96
21°C				
INITIAL	6.1 ± 0.70	6.1 ± 0.74	6.1 ± 0.88	6.2 ± 0.94
12 MOS	5.8 ± 0.58 *	6.1 ± 0.62	6.0 ± 0.80	6.1 ± 0.62
18 MOS	5.6 ± 0.84 *	6.1 ± 0.58	6.0 ± 0.75	6.1 ± 0.81
24 MOS	5.8 ± 0.79	6.1 ± 0.59	5.9 ± 0.85	6.1 ± 0.85
30 MOS	5.8 ± 0.80	6.0 ± 0.61	5.9 ± 0.83	6.0 ± 0.83
36 MOS	4.7 ± 1.14 *	5.5 ± 0.89 *	5.2 ± 1.24 *	5.5 ± 0.89
48 MOS	5.6 ± 1.23 *	5.8 ± 0.83 *	5.7 ± 0.86 *	5.9 ± 0.85
60 MOS	5.7 ± 0.93	5.8 ± 0.92 *	5.6 ± 1.07 *	5.9 ± 0.84
30°C				
INITIAL	6.1 ± 0.70	6.1 ± 0.74	6.1 ± 0.88	6.2 ± 0.94
6 MOS	±	±	±	±
12 MOS	6.5 ± 0.50	6.1 ± 0.67	6.1 ± 0.80	6.3 ± 0.74
18 MOS	6.3 ± 0.69 *	6.1 ± 0.67	6.1 ± 0.75	6.3 ± 0.81
24 MOS	5.7 ± 0.99 *	6.1 ± 0.66	6.0 ± 0.75	6.2 ± 0.81
30 MOS	6.1 ± 0.80	6.1 ± 0.66	6.0 ± 0.77 *	5.9 ± 0.90
36 MOS	5.3 ± 1.05 *	5.6 ± 0.48 *	5.3 ± 0.86	5.7 ± 0.86
38°C				
INITIAL	6.1 ± 0.70 *	6.1 ± 0.74	6.1 ± 0.88	6.2 ± 0.94
6 MOS	±	±	±	±
12 MOS	6.2 ± 0.71	6.1 ± 0.63	5.9 ± 0.78	6.2 ± 0.83
18 MOS	6.1 ± 0.84	6.1 ± 0.60	5.9 ± 0.74	6.1 ± 0.78
24 MOS	6.1 ± 0.85	6.1 ± 0.58	5.6 ± 0.92 *	6.1 ± 0.82

	APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C				
INITIAL	6.5 ± 0.64	6.7 ± 0.80	6.0 ± 0.85	5.8 ± 1.21
12 MOS	6.4 ± 0.77	6.6 ± 0.77	5.8 ± 1.12	5.0 ± 1.24 *
30 MOS	6.0 ± 0.78 *	6.2 ± 0.60 *	5.7 ± 1.12	5.3 ± 1.20
36 MOS	5.4 ± 1.20 *	5.9 ± 0.83 *	5.6 ± 1.17	4.9 ± 1.22 *
48 MOS	6.0 ± 0.95 *	6.1 ± 0.79 *	4.9 ± 0.90 *	4.3 ± 0.96 *
60 MOS	5.1 ± 1.20 *	5.8 ± 0.63 *	4.6 ± 1.07 *	4.1 ± 1.29 *
21°C				
INITIAL	6.5 ± 0.64	6.7 ± 0.80	6.0 ± 0.85	5.8 ± 1.21
12 MOS	6.5 ± 0.68	6.3 ± 0.82 *	5.2 ± 1.05 *	5.1 ± 0.92 *
18 MOS	6.4 ± 0.73	6.3 ± 0.46 *	5.0 ± 1.30 *	5.2 ± 1.29 *
24 MOS	5.8 ± 0.94 *	6.2 ± 0.58 *	5.0 ± 1.35 *	4.8 ± 0.94 *
30 MOS	6.1 ± 0.70 *	6.3 ± 0.46 *	5.4 ± 1.22	5.2 ± 0.98 *
36 MOS	6.1 ± 1.05 *	6.1 ± 0.54 *	5.1 ± 1.14 *	4.4 ± 1.02 *
48 MOS	5.8 ± 0.94 *	5.9 ± 1.08 *	5.0 ± 0.95 *	4.6 ± 0.37 *
60 MOS	5.9 ± 0.99 *	5.7 ± 0.67 *	5.3 ± 1.16	4.4 ± 1.42 *
30°C				
INITIAL	6.5 ± 0.64	6.7 ± 0.80	6.0 ± 0.85	5.8 ± 1.21
6 MOS	6.6 ± 0.66	6.7 ± 0.74	5.9 ± 0.93	5.4 ± 0.80
12 MOS	6.6 ± 0.72	6.6 ± 0.75	5.5 ± 1.22 *	5.2 ± 0.97 *
18 MOS	6.5 ± 0.71	6.6 ± 0.70	5.2 ± 1.17 *	4.9 ± 1.39 *
24 MOS	6.1 ± 0.90 *	6.4 ± 0.48 *	4.9 ± 1.38 *	4.4 ± 1.07 *
30 MOS	6.4 ± 0.75	6.3 ± 0.46 *	5.5 ± 1.12 *	5.0 ± 1.00
36 MOS	6.2 ± 0.87 *	6.3 ± 0.46 *	5.5 ± 1.12 *	4.5 ± 1.12 *
38°C				
INITIAL	6.5 ± 0.64	6.7 ± 0.80	6.0 ± 0.95	5.8 ± 1.21
6 MOS	6.5 ± 0.62	6.7 ± 0.74	5.9 ± 0.98	5.3 ± 0.85
12 MOS	6.5 ± 0.66	6.2 ± 0.80	4.9 ± 1.27 *	4.8 ± 1.17 *
18 MOS	6.5 ± 0.65	6.3 ± 0.46 *	4.9 ± 1.27 *	4.8 ± 1.23 *
24 MOS	5.5 ± 1.31 *	6.3 ± 0.45 *	4.5 ± 1.23 *	4.9 ± 1.24 *

Means ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL (MRE-1)
AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

TURKEY WITH GRAVY

	APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C				
INITIAL	6.8 ± 0.77	6.1 ± 0.96	5.9 ± 0.88	6.1 ± 0.88
12 MOS	5.7 ± 1.07 *	6.0 ± 0.80	5.8 ± 0.89	6.0 ± 0.56
30 MOS	6.3 ± 0.67 *	5.9 ± 0.83	5.0 ± 1.25 *	5.6 ± 0.83
36 MOS	5.6 ± 0.66	5.7 ± 0.78 *	5.3 ± 1.01 *	5.5 ± 0.92
48 MOS	5.8 ± 1.03 *	5.5 ± 0.78 *	5.3 ± 1.05 *	5.4 ± 0.77
60 MOS	5.4 ± 1.43 *	5.6 ± 1.02 *	4.7 ± 1.42 *	5.2 ± 0.87
21°C				
INITIAL	6.8 ± 0.77	6.1 ± 0.96	5.9 ± 0.88	6.1 ± 0.88
12 MOS	5.7 ± 0.61 *	5.3 ± 0.91 *	4.6 ± 1.08 *	4.9 ± 0.83
18 MOS	5.5 ± 0.75 *	5.4 ± 0.63 *	4.5 ± 1.15 *	5.5 ± 0.75
24 MOS	5.3 ± 0.75 *	5.2 ± 0.90 *	4.8 ± 1.07 *	5.1 ± 0.86
30 MOS	5.3 ± 0.67 *	5.2 ± 1.03 *	4.2 ± 1.40 *	4.9 ± 0.74
36 MOS	5.0 ± 0.89 *	5.2 ± 1.17 *	4.1 ± 1.38 *	4.5 ± 0.92
48 MOS	5.0 ± 0.74 *	5.4 ± 1.07 *	4.1 ± 1.31 *	4.8 ± 0.58
60 MOS	5.1 ± 0.54 *	5.0 ± 0.63 *	4.2 ± 0.60 *	4.7 ± 0.46
30°C				
INITIAL	6.8 ± 0.77	6.1 ± 0.96	5.9 ± 0.88	6.1 ± 0.88
6 MOS	6.3 ± 0.70 *	6.0 ± 0.88	5.7 ± 0.68 *	6.0 ± 0.91
12 MOS	6.2 ± 0.58 *	5.9 ± 0.82	5.2 ± 0.86 *	5.5 ± 0.63
18 MOS	6.3 ± 0.82 *	5.7 ± 0.61 *	5.2 ± 0.86 *	5.8 ± 0.66
24 MOS	6.0 ± 0.58 *	5.9 ± 0.78	4.6 ± 1.44 *	5.7 ± 0.47
30 MOS	6.1 ± 0.57 *	5.4 ± 0.96 *	4.6 ± 1.17 *	5.0 ± 0.82
36 MOS	5.8 ± 0.87	5.5 ± 1.20 *	4.7 ± 1.49 *	5.2 ± 0.98
38°C				
INITIAL	6.8 ± 0.77	6.1 ± 0.96	5.9 ± 0.99	6.1 ± 0.88
6 MOS	6.3 ± 0.77 *	6.1 ± 0.77	5.9 ± 0.98	6.0 ± 0.77
12 MOS	6.4 ± 0.49 *	6.0 ± 0.72	4.8 ± 1.42 *	5.6 ± 0.74
18 MOS	6.2 ± 0.53 *	5.6 ± 0.63 *	5.0 ± 0.78 *	5.8 ± 0.58
24 MOS	6.2 ± 0.55 *	5.8 ± 0.80 *	5.3 ± 0.92 *	5.4 ± 0.76

BEEF WITH GRAVY

	APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C				
INITIAL	6.2 ± 0.77	6.2 ± 0.68	6.1 ± 0.83	6.4 ± 0.74
12 MOS	5.0 ± 0.88 *	5.6 ± 0.63 *	5.5 ± 0.84 *	5.5 ± 0.93 *
30 MOS	5.7 ± 1.19 *	5.9 ± 0.54 *	5.5 ± 0.67 *	5.9 ± 0.54 *
36 MOS	5.2 ± 1.25 *	5.6 ± 0.66 *	5.1 ± 1.30 *	5.4 ± 1.02 *
48 MOS	5.3 ± 1.29 *	5.5 ± 0.66 *	5.3 ± 1.29 *	5.6 ± 0.88 *
60 MOS	5.0 ± 1.33 *	5.2 ± 1.03 *	5.2 ± 1.13 *	5.1 ± 0.88 *
21°C				
INITIAL	6.2 ± 0.77	6.2 ± 0.68	6.1 ± 0.83	6.4 ± 0.74
12 MOS	5.5 ± 1.01 *	5.8 ± 0.53 *	5.5 ± 0.93 *	5.5 ± 1.08 *
18 MOS	5.7 ± 1.32 *	5.8 ± 0.86 *	5.5 ± 0.75 *	5.8 ± 0.86 *
24 MOS	5.8 ± 1.12	6.0 ± 0.75	5.1 ± 1.16 *	6.0 ± 0.85 *
30 MOS	5.8 ± 1.13	6.0 ± 0.71	5.6 ± 0.49 *	6.0 ± 0.91
36 MOS	5.8 ± 1.14	5.9 ± 0.70	5.6 ± 0.80 *	5.9 ± 0.90
48 MOS	5.8 ± 1.12	5.6 ± 0.48 *	5.2 ± 1.03 *	5.9 ± 0.89
60 MOS	5.1 ± 1.37 *	5.3 ± 0.82 *	4.9 ± 1.29 *	5.3 ± 1.33 *
30°C				
INITIAL	6.2 ± 0.77	6.2 ± 0.68	6.1 ± 0.83	6.4 ± 0.74
6 MOS	6.1 ± 0.92	6.1 ± 0.83	6.0 ± 0.84	6.3 ± 0.79
12 MOS	5.7 ± 0.91 *	5.7 ± 0.72 *	5.8 ± 0.58 *	5.9 ± 0.62 *
18 MOS	6.0 ± 1.02	6.0 ± 0.81	5.5 ± 0.84 *	6.1 ± 0.92 *
24 MOS	6.0 ± 1.06	6.0 ± 0.81	5.5 ± 0.66 *	5.8 ± 0.83 *
30 MOS	5.9 ± 1.07	6.0 ± 0.77	5.6 ± 0.80 *	5.9 ± 0.54 *
36 MOS	5.9 ± 1.09	5.9 ± 0.74	5.1 ± 0.94 *	5.8 ± 0.98 *
38°C				
INITIAL	6.2 ± 0.77	6.2 ± 0.68	6.1 ± 0.83	6.4 ± 0.74
6 MOS	6.2 ± 0.91	5.7 ± 0.77 *	5.7 ± 0.68 *	6.3 ± 0.79
12 MOS	6.1 ± 0.90	6.0 ± 0.73	5.9 ± 0.27 *	6.3 ± 0.70
18 MOS	6.0 ± 1.01	5.0 ± 0.73	5.2 ± 1.05 *	5.8 ± 0.86 *
24 MOS	6.0 ± 1.01	6.0 ± 0.74	5.5 ± 0.78 *	5.9 ± 0.79 *

Means ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL (MRE-1)
AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

CHICKEN ALA KING					:	MEATBALLS WITH BBQ SAUCE				
	APPEARANCE	ODOR	FLAVOR	TEXTURE	:		APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C					:	4°C				
INITIAL	6.2 ± 1.01	6.1 ± 1.13	6.1 ± 0.99	6.5 ±0.99	:	INITIAL	6.9 ± 0.88	6.6 ± 0.63	6.6 ± 0.91	6.5 ±1.06
12 MOS	6.2 ± 0.93	6.1 ± 0.73 *	6.2 ± 0.89	5.9 ±0.73 *	:	12 MOS	6.5 ± 0.50 *	6.5 ± 0.57	6.5 ± 0.91	6.3 ±0.85
30 MOS	5.5 ± 1.08 *	5.5 ± 0.66 *	5.4 ± 0.77 *	5.7 ±0.86 *	:	30 MOS	6.3 ± 0.75 *	5.9 ± 0.90 *	5.9 ± 0.67 *	5.8 ±0.83 *
36 MOS	5.7 ± 0.85	5.4 ± 0.76 *	5.4 ± 1.04 *	5.5 ±1.12 *	:	36 MOS	6.1 ± 0.67 *	6.0 ± 0.74 *	5.6 ± 1.15 *	5.6 ±1.07 *
48 MOS	5.7 ± 0.86 *	5.6 ± 0.77 *	5.5 ± 1.08 *	5.5 ±0.99 *	:	48 MOS	6.3 ± 0.75 *	5.9 ± 0.90 *	5.6 ± 1.30 *	5.6 ±0.88 *
60 MOS	5.1 ± 0.99 *	5.0 ± 0.94 *	4.9 ± 1.29 *	4.9 ±1.20 *	:	60 MOS	6.0 ± 0.82 *	5.8 ± 0.92 *	5.4 ± 0.83 *	5.7 ±0.47 *
21°C					:	21°C				
INITIAL	6.2 ± 1.01	6.1 ± 1.13	6.1 ± 0.99	6.5 ±0.99	:	INITIAL	6.9 ± 0.88	6.6 ± 0.63	6.6 ± 0.91	6.5 ±1.06
12 MOS	6.1 ± 0.90	6.0 ± 0.78 *	6.0 ± 0.82	6.1 ±0.62 *	:	12 MOS	6.5 ± 0.63 *	6.5 ± 0.63	6.2 ± 0.77 *	6.3 ±0.92
18 MOS	6.1 ± 0.82	6.0 ± 0.68 *	6.0 ± 0.76	6.0 ±0.39 *	:	18 MOS	6.3 ± 0.72 *	6.2 ± 0.53 *	6.2 ± 0.70 *	5.8 ±0.77 *
24 MOS	6.0 ± 0.84	5.6 ± 0.64 *	6.0 ± 0.71	5.9 ±0.29 *	:	24 MOS	6.4 ± 0.74 *	6.2 ± 0.58 *	5.9 ± 0.73 *	5.8 ±0.66 *
30 MOS	5.6 ± 0.64 *	5.4 ± 0.77 *	5.5 ± 0.89 *	5.5 ±0.89 *	:	30 MOS	6.3 ± 0.75 *	6.0 ± 0.74 *	5.8 ± 0.94 *	5.8 ±1.03 *
36 MOS	5.0 ± 0.71 *	5.0 ± 0.91 *	4.8 ± 0.69 *	5.3 ±0.93 *	:	36 MOS	6.2 ± 0.72 *	5.9 ± 0.90 *	5.7 ± 0.96 *	5.8 ±1.11 *
48 MOS	4.4 ± 0.78 *	5.3 ± 0.86 *	4.3 ± 1.14 *	5.0 ±0.95 *	:	48 MOS	6.3 ± 0.75 *	6.0 ± 0.95 *	5.5 ± 0.89 *	5.5 ±0.99 *
60 MOS	5.2 ± 1.13 *	5.1 ± 0.74 *	4.8 ± 0.92 *	4.9 ±1.20 *	:	60 MOS	5.7 ± 1.25 *	5.9 ± 1.29 *	5.4 ± 1.50 *	5.4 ±1.17 *
30°C					:	30°C				
INITIAL	6.2 ± 1.01	6.1 ± 1.13	6.1 ± 0.99	6.5 ±0.99	:	INITIAL	6.9 ± 0.88	6.6 ± 0.63	6.6 ± 0.91	6.5 ±1.06
6 MOS	6.1 ± 0.94	6.2 ± 0.93	5.9 ± 0.68 *	6.4 ±0.84	:	6 MOS	6.9 ± 0.76	6.6 ± 0.56	6.5 ± 0.88	6.4 ±0.91
12 MOS	4.8 ± 0.97 *	5.8 ± 0.66 *	5.4 ± 0.84 *	5.7 ±0.82 *	:	12 MOS	6.4 ± 0.49 *	6.5 ± 0.59	6.4 ± 0.87	5.8 ±0.66 *
18 MOS	4.5 ± 1.01 *	5.5 ± 1.01 *	5.1 ± 0.92 *	5.3 ±0.91 *	:	18 MOS	6.4 ± 0.74 *	6.2 ± 0.66 *	5.9 ± 0.92 *	5.9 ±0.62 *
24 MOS	4.5 ± 0.89 *	4.7 ± 0.96 *	4.5 ± 0.66 *	5.1 ±0.67 *	:	24 MOS	6.2 ± 0.80 *	6.2 ± 0.53 *	5.8 ± 0.70 *	6.0 ±0.68 *
30 MOS	3.5 ± 0.78 *	4.7 ± 1.21 *	3.6 ± 0.48 *	4.8 ±0.94 *	:	30 MOS	6.0 ± 0.85 *	5.6 ± 0.88 *	5.2 ± 1.34 *	5.3 ±1.07 *
36 MOS	3.0 ± 0.71 *	4.5 ± 1.04 *	3.7 ± 0.75 *	4.5 ±1.19 *	:	36 MOS	5.9 ± 0.90 *	5.6 ± 0.98 *	4.7 ± 1.21 *	5.3 ±1.21 *
38°C					:	38°C				
INITIAL	6.2 ± 1.01	6.1 ± 1.13	6.1 ± 0.99	6.5 ±0.99	:	INITIAL	6.9 ± 0.88	6.6 ± 0.63	6.6 ± 0.91	6.5 ±1.06
6 MOS	6.1 ± 0.91	6.1 ± 0.98	6.0 ± 0.91	6.4 ±0.84	:	6 MOS	6.8 ± 0.83	6.6 ± 0.56	6.4 ± 0.88	6.3 ±0.94
12 MOS	4.6 ± 0.74 *	5.7 ± 0.82 *	4.8 ± 0.80 *	5.6 ±0.49 *	:	12 MOS	6.4 ± 0.62 *	6.2 ± 0.58 *	5.7 ± 1.26 *	5.8 ±0.80 *
18 MOS	4.2 ± 1.05 *	5.3 ± 0.91 *	4.1 ± 0.92 *	5.1 ±1.14 *	:	18 MOS	6.2 ± 0.77 *	5.9 ± 0.62 *	5.6 ± 0.92 *	5.6 ±0.63 *
24 MOS	3.8 ± 1.19 *	4.5 ± 1.16 *	3.8 ± 1.03 *	4.7 ±0.96 *	:	24 MOS	5.5 ± 0.84 *	5.8 ± 0.89 *	4.9 ± 1.07 *	5.0 ±1.11

Means ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL (MRE-1) AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

	HAM SLICES				:	BEEF WITH SPICED SAUCE			
	APPEARANCE	ODOR	FLAVOR	TEXTURE	:	APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C					:	4°C			
INITIAL	6.4 ± 0.83	6.5 ± 0.64	6.4 ± 0.91	6.5 ± 0.83	:	INITIAL	5.9 ± 1.13	6.3 ± 0.70	6.1 ± 0.74
12 MOS	6.3 ± 0.75	6.4 ± 0.62	6.4 ± 0.77	6.5 ± 0.78	:	12 MOS	5.7 ± 1.16	6.1 ± 0.69	6.3 ± 0.90
30 MOS	6.3 ± 0.77	5.8 ± 0.92 *	6.3 ± 0.83	6.4 ± 0.72	:	30 MOS	5.7 ± 1.11	6.1 ± 0.69	5.5 ± 0.93 *
36 MOS	5.3 ± 1.41 *	6.0 ± 1.16 *	6.3 ± 0.85	6.4 ± 0.79	:	36 MOS	5.7 ± 1.15	6.1 ± 0.79	5.2 ± 0.63 *
48 MOS	5.7 ± 1.05 *	5.9 ± 1.08 *	6.2 ± 0.85	6.3 ± 0.76	:	48 MOS	5.6 ± 1.12	6.1 ± 0.80	5.1 ± 1.22 *
60 MOS	5.6 ± 1.02 *	5.7 ± 1.01 *	6.2 ± 0.87	5.7 ± 0.90 *	:	60 MOS	5.5 ± 1.08	4.9 ± 1.22 *	5.2 ± 0.94 *
21°C					:	21°C			
INITIAL	6.4 ± 0.83	6.5 ± 0.64	6.4 ± 0.91	6.5 ± 0.83	:	INITIAL	5.9 ± 1.13	6.3 ± 0.70	6.1 ± 0.74
12 MOS	6.3 ± 0.76	6.4 ± 0.67	5.8 ± 0.97 *	6.3 ± 0.84	:	12 MOS	5.7 ± 1.23	6.1 ± 0.77	6.3 ± 0.90
18 MOS	6.3 ± 0.75	6.0 ± 0.68 *	6.0 ± 0.68 *	6.3 ± 0.77	:	18 MOS	5.8 ± 1.14	6.1 ± 0.68	5.1 ± 1.14 *
24 MOS	6.2 ± 0.82	6.1 ± 0.90 *	6.1 ± 0.90	6.3 ± 0.78	:	24 MOS	5.7 ± 1.12	6.2 ± 0.64	5.5 ± 0.93 *
30 MOS	6.2 ± 0.80	5.8 ± 0.92 *	6.1 ± 0.89	6.3 ± 0.76	:	30 MOS	5.7 ± 1.10	6.1 ± 0.68	5.7 ± 0.99 *
36 MOS	6.2 ± 0.86	5.6 ± 1.71 *	6.0 ± 1.05	6.3 ± 0.85	:	36 MOS	5.7 ± 1.10	6.1 ± 0.71	5.6 ± 0.76 *
48 MOS	6.1 ± 0.87	5.7 ± 1.48 *	6.0 ± 1.08	6.2 ± 0.92	:	48 MOS	5.7 ± 1.06	5.0 ± 1.05 *	5.2 ± 0.79 *
60 MOS	6.2 ± 0.87	5.6 ± 1.28 *	6.0 ± 1.11	5.8 ± 1.08 *	:	60 MOS	5.7 ± 1.06	5.2 ± 1.19 *	5.1 ± 1.14 *
30°C					:	30°C			
INITIAL	6.4 ± 0.83	6.5 ± 0.64	6.4 ± 0.91	6.5 ± 0.83	:	INITIAL	5.9 ± 1.13	6.3 ± 0.70	6.1 ± 0.74
6 MOS	6.5 ± 0.76	6.5 ± 0.56	6.4 ± 0.76	6.5 ± 0.72	:	6 MOS	6.0 ± 0.98	6.2 ± 0.60	6.3 ± 0.90
12 MOS	6.1 ± 0.47 *	6.4 ± 0.58	6.0 ± 0.68 *	6.4 ± 0.81	:	12 MOS	5.9 ± 1.07	6.2 ± 0.61	5.5 ± 0.81 *
18 MOS	6.5 ± 0.63 *	6.2 ± 0.95 *	6.3 ± 0.75	6.4 ± 0.79	:	18 MOS	5.8 ± 1.07	6.2 ± 0.60	5.7 ± 1.07 *
24 MOS	6.3 ± 0.75 *	6.2 ± 1.03 *	6.0 ± 0.74 *	6.3 ± 0.78	:	24 MOS	5.8 ± 1.05	6.2 ± 0.58	5.1 ± 1.00 *
30 MOS	6.4 ± 0.70	5.7 ± 0.94 *	5.7 ± 0.82 *	6.3 ± 0.80	:	30 MOS	5.8 ± 1.06	6.2 ± 0.58	5.0 ± 1.11 *
36 MOS	6.3 ± 0.71	6.0 ± 0.82 *	5.8 ± 1.23 *	5.9 ± 1.10 *	:	36 MOS	5.2 ± 0.98 *	4.8 ± 0.92	5.5 ± 1.08 *
38°C					:	38°C			
INITIAL	6.4 ± 0.83	6.5 ± 0.64	6.4 ± 0.91	6.5 ± 0.83	:	INITIAL	5.9 ± 1.13	6.3 ± 0.70	6.1 ± 0.74
6 MOS	6.5 ± 0.88	6.5 ± 0.56	6.3 ± 0.91	6.5 ± 0.81	:	6 MOS	5.8 ± 1.10	6.2 ± 0.73	6.3 ± 0.90
12 MOS	6.5 ± 0.79	6.4 ± 0.58	6.3 ± 0.89	6.4 ± 0.82	:	12 MOS	5.8 ± 1.10	6.2 ± 0.68	5.1 ± 1.18 *
18 MOS	6.5 ± 0.73	6.1 ± 0.83 *	6.2 ± 0.84	6.4 ± 0.84	:	18 MOS	5.8 ± 1.04	6.2 ± 0.63	5.5 ± 0.99 *
24 MOS	6.5 ± 0.72	6.1 ± 1.00 *	5.6 ± 0.88 *	6.4 ± 0.82	:	24 MOS	5.8 ± 1.06	6.2 ± 0.63	5.1 ± 0.92 *

Means ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL (MRE-1) AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

BROWNIES

	APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C				
INITIAL	7.0 ± 0.85	7.0 ± 1.00	6.4 ± 1.18	6.4 ± 1.12
12 MOS	6.8 ± 0.89	6.3 ± 0.96 *	5.4 ± 1.24 *	6.1 ± 1.17
30 MOS	6.7 ± 0.92	5.8 ± 1.39 *	5.5 ± 1.00 *	6.1 ± 1.10
36 MOS	-	-	-	-
48 MOS	-	-	-	-
60 MOS	-	-	-	-
21°C				
INITIAL	7.0 ± 0.85	7.0 ± 1.00	6.4 ± 1.18	6.4 ± 1.12
12 MOS	6.6 ± 0.82 *	6.2 ± 0.94 *	5.5 ± 1.35 *	6.2 ± 1.18
18 MOS	6.6 ± 0.95 *	6.1 ± 1.04 *	5.3 ± 1.18 *	6.1 ± 1.12
24 MOS	5.9 ± 0.83 *	6.2 ± 0.42 *	5.1 ± 0.92 *	6.1 ± 1.12
30 MOS	6.7 ± 0.88	6.1 ± 0.64 *	5.2 ± 1.14 *	6.1 ± 1.12
36 MOS	-	-	-	-
48 MOS	-	-	-	-
60 MOS	-	-	-	-
30°C				
INITIAL	7.0 ± 0.85	7.0 ± 1.00	6.4 ± 1.18	6.4 ± 1.12
6 MOS	6.9 ± 0.83	6.5 ± 0.81 *	6.1 ± 1.34	6.4 ± 1.14
12 MOS	6.6 ± 0.98 *	5.8 ± 1.14 *	4.9 ± 1.83 *	5.6 ± 1.29 *
18 MOS	6.3 ± 0.83 *	5.4 ± 1.12 *	4.7 ± 1.31 *	5.8 ± 0.92 *
24 MOS	5.6 ± 1.12 *	6.1 ± 0.64 *	5.2 ± 1.14 *	5.7 ± 1.11 *
30 MOS	5.4 ± 1.07 *	6.1 ± 0.57 *	4.8 ± 0.92 *	5.2 ± 0.79 *
36 MOS	-	-	-	-
38°C				
INITIAL	7.0 ± 0.85	7.0 ± 1.00	6.4 ± 1.18	6.4 ± 1.12
6 MOS	6.8 ± 0.86	6.4 ± 0.95 *	5.6 ± 1.36 *	6.2 ± 1.11
12 MOS	6.3 ± 1.22 *	5.6 ± 1.34 *	3.8 ± 1.90 *	5.4 ± 1.59 *
18 MOS	5.9 ± 1.12 *	5.4 ± 1.12 *	4.3 ± 1.30 *	5.4 ± 1.12 *
24 MOS	-	-	-	-

COOKIES

	APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C				
INITIAL	6.7 ± 0.72	6.9 ± 0.70	6.8 ± 0.68	7.1 ± 0.74
12 MOS	6.7 ± 0.75	6.9 ± 0.68	6.8 ± 0.61	7.0 ± 0.83
30 MOS	6.7 ± 0.74	6.8 ± 0.66	6.8 ± 0.66	7.0 ± 0.85
36 MOS	6.7 ± 0.77	6.8 ± 0.67	6.8 ± 0.67	6.9 ± 0.85
48 MOS	6.7 ± 0.75	6.2 ± 0.63 *	6.8 ± 0.71	6.9 ± 0.84
60 MOS	6.7 ± 0.81	6.4 ± 0.70 *	6.8 ± 0.74	6.9 ± 0.89
21°C				
INITIAL	6.7 ± 0.72	6.9 ± 0.70	6.8 ± 0.68	7.1 ± 0.74
12 MOS	6.7 ± 0.66	6.8 ± 0.70	6.7 ± 0.65	6.9 ± 0.83 *
18 MOS	6.7 ± 0.63	6.8 ± 0.72	6.7 ± 1.03 *	7.0 ± 0.75
24 MOS	6.7 ± 0.65	6.5 ± 1.04 *	6.5 ± 0.87 *	6.9 ± 0.75
30 MOS	6.8 ± 0.65	6.7 ± 0.80	6.7 ± 0.80	6.9 ± 0.77
36 MOS	6.8 ± 0.65	6.7 ± 0.76	6.7 ± 0.82	6.9 ± 0.78
48 MOS	6.8 ± 0.65	6.3 ± 0.47 *	6.6 ± 0.88	6.9 ± 0.79
60 MOS	6.8 ± 0.69	6.4 ± 0.70 *	6.6 ± 0.92	6.9 ± 0.79
30°C				
INITIAL	6.7 ± 0.72	6.9 ± 0.70	6.8 ± 0.68	7.1 ± 0.74
6 MOS	6.8 ± 0.70	6.9 ± 0.76	6.9 ± 0.76	7.2 ± 0.73
12 MOS	6.8 ± 0.71	6.8 ± 0.72	6.8 ± 0.73	7.0 ± 0.77
18 MOS	6.8 ± 0.68	6.8 ± 0.69	6.8 ± 0.76	7.0 ± 0.74
24 MOS	6.8 ± 0.66	6.8 ± 0.68	6.8 ± 0.75	7.0 ± 0.73
30 MOS	6.8 ± 0.67	6.8 ± 0.66	6.8 ± 0.77	7.0 ± 0.76
36 MOS	6.8 ± 0.66	6.7 ± 0.66	6.7 ± 0.80	7.0 ± 0.77
38°C				
INITIAL	6.7 ± 0.72	6.9 ± 0.70	6.8 ± 0.68	7.1 ± 0.74
6 MOS	6.8 ± 0.75	7.0 ± 0.71	6.9 ± 0.70	7.1 ± 0.81
12 MOS	6.8 ± 0.77	6.9 ± 0.70	6.9 ± 0.73	7.1 ± 0.80
18 MOS	6.8 ± 0.73	6.6 ± 0.76 *	6.4 ± 0.86 *	7.0 ± 0.82
24 MOS	6.8 ± 0.70	6.6 ± 0.76 *	6.3 ± 1.16 *	6.8 ± 0.69 *

Means ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL (MRE-1) AFTER STORAGE AT 4, 21, 30, AND 38°C

N	PINEAPPLE NUT CAKE					CHERRY NUT CAKE				
	APPEARANCE	ODOR	FLAVOR	TEXTURE		APPEARANCE	ODOR	FLAVOR	TEXTURE	
	4°C					4°C				
INITIAL	6.6 ± 0.83	6.3 ± 1.11	6.6 ± 1.12	6.7 ± 0.80	:	INITIAL	6.5 ± 0.74	6.8 ± 1.01	6.6 ± 1.06	6.6 ± 0.91
12 MOS	6.4 ± 0.73 *	6.2 ± 1.01	6.4 ± 0.90 *	6.7 ± 0.79	:	12 MOS	6.7 ± 0.70	6.7 ± 0.87	6.6 ± 0.89	6.7 ± 0.84
30 MOS	5.8 ± 1.27 *	6.2 ± 0.96	5.9 ± 1.31 *	6.6 ± 0.89	:	30 MOS	6.6 ± 0.80	6.7 ± 0.82	6.5 ± 0.92	6.6 ± 0.83
36 MOS	6.0 ± 0.89 *	6.1 ± 0.94	6.1 ± 0.94 *	6.6 ± 0.92	:	36 MOS	6.1 ± 0.79 *	6.6 ± 0.79	6.5 ± 0.90	6.6 ± 0.77
48 MOS	6.2 ± 0.60 *	6.1 ± 0.91	5.7 ± 0.90 *	6.0 ± 0.89 *	:	48 MOS	5.7 ± 1.16 *	5.7 ± 0.82 *	5.3 ± 0.94 *	6.0 ± 0.94 *
60 MOS	6.3 ± 0.90	6.1 ± 0.88	6.0 ± 0.71 *	6.2 ± 0.66 *	:	60 MOS	5.6 ± 0.48 *	6.0 ± 0.71 *	6.1 ± 0.60 *	6.1 ± 0.78 *
	21°C				:		21°C			:
INITIAL	6.6 ± 0.83	6.3 ± 1.11	6.6 ± 1.12	6.7 ± 0.80	:	INITIAL	6.5 ± 0.74	6.8 ± 1.01	6.6 ± 1.06	6.6 ± 0.91
12 MOS	6.5 ± 0.90	6.3 ± 1.02	6.3 ± 0.88 *	6.4 ± 0.73 *	:	12 MOS	6.6 ± 0.62 *	6.3 ± 0.96 *	6.4 ± 1.03	6.5 ± 0.91 *
18 MOS	6.6 ± 0.86	6.4 ± 0.93	6.5 ± 0.91	6.6 ± 0.73	:	18 MOS	6.5 ± 0.63	6.5 ± 0.89	6.5 ± 0.97	6.6 ± 0.49 *
24 MOS	6.5 ± 0.81	6.3 ± 0.87	6.5 ± 0.88	6.6 ± 0.76	:	24 MOS	6.1 ± 0.76 *	6.3 ± 0.72	6.4 ± 0.94	6.5 ± 0.77
30 MOS	6.5 ± 0.77	6.3 ± 0.87	6.3 ± 0.75 *	6.6 ± 0.77	:	30 MOS	5.8 ± 0.94 *	6.3 ± 0.75 *	5.7 ± 1.05 *	6.4 ± 0.88 *
36 MOS	6.5 ± 0.76	6.2 ± 0.85	6.0 ± 0.78 *	6.2 ± 0.75 *	:	36 MOS	6.5 ± 0.50 *	6.5 ± 0.82	6.4 ± 0.96	6.5 ± 0.77
48 MOS	6.5 ± 0.75	6.2 ± 0.86	5.8 ± 0.60 *	6.1 ± 0.83 *	:	48 MOS	5.7 ± 0.82 *	5.7 ± 0.67	5.7 ± 1.05 *	5.9 ± 0.99 *
60 MOS	6.0 ± 0.71 *	6.2 ± 0.85	5.4 ± 0.86 *	6.0 ± 1.12 *	:	60 MOS	5.1 ± 0.93 *	5.4 ± 0.48 *	5.1 ± 0.78 *	5.6 ± 1.11 *
	30°C				:		30°C			:
INITIAL	6.6 ± 0.83	6.3 ± 1.11	6.6 ± 1.12	6.7 ± 0.80	:	INITIAL	6.5 ± 0.74	6.8 ± 1.01	6.6 ± 1.06	6.6 ± 0.91
6 MOS	6.6 ± 0.76	6.3 ± 1.01	6.3 ± 0.87 *	6.6 ± 0.88	:	6 MOS	6.8 ± 0.65 *	6.5 ± 0.72 *	6.4 ± 0.61 *	6.7 ± 0.68 *
12 MOS	6.6 ± 0.75	6.3 ± 0.91	6.4 ± 0.61 *	6.5 ± 0.87	:	12 MOS	6.4 ± 0.72 *	6.6 ± 0.62 *	6.5 ± 0.84	6.7 ± 0.77
18 MOS	6.5 ± 0.73	6.3 ± 0.86	6.4 ± 0.86	6.5 ± 0.82	:	18 MOS	6.6 ± 0.73	6.6 ± 0.80	6.5 ± 0.82	6.4 ± 0.49 *
24 MOS	6.2 ± 0.69 *	6.3 ± 0.83	6.2 ± 0.69 *	6.5 ± 0.83	:	24 MOS	6.5 ± 0.72	6.1 ± 0.64	6.5 ± 0.80	6.3 ± 0.60 *
30 MOS	5.2 ± 0.72 *	5.4 ± 1.15 *	5.4 ± 0.88 *	5.8 ± 1.19 *	:	30 MOS	5.0 ± 1.21 *	5.8 ± 1.03 *	5.5 ± 1.23 *	6.2 ± 0.94 *
36 MOS	4.8 ± 0.87 *	5.3 ± 1.01 *	5.0 ± 1.00 *	5.2 ± 0.75 *	:	36 MOS	5.0 ± 0.95 *	5.8 ± 0.83 *	5.4 ± 0.98 *	5.6 ± 1.07 *
	38°C				:		38°C			:
INITIAL	6.6 ± 0.83	6.3 ± 1.11	6.6 ± 1.12	6.7 ± 0.80	:	INITIAL	6.5 ± 0.74	6.8 ± 1.01	6.6 ± 1.06	6.6 ± 0.91
6 MOS	6.5 ± 0.76	6.2 ± 0.96	6.2 ± 0.98 *	6.7 ± 0.77	:	6 MOS	6.6 ± 0.72	6.7 ± 1.01	6.5 ± 1.02	6.7 ± 0.83
12 MOS	5.6 ± 0.81 *	5.8 ± 0.86 *	5.4 ± 0.98 *	6.1 ± 1.06 *	:	12 MOS	5.9 ± 0.96 *	5.9 ± 0.83 *	6.4 ± 1.00	6.6 ± 0.84
18 MOS	5.6 ± 0.76 *	6.1 ± 0.94	5.4 ± 0.64 *	6.2 ± 1.07 *	:	18 MOS	5.6 ± 0.95 *	6.1 ± 1.12 *	6.1 ± 0.95 *	6.3 ± 0.72 *
24 MOS	5.0 ± 0.71 *	5.3 ± 1.11 *	5.0 ± 0.82 *	5.5 ± 1.19 *	:	24 MOS	5.4 ± 0.76 *	5.8 ± 0.90	5.7 ± 1.03 *	6.0 ± 0.71 *

Mean ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL (MRE-1) AFTER STORAGE AT 4, 21, 30, AND 38 °C

	MAPLE NUT CAKE					FRUITCAKE			
	APPEARANCE	ODOR	FLAVOR	TEXTURE		APPEARANCE	ODOR	FLAVOR	TEXTURE
4 °C						4 °C			
INITIAL	6.7 ± 0.72	6.9 ± 0.92	6.9 ± 0.88	6.6 ± 0.83	INITIAL	6.9 ± 0.80	6.7 ± 0.82	6.9 ± 0.92	6.9 ± 0.80
12 MOS	6.7 ± 0.70	6.7 ± 0.91	6.6 ± 0.83 *	6.6 ± 0.81	12 MOS	6.9 ± 0.71	6.6 ± 0.76	6.8 ± 0.99	6.9 ± 0.80
30 MOS	6.7 ± 0.63	6.7 ± 0.90	6.7 ± 0.9	6.5 ± 0.77	30 MOS	6.8 ± 0.70	6.5 ± 0.71	6.3 ± 0.62 *	6.4 ± 0.48 *
36 MOS	6.7 ± 0.63	6.6 ± 0.90	6.7 ± 0.88	6.6 ± 0.76	36 MOS	6.8 ± 0.67	6.4 ± 0.64 *	6.6 ± 0.78 *	6.5 ± 0.50 *
48 MOS	6.7 ± 0.62	6.6 ± 0.94	6.3 ± 1.42 *	6.6 ± 0.76	48 MOS	6.3 ± 0.67 *	6.5 ± 0.67	6.1 ± 0.74 *	6.4 ± 0.50 *
60 MOS	6.6 ± 0.66	6.6 ± 0.94	6.6 ± 0.99	6.6 ± 0.79	60 MOS	6.2 ± 0.97 *	6.1 ± 0.60 *	6.4 ± 0.48 *	6.6 ± 0.48 *
21 °C					21 °C				
INITIAL	6.7 ± 0.72	6.9 ± 0.92	6.9 ± 0.88	6.6 ± 0.83	INITIAL	6.9 ± 0.80	6.7 ± 0.82	6.9 ± 0.92	6.9 ± 0.80
12 MOS	6.8 ± 0.63	6.7 ± 0.91	6.4 ± 0.9 *	6.6 ± 0.81	12 MOS	6.8 ± 0.71	6.5 ± 0.73	6.7 ± 0.92	6.8 ± 0.71
18 MOS	6.7 ± 0.64	6.7 ± 0.92	6.1 ± 1.19 *	6.5 ± 0.83	18 MOS	6.9 ± 0.28 *	6.5 ± 0.67	6.7 ± 0.86	6.5 ± 0.76 *
24 MOS	6.6 ± 0.66	6.6 ± 0.88	6.4 ± 0.92 *	6.5 ± 0.80	24 MOS	6.3 ± 0.64 *	6.2 ± 0.60 *	6.1 ± 0.94 *	6.2 ± 0.40 *
30 MOS	6.6 ± 0.66	6.6 ± 0.88	6.5 ± 1.01	6.5 ± 0.79	30 MOS	5.5 ± 0.50 *	5.5 ± 0.50 *	5.8 ± 0.83 *	5.9 ± 0.51 *
36 MOS	6.3 ± 0.62 *	6.4 ± 0.88 *	6.5 ± 0.96	6.5 ± 0.79	36 MOS	5.3 ± 0.86 *	5.6 ± 0.48 *	6.0 ± 0.74 *	5.7 ± 0.75 *
48 MOS	6.2 ± 0.60 *	6.2 ± 0.98 *	5.9 ± 0.94 *	6.5 ± 0.81	48 MOS	5.3 ± 1.76 *	5.6 ± 0.96 *	5.3 ± 0.94 *	6.0 ± 0.67 *
60 MOS	5.9 ± 1.05 *	6.1 ± 1.05 *	5.9 ± 0.93 *	6.4 ± 0.83	60 MOS	4.6 ± 1.50 *	5.4 ± 1.11 *	5.6 ± 0.99 *	6.1 ± 0.78 *
30 °C					30 °C				
INITIAL	6.7 ± 0.72	6.9 ± 0.92	6.9 ± 0.88	6.6 ± 0.83	INITIAL	6.9 ± 0.80	6.7 ± 0.82	6.9 ± 0.92	6.9 ± 0.80
6 MOS	6.7 ± 0.63	6.7 ± 0.85	6.5 ± 0.72 *	6.6 ± 0.84	6 MOS	6.9 ± 0.72	6.6 ± 0.76	6.6 ± 1.17	6.9 ± 0.83
12 MOS	6.7 ± 0.63	6.7 ± 0.84	6.4 ± 0.97 *	6.5 ± 0.84	12 MOS	6.0 ± 1.07 *	6.5 ± 0.75	6.5 ± 1.10	6.4 ± 0.81 *
18 MOS	6.7 ± 0.64	6.2 ± 0.80 *	6.3 ± 0.94 *	6.5 ± 0.82	18 MOS	5.7 ± 0.75 *	6.0 ± 0.58 *	5.9 ± 0.64 *	6.0 ± 0.58 *
24 MOS	6.6 ± 0.64	6.2 ± 0.60 *	6.0 ± 0.89 *	6.5 ± 0.80	24 MOS	4.9 ± 0.94 *	5.6 ± 0.66 *	5.3 ± 0.64 *	5.7 ± 0.90 *
30 MOS	5.8 ± 0.90 *	5.7 ± 0.85	5.8 ± 0.92 *	6.4 ± 0.86	30 MOS	3.9 ± 1.24 *	4.9 ± 0.90 *	4.5 ± 1.23 *	5.2 ± 0.83 *
36 MOS	5.6 ± 0.98 *	5.5 ± 0.90	5.5 ± 1.08 *	6.2 ± 0.94 *	36 MOS	3.8 ± 1.11 *	5.1 ± 0.79 *	4.6 ± 1.07 *	5.2 ± 1.03 *
38 °C					38 °C				
INITIAL	6.7 ± 0.72	6.9 ± 0.92 *	6.9 ± 0.88	6.6 ± 0.83	INITIAL	6.9 ± 0.80	6.7 ± 0.82	6.9 ± 0.92	6.9 ± 0.80
6 MOS	6.7 ± 0.69	6.8 ± 0.84	6.5 ± 0.72 *	6.6 ± 0.76	6 MOS	6.5 ± 0.88 *	6.5 ± 0.76	6.4 ± 0.95 *	6.7 ± 0.85
12 MOS	6.1 ± 0.99 *	6.1 ± 0.92 *	5.6 ± 1.11 *	6.5 ± 0.81	12 MOS	5.5 ± 1.12 *	6.0 ± 0.76 *	5.9 ± 0.74 *	6.4 ± 0.90 *
18 MOS	6.0 ± 1.00 *	6.0 ± 0.91 *	6.0 ± 0.91 *	6.5 ± 0.80	18 MOS	4.7 ± 1.18 *	5.3 ± 0.94 *	5.2 ± 1.14 *	5.5 ± 0.65 *
24 MOS	5.6 ± 1.11 *	5.8 ± 0.87 *	5.6 ± 1.02 *	5.9 ± 1.14 *	24 MOS	3.8 ± 1.25 *	4.9 ± 0.70 *	4.5 ± 1.03 *	5.4 ± 0.66 *

Mean±S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL (MRE-1) AFTER STORAGE AT 4, 21, 30, AND 38 °C

CHOCOLATE NUT CAKE					ORANGE NUT CAKE				
	APPEARANCE	ODOR	FLAVOR	TEXTURE		APPEARANCE	ODOR	FLAVOR	TEXTURE
4 °C					4 °C				
INITIAL	6.9 ± 0.83	7.1 ± 0.88	6.8 ± 0.94	6.7 ± 0.98	INITIAL	6.8 ± 0.94	6.9 ± 0.96	6.9 ± 0.92	6.7 ± 0.96
12 MOS	6.4 ± 1.05 *	6.4 ± 0.90 *	6.0 ± 1.07 *	6.3 ± 1.10 *	12 MOS	6.8 ± 0.93	6.8 ± 1.01	6.4 ± 1.12 *	6.6 ± 1.00
30 MOS	6.3 ± 0.75 *	6.2 ± 0.90 *	6.2 ± 0.60 *	5.9 ± 0.76 *	30 MOS	6.7 ± 0.84	6.3 ± 0.62 *	6.1 ± 0.79 *	6.1 ± 0.79 *
36 MOS	6.5 ± 0.87	6.0 ± 0.78 *	6.2 ± 0.60 *	6.0 ± 0.63 *	36 MOS	6.7 ± 0.78	6.5 ± 0.67 *	6.3 ± 0.64 *	6.4 ± 0.49 *
48 MOS	6.6 ± 0.84	6.0 ± 1.05 *	5.7 ± 1.25 *	5.7 ± 0.67 *	48 MOS	6.7 ± 0.77	6.3 ± 0.64 *	6.0 ± 0.63 *	6.4 ± 0.86
60 MOS	6.5 ± 0.83	6.0 ± 0.87 *	5.9 ± 0.93 *	6.0 ± 0.87 *	60 MOS	6.2 ± 0.66 *	6.6 ± 0.70 *	6.5 ± 0.50 *	6.5 ± 0.83
21 °C					21 °C				
INITIAL	6.9 ± 0.83	7.1 ± 0.88	6.8 ± 0.94	6.7 ± 0.98	INITIAL	6.8 ± 0.94	6.9 ± 0.96	6.9 ± 0.92	6.7 ± 0.96
12 MOS	6.8 ± 0.90	6.3 ± 0.96 *	6.3 ± 1.10 *	6.3 ± 1.10 *	12 MOS	6.8 ± 0.90	6.7 ± 0.94	6.7 ± 0.91	6.6 ± 0.97
18 MOS	6.7 ± 0.93	6.2 ± 0.80 *	6.5 ± 0.97	6.4 ± 0.99	18 MOS	6.7 ± 0.87	6.3 ± 0.72 *	6.3 ± 0.92 *	6.3 ± 0.92 *
24 MOS	6.7 ± 0.86	6.3 ± 0.62 *	6.5 ± 0.94	6.5 ± 0.94	24 MOS	6.7 ± 0.83	6.5 ± 0.67 *	6.3 ± 1.01 *	6.3 ± 0.64 *
30 MOS	6.2 ± 0.80 *	6.1 ± 0.86 *	6.4 ± 0.93	5.9 ± 0.76 *	30 MOS	6.3 ± 0.62 *	6.4 ± 0.48 *	6.1 ± 0.90 *	6.3 ± 0.75 *
36 MOS	6.0 ± 0.70 *	5.6 ± 0.92 *	5.8 ± 0.98 *	5.5 ± 0.81 *	36 MOS	6.3 ± 0.78 *	6.5 ± 0.50 *	6.3 ± 0.78 *	6.4 ± 0.89
48 MOS	6.1 ± 0.57 *	5.6 ± 0.68 *	5.7 ± 0.94 *	5.7 ± 0.67 *	48 MOS	6.0 ± 0.89 *	5.9 ± 0.83 *	5.9 ± 0.70 *	6.4 ± 0.88
60 MOS	6.0 ± 0.71 *	5.4 ± 0.99 *	5.2 ± 1.09 *	5.9 ± 0.93 *	60 MOS	5.8 ± 0.83 *	6.1 ± 0.33 *	5.9 ± 0.60 *	6.4 ± 0.86
30 °C					30 °C				
INITIAL	6.9 ± 0.83	7.1 ± 0.88	6.8 ± 0.94	6.7 ± 0.98	INITIAL	6.8 ± 0.94	6.9 ± 0.96	6.9 ± 0.92	6.7 ± 0.96
6 MOS	6.8 ± 0.87	6.9 ± 0.89	6.6 ± 0.95	6.5 ± 1.06	6 MOS	6.8 ± 0.91	6.8 ± 1.01	6.7 ± 0.94	6.7 ± 0.94
12 MOS	6.3 ± 1.16 *	6.3 ± 1.03 *	5.9 ± 1.24 *	6.5 ± 1.06	12 MOS	6.8 ± 0.93	6.8 ± 0.89	6.7 ± 0.85	6.6 ± 0.94
18 MOS	6.3 ± 0.72 *	6.1 ± 0.76 *	6.3 ± 0.85 *	6.5 ± 1.02	18 MOS	6.3 ± 0.60 *	6.0 ± 0.71 *	6.1 ± 0.64 *	6.1 ± 0.86 *
24 MOS	5.8 ± 1.14 *	6.1 ± 0.86 *	5.8 ± 1.23 *	6.4 ± 1.02	24 MOS	6.1 ± 0.70 *	6.1 ± 0.70 *	6.2 ± 0.60 *	6.0 ± 0.63 *
30 MOS	5.7 ± 1.31 *	5.8 ± 1.28 *	5.4 ± 1.61 *	5.8 ± 1.23 *	30 MOS	5.7 ± 0.86 *	6.1 ± 0.90 *	5.7 ± 1.05 *	6.1 ± 0.90 *
36 MOS	5.0 ± 0.90 *	5.3 ± 1.01 *	5.2 ± 0.87 *	5.5 ± 1.03 *	36 MOS	5.7 ± 1.10 *	5.9 ± 0.94 *	5.4 ± 0.92 *	5.8 ± 0.75 *
38 °C					38 °C				
INITIAL	6.9 ± 0.83	7.1 ± 0.88	6.8 ± 0.94	6.7 ± 0.98	INITIAL	6.8 ± 0.94	6.9 ± 0.96	6.9 ± 0.92	6.7 ± 0.96
6 MOS	6.1 ± 0.62 *	6.7 ± 0.87	6.6 ± 1.02	6.6 ± 0.92	6 MOS	6.8 ± 0.87	6.8 ± 0.97	6.8 ± 0.87	6.6 ± 0.98
12 MOS	5.6 ± 1.39 *	6.0 ± 1.00 *	5.2 ± 1.57	6.5 ± 1.01	12 MOS	6.7 ± 0.92	6.4 ± 0.97 *	6.1 ± 0.92 *	6.5 ± 0.99
18 MOS	5.0 ± 1.23 *	6.0 ± 0.82 *	5.3 ± 1.31 *	6.0 ± 0.82 *	18 MOS	6.3 ± 0.72 *	6.0 ± 0.91 *	5.9 ± 1.04 *	5.9 ± 0.86 *
24 MOS	4.3 ± 1.03 *	5.6 ± 1.12 *	5.0 ± 1.23 *	5.7 ± 0.94 *	24 MOS	5.3 ± 0.90 *	5.8 ± 0.98 *	5.8 ± 0.98 *	5.7 ± 0.78 *

Mean ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL (MRE-1) AFTER STORAGE AT 4, 21, 30, AND 38°C

BEANS WITH TOMATO SAUCE					BEANS WITH TOMATO SAUCE				
	APPEARANCE	ODOR	FLAVOR	TEXTURE		APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C					4°C				
INITIAL	7.2 ± 0.86	6.9 ± 0.64	6.9 ± 0.74	7.1 ± 0.70	INITIAL	7.2 ± 0.86	6.9 ± 0.64	6.9 ± 0.74	7.1 ± 0.70
12 MOS	5.6 ± 0.90 *	6.7 ± 0.64	6.3 ± 0.80 *	6.4 ± 0.82 *	12 MOS	5.9 ± 0.99 *	6.5 ± 0.73 *	6.2 ± 1.01 *	5.9 ± 0.99 *
30 MOS	6.0 ± 0.85 *	6.7 ± 0.64	6.4 ± 0.88 *	6.3 ± 1.05 *	30 MOS	5.5 ± 0.99 *	6.4 ± 0.64 *	6.3 ± 0.86 *	6.1 ± 1.24 *
36 MOS	6.0 ± 0.95 *	6.7 ± 0.64	6.6 ± 0.80	6.5 ± 0.66 *	36 MOS	5.5 ± 0.89 *	6.5 ± 0.50 *	6.5 ± 0.66 *	6.2 ± 0.72 *
48 MOS	6.2 ± 0.42 *	6.7 ± 0.62	6.5 ± 0.78	6.2 ± 0.63 *	48 MOS	5.7 ± 0.82 *	6.1 ± 0.74 *	6.2 ± 0.92 *	6.0 ± 0.82 *
60 MOS	6.0 ± 0.71 *	6.7 ± 0.03	6.5 ± 0.78	6.4 ± 0.70 *	60 MOS	5.2 ± 0.43 *	6.2 ± 0.43 *	5.9 ± 0.93 *	6.2 ± 1.05
21°C					21°C				
INITIAL	7.2 ± 0.86	6.9 ± 0.64	6.9 ± 0.74	7.1 ± 0.70	INITIAL	7.7 ± 0.86	6.9 ± 0.64	6.9 ± 0.74	7.1 ± 0.70
12 MOS	7.0 ± 0.81	6.9 ± 0.57	6.8 ± 0.83	6.8 ± 0.77 *	12 MOS	6.4 ± 0.82 *	6.7 ± 0.59 *	6.6 ± 0.90 *	6.5 ± 0.63 *
18 MOS	7.0 ± 0.77	6.9 ± 0.53	6.9 ± 0.92	7.0 ± 0.72 *	18 MOS	6.3 ± 0.83 *	6.7 ± 0.62 *	6.6 ± 0.86 *	6.6 ± 0.90
24 MOS	7.0 ± 0.71	6.9 ± 0.51	7.0 ± 0.89	7.3 ± 0.60 *	24 MOS	6.8 ± 0.60 *	6.7 ± 0.75 *	6.8 ± 0.72 *	6.6 ± 0.85
30 MOS	6.3 ± 0.86 *	6.9 ± 0.56	6.9 ± 0.88	7.0 ± 0.67 *	30 MOS	6.3 ± 0.45 *	6.5 ± 0.66 *	6.5 ± 0.66 *	6.6 ± 0.82
36 MOS	6.3 ± 0.62 *	6.9 ± 0.53	6.8 ± 0.85	7.0 ± 0.66 *	36 MOS	5.7 ± 0.86 *	6.6 ± 0.48 *	6.6 ± 0.50 *	6.6 ± 0.79
48 MOS	6.1 ± 0.74 *	6.2 ± 0.92 *	6.3 ± 0.67 *	6.2 ± 0.79 *	48 MOS	5.7 ± 0.82 *	6.2 ± 0.79 *	6.2 ± 0.63 *	6.6 ± 0.78
60 MOS	6.0 ± 0.50 *	6.9 ± 0.33 *	6.8 ± 0.82	6.2 ± 0.66 *	60 MOS	5.6 ± 0.70 *	6.5 ± 0.50 *	6.5 ± 0.71 *	6.6 ± 0.78
30°C					30°C				
INITIAL	7.2 ± 0.86	6.9 ± 0.64	6.9 ± 0.74	7.1 ± 0.70	INITIAL	7.2 ± 0.86	6.9 ± 0.64	6.9 ± 0.74	7.1 ± 0.70
6 MOS	7.2 ± 0.83	6.8 ± 0.58	6.9 ± 0.68	7.0 ± 0.66 *	6 MOS	6.7 ± 0.87 *	7.0 ± 0.52	6.8 ± 0.98 *	6.8 ± 1.17
12 MOS	7.2 ± 0.83	6.8 ± 0.56	7.0 ± 0.71	7.0 ± 0.64 *	12 MOS	7.1 ± 0.52 *	7.0 ± 0.52	7.0 ± 0.84	6.7 ± 0.97
18 MOS	7.1 ± 0.84	6.9 ± 0.54	6.9 ± 0.77	7.0 ± 0.66 *	18 MOS	6.3 ± 1.01 *	6.7 ± 0.62 *	6.3 ± 0.94 *	6.7 ± 0.95
24 MOS	6.7 ± 0.75 *	6.9 ± 0.56	6.9 ± 0.91	7.0 ± 0.66 *	24 MOS	6.5 ± 0.65 *	6.3 ± 0.62 *	6.3 ± 1.01 *	6.2 ± 0.90 *
30 MOS	6.4 ± 0.98 *	6.8 ± 0.58	6.1 ± 1.31 *	7.0 ± 0.64 *	30 MOS	6.2 ± 0.72 *	6.4 ± 0.48 *	5.8 ± 0.83 *	6.5 ± 0.78 *
36 MOS	6.7 ± 0.86 *	6.8 ± 0.59	6.4 ± 1.23 *	7.0 ± 0.61 *	36 MOS	6.5 ± 0.89 *	6.7 ± 0.62 *	6.4 ± 1.30 *	6.6 ± 0.93
38°C					38°C				
INITIAL	7.2 ± 0.86	6.9 ± 0.64	6.9 ± 0.74	7.1 ± 0.70	INITIAL	7.2 ± 0.86	6.9 ± 0.64	6.9 ± 0.74	7.1 ± 0.70
6 MOS	7.2 ± 0.83	6.8 ± 0.70	6.9 ± 0.85	7.0 ± 0.73 *	6 MOS	7.3 ± 0.53	7.1 ± 0.40	7.2 ± 0.65	6.3 ± 0.87
12 MOS	6.7 ± 0.70 *	6.8 ± 0.70	6.8 ± 0.93	6.9 ± 0.78 *	12 MOS	6.7 ± 0.80 *	6.8 ± 0.56 *	6.6 ± 0.90 *	6.3 ± 0.96 *
18 MOS	6.0 ± 1.00 *	6.8 ± 0.66	6.0 ± 1.47 *	7.0 ± 0.76 *	18 MOS	6.3 ± 0.75 *	6.4 ± 0.49 *	5.7 ± 1.11 *	6.4 ± 1.00
24 MOS	5.3 ± 0.83 *	6.3 ± 0.72 *	5.3 ± 1.23 *	6.9 ± 0.83 *	24 MOS	5.3 ± 0.75 *	5.9 ± 0.76 *	5.0 ± 1.23 *	6.4 ± 0.96

Mean ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL (MRE-1) AFTER STORAGE AT 4, 21, 30, AND 38 °C

POTATO PATTIE

	APPEARANCE	ODOR	FLAVOR	TEXTURE
4 °C				
INITIAL	6.9 ± 0.83	6.8 ± 0.94	6.8 ± 0.86	5.9 ± 1.06
12 MOS	6.7 ± 0.91	6.6 ± 1.03	6.5 ± 1.10	5.9 ± 1.16
30 MOS	6.7 ± 0.87	6.2 ± 0.80 *	6.5 ± 1.08	5.8 ± 1.22
36 MOS	6.7 ± 0.85	6.2 ± 0.98 *	6.5 ± 1.07	5.8 ± 1.15
48 MOS	6.6 ± 0.89	6.1 ± 1.22 *	6.4 ± 1.22	5.8 ± 1.15
60 MOS	6.1 ± 0.78 *	6.4 ± 1.05	6.4 ± 1.21	5.8 ± 1.14
21 °C				
INITIAL	6.9 ± 0.83	6.8 ± 0.94	6.8 ± 0.86	5.9 ± 1.06
12 MOS	6.6 ± 0.93	6.6 ± 0.89	6.6 ± 0.85	5.9 ± 1.14
18 MOS	6.6 ± 0.88	5.9 ± 1.12 *	6.5 ± 0.89	5.9 ± 1.04
24 MOS	6.3 ± 0.90 *	5.9 ± 0.83 *	5.7 ± 0.64 *	5.8 ± 0.97
30 MOS	6.6 ± 0.85	6.3 ± 0.74 *	6.4 ± 0.90	6.1 ± 1.04 *
36 MOS	6.6 ± 0.82	6.0 ± 1.00 *	6.4 ± 0.92	5.9 ± 0.98
48 MOS	6.6 ± 0.79	6.3 ± 0.96	6.4 ± 0.93	5.9 ± 0.96
60 MOS	6.6 ± 0.77	6.3 ± 1.02	6.4 ± 1.04	5.9 ± 0.95
30 °C				
INITIAL	6.9 ± 0.83	6.8 ± 0.94	6.8 ± 0.86	5.9 ± 1.06
6 MOS	6.6 ± 0.88	6.6 ± 0.93	6.5 ± 0.92	6.0 ± 1.27 *
12 MOS	6.6 ± 0.86	6.6 ± 0.94	6.1 ± 1.24 *	5.9 ± 1.16
18 MOS	6.6 ± 0.84	6.6 ± 0.88	6.4 ± 1.01	6.0 ± 1.12
24 MOS	6.6 ± 0.84	6.0 ± 1.10 *	5.6 ± 1.11 *	5.9 ± 1.08
30 MOS	6.6 ± 0.81	6.2 ± 0.83 *	6.0 ± 1.16 *	5.9 ± 1.07
36 MOS	6.6 ± 0.86	5.9 ± 0.94 *	6.0 ± 1.55 *	5.9 ± 1.08
38 °C				
INITIAL	6.9 ± 0.83	6.8 ± 0.94	6.8 ± 0.86	5.9 ± 1.06
6 MOS	6.7 ± 0.86	6.7 ± 0.94	6.5 ± 0.92	5.8 ± 1.03
12 MOS	6.7 ± 0.85	6.6 ± 0.91	6.6 ± 0.89	5.9 ± 1.01
18 MOS	6.6 ± 0.84	6.6 ± 0.86	6.0 ± 0.91 *	5.9 ± 1.01
24 MOS	6.3 ± 0.90 *	6.2 ± 0.75 *	5.9 ± 0.94 *	5.9 ± 0.96

POTATO PATTIES

	APPEARANCE	ODOR	FLAVOR	TEXTURE
4 °C				
INITIAL	6.9 ± 0.83	6.8 ± 0.94	6.8 ± 0.86	5.9 ± 1.06
12 MOS	6.2 ± 0.77 *	6.2 ± 1.21 *	6.3 ± 0.96 *	5.7 ± 1.12
30 MOS	6.1 ± 0.79 *	6.1 ± 0.79 *	6.1 ± 0.79 *	5.7 ± 1.09
36 MOS	5.7 ± 0.78 *	6.0 ± 0.63 *	5.6 ± 0.80 *	5.6 ± 1.00
48 MOS	5.9 ± 0.74 *	6.0 ± 0.94 *	5.7 ± 1.49 *	5.6 ± 0.98
60 MOS	6.1 ± 0.64 *	6.3 ± 1.00	6.3 ± 1.03 *	5.7 ± 0.99
21 °C				
INITIAL	6.9 ± 0.83	6.8 ± 0.94	6.8 ± 0.86	5.9 ± 1.06
12 MOS	6.4 ± 0.82 *	6.6 ± 0.89	6.4 ± 0.82 *	5.8 ± 1.09
18 MOS	6.2 ± 0.99 *	6.3 ± 0.92 *	5.7 ± 1.18 *	5.7 ± 1.01
24 MOS	6.2 ± 0.58 *	6.5 ± 0.87	6.1 ± 0.51 *	5.8 ± 0.99
30 MOS	6.0 ± 0.74 *	6.5 ± 0.83	6.4 ± 0.88 *	5.8 ± 0.94
36 MOS	6.0 ± 0.73	6.0 ± 0.63 *	6.0 ± 0.63 *	5.8 ± 0.90
48 MOS	6.1 ± 0.74 *	6.1 ± 0.74 *	6.0 ± 0.82 *	5.8 ± 0.91
60 MOS	6.3 ± 0.88 *	6.4 ± 0.82	6.4 ± 0.73 *	5.9 ± 0.91
30 °C				
INITIAL	6.9 ± 0.83	6.8 ± 0.94	6.8 ± 0.86	5.9 ± 1.06
6 MOS	6.5 ± 0.81 *	6.5 ± 1.26	5.7 ± 1.66 *	5.7 ± 1.06
12 MOS	6.0 ± 0.93 *	4.8 ± 1.92 *	4.0 ± 2.04 *	5.4 ± 0.97 *
18 MOS	6.3 ± 0.75 *	6.4 ± 0.95 *	5.8 ± 1.40 *	6.0 ± 0.91 *
24 MOS	6.0 ± 0.74 *	6.5 ± 0.89 *	6.1 ± 1.08 *	5.7 ± 1.07
30 MOS	6.0 ± 0.74 *	6.3 ± 0.62 *	6.0 ± 1.13 *	5.7 ± 1.05
36 MOS	5.8 ± 0.87 *	6.0 ± 0.90 *	5.7 ± 1.62 *	5.7 ± 1.02
38 °C				
INITIAL	6.9 ± 0.83	6.8 ± 0.94	6.8 ± 0.86	5.9 ± 1.06
6 MOS	6.8 ± 0.79	6.8 ± 0.88	6.6 ± 0.91	5.8 ± 0.99
12 MOS	6.3 ± 0.96 *	6.7 ± 0.98	6.0 ± 1.36 *	5.9 ± 1.01
18 MOS	5.7 ± 1.05 *	6.3 ± 1.01 *	5.8 ± 1.21 *	5.2 ± 1.07 *
24 MOS	6.0 ± 0.85 *	6.3 ± 0.86 *	5.7 ± 1.21 *	5.7 ± 1.02

Mean ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL, (MRE-1) AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

PEACHES - A

PEACHES - B

	APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C				
INITIAL	6.6 ± 0.99	6.5 ± 0.83	5.8 ± 1.32	5.6 ± 1.35
12 MOS	6.3 ± 0.80 *	6.5 ± 0.77	6.0 ± 0.98	5.4 ± 1.05 *
30 MOS	6.5 ± 0.92	6.4 ± 0.97	6.4 ± 1.07 *	5.7 ± 1.15
36 MOS	6.5 ± 0.89	6.3 ± 0.97	6.1 ± 1.10	5.7 ± 1.13
48 MOS	6.4 ± 0.88	5.9 ± 1.14 *	6.0 ± 1.12	5.7 ± 1.14
60 MOS	6.5 ± 0.87	6.3 ± 0.99	6.0 ± 1.12	5.7 ± 1.12
21°C				
INITIAL	6.6 ± 0.99	6.5 ± 0.83	5.8 ± 1.32	5.2 ± 1.35
12 MOS	6.4 ± 0.72 *	6.5 ± 0.68	6.0 ± 0.98	5.9 ± 0.90
18 MOS	6.5 ± 0.86	6.4 ± 0.80	6.0 ± 0.98	5.9 ± 0.84
24 MOS	6.5 ± 0.87	6.4 ± 0.77	6.0 ± 0.93	5.8 ± 0.83
30 MOS	6.0 ± 0.95 *	6.4 ± 0.77	6.1 ± 0.95	5.8 ± 0.85
36 MOS	6.0 ± 1.41 *	5.9 ± 1.08 *	6.1 ± 1.01	5.8 ± 0.88
48 MOS	6.3 ± 0.64 *	6.1 ± 0.94 *	6.0 ± 1.05	5.8 ± 0.91
60 MOS	6.3 ± 0.95	6.3 ± 0.84	6.0 ± 1.03	5.8 ± 0.90
30°C				
INITIAL	6.6 ± 0.99	6.5 ± 0.83	5.8 ± 1.32	5.2 ± 1.35
6 MOS	6.5 ± 0.62 *	6.6 ± 0.84	6.1 ± 0.93	5.8 ± 1.00
12 MOS	6.5 ± 0.87	6.5 ± 0.81	5.6 ± 1.04 *	5.5 ± 0.98 *
18 MOS	6.5 ± 0.84	6.1 ± 1.32 *	5.9 ± 1.08	5.8 ± 0.98
24 MOS	6.5 ± 0.84	6.2 ± 0.87 *	6.0 ± 1.07	5.8 ± 0.95
30 MOS	6.5 ± 0.91	6.0 ± 1.21 *	5.9 ± 1.10	5.7 ± 1.04
36 MOS	6.1 ± 1.16 *	6.1 ± 0.79 *	5.9 ± 1.10	5.7 ± 1.05
38°C				
INITIAL	6.6 ± 0.99	6.5 ± 0.83	5.8 ± 1.32	5.2 ± 1.35
6 MOS	6.5 ± 0.96	6.5 ± 0.88	5.5 ± 1.09 *	6.0 ± 0.88
12 MOS	5.8 ± 0.56 *	6.5 ± 0.78	5.5 ± 0.91 *	5.4 ± 0.90 *
18 MOS	6.1 ± 0.64 *	6.4 ± 0.92	5.8 ± 1.04	5.8 ± 0.89
24 MOS	5.7 ± 1.01 *	5.7 ± 0.78 *	5.7 ± 1.03	5.8 ± 0.85

	APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C				
INITIAL	6.6 ± 0.99	6.5 ± 0.83	5.8 ± 1.32	5.2 ± 1.35
12 MOS	6.1 ± 0.64 *	6.4 ± 0.85	5.7 ± 1.36	5.7 ± 1.17
30 MOS	6.4 ± 0.80	6.3 ± 0.96	5.7 ± 1.35	5.8 ± 1.13
36 MOS	5.9 ± 0.90 *	6.3 ± 0.92	5.7 ± 1.35	5.8 ± 1.08
48 MOS	6.1 ± 0.74 *	5.7 ± 0.67 *	5.6 ± 1.30	5.8 ± 1.02
60 MOS	5.9 ± 0.60 *	5.6 ± 0.70 *	5.6 ± 1.31	5.8 ± 0.98
21°C				
INITIAL	6.6 ± 0.99	6.5 ± 0.83	5.8 ± 1.32	5.2 ± 1.35
12 MOS	6.2 ± 0.56 *	6.3 ± 0.92	5.7 ± 1.14	5.8 ± 0.77 *
18 MOS	6.3 ± 0.83 *	6.0 ± 1.08 *	5.8 ± 1.19	5.6 ± 1.12
24 MOS	6.0 ± 0.82 *	6.0 ± 0.82 *	5.8 ± 1.15	5.7 ± 1.08
30 MOS	6.4 ± 0.77 *	5.9 ± 1.08 *	5.8 ± 1.15	5.7 ± 1.05
36 MOS	6.3 ± 0.81	6.2 ± 0.95	5.8 ± 1.11	5.8 ± 1.02
48 MOS	5.6 ± 0.68 *	5.6 ± 0.50 *	5.7 ± 1.12	5.7 ± 1.00
60 MOS	6.4 ± 0.48 *	5.8 ± 0.66 *	5.7 ± 1.10	5.8 ± 0.97
30°C				
INITIAL	6.6 ± 0.99	6.5 ± 0.83	5.8 ± 1.32	5.2 ± 1.35
6 MOS	6.6 ± 0.80	6.6 ± 0.75	6.0 ± 1.10	6.0 ± 0.73 *
12 MOS	6.1 ± 0.74 *	6.5 ± 0.78	5.4 ± 1.12 *	5.9 ± 0.70 *
18 MOS	6.3 ± 0.72 *	6.0 ± 1.08 *	5.8 ± 1.16	5.9 ± 0.86 *
24 MOS	6.1 ± 0.64 *	5.8 ± 0.99 *	5.8 ± 1.13	5.8 ± 0.72 *
30 MOS	5.7 ± 0.86 *	5.7 ± 1.36 *	5.7 ± 1.14	5.5 ± 1.16 *
36 MOS	6.1 ± 0.90 *	6.3 ± 0.62 *	5.8 ± 1.15	6.1 ± 0.79 *
38°C				
INITIAL	6.6 ± 0.99	6.5 ± 0.83	5.8 ± 1.32	5.2 ± 1.35
6 MOS	6.4 ± 0.84	6.4 ± 0.76	5.7 ± 1.15	5.7 ± 0.68 *
12 MOS	6.1 ± 0.59 *	6.3 ± 0.77	5.7 ± 1.28	5.9 ± 0.64 *
18 MOS	6.0 ± 0.82 *	6.1 ± 1.04 *	5.7 ± 1.26	5.8 ± 1.01 *
24 MOS	5.3 ± 1.30 *	5.7 ± 1.03 *	5.6 ± 1.35	5.7 ± 1.02

Mean ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL, (MRE-1)
AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

STRAWBERRIES - A

STRAWBERRIES - B

	APPEARANCE	ODOR	FLAVOR	TEXTURE		APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C					4°C				
INITIAL	5.7 ± 0.90	6.2 ± 1.21	5.7 ± 1.10	5.6 ± 1.06	INITIAL	6.1 ± 0.77	7.1 ± 0.59	6.5 ± 0.92	6.1 ± 0.59
12 MOS	6.1 ± 0.91 *	6.4 ± 1.07	5.9 ± 0.97	5.8 ± 0.97	12 MOS	5.4 ± 1.05 *	6.2 ± 1.42 *	5.1 ± 1.16 *	5.4 ± 0.72 *
30 MOS	5.9 ± 0.90	6.4 ± 1.04	5.8 ± 0.97	5.6 ± 0.98	30 MOS	4.9 ± 1.44 *	4.6 ± 0.95 *	4.4 ± 1.07 *	5.3 ± 0.96 *
36 MOS	5.7 ± 0.97	6.4 ± 0.97	5.6 ± 1.27	5.5 ± 1.07	36 MOS	5.5 ± 0.66 *	5.8 ± 0.72 *	5.6 ± 1.27	5.3 ± 0.45 *
48 MOS	5.7 ± 1.00	6.4 ± 1.01	5.6 ± 1.27	5.5 ± 1.03	48 MOS	5.2 ± 1.08 *	5.7 ± 1.19 *	5.2 ± 1.25 *	5.0 ± 0.89 *
60 MOS	5.6 ± 1.05	6.4 ± 0.96	5.6 ± 1.23	5.5 ± 1.04	60 MOS	5.9 ± 1.22 *	6.3 ± 0.45 *	5.1 ± 0.64 *	5.4 ± 0.73 *
21°C					21°C				
INITIAL	5.7 ± 0.90	6.2 ± 1.21	5.7 ± 1.10	5.6 ± 1.06	INITIAL	6.1 ± 0.77	7.1 ± 0.59	6.5 ± 0.92	6.1 ± 0.59
12 MOS	5.6 ± 1.00	6.2 ± 1.13	5.1 ± 0.74 *	5.4 ± 1.22	12 MOS	5.9 ± 0.89	6.4 ± 0.97 *	5.2 ± 1.26 *	5.3 ± 0.96 *
18 MOS	5.6 ± 1.05	6.2 ± 1.22	5.0 ± 1.63 *	5.3 ± 1.24	18 MOS	6.0 ± 0.90	6.3 ± 0.83 *	6.2 ± 0.80 *	5.7 ± 0.94 *
24 MOS	5.5 ± 1.11	6.1 ± 1.22	4.8 ± 0.75 *	4.5 ± 0.92 *	24 MOS	6.0 ± 0.91	6.6 ± 0.80 *	6.0 ± 0.78 *	5.4 ± 0.87 *
30 MOS	4.9 ± 1.12 *	6.1 ± 1.12	4.8 ± 1.24 *	5.0 ± 0.95 *	30 MOS	5.0 ± 0.85 *	5.9 ± 1.08 *	5.0 ± 1.30 *	5.7 ± 0.86 *
36 MOS	4.3 ± 1.10 *	6.1 ± 1.10	5.2 ± 0.98 *	4.7 ± 1.35 *	36 MOS	5.8 ± 0.94	6.5 ± 0.66 *	5.2 ± 0.98 *	5.4 ± 0.64 *
48 MOS	4.3 ± 1.27 *	5.2 ± 1.25 *	3.7 ± 1.27 *	4.7 ± 1.01 *	48 MOS	4.4 ± 1.02 *	5.1 ± 1.51 *	3.8 ± 1.08 *	5.0 ± 0.89 *
60 MOS	5.0 ± 1.22 *	6.0 ± 0.87 *	5.2 ± 1.20 *	5.0 ± 1.00 *	60 MOS	5.3 ± 0.88 *	6.3 ± 0.45 *	5.3 ± 1.03 *	5.1 ± 0.64 *
30°C					30°C				
INITIAL	5.7 ± 0.90	6.2 ± 1.21	5.7 ± 1.10	5.6 ± 1.06	INITIAL	6.1 ± 0.80	7.1 ± 0.59	6.5 ± 0.92	6.1 ± 0.59
6 MOS	5.8 ± 0.87	6.2 ± 1.19	5.2 ± 1.11 *	5.5 ± 0.99	6 MOS	6.1 ± 0.81	7.0 ± 0.71	6.3 ± 1.10	6.1 ± 0.67
12 MOS	4.2 ± 1.08 *	5.4 ± 1.11 *	4.4 ± 0.82 *	4.6 ± 1.12 *	12 MOS	5.4 ± 1.54 *	6.0 ± 1.07 *	5.1 ± 1.39 *	5.1 ± 1.10 *
18 MOS	4.6 ± 1.26 *	5.8 ± 1.09 *	4.3 ± 1.11 *	4.9 ± 1.38 *	18 MOS	4.8 ± 1.07 *	5.4 ± 1.19 *	5.3 ± 1.11 *	4.9 ± 1.32 *
24 MOS	4.4 ± 1.11 *	5.7 ± 1.10 *	4.7 ± 0.78 *	4.4 ± 0.80 *	24 MOS	4.5 ± 2.11 *	5.3 ± 1.35 *	4.4 ± 1.20 *	5.0 ± 1.41 *
30 MOS	2.7 ± 1.11 *	4.6 ± 1.18 *	3.3 ± 1.38 *	4.2 ± 1.30 *	30 MOS	4.7 ± 1.54 *	5.6 ± 1.16 *	4.7 ± 1.05 *	4.9 ± 0.67 *
36 MOS	3.6 ± 1.43 *	5.5 ± 1.20 *	4.6 ± 1.43 *	4.8 ± 1.17 *	36 MOS	4.8 ± 0.94 *	5.5 ± 1.16 *	4.6 ± 1.43 *	4.9 ± 0.79 *
38°C					38°C				
INITIAL	5.7 ± 0.90	6.2 ± 1.21	5.7 ± 1.10	5.6 ± 1.06	INITIAL	6.1 ± 0.80	7.1 ± 0.59	6.5 ± 0.92	6.1 ± 0.59
6 MOS	5.4 ± 1.14	6.0 ± 1.28	4.9 ± 1.53 *	5.5 ± 1.02	6 MOS	5.5 ± 0.88 *	6.5 ± 1.20 *	5.7 ± 0.79 *	5.9 ± 0.73
12 MOS	3.6 ± 1.24 *	4.7 ± 0.96 *	3.3 ± 1.28 *	4.4 ± 1.05 *	12 MOS	4.0 ± 1.60 *	5.4 ± 1.29 *	4.1 ± 1.64 *	4.9 ± 1.16 *
18 MOS	2.7 ± 1.55 *	5.1 ± 1.38 *	3.8 ± 1.64 *	4.0 ± 1.53 *	18 MOS	3.9 ± 1.44 *	5.2 ± 1.28 *	4.0 ± 1.23 *	4.4 ± 1.38 *

Meant ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL, (MRE-1) AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

68	APPLESAUCE					:FRUIT MIX				
	APPEARANCE	ODOR	FLAVOR	TEXTURE	:	APPEARANCE	ODOR	FLAVOR	TEXTURE	:
	4°C				:	4°C				:
	INITIAL	7.1 ± 1.10	6.8 ± 0.86	6.9 ± 0.99	7.1 ± 0.96	INITIAL	6.2 ± 1.08	6.5 ± 1.13	6.3 ± 0.98	5.7 ± 0.98
	12 MOS	6.6 ± 1.05 *	6.7 ± 0.84	6.8 ± 0.93	6.9 ± 0.87	12 MOS	6.3 ± 0.94	6.3 ± 0.99	6.2 ± 1.05	5.7 ± 0.91
	30 MOS	6.9 ± 0.98	6.7 ± 0.76	6.7 ± 0.87	6.9 ± 0.79	30 MOS	4.4 ± 1.26 *	5.8 ± 1.16 *	5.2 ± 1.09 *	5.7 ± 0.87
	36 MOS	6.9 ± 0.92	6.7 ± 0.71	6.7 ± 0.84	6.8 ± 0.73	36 MOS	5.9 ± 0.70 *	5.9 ± 0.70 *	5.8 ± 0.60 *	5.7 ± 0.80
	48 MOS	6.8 ± 0.93	5.9 ± 1.20 *	6.7 ± 0.83	6.8 ± 0.69	48 MOS	6.3 ± 0.67 *	6.1 ± 0.99	5.9 ± 0.99 *	5.7 ± 0.78
	60 MOS	6.8 ± 0.89	6.5 ± 0.81	6.7 ± 0.83	6.8 ± 0.69	60 MOS	6.0 ± 1.31 *	6.2 ± 1.00	5.9 ± 1.05	5.7 ± 0.78
	21°C					21°C				
	INITIAL	7.1 ± 1.10	6.8 ± 0.86	6.9 ± 0.99	7.1 ± 0.96	INITIAL	6.2 ± 1.08	6.5 ± 1.13	6.3 ± 0.98	5.7 ± 0.98
	12 MOS	6.4 ± 0.98 *	6.6 ± 0.85	6.8 ± 0.91	6.9 ± 0.89	12 MOS	6.2 ± 1.02	6.3 ± 1.05	6.1 ± 1.17	5.7 ± 0.91
	18 MOS	6.6 ± 0.86 *	6.6 ± 0.91	6.8 ± 0.99	6.9 ± 0.87	18 MOS	6.2 ± 0.93	6.3 ± 1.01	6.1 ± 1.10	5.8 ± 0.87
	24 MOS	6.4 ± 0.92 *	6.5 ± 0.96	6.8 ± 0.96	6.6 ± 0.92 *	24 MOS	6.2 ± 0.92	6.2 ± 1.02	5.5 ± 1.16 *	5.8 ± 0.83
	30 MOS	5.4 ± 0.88 *	6.2 ± 0.72 *	5.9 ± 0.90 *	6.3 ± 0.62 *	30 MOS	6.3 ± 0.90	6.2 ± 0.98	6.0 ± 1.07 *	5.8 ± 0.79
	36 MOS	5.9 ± 0.90 *	6.5 ± 0.50 *	6.2 ± 0.83 *	6.5 ± 0.50 *	36 MOS	6.3 ± 0.86	6.2 ± 0.94	6.0 ± 1.05 *	6.2 ± 0.40
	48 MOS	5.7 ± 0.94 *	5.7 ± 1.05 *	5.8 ± 1.03 *	6.1 ± 0.88 *	48 MOS	6.2 ± 1.00	6.1 ± 0.93	5.3 ± 1.16 *	5.1 ± 0.88 *
	60 MOS	5.5 ± 0.87 *	6.1 ± 1.05 *	5.9 ± 1.27 *	6.2 ± 0.97 *	60 MOS	6.2 ± 1.00	6.2 ± 0.92	6.0 ± 1.06	5.8 ± 0.79
	30°C					30°C				
	INITIAL	7.1 ± 1.10	6.8 ± 0.86	6.9 ± 0.99	7.1 ± 0.96	INITIAL	6.2 ± 1.08	6.5 ± 1.13	6.3 ± 0.98	5.7 ± 0.98
	6 MOS	6.9 ± 1.08	6.7 ± 0.78	6.9 ± 0.92	7.0 ± 0.88	6 MOS	6.3 ± 0.93	6.5 ± 0.96	6.3 ± 1.00	5.8 ± 0.91
	12 MOS	5.9 ± 1.03 *	6.0 ± 1.00 *	6.1 ± 0.88 *	6.9 ± 0.87	12 MOS	5.7 ± 0.70 *	5.6 ± 1.05 *	5.1 ± 0.88 *	5.4 ± 0.72 *
	18 MOS	5.9 ± 0.95 *	5.9 ± 1.19 *	6.1 ± 0.86 *	6.5 ± 0.76 *	18 MOS	6.1 ± 0.86	5.7 ± 0.75 *	5.6 ± 0.86 *	5.7 ± 0.86
	24 MOS	4.9 ± 0.70 *	5.6 ± 1.02 *	5.4 ± 0.66 *	6.3 ± 0.78 *	24 MOS	5.6 ± 0.98 *	5.9 ± 0.90 *	5.6 ± 1.07 *	5.7 ± 0.92
	30 MOS	4.1 ± 0.79 *	5.5 ± 0.89 *	5.4 ± 0.97 *	5.8 ± 1.03 *	30 MOS	5.5 ± 1.04 *	5.6 ± 0.76 *	5.4 ± 0.95 *	5.7 ± 0.90
	36 MOS	4.3 ± 0.86 *	5.9 ± 1.10 *	5.2 ± 1.20 *	6.4 ± 0.77 *	36 MOS	5.4 ± 0.80 *	5.4 ± 1.02 *	5.4 ± 1.28 *	5.7 ± 0.87
	38°C					38°C				
	INITIAL	7.1 ± 1.10	6.8 ± 0.86	6.9 ± 0.99	7.1 ± 0.96	INITIAL	6.2 ± 1.08	6.5 ± 1.13	6.3 ± 0.98	5.7 ± 0.98
	6 MOS	6.0 ± 1.21 *	6.3 ± 0.85 *	6.6 ± 1.14	6.9 ± 0.96	6 MOS	6.0 ± 0.97	6.3 ± 1.03	5.7 ± 1.18 *	5.6 ± 0.88
	12 MOS	5.4 ± 1.11 *	6.1 ± 0.88 *	5.8 ± 1.01 *	6.3 ± 1.10 *	12 MOS	4.6 ± 1.29 *	4.8 ± 1.15 *	4.4 ± 1.50 *	4.9 ± 1.03 *
	18 MOS	4.8 ± 1.01 *	5.9 ± 1.19 *	5.8 ± 0.99 *	6.3 ± 1.01 *	18 MOS	4.3 ± 1.09 *	4.5 ± 1.50 *	4.2 ± 1.34 *	5.0 ± 1.40 *
	24 MOS	4.0 ± 0.78 *	5.4 ± 1.11 *	4.9 ± 0.54 *	6.0 ± 0.89 *	24 MOS	5.3 ± 1.14 *	5.7 ± 0.96 *	5.4 ± 0.98 *	5.3 ± 1.06

Mean ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL, (MRE-1) AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

COCOA					: COFFEE				
	APPEARANCE	ODOR	FLAVOR	TEXTURE	:	APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C					:	4°C			
INITIAL	7.1 ± 0.44	7.0 ± 0.73	6.7 ± 0.93	7.2 ± 0.40	:	INITIAL	6.9 ± 0.92	6.6 ± 0.90	6.9 ± 0.74
12 MOS	7.0 ± 0.50	6.8 ± 0.42 *	6.6 ± 0.81	6.9 ± 0.47 *	:	12 MOS	6.9 ± 0.88	6.4 ± 1.02	6.9 ± 0.76
30 MOS	6.9 ± 0.54	6.7 ± 0.67 *	6.6 ± 0.86	6.8 ± 0.42 *	:	30 MOS	6.8 ± 0.87	5.6 ± 1.34 *	6.8 ± 0.75
36 MOS	6.9 ± 0.56	6.4 ± 1.20 *	6.6 ± 0.94	6.8 ± 0.40 *	:	36 MOS	6.8 ± 0.89	5.9 ± 0.93 *	6.8 ± 0.74
48 MOS	6.9 ± 0.56	6.6 ± 0.88 *	6.6 ± 0.98	6.8 ± 0.39 *	:	48 MOS	6.8 ± 0.85	5.8 ± 0.97 *	5.6 ± 1.26
60 MOS	6.9 ± 0.53	6.7 ± 0.80	6.6 ± 0.99	6.6 ± 0.66 *	:	60 MOS	6.8 ± 0.80	5.7 ± 1.16 *	6.7 ± 0.70
21°C					:	21°C			
INITIAL	7.1 ± 0.44	7.0 ± 0.73	6.7 ± 0.93	7.2 ± 0.40	:	INITIAL	6.9 ± 0.92	6.6 ± 0.90	6.9 ± 0.74
12 MOS	7.0 ± 0.46	6.9 ± 0.27 *	6.6 ± 0.82	6.9 ± 0.47 *	:	12 MOS	6.9 ± 0.90	6.4 ± 0.99	6.8 ± 0.72
18 MOS	7.0 ± 0.42	7.5 ± 0.54	6.6 ± 0.80	6.8 ± 0.69 *	:	18 MOS	6.8 ± 0.89	6.1 ± 1.04 *	5.6 ± 1.22
24 MOS	7.0 ± 0.42	7.0 ± 0.52	6.6 ± 0.79	6.9 ± 0.54 *	:	24 MOS	6.8 ± 0.85	6.3 ± 1.04	5.6 ± 1.26
30 MOS	7.0 ± 0.42	6.6 ± 0.83 *	6.6 ± 0.88	6.8 ± 0.42 *	:	30 MOS	6.8 ± 0.81	5.7 ± 1.16 *	6.7 ± 0.64
36 MOS	6.8 ± 0.60 *	6.6 ± 0.49 *	6.6 ± 0.86	6.8 ± 0.40 *	:	36 MOS	6.8 ± 0.81	5.8 ± 0.97 *	6.7 ± 0.64
48 MOS	6.8 ± 0.58 *	6.7 ± 0.62 *	6.6 ± 0.88	6.8 ± 0.39 *	:	48 MOS	6.8 ± 0.79	6.0 ± 0.71 *	5.5 ± 1.27
60 MOS	6.6 ± 0.66 *	6.5 ± 0.81 *	6.6 ± 0.96	6.6 ± 0.66 *	:	60 MOS	6.8 ± 0.76	5.7 ± 1.16 *	6.7 ± 0.61
30°C					:	30°C			
INITIAL	7.1 ± 0.44	7.0 ± 0.73	6.7 ± 0.93	7.2 ± 0.40	:	INITIAL	6.9 ± 0.92	6.6 ± 0.90	6.9 ± 0.74
6 MOS	7.1 ± 0.47	7.0 ± 0.71	6.7 ± 0.91 *	7.0 ± 0.52 *	:	6 MOS	6.9 ± 0.84	6.5 ± 0.91	6.9 ± 0.65
12 MOS	7.0 ± 0.48	7.0 ± 0.64	6.7 ± 0.90	6.9 ± 0.61 *	:	12 MOS	6.9 ± 0.81	6.4 ± 0.99	6.9 ± 0.68
18 MOS	7.0 ± 0.47	6.9 ± 0.62	6.7 ± 0.94	6.9 ± 0.49 *	:	18 MOS	6.9 ± 0.82	6.0 ± 1.10 *	5.1 ± 1.51 *
24 MOS	6.7 ± 0.90 *	6.9 ± 0.64	6.6 ± 0.93	6.8 ± 0.40 *	:	24 MOS	6.8 ± 0.80	5.9 ± 1.05	5.2 ± 1.48 *
30 MOS	6.9 ± 0.31 *	6.9 ± 0.62	6.7 ± 0.90	6.7 ± 0.47 *	:	30 MOS	6.4 ± 0.96 *	5.4 ± 1.57 *	6.6 ± 0.69 *
36 MOS	6.8 ± 0.60 *	6.5 ± 0.81 *	6.6 ± 0.92	6.8 ± 0.40 *	:	36 MOS	6.8 ± 0.83	5.6 ± 0.99	6.8 ± 0.66
38°C					:	38°C			
INITIAL	7.1 ± 0.44	7.0 ± 0.73	6.7 ± 0.93	7.2 ± 0.40	:	INITIAL	6.9 ± 0.92	6.6 ± 0.90	6.9 ± 0.74
6 MOS	7.1 ± 0.51	7.0 ± 0.71	6.7 ± 1.03	7.1 ± 0.57 *	:	6 MOS	7.0 ± 0.82	6.5 ± 0.91	6.9 ± 0.72
12 MOS	7.0 ± 0.50	6.6 ± 0.49 *	6.6 ± 0.97	6.9 ± 0.47 *	:	12 MOS	6.9 ± 0.82	6.0 ± 1.18 *	6.9 ± 0.66
18 MOS	7.0 ± 0.51	6.9 ± 0.63	6.6 ± 0.91	6.9 ± 0.49 *	:	18 MOS	6.9 ± 0.79	6.0 ± 1.10 *	5.8 ± 1.20
24 MOS	7.1 ± 0.55	6.9 ± 0.61	6.4 ± 1.15 *	6.8 ± 0.39 *	:	24 MOS	6.8 ± 0.82	6.0 ± 1.05 *	6.8 ± 0.67

Meant ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL, (MRE-1) AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

CHOCOLATE WITH TOFFEE					CHOCOLATE FUDGE				
	APPEARANCE	ODOR	FLAVOR	TEXTURE		APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C					4°C				
INITIAL	7.2 ± 0.54	7.0 ± 0.52	7.1 ± 0.62	6.9 ± 1.20	INITIAL	6.9 ± 0.85	6.7 ± 0.77	6.1 ± 1.2	6.5 ± 1.15
12 MOS	6.9 ± 0.74 *	6.6 ± 0.81 *	6.6 ± 1.05 *	6.9 ± 1.04	12 MOS				
30 MOS	7.0 ± 0.65	6.5 ± 0.66 *	6.1 ± 0.94 *	6.8 ± 0.96	30 MOS				
36 MOS	6.3 ± 1.25 *	6.0 ± 0.94 *	5.9 ± 0.99	6.3 ± 0.67 *	36 MOS				
48 MOS	6.0 ± 1.26 *	5.9 ± 1.51 *	5.6 ± 1.56 *	6.3 ± 0.90 *	48 MOS				
60 MOS	6.6 ± 0.99 *	6.5 ± 1.22 *	6.5 ± 1.00 *	6.6 ± 0.91	60 MOS				
21°C					21°C				
INITIAL	7.2 ± 0.54	7.0 ± 0.52	7.1 ± 0.62	6.9 ± 1.20	INITIAL	6.9 ± 0.85	6.7 ± 0.77	6.1 ± 1.2	6.5 ± 1.15
12 MOS	4.3 ± 1.49 *	5.7 ± 1.03 *	4.6 ± 1.34 *	6.2 ± 1.01 *	12 MOS				
18 MOS	5.2 ± 1.59 *	6.1 ± 0.79 *	4.8 ± 1.95 *	6.3 ± 0.98 *	18 MOS				
24 MOS	6.0 ± 1.28 *	5.8 ± 1.14 *	5.4 ± 1.68 *	6.1 ± 1.16 *	24 MOS				
30 MOS	4.1 ± 1.24 *	5.3 ± 1.05 *	4.4 ± 1.37 *	5.3 ± 0.86 *	30 MOS				
36 MOS	3.9 ± 1.37 *	4.6 ± 1.95 *	3.7 ± 1.56	4.9 ± 0.57 *	36 MOS				
48 MOS	5.0 ± 1.41 *	5.4 ± 1.91 *	4.3 ± 1.79 *	5.4 ± 1.28 *	48 MOS				
60 MOS	4.1 ± 1.05 *	4.8 ± 1.2 *	3.2 ± 1.56 *	4.6 ± 0.99 *	60 MOS				
30°C					30°C				
INITIAL	7.2 ± 0.54	7.0 ± 0.52	7.1 ± 0.62	6.9 ± 1.20	INITIAL	6.9 ± 0.85	6.7 ± 0.77	6.1 ± 1.2	6.5 ± 1.15
6 MOS	7.2 ± 0.52	7.0 ± 0.52	6.9 ± 0.72 *	6.9 ± 1.14	6 MOS				
12 MOS	6.1 ± 1.12 *	6.0 ± 0.93 *	6.2 ± 1.01 *	6.8 ± 1.06	12 MOS				
18 MOS	6.5 ± 0.90 *	6.2 ± 0.84 *	5.7 ± 1.50 *	6.7 ± 1.02	18 MOS				
24 MOS	6.7 ± 0.89 *	6.1 ± 0.90 *	6.4 ± 0.79 *	6.5 ± 0.90 *	24 MOS				
30 MOS	5.6 ± 1.72 *	5.9 ± 1.16 *	5.1 ± 1.87 *	6.2 ± 0.72 *	30 MOS				
36 MOS	5.3 ± 1.41 *	5.4 ± 1.16 *	4.9 ± 1.60 *	6.0 ± 0.67 *	36 MOS				
38°C					38°C				
INITIAL	7.2 ± 0.54	7.0 ± 0.52	7.1 ± 0.62	6.9 ± 1.20	INITIAL	6.9 ± 0.85	6.7 ± 0.77	6.1 ± 1.2	6.5 ± 1.15
6 MOS	6.4 ± 0.61 *	6.7 ± 0.44 *	6.0 ± 0.77 *	6.9 ± 1.09	6 MOS				
12 MOS	6.1 ± 1.16	6.4 ± 0.72 *	6.2 ± 1.08	6.8 ± 1.04	12 MOS				
18 MOS	6.5 ± 1.00 *	6.4 ± 0.67 *	5.9 ± 0.90 *	6.7 ± 1.00	18 MOS				
24 MOS	6.4 ± 0.95 *	6.2 ± 0.92 *	6.1 ± 0.95	6.7 ± 0.97	24 MOS				

Mean ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL, (MRE-1)
AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

VANILLA CREAM

:CATSUP, INSTANT

	APPEARANCE	ODOR	FLAVOR	TEXTURE		APPEARANCE	ODOR	FLAVOR	TEXTURE
	4°C					4°C			
INITIAL	6.9 ± 1.03	6.6 ± 0.99	6.3 ± 1.03	6.7 ± 1.05	INITIAL	6.7 ± 1.03	6.5 ± 0.83	6.0 ± 0.76	6.4 ± 0.91
12 MOS	6.7 ± 0.94	5.9 ± 0.96 *	5.3 ± 1.10 *	6.3 ± 0.80 *	12 MOS	6.7 ± 0.84	6.4 ± 0.97	5.5 ± 1.39 *	6.3 ± 0.87
30 MOS	6.3 ± 0.62 *	5.9 ± 0.79 *	5.2 ± 1.11 *	5.2 ± 1.11 *	30 MOS	6.6 ± 0.82	6.3 ± 0.95	5.5 ± 0.83 *	5.7 ± 0.82 *
36 MOS	6.7 ± 0.77	6.8 ± 0.67	6.8 ± 0.67	6.9 ± 0.78	36 MOS	6.6 ± 0.82	6.2 ± 1.01	5.2 ± 1.47 *	5.9 ± 1.14 *
48 MOS					48 MOS	6.5 ± 0.88	6.2 ± 1.01	5.6 ± 1.23	6.1 ± 0.96
60 MOS					60 MOS	6.5 ± 0.85	6.2 ± 1.02	4.8 ± 1.17 *	5.8 ± 0.98 *
	21°C					21°C			
INITIAL	6.9 ± 1.03	6.6 ± 0.99	6.3 ± 1.03	6.7 ± 1.05	INITIAL	6.7 ± 1.03	6.5 ± 0.83	6.0 ± 0.76	6.4 ± 0.91
12 MOS	6.8 ± 0.97	6.0 ± 1.13 *	5.0 ± 1.51 *	6.4 ± 0.90 *	12 MOS	6.7 ± 0.88	6.4 ± 0.77	5.5 ± 0.93 *	6.2 ± 0.90
18 MOS	6.4 ± 0.76 *	5.7 ± 1.49 *	4.9 ± 1.32 *	6.4 ± 0.91	18 MOS	6.7 ± 0.84	6.3 ± 0.75	5.8 ± 0.85	6.2 ± 0.87
24 MOS	6.3 ± 0.83 *	5.3 ± 1.42 *	3.6 ± 1.55 *	6.1 ± 0.76 *	24 MOS	6.2 ± 0.94 *	6.3 ± 0.73	5.1 ± 1.31 *	6.2 ± 0.88
30 MOS	6.2 ± 0.72 *	5.3 ± 1.29 *	4.6 ± 1.50 *	4.6 ± 1.50 *	30 MOS	6.3 ± 0.82 *	6.3 ± 0.79	5.5 ± 0.96	6.2 ± 0.88
36 MOS	6.8 ± 0.65	6.7 ± 0.76	6.7 ± 0.82	6.9 ± 0.77	36 MOS	6.3 ± 0.78	6.3 ± 0.85	5.6 ± 1.01	6.1 ± 0.94
48 MOS					48 MOS	5.9 ± 0.67 *	6.2 ± 0.89	5.1 ± 1.00 *	6.1 ± 0.94
60 MOS					60 MOS	6.2 ± 0.87 *	5.9 ± 1.14 *	5.1 ± 1.38 *	6.1 ± 0.94
	30°C					30°C			
INITIAL	6.9 ± 1.03	6.6 ± 0.99	6.3 ± 1.03	6.7 ± 1.05	INITIAL	6.7 ± 1.03	6.5 ± 0.83	6.0 ± 0.76	6.4 ± 0.91
6 MOS	6.8 ± 1.03	6.5 ± 1.02	5.5 ± 1.26 *		6 MOS	6.7 ± 1.00	6.5 ± 0.81	6.0 ± 0.73	
12 MOS	6.4 ± 1.04 *	5.6 ± 0.9 *	4.4 ± 1.45 *	6.6 ± 0.94	12 MOS	6.3 ± 0.96 *	6.4 ± 0.86	5.9 ± 0.83	6.1 ± 0.83 *
18 MOS	6.2 ± 0.69 *	5.3 ± 1.43 *	3.7 ± 1.31 *	6.5 ± 0.95	18 MOS	4.6 ± 0.99 *	5.5 ± 0.99 *	4.2 ± 0.99 *	5.9 ± 0.99 *
24 MOS					24 MOS	3.1 ± 1.87 *	4.5 ± 1.70 *	3.0 ± 1.67 *	5.5 ± 1.04 *
30 MOS	5.6 ± 1.72 *	5.9 ± 1.16 *	5.1 ± 1.78 *	5.1 ± 1.79 *	30 MOS	5.6 ± 1.72 *	5.9 ± 1.16 *	5.1 ± 1.78 *	6.2 ± 0.72 *
36 MOS	6.8 ± 0.66	6.8 ± 0.66	6.7 ± 0.79	7.0 ± 0.8	36 MOS	5.4 ± 1.41 *	5.5 ± 1.17 *	4.9 ± 1.60 *	6.1 ± 0.67 *
	38°C					38°C			
INITIAL	6.9 ± 1.03	6.6 ± 0.99	6.3 ± 1.03	6.7 ± 1.05	INITIAL	6.7 ± 1.03	6.5 ± 0.83	6.0 ± 0.76	6.4 ± 0.91
6 MOS	6.7 ± 1.09	6.4 ± 0.99	5.5 ± 1.26 *		6 MOS	6.7 ± 1.00	6.5 ± 0.81	6.0 ± 0.73	
12 MOS	6.3 ± 0.96 *	5.4 ± 0.97 *	3.8 ± 1.47 *	6.1 ± 0.83 *	12 MOS	6.3 ± 0.96 *	5.4 ± 0.97 *	3.8 ± 1.47 *	6.3 ± 0.87
18 MOS	5.7 ± 0.94 *	5.3 ± 1.53 *	3.3 ± 1.01 *	6.0 ± 0.91 *	18 MOS	3.3 ± 0.99 *	4.6 ± 0.99 *	3.2 ± 0.99 *	5.7 ± 0.99 *

Meant ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL, (MRE-1)
AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

CRACKERS (SO. PACKAGING)

: CRACKERS (RIGHT AWAY)

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	APPEARANCE	ODOR	FLAVOR	TEXTURE		APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C					4°C				
INITIAL	7.0 ± 0.76	6.2 ± 0.94	5.9 ± 1.25	6.8 ± 0.94	INITIAL	7.1 ± 0.74	7.0 ± 1.00	7.1 ± 0.74	6.8 ± 0.86
12 MOS	6.9 ± 0.74	6.3 ± 0.87	6.5 ± 0.91 *	6.9 ± 0.86	12 MOS	7.1 ± 0.71	6.9 ± 0.94	7.1 ± 0.83	6.9 ± 0.79
30 MOS	6.6 ± 0.64 *	6.3 ± 0.80	6.0 ± 1.07	6.7 ± 0.91	30 MOS	7.0 ± 0.92	5.8 ± 0.93 *	5.9 ± 1.24 *	6.9 ± 0.75
36 MOS	6.8 ± 0.70	6.2 ± 0.86	6.0 ± 1.07	6.7 ± 0.94	36 MOS	7.0 ± 0.86	6.1 ± 0.94 *	6.3 ± 1.01 *	6.9 ± 0.71
48 MOS	6.8 ± 0.74	6.1 ± 0.95	5.9 ± 1.04	6.4 ± 1.11 *	48 MOS	6.7 ± 0.78 *	6.4 ± 0.80 *	6.5 ± 0.67 *	6.9 ± 0.73
60 MOS	6.8 ± 0.71	6.1 ± 0.93	5.9 ± 1.03	6.6 ± 0.98	60 MOS	6.9 ± 0.81	6.2 ± 1.09 *	6.4 ± 0.70 *	6.9 ± 0.76
21°C					21°C				
INITIAL	7.0 ± 0.76	6.2 ± 0.94	5.9 ± 1.25	6.8 ± 0.94	INITIAL	7.1 ± 0.74	7.0 ± 1.00	7.1 ± 0.74	6.8 ± 0.86
12 MOS	6.8 ± 0.92	6.3 ± 0.87	6.3 ± 1.16 *	6.8 ± 0.85	12 MOS	7.1 ± 0.87	6.9 ± 1.00	6.6 ± 0.72 *	6.9 ± 0.73
18 MOS	6.8 ± 0.91	6.2 ± 0.82	6.0 ± 1.17	6.7 ± 0.83	18 MOS	7.0 ± 0.84	6.8 ± 0.48	6.8 ± 0.92 *	6.9 ± 0.67
24 MOS	6.5 ± 0.67 *	6.2 ± 0.86	6.0 ± 1.18	6.3 ± 1.10 *	24 MOS	7.0 ± 0.80	6.5 ± 0.92 *	6.9 ± 0.77	6.9 ± 0.63
30 MOS	6.7 ± 0.83	6.1 ± 0.97	5.9 ± 1.20	6.3 ± 1.03 *	30 MOS	7.0 ± 0.78	5.6 ± 1.30 *	5.5 ± 1.30 *	6.9 ± 0.67
36 MOS	6.7 ± 0.81	5.2 ± 1.11 *	5.4 ± 0.98 *	6.4 ± 0.98 *	36 MOS	7.0 ± 0.74	5.4 ± 1.11 *	6.0 ± 1.10 *	6.8 ± 0.70
48 MOS	6.7 ± 0.79	4.8 ± 1.33 *	4.9 ± 1.30 *	6.2 ± 1.17 *	48 MOS	7.0 ± 0.74	5.2 ± 1.25 *	5.4 ± 1.11 *	6.8 ± 0.75
60 MOS	6.7 ± 0.77	5.2 ± 1.20 *	4.5 ± 1.12 *	6.5 ± 0.98	60 MOS	6.9 ± 0.72	5.9 ± 1.27 *	5.5 ± 1.12 *	6.8 ± 0.75
30°C					30°C				
INITIAL	7.0 ± 0.76	6.2 ± 0.94	5.9 ± 1.25	6.8 ± 0.94	INITIAL	7.1 ± 0.74	7.0 ± 1.00	7.1 ± 0.74	6.8 ± 0.86
6 MOS	6.9 ± 0.77	6.4 ± 0.88	6.0 ± 1.09		6 MOS	7.1 ± 0.81	6.7 ± 0.97 *	6.7 ± 0.70 *	
12 MOS	6.9 ± 0.86	6.4 ± 0.86	6.1 ± 1.05	6.7 ± 0.78	12 MOS	7.1 ± 0.81	6.2 ± 0.94 *	6.3 ± 0.88 *	6.7 ± 0.93
18 MOS	6.9 ± 0.79	5.7 ± 0.94 *	6.1 ± 1.17	6.7 ± 0.78	18 MOS	7.0 ± 0.76	5.9 ± 1.32 *	5.8 ± 1.36 *	6.7 ± 0.85
24 MOS	6.9 ± 0.74	5.2 ± 1.25 *	5.9 ± 1.06	6.2 ± 1.08 *	24 MOS	7.0 ± 0.76	5.4 ± 1.11 *	5.6 ± 1.36 *	6.7 ± 0.84
30 MOS	6.3 ± 1.16 *	4.7 ± 1.01 *	4.9 ± 1.32 *	6.5 ± 0.96 *	30 MOS	7.0 ± 0.85	5.6 ± 1.30 *	5.5 ± 1.30 *	6.7 ± 0.82
36 MOS	6.5 ± 0.66 *	4.1 ± 1.10 *	4.0 ± 1.04 *	6.4 ± 1.07 *	36 MOS	6.7 ± 0.64	5.2 ± 1.17 *	4.7 ± 1.35 *	6.6 ± 0.82
38°C					38°C				
INITIAL	7.0 ± 0.76	6.2 ± 0.94	5.9 ± 1.25	6.8 ± 0.94	INITIAL	7.1 ± 0.74	7.0 ± 1.00	7.1 ± 0.74	6.8 ± 0.86
6 MOS	7.0 ± 0.71	6.2 ± 0.92	5.9 ± 1.18		6 MOS	7.1 ± 0.79	6.5 ± 1.09 *	6.7 ± 1.18 *	
12 MOS	6.9 ± 0.78	6.1 ± 0.94	5.9 ± 1.22	6.7 ± 0.84	12 MOS	7.1 ± 0.79	6.0 ± 1.25 *	5.6 ± 1.23 *	6.8 ± 0.78
18 MOS	6.6 ± 0.86 *	4.9 ± 1.04 *	4.8 ± 1.34 *	6.2 ± 1.07 *	18 MOS	7.1 ± 0.74	5.6 ± 1.19 *	5.1 ± 1.26 *	6.8 ± 0.73
24 MOS	6.7 ± 0.46 *	5.3 ± 1.01 *	5.2 ± 1.08 *	6.0 ± 1.18 *	24 MOS	6.3 ± 1.01 *	5.4 ± 1.36 *	5.5 ± 1.36 *	6.8 ± 0.74

Meant ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-3. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR COMPONENTS OF THE MEAL, READY-TO-EAT, INDIVIDUAL, (MRE-1) AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

COFFEE WITH CREAM SUBSTITUTE

PEANUT BUTTER

	APPEARANCE	ODOR	FLAVOR	TEXTURE		APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C					4°C				
INITIAL	6.7 ± 1.95	6.2 ± 1.95	5.7 ± 1.75	6.5 ± 1.92	INITIAL	6.8 ± 0.65	6.9 ± 0.93	6.8 ± 0.91	6.6 ± 0.61
12 MOS	7.1 ± 0.57	6.2 ± 0.57 *	6.0 ± 0.84	6.9 ± 0.69	12 MOS	6.7 ± 0.70	6.8 ± 0.94	6.6 ± 1.01	6.5 ± 0.86
30 MOS	6.5 ± 0.73	6.4 ± 0.73	6.0 ± 0.79	6.9 ± 0.67	30 MOS	6.7 ± 0.65	6.2 ± 1.13 *	6.6 ± 0.92	6.5 ± 0.86
36 MOS	6.7 ± 0.66 *	6.4 ± 0.66	5.4 ± 0.70 *	6.8 ± 0.70	36 MOS	6.7 ± 0.64	6.3 ± 1.01 *	6.5 ± 0.99	6.4 ± 0.87
48 MOS	6.4 ± 0.48 *	5.9 ± 0.48 *	5.6 ± 1.11 *	6.8 ± 0.68	48 MOS	6.7 ± 0.70	6.3 ± 1.21 *	6.5 ± 1.02	6.4 ± 0.89
60 MOS	6.7 ± 0.45 *	6.0 ± 0.45 *	5.4 ± 0.90 *	6.8 ± 0.68	60 MOS	6.7 ± 0.70	6.3 ± 1.19 *	6.4 ± 1.06	6.4 ± 0.88
21°C					21°C				
INITIAL	6.7 ± 1.95	6.2 ± 1.95	5.7 ± 1.75	6.5 ± 1.92	INITIAL	6.8 ± 0.65	6.9 ± 0.93	6.8 ± 0.91	6.6 ± 0.61
12 MOS	7.1 ± 0.57	6.5 ± 0.57	6.0 ± 0.84	6.9 ± 0.68	12 MOS	6.6 ± 0.72	6.8 ± 0.98	6.7 ± 0.97	6.1 ± 1.21 *
18 MOS	7.1 ± 0.53	6.4 ± 0.53	6.0 ± 0.83	6.8 ± 0.71	18 MOS	6.7 ± 0.65	6.8 ± 0.91	6.7 ± 0.96	6.1 ± 1.04 *
24 MOS	6.8 ± 0.79 *	6.4 ± 0.79	5.9 ± 0.81	6.9 ± 0.68	24 MOS	6.7 ± 0.60	6.7 ± 0.92 *	6.7 ± 0.96	6.3 ± 0.97
30 MOS	6.0 ± 0.82 *	6.0 ± 0.82 *	5.9 ± 0.79	6.8 ± 0.67	30 MOS	6.4 ± 1.07 *	6.2 ± 1.03 *	6.6 ± 0.96	6.3 ± 0.94
36 MOS	6.7 ± 0.66 *	6.2 ± 0.66 *	5.9 ± 0.82	6.8 ± 0.70	36 MOS	6.7 ± 0.68	6.3 ± 1.34 *	6.6 ± 1.01	6.2 ± 0.95
48 MOS	6.4 ± 0.48 *	5.9 ± 0.48 *	5.5 ± 0.87 *	6.8 ± 0.69	48 MOS	6.5 ± 0.78 *	6.5 ± 1.08 *	6.6 ± 1.00	6.3 ± 0.94
60 MOS	6.7 ± 0.45 *	6.0 ± 0.45 *	5.8 ± 0.85	6.8 ± 0.68	60 MOS	6.7 ± 0.68	6.6 ± 1.04	6.6 ± 1.00	6.3 ± 0.91
30°C					30°C				
INITIAL	6.7 ± 1.95	6.2 ± 1.95	5.7 ± 1.75	6.5 ± 1.92	INITIAL	6.8 ± 0.65	6.9 ± 0.93	6.8 ± 0.91	6.6 ± 0.61
6 MOS	7.1 ± 0.58	6.5 ± 0.58	6.0 ± 0.94		6 MOS	6.8 ± 0.75	6.9 ± 0.96	6.9 ± 0.81	6.5 ± 0.72
12 MOS	7.1 ± 0.55	6.1 ± 0.55 *	6.0 ± 0.98	6.9 ± 0.68	12 MOS	6.3 ± 1.14 *	6.9 ± 0.90	6.9 ± 0.78	6.4 ± 0.79
18 MOS	7.1 ± 0.53	6.3 ± 0.53 *	6.0 ± 0.93	6.9 ± 0.70	18 MOS	6.6 ± 0.84	6.5 ± 0.97 *	6.1 ± 1.12 *	6.2 ± 0.83 *
24 MOS	7.1 ± 0.54	6.3 ± 0.54	6.0 ± 0.91	6.9 ± 0.68	24 MOS	6.2 ± 1.03 *	6.4 ± 1.04 *	6.0 ± 0.85 *	6.1 ± 0.90 *
30 MOS	6.3 ± 0.73	6.3 ± 0.93	5.9 ± 0.90	6.9 ± 0.67	30 MOS	6.6 ± 0.86	6.4 ± 0.96 *	6.6 ± 1.01 *	6.4 ± 0.82
36 MOS	6.6 ± 0.86	5.9 ± 0.86 *	5.5 ± 1.00 *	6.9 ± 0.70	36 MOS	6.6 ± 0.82	6.4 ± 0.8 *	6.5 ± 0.92 *	6.4 ± 0.83
38°C					38°C				
INITIAL	6.7 ± 1.95	6.2 ± 1.95	5.7 ± 1.75	6.5 ± 1.92	INITIAL	6.8 ± 0.65	6.9 ± 0.93	6.8 ± 0.91	6.6 ± 0.61
6 MOS	7.1 ± 0.64	6.6 ± 0.64	6.0 ± 0.80		6 MOS	6.8 ± 0.72	7.0 ± 1.00	6.9 ± 0.77	6.6 ± 0.72
12 MOS	7.1 ± 0.59	6.1 ± 0.59	6.0 ± 0.98	6.9 ± 0.68	12 MOS	6.8 ± 0.69	6.9 ± 0.91	6.9 ± 0.74	6.7 ± 0.77
18 MOS	7.1 ± 0.56	6.2 ± 0.56 *	6.0 ± 1.00	6.9 ± 0.70	18 MOS	6.8 ± 0.68	6.8 ± 0.89	6.5 ± 0.52 *	6.5 ± 0.87
24 MOS	7.1 ± 0.55	6.2 ± 0.55 *	6.0 ± 0.96	6.9 ± 0.68	24 MOS	6.8 ± 0.64	6.3 ± 0.94 *	6.1 ± 1.12 *	6.2 ± 0.90 *

Mean ± S.D.; N=36; Significant differences are indicated by * (p<0.05)

TABLE C-4. TRAINED PANEL MEAN RATINGS OF QUALITY ATTRIBUTES FOR
CHEESE SPREAD AFTER STORAGE AT 4°, 21°, 30°, AND 38°C

CHEESE SPREAD

	APPEARANCE	ODOR	FLAVOR	TEXTURE
4°C				
INITIAL	6.3 ± 1.18	6.6 ± 0.99	5.9 ± 1.36	6.5 ± 1.13
12 MOS	7.2 ± 0.58	6.7 ± 0.47	6.3 ± 1.14	6.7 ± 0.87
30 MOS	6.9 ± 0.32	5.9 ± 1.52	5.5 ± 1.43	6.4 ± 0.52
36 MOS	7.0 ± 0.00	5.9 ± 1.45	6.1 ± 1.14	6.6 ± 0.81
48 MOS	6.7 ± 0.48	5.9 ± 1.45	5.8 ± 1.14	6.4 ± 0.70
60 MOS	6.6 ± 0.74 NS	6.3 ± 0.46 NS	6.4 ± 0.74 NS	6.4 ± 0.74 NS
21°C				
INITIAL	6.3 ± 1.18 ab	6.6 ± 0.99	5.9 ± 1.36	6.5 ± 1.13
12 MOS	6.8 ± 0.58 a	6.3 ± 1.42	6.0 ± 1.21	6.6 ± 0.67
18 MOS	6.9 ± 0.33 a	6.1 ± 1.62	6.0 ± 1.22	6.6 ± 0.73
24 MOS	6.8 ± 0.42 a	6.0 ± 1.49	5.8 ± 1.23	6.3 ± 0.67
30 MOS	5.8 ± 0.63 b	5.7 ± 1.34	5.2 ± 1.14	6.2 ± 0.63
36 MOS	5.6 ± 0.5 b	5.7 ± 1.35	5.6 ± 1.12	6.2 ± 0.75
48 MOS	5.6 ± 0.97 b	5.5 ± 1.35	4.8 ± 0.92	6.3 ± 0.67
60 MOS	5.7 ± 0.89 b	5.7 ± 0.71 NS	5.7 ± 1.04 NS	6.5 ± 0.53 NS
30°C				
INITIAL	6.3 ± 1.18 a	6.6 ± 0.99 a	5.9 ± 1.36 a	6.5 ± 1.13 a
6 MOS	6.1 ± 1.19 a	6.3 ± 0.90 ab	5.6 ± 1.40 a	6.3 ± 1.10 ab
12 MOS	6.0 ± 0.74 a	5.8 ± 1.34 abc	5.3 ± 1.37 ab	6.5 ± 0.67 a
18 MOS	4.8 ± 0.67 b	5.4 ± 1.33 bc	4.3 ± 0.87 bc	5.4 ± 1.01 b
24 MOS	4.8 ± 1.03 b	5.5 ± 1.43 abc	4.4 ± 1.07 bc	5.4 ± 1.17 b
30 MOS	4.5 ± 1.08 b	5.2 ± 1.48 c	3.9 ± 1.37 c	5.7 ± 0.67 ab
36 MOS	4.2 ± 0.75 b	5.1 ± 1.30 c	3.9 ± 1.30 c	5.9 ± 0.70 ab
38°C				
INITIAL	6.3 ± 1.18 a	6.6 ± 0.99	5.9 ± 1.36 a	6.5 ± 1.13 a
6 MOS	5.9 ± 0.59 a	6.2 ± 0.77	5.2 ± 0.77 ab	6.0 ± 0.76 abc
12 MOS	5.7 ± 0.62 a	5.8 ± 1.47	5.3 ± 1.15 ab	6.2 ± 0.83 ab
18 MOS	4.3 ± 0.71 b	5.6 ± 1.42	4.6 ± 0.73 bc	5.6 ± 0.88 bc
24 MOS	4.4 ± 1.17 b	5.4 ± 1.58 NS	4.1 ± 1.10 c	5.2 ± 1.23 c

Mean ± S.D.; N=36; Significant differences are indicated by different letters (p<0.05)

APPENDIX D

Table D-1	Methods Used for Nutrient Analyses
Table D-2	Record of Nutritive Values of the Meal, Ready-to-Eat, Individual (MRE-1) (From Analyses of Menu Composites Before Storage)
Table D-3	Nutritional Data of the Meal, Ready-to-Eat, Individual Case Composites - As-Is Basis
Table D-4	Nutritional Data of the Meal, Ready-to-Eat, Individual Case Composites - Moisture Free-Fat Free Basis
Table D-5	Meal, Ready-to-Eat, Individual - (MRE-1) - Thiamin Analysis of Variance on Moisture-Fat Free Basis
Table D-6	Meal, Ready-to-Eat, Individual Measured Vitamin Content Per Average Meal Following Storage at 4 ^o , 21 ^o , 30 ^o and 38 ^o C
Table D-7	Nutritional Data of Cheese Spread, Fortified (Analysis of Variance on As-Is Basis)
Table D-8	Nutritional Data of Cheese Spread, Fortified (Analysis of Variance on Moisture-Fat Free Basis)

Table D-1. Methods Used for Nutrient Analyses

AOAC Methods, Thirteenth Edition (1980)

<u>Assay</u>	<u>Reference</u>
Moisture	As appropriate
Total Fat	As appropriate
Protein	2.057
Crude Fiber	7.065
Ash	14.006
Phosphorus	2.021
Chloride as NaCl	18.034
Cholesterol	14.149
Total Fatty Acids	28.051
Atomic Absorption Spectrophotometer	AASP ¹
Calcium	AASP
Iron	AASP
Sodium	AASP
Potassium	AASP
Magnesium	AASP
Other	
Iodine	Anal. Chimica Acta <u>10</u> , 78 (1954)

Methods of Vitamin Assay - Third Edition (1966)

<u>Assay</u>	
Vitamin A	70-79
Carotene	104-115
Thiamin	127-140
Riboflavin	158-164
Niacin	172-176
Pyridoxine	212-219
Vitamin E ²	366-396
Ascorbic Acid	299-306
Folacin	227-234
Vitamin B ₁₂	262-270

¹Atomic absorption spectrophotometry methods are based upon solution of ash in acid followed by dilution and reading. In the case of calcium and magnesium a further step is required in that lanthanum salt is added before spectrophotometry. The general procedures are described in "Analytical Methods for Atomic Absorption Spectrophotometry", Perkin-Elmer, 1964.

²Acta Chem. Scand. 11, 34 (1957)
J. Chromato. 27, 96 (1967)

TABLE D-2. RECORD OF NUTRITIVE VALUES OF THE MEAL, READY-TO-EAT, INDIVIDUAL, (MRE-1)
(FROM ANALYSES OF MENU COMPOSITES BEFORE STORAGE; N=5)

TOTAL MEANS		PROXIMATE				SUMMARY						
MENU NO.	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOSPHORUS (MG)	IRON (MG)	SODIUM (MG)	POTASSIUM (MG)	MAGNESIUM (MG)	CHLORIDE (G)	
1	125.63	33.49	59.44	8.32	427	798	5.98	1944	948	89	3.65	
2	123.78	50.81	54.17	7.18	244	635	6.29	1618	867	148	3.35	
3	118.26	40.64	59.80	8.45	312	766	6.32	1934	948	118	3.97	
4	101.13	41.47	50.75	7.65	236	473	6.95	1612	1069	152	3.93	
5	125.24	48.36	56.48	7.94	194	687	5.89	1520	1228	172	3.74	
6	169.56	32.06	41.84	9.98	281	529	7.14	2201	1133	111	5.77	
7	131.32	42.28	48.18	9.76	259	635	4.61	2189	1131	104	5.63	
8	227.61	51.30	47.90	8.95	336	823	8.59	1955	1083	126	4.61	
9	146.12	35.47	50.00	9.28	437	883	5.61	2001	990	92	4.29	
10	119.50	34.20	57.03	10.03	194	654	6.76	2062	1595	126	5.45	
11	116.91	43.15	52.50	11.81	377	1018	6.52	2955	1171	103	6.55	
12	94.18	42.57	55.52	7.82	149	512	6.78	1670	1194	159	4.37	
MEAN	133.27	41.32	52.80	8.93	287	701	6.45	1972	1113	125	4.61	
MIN	94.18	32.06	41.84	7.18	149	473	4.61	1519	866	88	3.35	
MAX	227.61	51.30	59.80	11.81	437	1018	8.59	2954	1595	172	6.55	

Minimum Meal
Requirements (1976)
1/3 AR 40-25 Reqmts

33.40

267

6.0

TOTAL MEANS		VITAMINS												
		A (IU)	CAROTENE (MG)	TOTAL A (IU)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MCG)	B12 (MCG)	E (MG)	CHOLESTEROL (MG)	CHO (G)	CALORIES	WEIGHT (G)
1		6740	0.086	6880	4.05	1.28	7.09	3.23	1.112	5.35	149	120.5	1151	347
2		1898	0.145	2134	2.32	1.19	14.22	0.66	0.752	6.98	151	106.0	1115	342
3		2640	0.205	2974	1.79	0.80	8.27	2.62	1.955	3.19	200	98.6	1095	326
4		2234	0.335	2788	2.34	0.92	11.94	0.92	1.725	5.12	65	96.5	1009	297
5		3580	1.023	5284	3.33	0.99	12.84	2.15	1.622	5.42	132	148.8	1297	387
6		2336	0.175	2624	2.69	0.94	6.78	1.89	1.620	4.27	96	115.0	965	368
7		2180	0.069	2290	2.68	0.84	12.10	1.82	2.044	4.62	151	146.7	1189	378
8		3920	0.283	4388	1.96	0.80	10.17	2.55	1.754	5.70	201	102.7	1047	438
9		5382	0.279	5844	3.08	0.86	10.34	2.99	1.454	4.30	148	123.0	1084	364
10		1778	0.368	2384	2.23	1.16	9.83	2.13	1.574	5.27	140	172.6	1341	393
11		3820	0.231	4200	2.98	1.35	10.64	3.71	1.277	5.04	173	130.2	1166	355
12		1830	0.693	2984	2.13	0.96	13.80	1.01	1.944	3.36	115	94.7	1049	295
MEAN		3195	0.324	3731	2.63	1.01	10.67	2.14	1.569	4.88	143	121.3	1126	358
MIN		1778	0.069	2134	1.79	0.80	6.78	0.66	0.752	3.19	65	94.7	964	294
MAX		6740	1.023	6880	4.05	1.35	14.22	3.71	2.044	6.98	200	172.6	1340	438

Minimum Meal
Requirements (1976)

1670

0.53

0.67

7.0

0.67

1067

Summary of Nutrient Analysis of Composited Menus (5 samples each) of 1980 stored menus w/coffee or candy

MENU	PROXIMATES										
	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOSPHORUS (MG)	IRON (MG)	SODIUM (MG)	POTASSIUM (MG)	MAGNESIUM (MG)	CHLORIDE (G)
1	123.61	33.98	60.09	8.55	405	770	5.84	2030	924	86	3.85
2	126.76	33.49	60.03	8.10	426	782	5.94	1833	964	87	3.42
3	126.11	32.76	58.39	8.28	426	814	6.23	1943	973	90	3.53
4	124.14	33.68	59.10	8.19	422	812	5.93	1907	959	91	3.66
5	127.56	33.56	59.61	8.45	457	814	5.94	2008	922	91	3.77
MEAN	125.63	33.49	59.44	8.32	427	798	5.98	1944	948	89	3.65
SDEV	1.70	.45	.71	.19	19	21	.15	79	24	2	.17
MIN	123.61	32.76	58.39	8.10	405	770	5.84	1833	922	86	3.42
MAX	127.56	33.98	60.09	8.55	457	814	6.23	2030	973	91	3.85

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MENU	1	VITAMINS												
		A (IU)	CAROTENE (MG)	TOTAL A (IU)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	B12 (MCG)	E (MG)	CHOLESTEROL (MG)	CHO (G)	CALORIES	WEIGHT (G)
	1	6580	.082	6710	3.95	1.34	6.67	3.33	1.031	5.15	148	117.3	1146	344
	2	6770	.084	6910	3.88	1.22	6.98	3.21	1.397	6.63	150	120.8	1157	349
	3	6410	.076	6530	3.98	1.25	6.93	2.98	1.039	5.20	156	120.8	1140	346
	4	6680	.098	6840	4.22	1.26	7.32	3.31	1.046	5.23	133	123.6	1161	349
	5	7260	.091	7410	4.23	1.33	7.33	3.32	1.048	4.54	161	120.0	1151	349
	MEAN	6740	.086	6880	4.05	1.28	7.09	3.23	1.112	5.35	149	120.5	1151	347
	SDEV	320	.008	330	.16	.05	.22	.15	.159	.77	11	2.2	9	2
	MIN	6410	.076	6530	3.88	1.22	6.67	2.98	1.031	4.54	133	117.3	1140	344
	MAX	7260	.098	7410	4.23	1.34	7.33	3.33	1.397	6.63	161	123.6	1161	349

Summary of Nutrient Analysis of Compositied Menus (5 samples each) of 1980 stored menus w/o coffee or candy

MENU 2	PROXIMATES										
	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOSPHORUS (MG)	IRON (MG)	SODIUM (MG)	POTASSIUM (MG)	MAGNESIUM (MG)	CHLORIDE (G)
1	122.17	51.38	54.45	7.25	272	664	6.47	1662	916	153	3.58
2	126.59	48.63	53.70	6.44	240	596	5.82	1442	832	144	2.91
3	123.81	53.18	55.29	7.15	274	687	6.59	1638	920	149	3.37
4	122.58	46.28	53.35	7.53	232	627	6.13	1669	835	150	3.37
5	123.75	52.57	54.06	7.52	203	603	6.44	1677	830	142	3.52
MEAN	123.78	50.81	54.17	7.18	244	635	6.29	1618	867	148	3.35
SDEV	1.73	2.25	.75	.45	30	39	.31	99	47	5	.26
MIN	122.17	48.28	53.35	6.44	203	596	5.82	1442	830	142	2.91
MAX	126.59	53.18	55.29	7.53	274	687	6.59	1677	920	153	3.58

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MENU 2	VITAMINS												
	A (IU)	CAROTENE (MG)	TOTAL A (IU)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	B12 (MCG)	E (MG)	CHOLESTEROL (MG)	CHO (G)	CALORIES	WEIGHT (G)
1	1970	.054	2060	2.49	1.16	13.96	.61	.681	7.15	150	105.2	1117	341
2	2330	.192	2640	2.33	1.16	14.04	.62	.685	7.19	140	107.1	1106	343
3	1720	.364	2320	2.29	1.28	14.23	.76	.694	7.64	149	107.7	1141	347
4	1670	.055	1760	2.25	1.19	14.65	.65	1.022	6.47	157	109.0	1109	341
5	1800	.058	1890	2.27	1.15	14.23	.68	.677	6.44	159	100.8	1100	339
MEAN	1898	.145	2134	2.32	1.19	14.22	.66	.752	6.98	151	106.0	1115	342
SDEV	267	.136	352	.09	.05	.27	.06	.151	.51	7	3.2	.16	3
MIN	1670	.054	1760	2.25	1.15	13.96	.61	.677	6.44	140	100.8	1100	339
MAX	2330	.364	2640	2.49	1.28	14.65	.76	1.022	7.64	159	109.0	1141	347

Summary of Nutrient Analysis of Compositied Menus (5 samples each) of 1980 stored menus w/o coffee or candy

MENU 3		PROXIMATES										
		WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOSPHORUS (MG)	IRON (MG)	SODIUM (MG)	POTASSIUM (MG)	MAGNESIUM (MG)	CHLORIDE (G)
1		119.84	40.21	59.61	8.52	311	741	6.88	1940	888	121	3.77
2		115.07	40.64	58.61	8.23	307	740	6.73	1848	871	115	3.94
3		119.51	40.03	61.65	8.48	321	783	6.22	1972	976	118	3.87
4		118.75	41.79	60.67	8.54	315	785	5.96	1984	1010	119	4.21
5		118.13	40.53	58.47	8.47	306	780	5.80	1926	992	116	4.09
MEAN		118.26	40.64	59.30	8.45	312	766	6.32	1934	948	118	3.97
SDEV		1.90	.69	1.36	.13	6	23	.47	53	63	2	.18
MIN		115.07	40.03	58.47	8.23	306	740	5.80	1848	871	115	3.77
MAX		119.84	41.79	61.65	8.54	321	785	6.88	1984	1010	121	4.21

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MENU 3		VITAMINS											
	A (IU)	CAROTENE (MG)	TOTAL A (IU)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	B12 (MCG)	E (MG)	CHOLESTEROL (MG)	CHO (G)	CALORIES	WEIGHT (G)
1	2820	.187	3120	1.97	.85	8.19	2.65	1.966	3.60	187	99.5	1095	328
2	3010	.186	3310	1.76	.77	8.33	2.53	1.921	3.20	208	97.7	1081	320
3	2180	.242	2580	1.77	.82	7.86	2.65	1.966	2.62	193	97.9	1107	328
4	2240	.232	2620	1.79	.79	8.61	2.81	1.987	3.31	209	101.4	1119	331
5	2950	.177	3240	1.64	.77	8.38	2.45	1.933	3.22	203	96.5	1075	322
MEAN	2640	.205	2974	1.79	.80	8.27	2.62	1.955	3.19	200	98.6	1095	326
SDEV	399	.030	348	.12	.03	.27	.14	.027	.36	10	1.9	.18	4
MIN	2180	.177	2580	1.64	.77	7.86	2.45	1.921	2.62	187	96.5	1075	320
MAX	3010	.242	3310	1.97	.85	8.61	2.81	1.987	3.60	209	101.4	1119	331

Summary of Nutrient Analysis of Compositied Menus (5 samples each) of 1980 stored menus w/o coffee or candy

MENU 4	PROXIMATES										
	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOSPHORUS (MG)	IRON (MG)	SODIUM (MG)	POTASSIUM (MG)	MAGNESIUM (MG)	CHLORIDE (G)
1	97.86	42.37	51.78	7.88	241	491	7.35	1732	1085	153	4.06
2	102.59	40.76	48.67	7.62	235	450	7.14	1548	1057	149	3.99
3	97.66	40.55	50.31	7.32	235	488	6.97	1437	1031	148	3.63
4	103.24	40.94	50.15	7.55	214	494	7.13	1578	1037	152	3.86
5	104.29	42.75	52.83	7.89	253	453	6.16	1766	1137	157	4.13
MEAN	101.13	41.47	50.75	7.65	236	473	6.95	1612	1069	152	3.93
SDEV	3.14	1.01	1.60	.24	14	20	.46	136	44	4	.20
MIN	97.66	40.55	48.67	7.32	214	450	6.16	1437	1031	148	3.63
MAX	104.29	42.75	52.83	7.89	253	491	7.35	1766	1137	157	4.13

MENU 4	VITAMINS												
	A (IU)	CAROTENE (MG)	TOTAL A (IU)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	B12 (MCG)	E (MG)	CHOLESTEROL (MG)	CHO (G)	CALORIES	WEIGHT (G)
1	2400	.323	2930	2.29	.94	12.35	.91	1.764	4.41	65	94.2	1012	294
2	2260	.342	2830	2.26	.86	12.50	.98	1.488	5.36	71	98.1	993	298
3	2060	.401	2720	2.29	1.10	11.90	.87	1.742	4.64	55	94.5	993	290
4	2020	.291	2500	2.56	.89	12.18	.92	1.783	6.24	68	95.2	996	297
5	2430	.317	2960	2.31	.80	10.79	.92	1.849	4.93	68	100.4	1048	308
MEAN	2234	.335	2788	2.34	.92	11.94	.92	1.725	5.12	65	96.5	1009	297
SDEV	189	.041	186	.12	.11	.68	.04	.138	.72	6	2.7	24	7
MIN	2020	.291	2500	2.26	.80	10.79	.87	1.488	4.41	55	94.2	993	290
MAX	2430	.401	2960	2.56	1.10	12.50	.98	1.849	6.24	71	100.4	1048	308

Summary of Nutrient Analysis of Composited Menus (5 samples each) of 1980 stored menus w/o coffee or candy

MENU 5	PROXIMATES										
	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOSPHORUS (MG)	IRON (MG)	SODIUM (MG)	POTASSIUM (MG)	MAGNESIUM (MG)	CHLORIDE (G)
1	131.31	50.57	56.56	7.96	244	729	7.09	1528	1233	173	3.86
2	127.54	47.36	54.98	7.78	179	677	5.44	1478	1248	175	3.62
3	126.77	47.39	56.18	8.13	184	660	5.86	1574	1219	168	3.87
4	115.68	49.03	56.59	7.74	172	669	5.24	1515	1212	172	3.67
5	124.98	47.45	58.09	8.08	193	700	5.80	1504	1226	174	3.67
MEAN	125.24	48.36	56.48	7.94	194	687	5.89	1520	1228	172	3.74
SDEV	5.83	1.42	1.11	.17	29	28	.72	36	14	3	.12
MIN	115.60	47.36	54.98	7.74	172	660	5.24	1478	1212	168	3.62
MAX	131.31	50.57	58.09	8.13	244	729	7.09	1574	1248	175	3.87

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MENU 5	VITAMINS												
	A (IU)	CAROTENE (MG)	TOTAL A (IU)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	B12 (MCG)	E (MG)	CHOLESTEROL (MG)	CHO (G)	CALORIES	WEIGHT (G)
1	3700	.965	5310	3.54	.98	13.39	2.32	1.575	6.70	146	147.5	1301	394
2	3620	1.264	5720	3.31	1.01	12.83	2.18	1.555	4.67	124	151.2	1289	389
3	3400	1.387	5710	3.32	.98	11.72	2.03	1.563	4.69	117	152.2	1304	391
4	3700	.767	4930	3.07	.93	13.09	2.17	1.870	4.86	142	145.0	1285	374
5	3480	.735	4700	3.40	1.04	13.15	2.05	1.547	6.19	131	148.2	1306	387
MEAN	3580	1.023	5284	3.33	.99	12.84	2.15	1.622	5.42	132	148.8	1297	387
SDEV	135	.293	449	.17	.04	.66	.12	.139	.95	12	2.9	9	8
MIN	3400	.735	4700	3.07	.93	11.72	2.03	1.547	4.67	117	145.0	1285	374
MAX	3700	1.387	5720	3.54	1.04	13.39	2.32	1.870	6.70	146	152.2	1306	394

Summary of Nutrient Analysis of Composited Menus (5 samples each) 1980 stored menus w/o coffee or candy

MENU 6		PROXIMATES										
		WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOSPHCRUS (MG)	IRON (MG)	SODIUM (MG)	POTASSIUM (MG)	MAGNESIUM (MG)	CHLORIDE (G)
1		167.77	32.36	41.71	10.30	274	526	7.67	2144	1161	110	5.70
2		168.46	32.55	41.89	9.85	299	532	7.75	2082	1100	114	5.46
3		176.98	32.15	41.89	9.86	272	555	6.80	2229	1190	113	5.63
4		163.13	32.10	41.78	9.67	297	522	6.88	2185	1105	109	5.62
5		171.46	31.14	41.92	10.22	265	511	6.62	2368	1107	107	6.43
MEAN		169.56	32.06	41.04	9.98	281	529	7.14	2201	1133	111	5.77
SDEV		5.11	.54	.09	.27	16	16	.53	108	41	3	.38
MIN		163.13	31.14	41.71	9.67	265	511	6.62	2082	1100	107	5.46
MAX		176.98	32.55	41.92	10.30	299	555	7.75	2368	1190	114	6.43

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MENU 6		VITAMINS												
	A (IU)	CAROTENE (MG)	TOTAL A (IU)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	B12 (MCG)	E (MG)	CHOLESTEROL (MG)	CHO (G)	CALORIES	WEIGHT (G)	
1	2230	.164	2500	2.63	.80	6.21	2.08	1.461	4.75	99	113.1	957	365	
2	2180	.166	2450	2.81	.92	7.01	1.81	1.476	3.32	100	116.3	973	369	
3	2300	.162	2570	2.68	.91	7.18	1.85	1.511	4.16	106	116.9	973	378	
4	2320	.163	2590	2.72	1.09	6.88	1.96	1.812	3.99	91	115.7	967	362	
5	2650	.221	3010	2.61	.99	6.62	1.76	1.838	5.15	85	113.0	954	368	
MEAN	2336	.175	2624	2.69	.94	6.78	1.89	1.620	4.27	96	115.0	965	368	
SDEV	184	.025	223	.08	.11	.38	.13	.189	.71	8	1.8	9	6	
MIN	2180	.162	2450	2.61	.80	6.21	1.76	1.461	3.32	85	113.0	954	362	
MAX	2650	.221	3010	2.81	1.09	7.18	2.08	1.838	5.15	106	116.9	973	378	

Summary of Nutrient Analysis of Composited Menus (5 samples each) of 1980 stored menus w/o coffee or candy

MENU 7		PROXIMATES										
		WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOSPHORUS (MG)	IRON (MG)	SODIUM (MG)	POTASSIUM (MG)	MAGNESIUM (MG)	CHLORIDE (G)
1		129.23	42.88	47.22	9.41	262	633	4.12	1975	1147	109	5.10
2		133.33	42.55	48.84	9.96	252	656	3.82	2213	1122	107	5.69
3		127.79	41.53	47.63	10.45	264	621	5.21	2461	1130	100	6.36
4		133.59	41.21	49.49	9.49	267	606	5.34	2200	1094	99	5.60
5		132.68	43.21	47.71	9.50	252	660	4.58	2096	1160	107	5.42
MEAN		131.32	42.28	48.18	9.76	259	635	4.61	2189	1131	104	5.63
SDEV		2.64	.86	.95	.44	7	23	.66	180	25	4	.46
MIN		127.79	41.21	47.22	9.41	252	606	3.82	1975	1094	99	5.10
MAX		133.59	43.21	49.49	10.45	267	660	5.34	2461	1160	109	6.36

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MENU 7		VITAMINS											
	A (IU)	CAROTENE (MG)	TOTAL A (IU)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	B12 (MCG)	E (MG)	CHOLESTEROL (MG)	CHO (G)	CALORIES	WEIGHT (G)
1	2140	.075	2260	2.74	.94	12.74	1.84	1.874	4.12	150	146.1	1181	375
2	2080	.057	2170	2.56	.99	12.97	1.91	2.290	4.96	168	146.9	1197	382
3	2200	.059	2300	2.75	.86	11.53	1.82	1.859	4.09	130	144.4	1172	372
4	2190	.076	2310	2.71	.72	11.06	1.75	1.906	4.96	156	147.5	1200	381
5	2290	.076	2410	2.67	.69	12.21	1.76	2.290	4.96	149	148.6	1197	382
MEAN	2180	.069	2290	2.68	.84	12.10	1.82	2.044	4.62	151	146.7	1189	378
SDEV	78	.010	87	.08	.13	.81	.06	.225	.47	14	1.6	12	5
MIN	2080	.057	2170	2.56	.69	11.06	1.75	1.859	4.09	130	144.4	1172	372
MAX	2290	.076	2410	2.75	.99	12.97	1.91	2.290	4.96	168	148.6	1200	382

Summary of Nutrient Analysis of Compositied Menus (5 samples each) of 1980 stored menus w/o coffee or candy

MENU	8	PROXIMATES										
		WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOSPHORUS (MG)	IRON (MG)	SODIUM (MG)	POTASSIUM (MG)	MAGNESIUM (MG)	CHLORIDE (G)
1		224.17	50.92	45.99	8.98	333	799	9.07	1987	1054	121	4.75
2		229.50	51.93	47.18	9.16	348	868	8.81	2017	1097	132	4.63
3		223.81	50.64	50.12	8.83	345	817	7.87	1892	1092	127	4.46
4		230.88	52.14	47.87	8.65	317	806	8.81	1911	1096	123	4.58
5		229.72	50.87	48.34	8.94	336	823	8.41	1970	1076	128	4.65
MEAN		227.61	51.30	47.90	8.95	336	823	8.59	1955	1083	126	4.61
SDEV		3.35	.68	1.52	.13	12	27	.47	52	19	4	.11
MIN		223.81	50.64	45.99	8.83	317	799	7.87	1892	1054	121	4.46
MAX		230.88	52.14	50.12	9.16	348	868	9.07	2017	1097	132	4.75

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MENU	B	VITAMINS												
		A (IU)	CAROTENE (MG)	TOTAL A (IU)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	B12 (MCG)	E (MG)	CHOLESTEROL (MG)	CHO (G)	CALORIES	WEIGHT (G)
1		4920	.294	5410	1.86	.73	9.50	2.38	1.727	6.05	194	101.8	1025	432
2		3920	.282	4390	1.98	.79	10.57	2.42	1.762	5.29	167	102.7	1043	441
3		4050	.284	4550	1.97	.74	10.05	2.88	1.748	6.12	184	103.6	1068	437
4		3370	.277	3830	1.98	.84	11.01	2.51	1.761	6.16	233	100.6	1042	440
5		3300	.279	3760	1.99	.89	9.74	2.57	1.771	4.87	226	104.8	1058	443
MEAN		3920	.283	4368	1.96	.80	10.17	2.55	1.754	5.70	201	102.7	1047	438
SDEV		655	.006	666	.06	.06	.61	.20	.017	.59	28	1.6	.17	4
MIN		3300	.277	3760	1.86	.73	9.50	2.38	1.727	4.87	167	100.6	1025	432
MAX		4920	.294	5410	1.99	.89	11.01	2.88	1.771	6.16	233	104.8	1068	443

Summary of Nutrient Analysis of Composited Menus (5 samples each) of 1980 stored menus w/o coffee or candy

MENU 9		PROXIMATES										
		WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOSPHORUS (MG)	IRON (MG)	SODIUM (MG)	POTASSIUM (MG)	MAGNESIUM (MG)	CHLORIDE (G)
1		143.89	35.68	48.42	9.84	446	893	5.44	2185	1038	94	4.79
2		148.79	36.11	49.73	9.56	426	853	5.91	2075	986	92	4.69
3		146.71	35.77	50.83	9.57	446	870	5.85	2119	961	91	4.60
4		145.77	34.66	50.58	9.66	431	919	5.43	2124	973	90	4.56
5		145.44	35.15	50.45	7.74	436	879	5.40	1502	994	94	2.81
MEAN		146.12	35.47	50.00	9.28	437	883	5.61	2001	990	92	4.29
SDEV		1.80	.57	.97	.86	8	25	.25	282	29	2	.83
MIN		143.09	34.66	48.42	7.74	428	853	5.40	1502	961	90	2.81
MAX		148.79	36.11	50.83	9.84	446	919	5.91	2185	1038	94	4.79

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MENU 9		VITAMINS											
	A (IU)	CAROTENE (MG)	TOTAL A (IU)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	B12 (MCG)	E (MG)	CHOLESTEROL (MG)	CHO (G)	CALORIES	WEIGHT (G)
1	5190	.276	5650	3.09	.83	10.89	3.01	1.815	4.72	145	125.2	1079	363
2	5700	.277	6160	3.25	.81	10.71	2.88	1.108	4.80	151	125.0	1092	369
3	5240	.281	5710	2.78	.84	9.87	2.96	1.462	4.02	128	122.5	1091	365
4	5230	.271	5680	3.08	.87	10.13	2.86	1.447	3.62	152	121.1	1078	362
5	5550	.288	6020	3.20	.94	10.08	3.24	1.440	4.32	162	121.3	1080	360
MEAN	5382	.279	5844	3.08	.86	10.34	2.99	1.454	4.30	148	123.0	1084	364
SDEV	229	.006	231	.18	.05	.44	.15	.250	.49	13	2.0	7	4
MIN	5190	.271	5650	2.78	.81	9.87	2.86	1.108	3.62	128	121.1	1078	360
MAX	5700	.288	6160	3.25	.94	10.89	3.24	1.815	4.80	162	125.2	1092	369

Summary of Nutrient Analysis of Composited Menus (5 samples each) of 1980 stored menus w/o coffee or candy

MENU 10	PROXIMATES										
	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOSPHORUS (MG)	IRON (MG)	SODIUM (MG)	POTASSIUM (MG)	MAGNESIUM (MG)	CHLORIDE (G)
1	117.08	35.29	56.19	9.77	202	686	6.98	1962	1613	124	5.20
2	114.82	31.80	57.39	9.53	193	629	6.95	1964	1582	127	5.09
3	125.31	36.04	56.54	9.99	191	609	7.17	2099	1557	123	5.57
4	117.68	33.78	57.76	10.39	193	661	6.30	2189	1606	126	5.91
5	122.61	34.10	57.29	10.47	193	682	6.42	2094	1617	128	5.46
MEAN	119.50	34.20	57.03	10.03	194	654	6.76	2062	1595	126	5.45
SDEV	4.32	1.62	.64	.40	4	34	.38	97	25	2	.32
MIN	114.82	31.80	56.19	9.53	191	609	6.30	1962	1557	123	5.09
MAX	125.31	36.04	57.76	10.47	202	686	7.17	2189	1617	128	5.91

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MENU 10	VITAMINS												
	A (IU)	CAROTENE (MG)	TOTAL A (IU)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	B12 (MCG)	E (MG)	CHOLESTEROL (MG)	CHO (G)	CALORIES	WEIGHT (G)
1	1980	.337	2540	2.33	1.16	10.08	2.02	1.551	5.04	143	169.5	1325	388
2	1760	.378	2330	2.12	1.08	9.65	1.81	1.544	5.02	127	172.4	1333	386
3	1670	.346	2240	2.19	1.15	9.95	2.19	1.195	4.38	147	170.3	1334	398
4	1650	.354	2240	2.24	1.22	9.84	2.20	1.575	5.91	138	174.1	1351	394
5	1830	.421	2520	2.29	1.20	9.63	2.33	2.006	6.02	144	176.7	1359	401
MEAN	1778	.368	2384	2.23	1.16	9.83	2.13	1.574	5.27	140	172.6	1341	393
SDEV	134	.034	145	.08	.05	.20	.21	.288	.68	8	2.9	14	7
MIN	1650	.337	2240	2.12	1.08	9.63	1.81	1.195	4.38	127	169.5	1325	386
MAX	1980	.421	2540	2.33	1.22	10.08	2.33	2.006	6.02	147	176.7	1359	401

Summary of Nutrient Analysis of Composited Menus (5 samples each) of 1980 stored menus w/o coffee or candy

MENU 11											
PROXIMATES											
	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOSPHORUS (MG)	IRON (MG)	SODIUM (MG)	POTASSIUM (MG)	MAGNESIUM (MG)	CHLORIDE (G)
1	120.33	44.23	50.13	12.34	338	1062	5.76	3012	1198	101	6.95
2	116.97	41.91	55.11	11.74	342	1025	6.05	2867	1160	96	6.65
3	115.12	44.68	56.65	11.72	405	1003	6.45	2981	1179	107	6.41
4	113.79	41.81	48.34	11.74	404	1005	6.90	2983	1153	107	6.48
5	118.31	43.10	52.30	11.53	396	997	7.43	2931	1167	108	6.29
MEAN	116.91	43.15	52.50	11.81	377	1018	6.52	2955	1171	103	6.55
SDEV	2.58	1.31	3.43	.31	34	26	.67	57	18	5	.25
MIN	113.79	41.81	48.34	11.53	338	997	5.76	2867	1153	96	6.29
MAX	120.33	44.68	56.65	12.34	405	1062	7.43	3012	1198	107	6.95

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MENU 11													
VITAMINS													
	A (IU)	CAROTENE (MG)	TOTAL A (IU)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	B12 (MCG)	E (MG)	CHOLESTEROL (MG)	CHO (G)	CALORIES	WEIGHT (G)
1	3810	.259	4240	2.88	1.37	11.16	3.67	1.439	6.12	151	132.8	1159	360
2	4000	.224	4370	2.95	1.32	10.67	3.77	1.423	5.34	185	130.0	1184	356
3	3870	.240	4260	3.01	1.29	10.75	3.58	1.075	6.09	208	130.1	1209	358
4	3880	.193	4200	3.07	1.38	10.36	3.69	1.036	4.83	135	129.6	1121	345
5	3540	.237	3930	3.01	1.38	10.25	3.82	1.414	2.83	187	128.4	1157	354
MEAN	3820	.231	4200	2.98	1.35	10.64	3.71	1.277	5.04	173	130.2	1166	355
SDEV	171	.024	164	.07	.04	.36	.09	.203	1.35	30	1.6	33	6
MIN	3540	.193	3930	2.88	1.29	10.25	3.58	1.036	2.83	135	128.4	1121	345
MAX	4000	.259	4370	3.07	1.38	11.16	3.82	1.439	6.12	208	132.8	1209	360

Summary of Nutrient Analysis of Composited Menus (5 samples each) of 1980 stored menus w/o coffee or candy

MENU 12	PROXIMATES										
	WATER (G)	PROTEIN (G)	FAT (G)	ASH (G)	CALCIUM (MG)	PHOSPHORUS (MG)	IRON (MG)	SODIUM (MG)	POTASSIUM (MG)	MAGNESIUM (MG)	CHLORIDE (G)
1	94.59	43.59	57.23	8.12	147	516	7.20	1745	1232	168	4.65
2	91.38	42.73	55.84	7.83	142	502	6.38	1720	1204	154	4.44
3	93.22	40.62	56.19	7.45	149	488	7.01	1598	1113	155	4.09
4	94.29	44.64	58.98	8.35	165	538	7.03	1743	1263	165	4.62
5	97.44	41.28	49.34	7.36	143	516	6.30	1544	1157	152	4.04
MEAN	94.18	42.57	55.52	7.82	149	512	6.78	1670	1194	159	4.37
SDEV	2.21	1.64	3.66	.42	9	19	.41	93	60	7	.29
MIN	91.38	40.62	49.34	7.36	142	488	6.30	1544	1113	152	4.04
MAX	97.44	44.64	58.98	8.35	165	538	7.20	1745	1263	168	4.65

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MENU 12		VITAMINS											
	A (IU)	CAROTENE (MG)	TOTAL A (IU)	B1 (MG)	B2 (MG)	NIACIN (MG)	B6 (MG)	B12 (MCG)	E (MG)	CHOLESTEROL (MG)	CHO (G)	CALORIES	WEIGHT (G)
1	2010	.764	3280	2.19	.93	14.09	1.05	2.099	3.30	123	96.3	1075	300
2	1650	.740	2880	2.03	.90	13.92	.96	1.741	3.48	116	92.3	1043	290
3	2350	.643	3420	2.07	.93	13.43	1.11	1.752	3.21	108	94.6	1046	292
4	1540	.688	2690	2.08	1.16	14.37	1.01	1.834	3.36	131	99.5	1107	308
5	1600	.630	2650	2.26	.86	13.18	.95	2.292	3.44	97	91.1	973	287
MEAN	1830	.693	2984	2.13	.96	13.80	1.01	1.944	3.36	115	94.7	1049	295
SDEV	344	.059	349	.10	.12	.49	.07	.242	.11	13	3.3	50	8
MIN	1540	.630	2650	2.03	.86	13.18	.95	1.741	3.21	97	91.1	973	287
MAX	2350	.764	3420	2.26	1.16	14.37	1.11	2.292	3.48	131	99.5	1107	308

TABLE D-3. NUTRITIONAL DATA OF MEAL, READY-TO-EAT, INDIVIDUAL CASE COMPOSITES - AS-IS BASIS

VITAMIN A			CAROTENE		THIAMIN	
	SO. PKG.	RIGHT AWAY	SO. PKG.	RIGHT AWAY	SO. PKG.	RIGHT AWAY
4°C						
INITIAL	910 ± 106	930 ± 5	0.13 ± 0.01	0.13 ± 0.00	0.70 ± 0.02	0.66 ± 0.03
12 MONTHS	957 ± 53	904 ± 17	0.18 ± 0.01	0.12 ± 0.00	0.66 ± 0.01	0.59 ± 0.02
30 MONTHS	1138 ± 70	1063 ± 35	0.14 ± 0.03	0.16 ± 0.02	0.77 ± 0.05	0.67 ± 0.02
36 MONTHS	1130 ± 36	1178 ± 18	0.12 ± 0.02	0.16 ± 0.02	0.60 ± 0.04	0.60 ± 0.03
48 MONTHS	845 ± 55	770 ± 167	0.09 ± 0.02	0.10 ± 0.02	0.63 ± 0.01	0.56 ± 0.05
60 MONTHS	641 ± 63	648 ± 27	0.10 ± 0.01	0.11 ± 0.01	0.50 ± 0.04	0.49 ± 0.02
21°C						
INITIAL	910 ± 106	930 ± 5	0.13 ± 0.01	0.13 ± 0.00	0.71 ± 0.02	0.66 ± 0.03
12 MONTHS	952 ± 10	994 ± 112	0.10 ± 0.00	0.11 ± 0.01	0.57 ± 0.02	0.60 ± 0.02
18 MONTHS	780 ± 137	1133 ± 18	0.13 ± 0.01	0.09 ± 0.01	0.64 ± 0.00	0.65 ± 0.00
24 MONTHS	716 ± 16	813 ± 14	0.08 ± 0.01	0.08 ± 0.01	0.69 ± 0.03	0.65 ± 0.01
30 MONTHS	1115 ± 44	992 ± 51	0.12 ± 0.02	0.14 ± 0.00	0.70 ± 0.02	0.63 ± 0.02
36 MONTHS	1001 ± 2	893 ± 18	0.12 ± 0.00	0.12 ± 0.00	0.56 ± 0.02	0.56 ± 0.01
48 MONTHS	740 ± 105	980 ± 152	0.08 ± 0.03	0.08 ± 0.00	0.56 ± 0.01	0.50 ± 0.08
60 MONTHS	743 ± 137	569 ± 41	0.11 ± 0.02	0.17 ± 0.02	0.40 ± 0.01	0.53 ± 0.02
30°C						
INITIAL	910 ± 106	930 ± 5	0.13 ± 0.01	0.13 ± 0.00	0.71 ± 0.02	0.66 ± 0.02
6 MONTHS	923 ± 119	755 ± 83	0.09 ± 0.01	0.09 ± 0.01	0.66 ± 0.02	0.67 ± 0.03
12 MONTHS	1062 ± 120	893 ± 22	0.09 ± 0.02	0.09 ± 0.02	0.58 ± 0.02	0.58 ± 0.01
18 MONTHS	719 ± 34	868 ± 45	0.12 ± 0.00	0.07 ± 0.00	0.58 ± 0.02	0.62 ± 0.01
24 MONTHS	795 ± 72	595 ± 44	0.09 ± 0.01	0.08 ± 0.01	0.62 ± 0.03	0.64 ± 0.01
30 MONTHS	971 ± 64	947 ± 28	0.15 ± 0.01	0.13 ± 0.01	0.65 ± 0.02	0.57 ± 0.02
36 MONTHS	952 ± 63	838 ± 58	0.14 ± 0.02	0.13 ± 0.01	0.56 ± 0.02	0.56 ± 0.01
38°C						
INITIAL	910 ± 106	930 ± 5	0.13 ± 0.01	0.13 ± 0.00	0.71 ± 0.02	0.66 ± 0.03
6 MONTHS	743 ± 29	680 ± 65	0.08 ± 0.01	0.07 ± 0.01	0.60 ± 0.02	0.63 ± 0.03
12 MONTHS	943 ± 78	948 ± 31	0.10 ± 0.00	0.08 ± 0.00	0.53 ± 0.03	0.56 ± 0.01
18 MONTHS	786 ± 33	855 ± 51	0.09 ± 0.01	0.08 ± 0.01	0.52 ± 0.02	0.56 ± 0.01
24 MONTHS	742 ± 77	562 ± 33	0.08 ± 0.01	0.09 ± 0.01	0.54 ± 0.05	0.58 ± 0.01

TABLE D-3. NUTRITIONAL DATA OF MEAL, READY-TO-EAT CASE COMPOSITES - AS-IS BASIS

	RIBOFLAVIN		NIACIN		PYRIDOXINE	
	SO. PKG.	RIGHT AWAY	SO. PKG.	RIGHT AWAY	SO. PKG.	RIGHT AWAY
4°C						
INITIAL	0.23 ± 0.02	0.31 ± 0.02	2.82 ± 0.12	3.03 ± 0.08	0.48 ± 0.01	0.57 ± 0.03
12 MONTHS	0.26 ± 0.01	0.31 ± 0.00	2.95 ± 0.10	3.10 ± 0.00	0.49 ± 0.03	0.58 ± 0.04
30 MONTHS	0.26 ± 0.01	0.30 ± 0.00	3.32 ± 0.08	3.37 ± 0.24	0.44 ± 0.01	0.55 ± 0.02
36 MONTHS	0.24 ± 0.01	0.31 ± 0.02	2.95 ± 0.13	3.35 ± 0.05	0.56 ± 0.03	0.67 ± 0.11
48 MONTHS	0.19 ± 0.01	0.22 ± 0.01	2.63 ± 0.12	2.83 ± 0.12	0.76 ± 0.04	0.69 ± 0.12
60 MONTHS	0.17 ± 0.01	0.22 ± 0.01	3.37 ± 0.16	3.43 ± 0.18	0.55 ± 0.04	0.72 ± 0.08
21°C						
INITIAL	0.23 ± 0.02	0.31 ± 0.02	2.82 ± 0.12	3.03 ± 0.08	0.48 ± 0.01	0.57 ± 0.03
12 MONTHS	0.25 ± 0.00	0.32 ± 0.02	2.87 ± 0.08	3.15 ± 0.00	0.49 ± 0.02	0.57 ± 0.02
18 MONTHS	0.24 ± 0.02	0.31 ± 0.00	2.87 ± 0.03	3.10 ± 0.05	0.59 ± 0.03	0.56 ± 0.08
24 MONTHS	0.24 ± 0.02	0.30 ± 0.01	2.70 ± 0.10	2.80 ± 0.05	0.46 ± 0.07	0.52 ± 0.07
30 MONTHS	0.24 ± 0.00	0.31 ± 0.01	3.42 ± 0.16	3.42 ± 0.08	0.45 ± 0.01	0.48 ± 0.02
36 MONTHS	0.29 ± 0.00	0.30 ± 0.01	3.13 ± 0.03	3.18 ± 0.15	0.56 ± 0.08	0.65 ± 0.05
48 MONTHS	0.21 ± 0.03	0.23 ± 0.01	2.65 ± 0.09	2.83 ± 0.19	0.65 ± 0.08	0.68 ± 0.04
60 MONTHS	0.16 ± 0.02	0.18 ± 0.00	3.25 ± 0.18	3.42 ± 0.06	0.56 ± 0.06	0.52 ± 0.04
30°C						
INITIAL	0.23 ± 0.02	0.31 ± 0.02	2.82 ± 0.12	3.03 ± 0.08	0.48 ± 0.01	0.57 ± 0.03
6 MONTHS	0.27 ± 0.02	0.34 ± 0.00	2.82 ± 0.08	3.10 ± 0.05	0.57 ± 0.06	0.61 ± 0.01
12 MONTHS	0.26 ± 0.01	0.33 ± 0.01	2.87 ± 0.12	3.28 ± 0.06	0.45 ± 0.01	0.57 ± 0.04
18 MONTHS	0.25 ± 0.00	0.33 ± 0.02	2.78 ± 0.08	3.08 ± 0.08	0.55 ± 0.05	0.60 ± 0.01
24 MONTHS	0.24 ± 0.02	0.26 ± 0.00	2.82 ± 0.03	2.95 ± 0.05	0.37 ± 0.02	0.49 ± 0.02
30 MONTHS	0.24 ± 0.00	0.30 ± 0.01	3.78 ± 0.38	3.30 ± 0.09	0.47 ± 0.03	0.47 ± 0.04
36 MONTHS	0.26 ± 0.01	0.28 ± 0.01	3.12 ± 0.08	3.00 ± 0.10	0.54 ± 0.04	0.70 ± 0.06
38°C						
INITIAL	0.23 ± 0.02	0.31 ± 0.02	2.82 ± 0.12	3.03 ± 0.08	0.48 ± 0.01	0.57 ± 0.03
6 MONTHS	0.27 ± 0.01	0.34 ± 0.00	2.78 ± 0.10	3.05 ± 0.09	0.49 ± 0.11	0.59 ± 0.03
12 MONTHS	0.25 ± 0.01	0.32 ± 0.01	2.94 ± 0.10	3.20 ± 0.10	0.45 ± 0.01	0.49 ± 0.01
18 MONTHS	0.26 ± 0.01	0.30 ± 0.03	2.75 ± 0.09	2.97 ± 0.08	0.46 ± 0.01	0.53 ± 0.02
24 MONTHS	0.24 ± 0.01	0.26 ± 0.00	2.75 ± 0.13	2.98 ± 0.12	0.31 ± 0.02	0.45 ± 0.04

TABLE D-3. NUTRITIONAL DATA OF MEAL, READY-TO-EAT, INDIVIDUAL CASE COMPOSITES - AS-IS BASIS

VITAMIN B12			VITAMIN E		
	50. PKG.	RIGHT AWAY	50. PKG.	RIGHT AWAY	
4°C					
INITIAL	0.61 ± 0.04	0.68 ± 0.03	0.61 ± 0.04	0.68 ± 0.03	
12 MONTHS	0.48 ± 0.02	0.43 ± 0.03	0.24 ± 0.06	0.44 ± 0.03	
30 MONTHS	0.41 ± 0.02	0.39 ± 0.02	2.10 ± 0.09	1.70 ± 0.05	
36 MONTHS	0.48 ± 0.01	0.43 ± 0.02	1.98 ± 0.03	1.90 ± 0.05	
48 MONTHS	0.57 ± 0.30	0.39 ± 0.02	2.82 ± 0.80	1.70 ± 0.18	
60 MONTHS	0.48 ± 0.04	0.48 ± 0.05	1.98 ± 0.16	1.72 ± 0.14	
21°C					
INITIAL	0.61 ± 0.04	0.68 ± 0.03	0.61 ± 0.04	0.68 ± 0.03	
12 MONTHS	0.47 ± 0.04	0.43 ± 0.01	0.32 ± 0.06	0.43 ± 0.01	
18 MONTHS	0.34 ± 0.03	0.29 ± 0.01	1.25 ± 0.09	1.12 ± 0.28	
24 MONTHS	0.36 ± 0.01	0.34 ± 0.01	1.28 ± 0.03	1.50 ± 0.18	
30 MONTHS	0.40 ± 0.05	0.36 ± 0.02	2.12 ± 0.20	1.85 ± 0.05	
36 MONTHS	0.47 ± 0.02	0.43 ± 0.01	1.72 ± 0.12	1.72 ± 0.06	
48 MONTHS	0.31 ± 0.12	0.37 ± 0.01	1.30 ± 0.35	1.12 ± 0.08	
60 MONTHS	0.43 ± 0.01	0.42 ± 0.15	2.05 ± 0.18	1.98 ± 0.23	
30°C					
INITIAL	0.61 ± 0.04	0.68 ± 0.03	0.61 ± 0.04	0.68 ± 0.03	
6 MONTHS	0.50 ± 0.02	0.44 ± 0.02	1.62 ± 0.10	1.25 ± 0.09	
12 MONTHS	0.44 ± 0.01	0.42 ± 0.02	0.68 ± 0.08	0.42 ± 0.02	
18 MONTHS	0.30 ± 0.02	0.28 ± 0.02	1.08 ± 0.18	0.50 ± 0.61	
24 MONTHS	0.35 ± 0.01	0.35 ± 0.00	1.34 ± 0.23	1.65 ± 0.13	
30 MONTHS	0.37 ± 0.01	0.36 ± 0.01	1.53 ± 0.08	1.68 ± 0.10	
36 MONTHS	0.44 ± 0.01	0.40 ± 0.02	1.58 ± 0.03	1.58 ± 0.03	
38°C					
INITIAL	0.61 ± 0.04	0.68 ± 0.03	0.61 ± 0.04	0.68 ± 0.03	
6 MONTHS	0.51 ± 0.01	0.42 ± 0.01	1.27 ± 0.13	1.03 ± 0.06	
12 MONTHS	0.42 ± 0.01	0.41 ± 0.01	0.67 ± 0.76	0.41 ± 0.01	
18 MONTHS	0.28 ± 0.02	0.28 ± 0.01	1.27 ± 0.06	0.54 ± 0.58	
24 MONTHS	0.31 ± 0.01	0.33 ± 0.04	1.34 ± 0.14	1.70 ± 0.05	

TABLE D-4. NUTRITIONAL DATA OF THE MEAL, READY-TO-EAT, INDIVIDUAL CASE COMPOSITES - MOISTURE FREE - FAT FREE BASIS

	VITAMIN A (IU)			CAROTENE (mg)			THIAMIN (mg)					
	SO. PKG.		RIGHT AWAY	SO. PKG.		RIGHT AWAY	SO. PKG.		RIGHT AWAY			
4°C												
INITIAL	1878 ± 223	b	1892 ± 25	bc	0.26 ± 0.01	0.27 ± 0.01	b	1.45 ± 0.04	b	1.35 ± 0.04	a	
12 MONTHS	2004 ± 102	b	1861 ± 40	bc	0.25 ± 0.02	0.25 ± 0.00	b	1.37 ± 0.03	bc	1.21 ± 0.03	ab	
30 MONTHS	2329 ± 128	a	2166 ± 106	ab	0.28 ± 0.07	0.34 ± 0.03	a	1.59 ± 0.11	a	1.35 ± 0.05	a	
36 MONTHS	2336 ± 75	a	2418 ± 44	a	0.26 ± 0.04	0.33 ± 0.03	a	1.24 ± 0.09	c	1.24 ± 0.05	ab	
48 MONTHS	1749 ± 82	b	1586 ± 340	cd	0.18 ± 0.03	0.20 ± 0.03	c	1.30 ± 0.01	c	1.15 ± 0.11	b	
60 MONTHS	1294 ± 91	c	1330 ± 57	d	0.21 ± 0.03	NS	0.22 ± 0.02	bc	1.01 ± 0.08	d	1.01 ± 0.03	c
21°C												
INITIAL	1878 ± 223	abc	1892 ± 25	bc	0.26 ± 0.01	a	0.27 ± 0.01	b	1.45 ± 0.04	a	1.35 ± 0.04	a
12 MONTHS	2001 ± 29	abc	2094 ± 229	ab	0.21 ± 0.01	ab	0.24 ± 0.02	b	1.19 ± 0.03	c	1.26 ± 0.04	a
18 MONTHS	1604 ± 294	bc	2340 ± 31	a	0.26 ± 0.01	a	0.19 ± 0.02	c	1.32 ± 0.02	b	1.35 ± 0.01	a
24 MONTHS	1894 ± 39	abc	1655 ± 19	c	0.16 ± 0.01	b	0.17 ± 0.01	c	1.42 ± 0.07	a	1.32 ± 0.03	a
30 MONTHS	2315 ± 96	a	2041 ± 110	abc	0.24 ± 0.03	a	0.28 ± 0.01	b	1.46 ± 0.03	a	1.29 ± 0.05	a
36 MONTHS	2071 ± 10	ab	1842 ± 46	bc	0.25 ± 0.01	a	0.25 ± 0.01	b	1.16 ± 0.05	c	1.15 ± 0.01	b
48 MONTHS	1560 ± 23	c	2019 ± 343	abc	0.17 ± 0.07	b	0.16 ± 0.01	c	1.17 ± 0.03	c	1.03 ± 0.15	b
60 MONTHS	1536 ± 295	c	1180 ± 82	d	0.25 ± 0.05	a	0.44 ± 0.04	a	0.83 ± 0.01	d	1.10 ± 0.05	b
30°C												
INITIAL	1878 ± 223	abc	1892 ± 25	a	0.26 ± 0.01	b	0.27 ± 0.01	a	1.45 ± 0.04	a	1.35 ± 0.04	a
6 MONTHS	1921 ± 244	abc	1555 ± 163	b	0.20 ± 0.02	c	0.19 ± 0.01	b	1.37 ± 0.04	ab	1.38 ± 0.05	a
12 MONTHS	2218 ± 249	a	1827 ± 68	a	0.20 ± 0.03	c	0.19 ± 0.04	b	1.21 ± 0.03	cd	1.19 ± 0.04	b
18 MONTHS	1487 ± 71	c	1786 ± 113	a	0.26 ± 0.02	b	0.14 ± 0.00	c	1.19 ± 0.04	cd	1.28 ± 0.04	a
24 MONTHS	1646 ± 140	bc	1240 ± 102	c	0.18 ± 0.02	c	0.17 ± 0.02	bc	1.28 ± 0.07	bc	1.32 ± 0.01	a
30 MONTHS	2035 ± 150	ab	1966 ± 57	a	0.31 ± 0.02	a	0.27 ± 0.01	a	1.36 ± 0.04	ab	1.18 ± 0.05	b
36 MONTHS	1980 ± 138	ab	1722 ± 107	ab	0.30 ± 0.03	a	0.26 ± 0.02	a	1.18 ± 0.05	d	1.14 ± 0.02	c
38°C												
INITIAL	1878 ± 223		1892 ± 25	ab	0.26 ± 0.01	a	0.27 ± 0.01	a	1.45 ± 0.04	a	1.35 ± 0.04	a
6 MONTHS	1558 ± 64		1404 ± 135	c	0.17 ± 0.02	c	0.16 ± 0.03	b	1.26 ± 0.04	b	1.30 ± 0.08	a
12 MONTHS	1966 ± 178		1947 ± 56	a	0.21 ± 0.00	b	0.18 ± 0.01	b	1.10 ± 0.06	c	1.14 ± 0.01	b
18 MONTHS	1665 ± 90		1756 ± 82	b	0.19 ± 0.02	bc	0.17 ± 0.02	b	1.10 ± 0.06	c	1.15 ± 0.02	b
24 MONTHS	1570 ± 172	NS	1172 ± 69	d	0.17 ± 0.02	c	0.21 ± 0.03	b	1.15 ± 0.10	c	1.22 ± 0.03	b

Means ± S.D.; N=36; Significant differences are indicated by different letters (p<0.05)

TABLE D-4. NUTRITIONAL DATA OF THE MEAL, READY-TO-EAT, INDIVIDUAL CASE COMPOSITES - MOISTURE FREE - FAT FREE BASIS

	RIBOFLAVIN (mg)		NIACIN (mg)		PYRIDOXINE (mg)	
	SO. PKG.	RIGHT AWAY	SO. PKG.	RIGHT AWAY	SO. PKG.	RIGHT AWAY
4°C						
INITIAL	0.48 ± 0.04 a	0.62 ± 0.03 a	5.81 ± 0.24 b	6.17 ± 0.16 c	0.99 ± 0.02 cd	1.16 ± 0.06
12 MONTHS	0.54 ± 0.03 a	0.65 ± 0.00 a	6.18 ± 0.18 b	6.38 ± 0.03 bc	1.03 ± 0.08 bcd	1.20 ± 0.08
30 MONTHS	0.52 ± 0.02 a	0.61 ± 0.12 a	6.79 ± 0.20 a	6.84 ± 0.37 ab	0.89 ± 0.02 d	1.11 ± 0.07
36 MONTHS	0.50 ± 0.02 a	0.64 ± 0.04 a	6.10 ± 0.27 b	6.87 ± 0.08 ab	1.16 ± 0.06 b	1.38 ± 0.23
48 MONTHS	0.41 ± 0.02 b	0.45 ± 0.03 b	5.45 ± 0.14 c	5.84 ± 0.30 c	1.57 ± 0.06 a	1.42 ± 0.26
60 MONTHS	0.34 ± 0.04 c	0.44 ± 0.02 b	6.81 ± 0.12 a	7.05 ± 0.37 a	1.12 ± 0.11 bc	1.48 ± 0.16 NS
21°C						
INITIAL	0.48 ± 0.04 b	0.62 ± 0.03 b	5.81 ± 0.24 c	6.17 ± 0.16 bc	0.99 ± 0.02 b	1.16 ± 0.06 bc
12 MONTHS	0.52 ± 0.01 b	0.68 ± 0.03 a	6.03 ± 0.17 c	6.64 ± 0.06 b	1.04 ± 0.07 b	1.21 ± 0.07 abc
18 MONTHS	0.49 ± 0.04 b	0.64 ± 0.01 ab	5.89 ± 0.10 c	6.40 ± 0.09 b	1.21 ± 0.06 ab	1.16 ± 0.16 bc
24 MONTHS	0.50 ± 0.01 b	0.62 ± 0.01 b	5.58 ± 0.18 c	5.70 ± 0.08 d	0.95 ± 0.13 b	1.06 ± 0.13 c
30 MONTHS	0.50 ± 0.01 b	0.65 ± 0.03 ab	7.09 ± 0.31 a	7.03 ± 0.17 a	0.93 ± 0.03 b	0.99 ± 0.04 c
36 MONTHS	0.59 ± 0.06 a	0.61 ± 0.01 b	6.48 ± 0.06 b	6.56 ± 0.34 b	1.15 ± 0.16 ab	1.34 ± 0.09 ab
48 MONTHS	0.44 ± 0.01 b	0.48 ± 0.01 c	5.59 ± 0.21 c	5.82 ± 0.37 cd	1.38 ± 0.18 a	1.39 ± 0.04 a
60 MONTHS	0.33 ± 0.04 c	0.38 ± 0.13 d	6.71 ± 0.33 ab	7.08 ± 0.37 a	1.15 ± 0.12 ab	1.08 ± 0.09 c
30°C						
INITIAL	0.48 ± 0.04 b	0.62 ± 0.03 bc	5.81 ± 0.24 b	6.17 ± 0.16 b	0.99 ± 0.02 ab	1.16 ± 0.06 a
6 MONTHS	0.56 ± 0.03 a	0.70 ± 0.01 a	5.87 ± 0.13 b	6.38 ± 0.05 b	1.18 ± 0.13 a	1.25 ± 0.02 a
12 MONTHS	0.54 ± 0.02 ab	0.67 ± 0.03 ab	5.99 ± 0.24 b	6.72 ± 0.21 a	0.95 ± 0.02 b	1.17 ± 0.06 a
18 MONTHS	0.51 ± 0.01 ab	0.67 ± 0.03 ab	5.76 ± 0.16 b	6.34 ± 0.09 b	1.14 ± 0.11 ab	1.23 ± 0.01 a
24 MONTHS	0.49 ± 0.03 b	0.55 ± 0.01 d	5.83 ± 0.09 b	6.15 ± 0.05 b	0.77 ± 0.04 c	1.03 ± 0.03 b
30 MONTHS	0.51 ± 0.01 ab	0.61 ± 0.01 c	7.92 ± 0.8 a	6.85 ± 0.16 a	0.99 ± 0.07 ab	0.98 ± 0.08 b
36 MONTHS	0.55 ± 0.01 a	0.58 ± 0.02 bc	6.48 ± 0.14 b	6.17 ± 0.25 b	1.12 ± 0.08 ab	1.45 ± 0.12 a
38°C						
INITIAL	0.48 ± 0.04 c	0.62 ± 0.03 ab	5.81 ± 0.24	6.17 ± 0.16	0.99 ± 0.02 a	1.16 ± 0.06 ab
6 MONTHS	0.57 ± 0.02 a	0.70 ± 0.01 a	5.84 ± 0.21	6.30 ± 0.16	1.03 ± 0.22 a	1.23 ± 0.05 a
12 MONTHS	0.52 ± 0.01 abc	0.66 ± 0.03 a	6.11 ± 0.24	6.58 ± 0.19	0.93 ± 0.02 a	1.02 ± 0.02 cd
18 MONTHS	0.54 ± 0.01 ab	0.62 ± 0.07 ab	5.82 ± 0.22	6.10 ± 0.15	0.98 ± 0.01 a	1.09 ± 0.05 bc
24 MONTHS	0.49 ± 0.02 bc	0.55 ± 0.07 b	5.81 ± 0.24 NS	6.22 ± 0.23 NS	0.66 ± 0.04 b	0.94 ± 0.08 d

Means ± S.D.; N=36; Significant differences are indicated by different letters (p<0.05)

TABLE D-4. NUTRITIONAL DATA OF THE MEAL, READY-TO-EAT, INDIVIDUAL CASE COMPOSITES - MOISTURE FREE - FAT FREE BASIS

	VITAMIN B12 (mcg)		VITAMIN E (mg)	
	SO. PKG.	RIGHT AWAY	SO. PKG.	RIGHT AWAY
4°C				
INITIAL	1.26 ± 0.08	1.38 ± 0.06 a	2.06 ± 0.18 c	2.40 ± 0.41 b
12 MONTHS	1.00 ± 0.05	0.90 ± 0.06 bc	0.49 ± 0.12 d	1.55 ± 0.28 c
30 MONTHS	0.84 ± 0.04	0.79 ± 0.04 c	4.30 ± 0.18 b	3.46 ± 0.09 a
36 MONTHS	0.99 ± 0.01	0.89 ± 0.03 bc	4.10 ± 0.06 b	3.90 ± 0.12 a
48 MONTHS	1.18 ± 0.62	0.80 ± 0.02 c	5.86 ± 1.79 a	3.50 ± 0.31 a
60 MONTHS	0.97 ± 0.10 NS	0.98 ± 0.10 b	4.01 ± 0.22 b	3.52 ± 0.30 a
21°C				
INITIAL	1.26 ± 0.08 a	1.38 ± 0.06 a	2.06 ± 0.18 c	2.40 ± 0.41 cd
12 MONTHS	0.99 ± 0.07 b	0.90 ± 0.02 b	0.67 ± 0.13 d	1.58 ± 0.21 d
18 MONTHS	0.70 ± 0.06 d	0.59 ± 0.14 d	2.57 ± 0.19 c	2.30 ± 0.57 cd
24 MONTHS	0.75 ± 0.02 cd	0.70 ± 0.03 c	2.65 ± 0.05 c	3.06 ± 0.36 bc
30 MONTHS	0.84 ± 0.10 cd	0.75 ± 0.03 c	4.40 ± 0.46 a	3.81 ± 0.10 a
36 MONTHS	0.97 ± 0.05 b	0.88 ± 0.02 b	3.55 ± 0.24 b	3.54 ± 0.14 ab
48 MONTHS	0.80 ± 0.03 cd	0.76 ± 0.01 c	2.74 ± 0.75 c	2.30 ± 0.23 cd
60 MONTHS	0.89 ± 0.03 bc	0.86 ± 0.03 b	4.23 ± 0.39 a	4.11 ± 0.51 a
30°C				
INITIAL	1.26 ± 0.08 a	1.38 ± 0.06 a	2.06 ± 0.18 c	2.40 ± 0.41 ab
6 MONTHS	1.04 ± 0.03 b	0.90 ± 0.04 b	3.37 ± 0.23 a	2.58 ± 0.19 ab
12 MONTHS	0.91 ± 0.02 c	0.85 ± 0.02 b	1.43 ± 0.17 d	1.47 ± 0.22 bc
18 MONTHS	0.61 ± 0.04 e	0.58 ± 0.05 d	2.24 ± 0.36 bc	1.02 ± 1.23 c
24 MONTHS	0.72 ± 0.02 d	0.74 ± 0.01 c	2.76 ± 0.49 ab	3.44 ± 0.26 a
30 MONTHS	0.77 ± 0.02 d	0.75 ± 0.02 c	3.21 ± 0.16 a	3.50 ± 0.21 a
36 MONTHS	0.90 ± 0.02 c	0.83 ± 0.05 b	3.29 ± 0.06 a	3.25 ± 0.07 a
38°C				
INITIAL	1.26 ± 0.08 a	1.38 ± 0.06 a	2.06 ± 0.18 b	2.40 ± 0.41 b
6 MONTHS	1.07 ± 0.02 b	0.86 ± 0.02 b	2.66 ± 0.27 a	2.13 ± 0.11 b
12 MONTHS	0.88 ± 0.02 c	0.84 ± 0.02 b	1.39 ± 0.15 c	1.03 ± 0.10 b
18 MONTHS	0.60 ± 0.03 d	0.58 ± 0.00 d	2.68 ± 0.15 a	1.08 ± 0.12 b
24 MONTHS	0.66 ± 0.01 d	0.69 ± 0.07 c	2.82 ± 0.33 a	3.55 ± 0.07 a

Mean ± S.D.; N=36; Significant differences are indicated by different letters (p<0.05)

TABLE D-5. MEAL, READY-TO-EAT, INDIVIDUAL - (MRE-1)

MENUS 1 - 12

THIAMIN (analysis of variance on moisture-fat free basis)

	MENU 1	MENU 2	MENU 3	MENU 4
4°C				
INITIAL	1.60 ± 0.06 a	1.06 ± 0.04	1.04 ± 0.06 a	1.13 ± 0.06 b
12 MONTHS	1.29 ± 0.13 b	1.01 ± 0.01	1.03 ± 0.07 a	1.11 ± 0.07 b
30 MONTHS	1.50 ± 0.23 ab	0.98 ± 0.04	1.02 ± 0.03 a	1.20 ± 0.04 ab
36 MONTHS	1.60 ± 0.12 a	1.05 ± 0.03	1.09 ± 0.08 a	1.12 ± 0.01 b
48 MONTHS	1.50 ± 0.96 ab	0.99 ± 0.04	0.90 ± 0.06 b	1.12 ± 0.04 b
60 MONTHS	1.52 ± 0.16 ab	1.06 ± 0.10 NS	1.06 ± 0.03 a	1.24 ± 0.08 a
21°C				
INITIAL	1.60 ± 0.06 ab	1.06 ± 0.04 a	1.04 ± 0.06 a	1.13 ± 0.06 bc
12 MONTHS	1.72 ± 0.27 a	1.03 ± 0.03 a	0.90 ± 0.05 bc	1.10 ± 0.04 bc
18 MONTHS	1.39 ± 0.11 c	0.97 ± 0.04 b	0.83 ± 0.05 bc	1.03 ± 0.05 c
24 MONTHS	1.55 ± 0.04 abc	0.96 ± 0.07 b	0.82 ± 0.02 bc	1.10 ± 0.06 bc
30 MONTHS	1.62 ± 0.08 ab	1.04 ± 0.05 a	0.89 ± 0.03 bc	1.16 ± 0.07 b
36 MONTHS	1.62 ± 0.10 ab	1.04 ± 0.02 a	0.92 ± 0.08 b	1.16 ± 0.1 b
48 MONTHS	1.47 ± 0.07 bc	0.92 ± 0.03 b	0.81 ± 0.02 c	1.08 ± 0.05 bc
60 MONTHS	1.72 ± 0.08 a	1.07 ± 0.02 a	1.01 ± 0.05 a	1.37 ± 0.04 a
30°C				
INITIAL	1.60 ± 0.06 ab	1.06 ± 0.04 a	1.04 ± 0.06 a	1.13 ± 0.06 a
6 MONTHS	1.50 ± 0.11 bc	1.07 ± 0.03 a	0.96 ± 0.04 b	1.19 ± 0.02 a
12 MONTHS	1.68 ± 0.05 a	0.99 ± 0.05 ab	0.80 ± 0.07 c	1.03 ± 0.08 b
18 MONTHS	1.15 ± 0.09 e	0.94 ± 0.07 b	0.70 ± 0.03 de	1.02 ± 0.03 b
24 MONTHS	1.32 ± 0.11 d	0.99 ± 0.07 ab	0.71 ± 0.05 de	1.18 ± 0.04 a
30 MONTHS	1.36 ± 0.17 cd	0.90 ± 0.05 b	0.64 ± 0.04 e	1.19 ± 0.07 a
36 MONTHS	1.43 ± 0.09 cd	0.90 ± 0.07 b	0.76 ± 0.08 cd	1.13 ± 0.06 a
38°C				
INITIAL	1.60 ± 0.06 a	1.06 ± 0.04 a	1.04 ± 0.06 a	1.13 ± 0.06 a
6 MONTHS	1.33 ± 0.11 b	0.93 ± 0.04 b	0.71 ± 0.02 b	1.02 ± 0.01 b
12 MONTHS	1.15 ± 0.11 c	0.87 ± 0.04 b	0.61 ± 0.02 c	1.00 ± 0.03 b
18 MONTHS	1.20 ± 0.04 bc	0.89 ± 0.04 b	0.67 ± 0.09 bc	0.99 ± 0.08 b
24 MONTHS	1.22 ± 0.12 bc	0.93 ± 0.04 b	0.69 ± 0.06 bc	1.05 ± 0.03 b

Means ± S.D.; N=36; Significant differences are indicated by different letters (p<0.05)

TABLE D-5. MEAL, READY-TO-EAT, INDIVIDUAL - (MRE-1)

MENUS 1 - 12

THIAMIN (analysis of variance on moisture-fat free basis)

MENU 5

MENU 6

MENU 7

MENU 8

4°C

INITIAL	1.24 ± 0.10	1.19 ± 0.02 a	0.90 ± 0.05 a	0.94 ± 0.01
12 MONTHS	1.22 ± 0.01	1.04 ± 0.03 c	0.80 ± 0.02 ab	1.01 ± 0.02
30 MONTHS	1.26 ± 0.05	1.17 ± 0.05 a	0.89 ± 0.02 a	0.91 ± 0.11
36 MONTHS	1.17 ± 0.02	0.98 ± 0.02 d	0.83 ± 0.05 ab	0.92 ± 0.04
48 MONTHS	1.24 ± 0.08	1.12 ± 0.02 b	0.88 ± 0.02 a	0.95 ± 0.03
60 MONTHS	1.32 ± 0.08 NS	1.14 ± 0.05 b	0.74 ± 0.14 b	0.81 ± 0.02

21°C

INITIAL	1.24 ± 0.10 bcd	1.19 ± 0.02 bc	0.90 ± 0.05 ab	0.94 ± 0.01
12 MONTHS	1.29 ± 0.04 abc	1.13 ± 0.03 bc	0.85 ± 0.05 ab	0.82 ± 0.08
18 MONTHS	1.25 ± 0.05 bcd	1.09 ± 0.02 c	0.86 ± 0.10 ab	0.81 ± 0.03
24 MONTHS	1.19 ± 0.04 cd	1.09 ± 0.05 c	0.97 ± 0.02 a	0.70 ± 0.02
30 MONTHS	1.31 ± 0.06 ab	1.15 ± 0.03 bc	0.92 ± 0.09 ab	0.73 ± 0.09
36 MONTHS	1.39 ± 0.05 a	1.28 ± 0.08 a	0.90 ± 0.07 ab	0.71 ± 0.01
48 MONTHS	1.15 ± 0.01 d	1.10 ± 0.05 c	0.85 ± 0.06 ab	0.61 ± 0.01
60 MONTHS	1.33 ± 0.03 ab	1.20 ± 0.08 b	0.82 ± 0.02 b	0.54 ± 0.11

30°C

INITIAL	1.24 ± 0.10 ab	1.19 ± 0.02 a	0.90 ± 0.05 a	0.94 ± 0.01
6 MONTHS	1.35 ± 0.08 a	1.14 ± 0.06 b	0.91 ± 0.07 a	0.84 ± 0.02
12 MONTHS	1.13 ± 0.03 b	1.05 ± 0.05 cd	0.80 ± 0.04 bc	0.70 ± 0.13
18 MONTHS	1.20 ± 0.08 ab	1.05 ± 0.04 cd	0.86 ± 0.03 ab	0.73 ± 0.01
24 MONTHS	1.25 ± 0.12 ab	1.06 ± 0.02 cd	0.80 ± 0.11 abc	0.71 ± 0.02
30 MONTHS	1.26 ± 0.07 ab	1.01 ± 0.05 d	0.71 ± 0.12 c	0.61 ± 0.04
36 MONTHS	1.24 ± 0.11 ab	1.08 ± 0.06 c	0.82 ± 0.02 abc	0.54 ± 0.11

38°C

INITIAL	1.24 ± 0.10 ab	1.19 ± 0.02 a	0.90 ± 0.05 a	0.94 ± 0.01
6 MONTHS	1.27 ± 0.04 a	1.04 ± 0.02 b	0.85 ± 0.03 b	0.78 ± 0.04
12 MONTHS	1.12 ± 0.02 c	1.03 ± 0.02 b	0.77 ± 0.03 c	0.53 ± 0.11
18 MONTHS	1.16 ± 0.06 bc	1.04 ± 0.07 b	0.75 ± 0.02 c	0.53 ± 0.13
24 MONTHS	1.23 ± 0.06 ab	0.93 ± 0.03 c	0.84 ± 0.01 b	0.61 ± 0.05

Means ± S.D.; N=36; Significant differences are indicated by different letters (p<0.05)

TABLE D-5. MEAL, READY-TO-EAT, INDIVIDUAL - (MRE-1)

MENUS 1 - 12

THIAMIN (analysis of variance on moisture-fat free basis)

	MENU 9	MENU 10	MENU 11	MENU 12
4°C				
INITIAL	1.18 ± 0.05 b	0.72 ± 0.03 b	1.18 ± 0.07 ab	1.15 ± 0.08
12 MONTHS	1.06 ± 0.02 c	0.72 ± 0.05 b	1.14 ± 0.05 bc	1.22 ± 0.01
30 MONTHS	1.07 ± 0.03 c	0.76 ± 0.09 b	1.25 ± 0.02 a	1.27 ± 0.19
36 MONTHS	0.95 ± 0.03 d	0.85 ± 0.07 ab	1.13 ± 0.07 bc	1.15 ± 0.05
48 MONTHS	1.10 ± 0.04 c	0.72 ± 0.03 b	1.09 ± 0.04 c	1.16 ± 0.14
60 MONTHS	1.29 ± 0.05 a	0.95 ± 0.12 a	1.22 ± 0.04 ab	1.25 ± 0.07 NS
21°C				
INITIAL	1.18 ± 0.05 ab	0.72 ± 0.03 c	1.18 ± 0.07 a	1.15 ± 0.08 bc
12 MONTHS	1.09 ± 0.03 ab	0.76 ± 0.03 bc	0.98 ± 0.10 bcd	1.13 ± 0.08 bc
18 MONTHS	1.06 ± 0.07 abc	0.75 ± 0.07 c	1.01 ± 0.03 bc	1.40 ± 0.23 a
24 MONTHS	1.28 ± 0.39 a	0.85 ± 0.05 ab	1.11 ± 0.08 ab	1.21 ± 0.12 b
30 MONTHS	1.03 ± 0.07 abc	0.79 ± 0.07 bc	1.06 ± 0.04 ab	1.12 ± 0.10 bc
36 MONTHS	1.06 ± 0.08 abc	0.89 ± 0.09 a	1.10 ± 0.07 ab	1.22 ± 0.09 b
48 MONTHS	0.94 ± 0.02 bc	0.73 ± 0.05 c	0.87 ± 0.07 d	1.06 ± 0.08 bc
60 MONTHS	0.80 ± 0.06 c	0.76 ± 0.06 bc	0.92 ± 0.01 cd	0.98 ± 0.04 c
30°C				
INITIAL	1.18 ± 0.05 a	0.72 ± 0.03 c	1.18 ± 0.07 a	1.15 ± 0.08
6 MONTHS	1.07 ± 0.05 b	0.81 ± 0.03 ab	1.09 ± 0.06 ab	1.07 ± 0.06
12 MONTHS	0.96 ± 0.07 c	0.73 ± 0.04 bc	0.96 ± 0.08 bc	1.08 ± 0.07
18 MONTHS	0.93 ± 0.03 c	0.80 ± 0.04 abc	1.08 ± 0.06 ab	1.20 ± 0.13
24 MONTHS	0.94 ± 0.02 c	0.83 ± 0.02 a	1.00 ± 0.03 bc	1.20 ± 0.08
30 MONTHS	0.85 ± 0.02 d	0.81 ± 0.09 abc	0.94 ± 0.06 c	1.12 ± 0.11
36 MONTHS	0.92 ± 0.03 c	0.79 ± 0.06 abc	0.92 ± 0.11 c	1.14 ± 0.07 NS
38°C				
INITIAL	1.18 ± 0.05 a	0.72 ± 0.03 b	1.18 ± 0.07 a	1.15 ± 0.08
6 MONTHS	1.01 ± 0.07 b	0.75 ± 0.05 ab	1.03 ± 0.05 b	1.25 ± 0.11
12 MONTHS	0.86 ± 0.02 c	0.71 ± 0.03 b	0.84 ± 0.10 c	1.13 ± 0.07
18 MONTHS	0.90 ± 0.05 c	0.78 ± 0.04 a	0.91 ± 0.11 c	1.21 ± 0.17
24 MONTHS	0.93 ± 0.03 c	0.80 ± 0.03 a	0.82 ± 0.07 c	1.19 ± 0.10 NS

Means ± S.D.; N=36; Significant differences are indicated by different letters (p<0.05)

TABLE D-6. MEAL, READY-TO-EAT, INDIVIDUAL MEASURED VITAMIN CONTENT
PER AVERAGE MEAL FOLLOWING STORAGE AT 4°, 21°, 30° AND 38°C

Storage Time/ Temperature :	Vitamin A IU		Thiamin (MG)		Riboflavin (MG)	
	So. Pkg.	Right Away	So. Pkg.	Right Away	So. Pkg.	Right Away
48 mo @ 4°C :	3025	2757	2.26	2.00	0.68	0.79
60 mo @ 4°C :	2295	2320	1.79	1.75	0.61	0.79
48 mo @ 21°C :	2649	3508	2.00	1.79	0.75	0.82
60 mo @ 21°C :	2660	2037	1.43	1.90	0.57	0.64
36 mo @ 30°C :	3408	3000	2.00	2.00	0.93	1.00
6 mo @ 38°C :	2660	2434	2.15	2.26	0.97	1.22
24 mo @ 38°C :	2656	2012	1.93	2.08	0.86	0.93

Minimum Meal
Requirements
(1976)
1/3 AR 40-25

1670

0.53

0.67

Storage Time/ Temperature :	Niacin (MG)		Pyridoxine (MG)		WEIGHT (GM)
	So. Pkg.	Right Away	So. Pkg.	Right Away	
48 mo @ 4°C :	9.42	10.13	2.72	2.47	358.00
60 mo @ 4°C :	12.06	12.28	1.97	2.58	358.00
48 mo @ 21°C :	9.49	10.13	2.33	2.43	358.00
60 mo @ 21°C :	11.64	12.24	2.00	1.86	358.00
36 mo @ 30°C :	11.17	10.74	1.93	2.51	358.00
6 mo @ 38°C :	9.95	10.92	1.75	2.11	358.00
24 mo @ 38°C :	9.85	10.67	1.11	1.61	358.00

Minimum Meal
Requirements
(1976)
1/3 AR 40-25

7.0

0.67

TABLE D-7. NUTRITIONAL DATA OF CHEESE, SPREAD, FORTIFIED
(ANALYSIS OF VARIANCE ON AS-IS BASIS)

	VITAMIN A	ASCORBIC ACID	THIAMIN	PYRIDOXINE
4°C				
INITIAL	6842 ± 413	79 ± 7	2.51 ± 0.16	3.25 ± 0.05
12 MONTHS	5812 ± 288	112 ± 11	2.37 ± 0.08	2.92 ± 0.38
30 MONTHS	7795 ± 637	59 ± 10	1.55 ± 0.17	3.87 ± 0.03
36 MONTHS	8612 ± 32	124 ± 23	2.50 ± 0.10	3.67 ± 0.06
48 MONTHS	9170 ± 506	128 ± 6	1.80 ± 0.09	3.78 ± 0.32
60 MONTHS	6372 ± 558	75 ± 12	1.78 ± 0.18	3.52 ± 0.08
21°C				
INITIAL	6842 ± 413	79 ± 7	2.51 ± 0.16	3.25 ± 0.05
12 MONTHS	5035 ± 17	102 ± 4	1.93 ± 0.06	3.30 ± 0.69
18 MONTHS	6097 ± 178	105 ± 5	1.80 ± 0.05	3.63 ± 0.08
24 MONTHS	9317 ± 392	110 ± 2	1.52 ± 0.08	3.17 ± 0.24
30 MONTHS	8748 ± 223	63 ± 1	0.84 ± 0.09	3.80 ± 0.15
36 MONTHS	8877 ± 238	109 ± 20	1.2 ± 0.17	3.52 ± 0.30
48 MONTHS	8857 ± 159	91 ± 40	0.74 ± 0.04	3.67 ± 0.08
60 MONTHS	6147 ± 1159	65 ± 23	0.66 ± 0.08	2.89 ± 0.93
30°C				
INITIAL	6842 ± 413	79 ± 7	2.51 ± 0.16	3.25 ± 0.05
6 MONTHS	4642 ± 789	89 ± 4	1.26 ± 0.04	3.17 ± 0.14
12 MONTHS	4860 ± 265	94 ± 18	0.98 ± 0.02	2.58 ± 0.06
18 MONTHS	4903 ± 389	77 ± 7	0.53 ± 0.05	3.50 ± 0.22
24 MONTHS	9477 ± 158	77 ± 2	0.22 ± 0.05	4.13 ± 0.38
30 MONTHS	8305 ± 516	72 ± 15	0.14 ± 0.02	3.27 ± 0.29
36 MONTHS	7462 ± 300	66 ± 30	0.24 ± 0.17	3.32 ± 0.10
38°C				
INITIAL	6842 ± 412	79 ± 7	2.51 ± 0.16	3.25 ± 0.05
6 MONTHS	5892 ± 341	92 ± 1	1.34 ± 0.03	3.02 ± 0.28
12 MONTHS	4597 ± 98	100 ± 5	0.76 ± 0.04	2.92 ± 0.76
18 MONTHS	5525 ± 202	78 ± 1	0.46 ± 0.03	3.48 ± 0.13
24 MONTHS	7990 ± 163	63 ± 2	0.19 ± 0.03	3.45 ± 0.30

TABLE D-8. NUTRITIONAL DATA OF CHEESE SPREAD, FORTIFIED
(ANALYSIS OF VARIANCE ON MOISTURE-FAT FREE BASIS)

	VITAMIN A	ASCORBIC ACID	THIAMIN	PYRIDOXINE
4°C				
INITIAL	32770 ± 4248 b	377 ± 52 b	12.06 ± 1.67 a	15.53 ± 1.17 c
12 MONTHS	31820 ± 2601 b	610 ± 42 a	12.95 ± 0.75 a	16.00 ± 2.60 c
30 MONTHS	43380 ± 7335 a	328 ± 46 b	8.64 ± 1.66 b	21.49 ± 3.03 b
36 MONTHS	48950 ± 1270 a	707 ± 21 a	14.20 ± 0.25 a	20.84 ± 0.24 b
48 MONTHS	43180 ± 3360 a	601 ± 21 a	8.47 ± 0.55 b	17.82 ± 1.83 bc
60 MONTHS	47360 ± 2143 a	561 ± 132 a	13.27 ± 0.94 a	26.27 ± 2.57 a
21°C				
INITIAL	32770 ± 4248 b	377 ± 52 e	12.06 ± 1.67 a	15.53 ± 1.17 b
12 MONTHS	26770 ± 481 b	538 ± 9 c	10.19 ± 1.30 b	17.39 ± 3.61 ab
18 MONTHS	40840 ± 671 a	704 ± 46 a	12.06 ± 0.19 a	24.38 ± 1.56 a
24 MONTHS	44120 ± 4047 a	524 ± 56 c	7.21 ± 1.05 c	15.12 ± 2.80 b
30 MONTHS	50480 ± 1509 a	364 ± 67 e	4.86 ± 0.53 d	21.94 ± 1.17 ab
36 MONTHS	49580 ± 622 a	611 ± 18 b	6.70 ± 0.10 c	19.65 ± 1.67 ab
48 MONTHS	45210 ± 1765 a	466 ± 31 cd	3.76 ± 0.19 d	18.71 ± 0.42 ab
60 MONTHS	41590 ± 8951 a	441 ± 32 d	4.48 ± 0.64 d	19.48 ± 6.24 ab
30°C				
INITIAL	32770 ± 4248 b	377 ± 52	12.06 ± 1.67 a	15.53 ± 1.17 b
6 MONTHS	23230 ± 5498 b	442 ± 40	6.27 ± 0.66 b	15.71 ± 0.88 b
12 MONTHS	25310 ± 1238 b	490 ± 93	5.12 ± 0.08 b	13.46 ± 0.43 b
18 MONTHS	30890 ± 5053 b	484 ± 76	3.29 ± 0.23 c	22.14 ± 4.37 a
24 MONTHS	51860 ± 4929 a	422 ± 44	1.17 ± 0.20 d	22.50 ± 0.57 a
30 MONTHS	4574 ± 7409 a	394 ± 52	0.77 ± 0.12 d	18.06 ± 3.73 ab
36 MONTHS	42440 ± 2668 a	374 ± 26 NS	1.33 ± 0.07 d	18.86 ± 1.05 ab
38°C				
INITIAL	32770 ± 4248 a	377 ± 52 b	12.06 ± 1.67 a	15.53 ± 1.17 c
6 MONTHS	33610 ± 3446 a	540 ± 32 a	7.65 ± 0.57 b	17.13 ± 0.55 b
12 MONTHS	23380 ± 489 b	510 ± 20 a	3.89 ± 0.15 c	14.83 ± 0.11 c
18 MONTHS	33360 ± 2643 a	471 ± 22 a	2.79 ± 0.27 c	21.00 ± 0.54 a
24 MONTHS	39270 ± 5274 a	312 ± 43 b	0.91 ± 0.15 d	16.82 ± 0.66 b

Means ± S.D.; N=36 Significant differences are indicated by different letters (p<0.05)

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