

AD

TECHNICAL REPORT
NATICK/TR-81/022

PERFORMANCE, PHYSIOLOGICAL, AND
ACCEPTANCE TESTS OF A 1500-KCAL
EMERGENCY / ASSAULT FOOD PACKET DIET
IN A COLD WEATHER ENVIRONMENT

BY

KERRY W. WYANT
WILLIAM C. WILKINSON
HERBERT L. MEISELMAN
LAWRENCE E. SYMINGTON
JOSEPH G. HUNN

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED.

NOVEMBER 1980

UNITED STATES ARMY
NATICK RESEARCH and DEVELOPMENT LABORATORIES
NATICK, MASSACHUSETTS 01760



SCIENCE & ADVANCED TECHNOLOGY
LABORATORY

Approved for public release; distribution unlimited.

Citation of trade names in this report does not constitute an official indorsement or approval of the use of such items.

Destroy this report when no longer needed. Do not return it to the originator.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER NATICK/TR-81/022	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) PERFORMANCE, PHYSIOLOGICAL, AND ACCEPTANCE TESTS OF A 1500 KCAL EMERGENCY/ASSAULT FOOD PACKET DIET IN A COLD WEATHER ENVIRONMENT		5. TYPE OF REPORT & PERIOD COVERED
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Kerry W. Wyant, William C. Wilkinson, Herbert L. Meiselman, Lawrence E. Symington, and Joseph G. Hunn		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Food Sciences Laboratory US Army Natick Research & Development Command Natick, MA 01760		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 6.2 1L162724AH99/BB036
11. CONTROLLING OFFICE NAME AND ADDRESS US Army Natick Research & Development Command ATTN: DRDNA-YBH Natick, MA 01760		12. REPORT DATE
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		13. NUMBER OF PAGES 46
		15. SECURITY CLASS. (of this report) Unclassified
15a. DECLASSIFICATION/DOWNGRADING SCHEDULE		
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
CONSUMER ACCEPTANCE RATIONS EMERGENCY RATIONS FREEZE DRIED FOODS DEHYDRATED FOODS	EMERGENCY/ASSAULT PACKET DIET(S) COMPRESSED FOODS COLD WEATHER MILITARY FEEDING	FIELD FEEDING PHYSIOLOGICAL TESTS PERFORMANCE
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)		
A cold weather study was conducted at the US Marine Corps Mountain Warfare Training Center in order to assess consumer acceptance of the modified Emergency/Assault Food Packet (E/AP) and to assess performance and physiological effects of the ration at two different caloric levels. During a five-day exercise in a cold-weather climate, one group of Marines was issued the standard C ration (3550 kcal) while half of a second group were issued one E/AP per day (1500 kcal) and the other half, two E/AP's per day (3000 kcal). Acceptance was measured using rating scales during face-to-face interviews and performance was measured by three-mile		

20. Abstract (cont'd)

runs and snowshoe runs. Heart rates were continuously monitored, and repeated measurements were made on a symptoms questionnaire.

Results indicated that the E/AP is a highly acceptable ration that holds up well, with some minor exceptions, under field conditions. Generally, no performance or physiological differences were detected either between E/AP and C ration groups or within the E/AP group between the 1500 and 3000 kcal groups. The short duration of the test and mild environmental conditions mitigated against obtaining differences. Further, the heart rate data is based on a small sample. However, greater quantities of water were purportedly required by the E/AP group, not only for rehydrating food but also for drinking.

PREFACE

The present study was conducted by the Behavioral Sciences Division of the Food Sciences Laboratory in conjunction with elements of the Food Engineering Laboratory, USANARADCOM, in response to US Marine Corps Requirement 2-5. We are indebted to Major Paul L. Caron, D.V.M., Food Engineering Laboratory, and to Major William W. Kastner III, US Marine Corps Liaison Officer, who assisted in the design of the study and who coordinated the study with elements of the Marine Corps at the US Marine Corps Mountain Warfare Training Center (MCMWTC), Bridgeport, CA.

We are also greatly indebted to LTC James Stokes and Dr. James Sampson, US Army Institute of Environmental Medicine, who contributed equipment and Materials to the study, and to LTC Dan Redmond, M.D., Walter Reed Army Institute of Research, who acted as a consultant and contributed many hours to the study. We wish to thank the staff at MCMWTC, particularly LTC John Guy and LT Roy Chapman, and special thanks are due to the Marines who participated in the study.

Table of Contents

	Page
List of Tables	4
Introduction	5
Method	6
Subjects	6
Materials	6
Procedure	6
Design and Analysis	9
Environmental Conditions	9
Results	9
Acceptance Data	9
Performance and Physiological Tests	16
Symptoms Questionnaire	16
Conclusions	22
Appendix A. Modified Environmental Symptoms Questionnaire	25
Appendix B. Acceptance Interview	29
Appendix C. Post Surveys	33

List of Tables

	Page
Table 1. Group Counts by Measure	7
Table 2. Mean Preference Ratings of Food Items	10
Table 3. Rank Order of Food Items by Decreasing Preference	12
Table 4. Mean Ratings of E/AP and MCI on Quality, Liking, and Convenience and Rank Order by Decreasing Preference for Carrying into the Field	13
Table 5. Percent of Respondents Indicating E/AP Problems	14
Table 6. Mean Ratings of Food Items on Difficulty of Rehydration	14
Table 7. Desired Frequency of Coffee	15
Table 8. Percent of India Company Respondents by Caloric Group Commenting on E/AP Issues	15
Table 9. Three-Mile Run Mean Times in Minutes Between and Within India and Kilo Companies and 1500 and 3000 KCAL Groups of India Company	17
Table 10. Three-Mile Run Mean Times in Minutes Between and Within 1500 and 3000 KCAL Groups of India Company, Extreme Values (± 2 Standard Deviations) Omitted	17
Table 11. Snowshoe Run Mean Times in Minutes Between and Within 1500 and 3000 KCAL Groups of India Company	18
Table 12. Mean Heart Rates Within and Between Subjects Across the First Ten Minutes of 2100 and 0200 Hours	19
Table 13. Interactions and Replication Differences Between India (N=25) and Kilo (N=42) Companies on the Modified Environmental Symptoms Questionnaire (Number of Items 34)	19
Table 14. Interactions and Group Differences for 1500 (N=9) and 3000 (N=16) KCAL Groups on the Modified Environmental Symptoms Questionnaire (Number of Items 34)	23

PERFORMANCE, PHYSIOLOGICAL, AND ACCEPTANCE TESTS OF A 1500 KCAL EMERGENCY/ASSAULT FOOD PACKET DIET IN A COLD WEATHER ENVIRONMENT

Introduction

In response to US Marine Corps Requirement 2-5, Emergency/Assault Packet, the Food Engineering Laboratory (FEL) of USANARADCOM developed a freeze-dehydrated compressed lightweight ration designed to be used under highly mobile tactical conditions for periods up to 5 days. The acceptability of the resulting packet to the serviceman consumer was studied by Wilkinson, Chao, Meiselman, and Symington (1980)¹ under high altitude winter conditions. The present study was conducted to assess the acceptability of the packet following changes made as a result of the Wilkinson, et al. study and to determine whether there is any loss of physical performance due to subsisting on the packet for five days. The study was a high altitude cold weather climate test conducted at the Marine Corps Mountain Warfare Training Center (MCMWTC), in February 1980.

The Emergency/Assault Food Packet (E/AP) is a 1500-kilocalorie (kcal), lightweight, compact food packet designed to sustain an individual when issued one per day, as a restricted diet, for periods of three to five days. The packets contain low moisture compressed food bars and confectionaries. All of the food items can be eaten dry as packaged and some may be rehydrated to provide more conventional entrees, beverages, and desserts. The cold weather climate test, therefore, involved at least four properties of the E/AP — acceptability, caloric value, moisture content, and remaining nutritional content — and the test was designed to assess the effects of these properties. In order to assess acceptance, nutrition (holding the number of calories roughly constant), and possible dehydration effects, an experimental group which received the E/AP's was contrasted with a group which received three Meal Combat Individual (MCI), a 3550 kcal per day hydrated ration that meets recommended daily dietary allowances. To measure dehydration, whole body water measurements as well as other physiological measurements were taken from both groups on individuals who were on ad lib water schedules. Results from these measures were either nonconclusive or nonsignificant.² (The occurrence of significant dehydration differences would have confounded measures of acceptability and nutritional effects. Dehydration, however, would only be expected if (1) subjects ate their rations dry, that is, without rehydrating, and (2) if subjects failed to supplement what they would normally be required to drink in a cold weather environment.) Continuous heart rate measurements were also taken. Acceptability of the E/AP was measured using survey and interview techniques, and nutritional effects by means of timed runs and a questionnaire that asked respondents to indicate on a six-point scale whether they were experiencing any of several symptoms, for example, thirst and hunger. In order to assess caloric effects, the experimental group was divided into 3000 and 1500 kcal groups. Effects were

¹W.C. Wilkinson, E.T. Chao, H.L. Meiselman, and L.E. Symington. Consumer Opinion of Emergency Assault Food Packet Under Rigorous Field Conditions in a Cold Weather Environment. US Army Natick Research and Development Command Technical Report, NATICK/TR-80/009, January 1980.

²Personal communications with members of FEL, US Army NARADCOM.

Method

Subjects

Subjects (Ss) were active duty personnel from Kilo (K) and India (I) Companies of the 3rd Battalion, 1st Marine Regiment from Camp Pendleton, CA. Tests were conducted while subjects were undergoing routinely programmed cold weather training at MCMWTC, Bridgeport, CA. Members of I Company (E/AP Company) were scheduled to receive the E/AP and K Company (MCI Company), the MCI. Of the 110 men who volunteered from I Company (E/AP Company), half were randomly assigned to a 3000-kcal-per-day group and half to a 1500-kcal-per-day group. Group counts by measure are given in Table 1.

Materials

Materials consisted of paper and pencil instruments and heart rate monitoring equipment. Paper and pencil materials were a modified 34-item Environmental Symptoms Questionnaire (ESQ), a 9-point acceptability rating scale, a 23-item E/AP Consumer Survey, and an 11-item MCI Consumer Survey. The symptoms' questionnaire, called the Cold Weather Questionnaire for purposes of the study, consists of items describing various physical and psychological symptoms, for example, "I feel dizzy," "I feel depressed," which respondents might be experiencing as a function of extreme or unusual environmental conditions. Each symptom is rated on a 6-point scale ranging from NOT AT ALL to EXTREME (Appendix A). The acceptability rating scales, which were administered during face-to-face interviews, range from LIKE EXTREMELY to DISLIKE EXTREMELY and allow the respondent to rate items eaten dry, as issued, or rehydrated with either hot or cold water (Appendix B). Items on the E/AP survey are concerned with the availability of water, adequacy of food quantity, overall ration acceptability and quality, ration convenience, preference for entrees and desserts, and difficulty of rehydration. Respondents are also requested to comment on several issues contained in the survey and on any issue not adequately covered (Appendix C). Items on the MCI survey are concerned with similar questions (Appendix C).

Heart rate monitors were Oxford's Electronic Instruments Medilog 4-24 recorders. The Medilog 4-24 is a miniature analog tape recorder designed to monitor physiological information continuously for 24 hours on four channels on unrestricted subjects. Units weigh 400 gm., are 112 x 87 x 36 mm., and can be worn with minimal inconvenience by active subjects either under or over clothing. Tapes were either Memorex MRX2 C-120 or BASDA AV Headmaster C-120 cassettes, and batteries Mallory RM1R. Prior to use, tapes were wound and rewound, and batteries were tested. A two-lead configuration, using NDM Silvon diaphoretic ECG electrodes, was used.

Procedure

The MCI Company arrived at MCMWTC, 29 January 1980, and was briefed the following morning. Beginning 0500 hours, Thursday, 31 January 1980, as a first step, total body water measurements were taken on 26 individuals who comprised an ad lib water group in a study conducted by the Naval Submarine Medical Research Laboratory (NSMRL). These Ss were

Table 1. Group Counts By Measure

Performance					
Both 3-Mile Runs			Both Snowshoe Runs		
MCI (Kilo) Co	3000 KCAL	1500 KCAL	MCI (Kilo) Co	3000 KCAL	1500 KCAL
71	44	40	8	12	5
Environmental Symptoms Questionnaire					
	Kilo India	Time 1 31 Jan 2 Feb	Time 2 5 Feb 5 Feb	Time 3 7 Feb 7 Feb	Number of Respondents Who Completed All 3
MCI (Kilo) Co		61	50	48	42
3000 KCAL		33	26	25	16
1500 KCAL		26	20	18	9
Post Surveys			Acceptance Scales		
MCI (Kilo) Co	E/AP (India) Co 3000 KCAL		1500 KCAL		E/AP (India) Co
67	50		48		185
Heart Rate Monitors*					
	Time 1 31 Jan 2 Feb	Time 2 4 Feb 4 Feb	Time 3 5 Feb 5 Feb	Time 4 6 Feb 6 Feb	Time 5 7 Feb 7 Feb
MCI (Kilo) Co					
3000 KCAL					
MCI (Kilo) Co	4(4)	3	3(3)	3	3(3)
3000 KCAL	5(4)	5	4(3)	4	5(4)

*In parentheses are counts of groups on which analyses were actually made.

designated Group A by NSMRL, and the data were made available for use in the present study. Second, following total body water measurements, five of the 26 Ss were introduced to the heart monitors and were instructed to wear them for the following 24-hour period. Third, all of the 26 Ss plus an additional group, who were not involved in the Navy study, were administered the ESQ. The last two measures (heart rate and self report on the ESQ) provided baseline estimates of the physiological conditions of the Ss and some indications of their attitudes towards the exercise. Finally, at 1300 hours, Ss participated in a three-mile run. The run provided a baseline performance measure.

Members of E/AP Company were treated similarly except they arrived Friday evening, 1 February 1980; were briefed that same evening, 2130 to 2230 hours; and measurements were taken early the next morning. First, total body water measurements were taken on ten individuals in each of the 1500 and 3000 kcal groups. Second, five individuals from the 3000 kcal group were connected to the heart rate monitors. Third, the ESQ was administered to the 20 Ss plus an additional group. Fourth, at 1300 hours, the members of I Company participated in a three-mile run.

Both companies ran a three-mile course on an asphalt covered road characterized by moderate declines at the start and near the 1.5 mile mark where subjects were required to make a 180 degree turn. Subjects, wearing tee shirts, fatigue pants and combat boots, were run in approximately ten groups, each group comprised of approximately ten individuals. Groups were started every 60 seconds by a single time keeper, who also reported elapsed times as subjects completed the run. Subjects were instructed to listen for their elapsed times and to report them to their group recorders. An observer was stationed at the 1.5 mile mark to insure that all runners turned at the appropriate place. Subjects repeated the run, after returning from the field on 8 February, 1300 hours. Weather conditions were moderate during both runs and road surfaces were dry.

Under field conditions at approximately 1800 hours, 4 February, heart monitors were attached to the same ten Ss who had previously worn the equipment. Units were worn continuously for the following four days. At approximately 0700 hours each day units were checked for equipment failures, and at 1600 hours each day, batteries and tapes were changed. Subject numbers and tape start times were recorded on the cassette case of each fresh tape. Electrodes were not changed unless slippage occurred. Under similar future conditions, it is recommended that they be changed at least once every three days. The ESQ was also administered on two additional occasions, 5 February and 7 February 1980. The questionnaire was administered during formations, following noon meals.

Each field administration of the ESQ was followed by 250-yard snowshoe runs. Approximately 30 subjects were randomly selected from each company. Runs were made in moderate cold weather clothing (two to three layers of cold dry clothing, for example, thermal under garments, field trousers, wool shirts, and parka), white insulated boots (2.5 kilograms, size 9D), and magnesium trail snow shoes (1.5 kilograms with bindings). Because companies were bivouacked several kilometers apart, two courses were selected. Courses were relatively flat; course length was 50 yards; and subjects were run in groups of approximately ten. Snow on the courses was packed prior to runs. Because of adverse weather conditions that affected the two courses differently during the second run, 7 February, comparisons between companies were precluded.

During the last three days of the exercise, at approximately 1700 hours each day, the acceptance rating scales were randomly administered to the subjects. These face-to-face interviews often occurred in tents while subjects were eating. Following the return to base camp and the second three-mile run, subjects were directed to the camp auditorium and given the post exercise surveys.

Design and Analysis

Acceptance data were obtained at random within India E/AP Company and comparisons are among food items. The post survey afforded comparisons between companies and between 1500 and 3000 kcal groups. Analysis is largely descriptive involving mean ratings and percentages. Other aspects of the study are readily conceived as a two (either E/AP or MCI Companies) by two or three (repeated measures on either performance, physiological, or self-report tests) groups by trials repeated measures design, but with the 1500 and 3000 kcal groups nested within E/AP Company. Performance data, however, were analyzed using planned t-test. Further, because large amounts of heart rate data were lost, only mean heart rates are reported. Failure to change electrodes resulted in this loss.

Environmental Conditions

Weather conditions were generally mild. Low temperatures ranged from 15 to 18 degrees Fahrenheit, high temperatures, from 45 to 55 degrees Fahrenheit. Precipitation for the period was limited to several inches of snow Thursday morning, 7 February. Snow accumulation from previous precipitation ranged from approximately one to four feet. The physical exertions of the men were also moderate. A mean energy expenditure of 3400 kcal per day was estimated.^{3,4} Activities were limited to brief tactical maneuvers and outdoor classes. Water resources for the two companies were different. Initially E/AP Company obtained water from a stream located approximately 1.5 km from their camp area. Subsequently, water was delivered from base camp to E/AP Company in five-gallon cans. The MCI Company, in order to obtain water, sent work parties to a brook located approximately 200 meters from where MCI Company was camped.

Results

Acceptance Data

Acceptance data are given in Tables 2 through 8. Mean preference ratings (Table 2) ranged from 6.23, for beef hash, to 8.59, for beef jerky, indicating that all the items were acceptable.

³J.E. McCarroll, R.F. Goldman, and J.C. Denniston. Food intake and energy expenditure in cold weather military training. *Military Medicine*, 1979, 144, pp 606-610.

⁴F. Chapman, C.M. French, H.M. MacDonald, P.K. McFadyen, C.D. Murch, M. Savill, R.D. Skitt, and R.C. Vickers. Phase III Comparison of diets of different fat content and low energy value: Exercise "slim line". Army Personnel Research Establishment Report 21/74. **Project 521 Combat Nutrition**, United Kingdom - 26, November 1974.

**Table 2. Mean Preference Ratings of Food Items
(9-pt. scale, 9 like extremely, N= 185)**

Item	Mean	Median
Candies		
Caramels	8.38	
Chocolate Bar	7.58	8.46
Starch Jelly	7.18	8.60
Fudge Bar	6.62	7.75
Cookie/Cereal		
Oatmeal Cookie Bar	7.97	8.78
Granola Bar	7.89	8.79
Pudding Bars		
Chocolate Pudding	7.00	7.70
Vanilla Pudding	6.89	7.50
Beef Snack		
Beef Jerky	8.59	
Beef Pepperoni	8.23	8.74
Entree Bars Rehydrated		
Chicken A-la-king	7.99	
Chicken Stew	7.59	
Chicken and Rice	7.54	8.45
Beef and Vegetables	7.39	
Pork and Escalloped Potatoes	7.17	
Beef Hash	6.12	6.70
Beverages		
Coffee	7.97	
Orange Beverage	7.92	

Chicken a-la-king received the highest entree rating; beef hash had the lowest. Of the cookies, desserts, and snacks, beef jerky was the most preferred, vanilla pudding the least. Caramels received the highest candy rating, fudge the lowest. The five most preferred items were beef jerky, caramels, beef pepperoni, oatmeal cookie and coffee, respectively. Similar results were obtained when respondents were asked to rank order food items (Table 3), either eaten dry or rehydrated. Chicken a-la-king, for example, was the most preferred entree item and beef hash the least.

State of hydration did not seem to make a difference with one exception. Pork and escalloped potatoes were liked better dry than rehydrated.

Previous ratings of the entree bars were generally lower, but these were obtained under harsher conditions (Wilkinson, et al., 1980).⁵ Troops, for example, moved daily, and they encountered severe weather conditions. Further, nearly 69% of those receiving the E/AP reported that they were unable to get sufficient water to rehydrate their food. However, the relative ordinal rank order of the food items as determined by the ratings was the same as that obtained in the present study with one exception; chicken and rice, which ranked third in the present study, was the least preferred entree in the previous study. The rank ordering of the entree bars by the previous sample more nearly corresponds with the ratings in the present study than in the first. Chicken and rice, for example, was ranked second in the previous study.

With some exceptions, there was good correspondence between studies for preference measures on candies, the cookie and cereal bars, and pudding bars. Exceptions were the cookie and granola bar, which received lower mean ranks in the previous study, and the fudge bar, which received the highest mean hedonic rating in the previous study. The latter result, however, appears unreliable because fudge bars also received a low mean ranking in the previous study. Further, while the chocolate pudding bar was consistently rated higher than the vanilla pudding bar in the present study, results were inconsistent in the previous study.

In comparison to the MCI, the E/AP was better liked, thought more convenient, and was preferred over the MCI for carrying into the field, though troops never actually carried the ration, they were issued daily (Table 4). The adequacy of the content of the E/AP, however, was not rated as high as that for the MCI (Table 4). This was especially true of the 1500 kcal group who rated the quantity of the E/AP as neither adequate nor inadequate. Similar ratings on quantity, quality, and convenience were obtained in the previous study, with the exception that the E/AP received a much lower rating on quality, that is, overall liking, 3.03. Instructions for rehydrating food items were understood by 93.9% of the respondents (Table 5). However, almost 30% of the respondents reported problems using the zip-loc bags. Several respondents reported that the entree bags split while kneading food material during rehydration. Several individuals also reported that the bags were much too deep. Further, almost 40% of the respondents indicated that they could not get enough water for rehydration, and 56.3% indicated that they could not get enough water to quench their thirst. These percentages are much lower than those reported in the first study (68.8% and 65.5%, respectively), but they nonetheless indicate that from the troop viewpoint not enough water was available in either study. Further, among individuals receiving MCI's, only 15.2% reported not receiving enough water to drink. Data in Table 6 indicate that food items were relatively easy to rehydrate, and in Table 7, that coffee was desired at least twice a day by 70.4% of the respondents.

⁵ See footnote 1.

**Table 3. Order of Food Items by Decreasing Preference
(N=98)**

Rank	Food Item	Mean Rank	Group Count	Rank	Food Item	Mean Rank	Group Count
Entree Bars Dry				Entree Bars Rehydrated			
1	Chicken A-la-king	3.39	39	1	Chicken A-la-king	2.49	82
2	Pork & Escalloped Potatoes	3.79	28	2	Chicken and Rice	2.88	82
3	Chicken and Rice	4.00	35	3	Beef and Vegetable	3.07	76
4	Beef and Vegetable	4.11	34	4	Chicken Stew	3.16	73
5	Chicken Stew	4.19	36	5	Pork & Escalloped Potatoes	3.44	68
6	Beef Hash	4.40	35	6	Beef Hash	4.22	65
Cookie/Cereal Bar				Candies			
1	Oatmeal Cookie Bar	2.40	96	1	Caramels	2.60	93
2	Granola Bar	2.40	93	2	Chocolate Bar	3.17	89
				3	Starch Jelly	3.83	75
				4	Fudge Bar	4.74	88
Pudding Bars Wet				Pudding Bars Dry			
1	Chocolate Pudding	1.97	36	1	Chocolate Pudding	1.45	59
2	Vanilla Pudding	2.53	32	2	Vanilla Pudding	1.53	56
Beverages				Snacks			
1	Fudge Bar	3.10	60	1	Beef Jerky	1.47	88
2	Orange Bar	3.51	60	2	Beef Pepperoni	2.06	81

**Table 4. Mean Ratings of E/AP & MCI on Quality, Liking & Convenience (7-pt scales)
And Preference Rank in Decreasing Order for Carrying Into The Field***

	Mean Ratings				
	E/AP Mean	1500 KCAL	3000 KCAL	MCI Mean	
Adequacy of Quantity	3.94 (96)	4.69 (48)	3.19 (48)	3.32 (65)	1=Extremely Adequate
Overall Liking	2.20 (96)	2.02 (48)	2.38 (48)	3.68 (64)	1=Extremely Good
Convenience	1.79 (96)	1.62 (48)	1.96 (48)	4.23 (64)	1=Extremely Convenient

*Group counts are in parentheses.

Preference for Carrying Into The Field

	Mean	Count
E/AP	1.17	87
MCI	1.94	86

Table 5. Percent of Respondents Indicating E/AP Problems

	Yes	No	Count
Difficulty Understanding Instructions	5.1	93.9	97
Bag Problems	29.6	70.4	98
Get Enough Water for Rehydration	58.2	38.8	95
Get Enough Water to Quench Thirst	42.9	55.1	96

**Table 6. Mean Ratings of Food Items on Difficulty of Rehydration
(7-pt. scale; 1=very easy)**

Item	Mean	Count
Chicken Stew	1.88	68
Chicken A-la-king	1.95	81
Chicken and Rice	1.98	82
Beef and Vegetable	2.18	76
Pork & Escalloped Potatoes	2.23	69
Beef Hash	2.55	66
Chocolate Pudding	2.80	70
Vanilla Pudding	2.86	66
Orange Beverage	3.22	81

Table 7. Desired Frequency of Coffee
N = 91

Number of Times Per Day	Frequency	Percent
None	12	12.2
Once	10	10.2
Twice	21	21.4
Thrice	19	19.4
Three or More	29	29.6

**Table 8. Percent of E/AP (India) Company Respondents
By Caloric Group Commenting on E/AP Issues**

Issues	3000 KCAL	Percent Commenting 1500 KCAL	Total
Add nonsweet food (e.g., nuts, dried fruit, cheese, soup)	50	21	36
Too many sweets	34	29	32
Need more food	12	17	14
Concern with nutrition (e.g., vitamins, protein)	10	6	8
Add coffee packs	6	2	4
Add hot chocolate	0	8	4
Need more water	4	4	4
Heavier entree bags	6	0	3
Shorten package length	0	2	1
Add water line	2	0	1
Group size	50	48	98

At three different places on the post exercise questionnaire, respondents are asked to comment on issues about the E/AP (Table 8). Fifty percent of the comments were related to the sugar content of the packet. The most frequent comment was a request for additional nonsweet foods, as, for example, nuts and dried fruit. Too many sweets was the second most frequent comment made. The third most frequent comment indicated that more food was needed. Twelve percent of the 3000 kcal group indicated they needed more food and 17% of the 1500 kcal group indicated they needed more food. Several individuals indicated that either the length of the rehydration bags needed to be shortened or that longer spoons were required. Similar comments were reported in the earlier acceptance study.

Performance and Physiological Tests

Performance tests included three-mile runs and snowshoe runs. Neither calorie (either 1500 or 3000 kcal) nor type of food (either MCI or E/AP) had a recognizable effect. Results of the a priori t tests are presented in Table 9 and indicate that subjects receiving MCI's (Kilo Company) obtained higher mean times on both three-mile runs, the difference being significant for run 2. Further, both groups obtained higher times on the second run than on the first, but the increase was greater for individuals receiving MCI's. No significant differences were found between the 1500 and 3000 kcal groups, but both groups obtained higher times on the second run. This difference was significant for the 3000 kcal group, but not the 1500 group. This part of the analysis was repeated with extreme scores (i.e., ± 2 standard deviations) omitted (Table 10). Similar results were obtained. Differential weather and course conditions precluded a comparison between companies on the snowshoe runs. However, data for the 1500 and 3000 groups are given in Table 11. Virtually no differences were obtained between groups, but both groups obtained higher times on the second run than on the first. Although the difference reached significance for the 3000 kcal group, gains were similar for both groups.

Finally, the heart rate data (Table 12) were consistent with the performance results.

Unfortunately heart rate data could not be taken from the three-mile run because electrodes were not replaced prior to the second run and generally did not adhere during that run. Rates were available, however, just before (2100 hours) and during the sleep cycle (0200 hours) of several individuals. Mean heart rates taken during sleep, avoiding REM (rapid eye movement) sleep, are especially desirable because they are more likely to be free of the effects of extraneous and possibly confounding factors. Data represent measures taken at base camp, on Wednesday in the field, and on Thursday in the field (these are given as Times 1, 2, and 3 respectively in the table). Rather than an increase in rate, which would be expected given dehydration, comparison across times for the same subjects in E/AP Company indicated decreased heart rates. Further, comparisons between companies on Time 3 indicated that subjects who were receiving E/AP's during the week had lower heart rates than those receiving MCI's. Results, however, are tentative as they are based on three to five subjects.

Symptoms Questionnaire

Results of the groups by trials analyses performed on the items of the modified Environmental Symptoms Questionnaire are given in Table 13. Interaction differences are

**Table 9. Three-Mile Run Mean Times in Minutes Between and Within
E/AP (India) and MCI (Kilo) Companies and 1500 and 3000 KCAL Groups
Of E/AP (India) Company**

	India E/AP	Kilo MCI	Difference	E/AP 1500 KCAL	E/AP 3000 KCAL	Difference
Run 1	28.19	28.50	-0.31	28.43	27.99	0.44
Run 2	29.22	30.61	-1.39**	29.49	28.99	0.50
Difference	-1.03*	-2.10*		-1.06	-1.01*	
Count	96	87		44	52	

*Significant below the 0.05 level.

**Significant below the 0.10 level.

**Table 10. Three-Mile Runs Mean Times in Minutes Between and Within
1500 and 3000 KCAL Groups of India Company,
Extreme Values (± 2 Standard Deviations) Omitted**

	1500 Calorie	3000 Calorie	Difference
Run 1	28.06	27.83	0.22
Run 2	28.79	28.90	-0.11
Difference	-0.73	-1.07*	
Count	41	51	

*Significant below the .01 level.

Table 11. Snowshoe Run Mean Times in Minutes Between and Within 1500 and 3000 KCAL Groups of E/AP (India) Company

Between Subjects			
	1500 KCAL (in minutes)	3000 KCAL (in minutes)	Difference
Run 1 (Count)	1.30 (10)	1.20 (22)	0.10
Run 2 (Count)	1.58 (8)	1.58 (19)	0.00
Within Subjects			
	1500 KCAL	3000 KCAL	Difference
Run 1	1.35	1.21	0.14
Run 2	1.58	1.58	0.00
Difference	-0.23	-0.37*	
Count	8	19	

*Significant below the .01 level.

**Table 12. Mean Heart Rates Within and Between Subjects
Across the First Ten Minutes of 2100 and 0200 Hours**

Mean Heart Rates Within Subjects									
2100 Hours									
	1	Times 2	D	1	Times 3	D	2	Times 3	D
K Co	52.67	n=3 72.50	-19.83	72.85	n=2 78.85	-6.00	74.55	n=2 78.85	-4.30
I Co	90.23	n=3 79.83	10.40	96.37	n=3 58.90	37.47	86.80	n=2 55.75	31.05
0200 Hours									
K Co	60.63	n=3 52.27	8.37	48.80	n=1 54.20	-5.40	48.10	n=1 54.20	-6.10
I Co	81.50	n=3 63.67	17.83	61.20	n=4 53.35	7.85	65.40	n=2 52.45	12.95
Mean Heart Rates Between Subjects									
2100 Hours									
	K	Time 1 I	D	K	Time 2 I	D	K	Time 3 I	D
	n=4 54.42	n=4 90.30	-35.88	n=3 72.50	n=3 79.83	-7.33	n=3 75.93	n=4 57.60	18.33
0200 Hours									
	n=4 58.37	n=4 61.20	-2.83	n=3 52.27	n=3 63.67	-11.40	n=2 58.00	n=4 53.35	4.65

**Table 13. Interactions and Replication Differences for E/AP (India) (N=25)
and MCI (Kilo) (N=42) Companies on the Modified Environmental
Symptoms Questionnaire (Number of Items 34)**

Item/Symptom	Group	Interactions			Interaction Significance Level
		1	Replication 2	3	
1 Headache	I	0.72	1.08	1.40	.006
	K	1.19	0.86	0.59	
5 Fast Heart Rate	I	0.92	1.44	1.08	.084
	K	1.67	1.36	1.24	
7 Muscle Cramps	I	0.52	1.92	1.16	.009
	K	1.02	1.14	1.05	
10 Feel Weak	I	1.04	1.20	2.12	.003
	K	1.43	1.19	1.19	
22 Ears Bother Me	I	1.40	0.44	0.64	.006
	K	0.57	0.48	1.02	
11 Drink Water More	I	0.68	3.04	2.44	.026
	K	0.64	1.81	1.52	
28 Thirsty	I	1.48	1.68	2.44	.104
	K	1.74	2.40	2.17	
25 Hungry	I	1.20	2.88	2.96	.008
	K	1.21	1.81	1.62	
9 Feel Relaxed	I	2.00	2.08	2.36	.062
	K	2.14	1.71	1.52	
18 Learn More	I	1.92	2.40	2.28	.093
	K	2.24	2.00	1.81	
24 Exercise Rewarding	I	1.92	2.32	1.68	.051
	K	2.29	1.69	1.52	

**Table 13. Interactions and Replication Differences for E/AP (India) (N=25)
and MCI (Kilo) (N=42) Companies on the Modified Environmental
Symptoms Questionnaire (Number of Items 34) (Cont'd)**

Item/Symptom	Group	Replication Differences			Interaction Significance Level
		1	2	3	
4 Feel Less Strong	I	2.60	2.72	2.00	.038
	K	2.21	2.21	1.95	
6 Feel Worse Exercising	I	2.60	1.84	1.60	.003
	K	2.40	2.33	1.74	
14 More Constipated	I	0.56	0.84	1.24	.048
	K	0.60	0.93	0.93	
15 Urinate Less	I	0.64	1.60	1.40	.024
	K	0.98	1.29	1.17	
33 Feel Depressed	I	1.64	2.00	2.24	.075
	K	1.45	1.45	1.79	
34 Feel Worse	I	2.04	2.60	1.48	.001
	K	2.62	2.12	1.81	
11 Drink Water More	I	0.68	3.04	2.44	.000
	K	0.64	1.81	1.52	
28 Thirsty	I	1.48	1.68	2.44	.012
	K	1.74	2.40	2.17	
16 Sleeping Less	I	2.64	2.00	1.64	.029
	K	2.48	2.52	2.17	
25 Increased Hunger	I	1.20	2.88	2.96	.000
	K	1.21	1.81	1.62	
27 Appetite Good	I	2.76	3.44	2.92	.088
	K	2.69	2.88	2.52	

presented first and are followed by replication differences. India Company, for example, reported more headaches, cramps, and feelings of weakness but also reported feeling more relaxed, that the exercise was more rewarding, and that they were learning more. Perhaps the most noteworthy interaction results concerned water and food consumption. India Company reported a greater increase in water consumption, greater thirst, and greater hunger. The greater water consumption, thirst, and hunger may be related to the kind of ration used, though the first two differences might be attributed to water discipline. However, results for the 3000 and 1500 kcal groups (Table 14) indicate that water consumption increased much more for the 3000 kcal group than for the 1500 group. The magnitude of the response given in the first replication increased on the second replication by a factor of 9.29 for the 3000 kcal group, but only by a factor of 2.5 for the 1500 kcal group. (The 1500 kcal group reported drinking more water than the 3000 kcal group, but this difference was consistent across all replications.) Further, the 1500 kcal group reported urinating less (the 1500 kcal group reported a significant decrease, Tukey's test $p < .01$, the 3000 kcal group did not). The E/AP Company, moreover, reported a significant increase in thirst ($p < .01$), MCI Company did not. Finally, the 1500 kcal group reported feeling worse than the 3000 kcal group, and they reported a significant decrease in how good they felt ($p < .01$); there was no difference between the first and third replications for the 3000 group. Hunger differences can be attributed to the caloric differences. On the second replication, individuals receiving 1500 kcal each day reported being hungrier than those receiving 3000 kcal ($p < .05$).

Replication differences indicated an increased frequency of symptoms as time passed. All groups, for example, reported drinking more water. Both companies reported feeling less strong, more constipated and depressed, and sleeping less. Further, both indicated an increase and then a decrease in appetite.

Conclusions

Environmental conditions mitigated against the test of E/AP. Weather conditions were mild, and troops were relatively sedentary. Greater energy output might have brought to surface effects of reduced caloric intake, dehydration, or nutrition that otherwise were undetected. Moreover, troops consumed the packet for a relatively short period of time, five days. An increase in the number of days might surface any possible effects. Equipment failure also reduced the effectiveness of the study. Further, we do not know whether water discipline is adequate to prevent dehydration of the troops if the food items were consumed dry. Finally, tests performed under more controlled conditions would allow better measurements of food and liquid intake, physiological measurements, mental tests, and tests of performance.

Nevertheless, results of the present study continue to indicate that the E/AP is a highly acceptable item that holds up well — with the exception of some bag problems — under mild field conditions and does not result in performance decrements as measured by three-mile runs when issued one per day for five days of moderate energy output. There were no consistent detrimental effects associated with the five-day, 1500 kcal-per-day diet. However, we know that for purposes of rehydration more water is required in the field than normally, and that under field exercise conditions, approximately half of the troops reported they were unable to obtain enough water for either rehydrating their food or for drinking. We also found some

**Table 14. Interactions and Group Differences for 1500 (N=9) and
3000 (N=16) KCAL Groups on the Modified Environmental
Symptoms Questionnaire (Number of Items 34)**

Item/Symptom	Group	Replication			Group/Interaction Significance Level
		1	2	3	
15 Urinate Less	1500	0.78	2.22	2.56	.030
	3000	0.56	1.19	0.81	
34 Feel Good	1500	3.33	2.33	2.11	.020*
	3000	1.31	2.56	1.31	
17 Feel Warm and Comfortable	1500	2.22	3.67	2.22	.045
	3000	1.81	2.12	1.56	
22 Ears Bother Me	1500	2.00	1.00	0.89	.004*
	3000	1.06	0.12	0.50	
23 Runny Nose	1500	1.56	1.78	2.33	.039
	3000	2.69	3.50	3.12	
24 Exercise Rewarding	1500	2.67	2.00	2.33	.049*
	3000	1.50	2.38	1.44	
18 Learn More	1500	3.33	3.22	3.22	.009*
	3000	1.12	2.00	1.69	
11 Drink Water More	1500	1.33	3.33	3.11	.068
	3000	0.31	2.88	2.06	
16 Sleeping Well	1500	3.56	2.33	2.22	.044
	3000	2.12	1.75	1.38	
25 Hungry More	1500	1.00	3.67	3.33	
	3000	1.33	2.56	2.62	

*Interaction level of significance; all others are for group differences.

**Replication level of significance < 0.001.

evidence indicating that troops might be drinking more water than usual which would increase the demand for water. An increased supply of water consequently is important for the optimal use of the packet.

Finally, troops reported an increase in the occurrence of certain physical symptoms regardless of ration. Troops reported drinking more water, for example, towards the end of the exercise than at the beginning.

Appendix A
Modified Environmental Symptoms Questionnaire
(Cold Weather Questionnaire)

COLD WEATHER QUESTIONNAIRE

US Army Natick Research and Development Command

INDIVIDUAL:

TIME:

DATE:

Indicate your answer by circling the appropriate number.

	NOT AT ALL	SLIGHT	SOMEWHAT	MODERATE	QUITE A BIT	EXTREME
1. I have a headache	0	1	2	3	4	5
2. I feel dizzy	0	1	2	3	4	5
3. I'm short of breath	0	1	2	3	4	5
4. I feel strong	0	1	2	3	4	5
5. My heart is beating fast	0	1	2	3	4	5
6. I feel good when I exercise	0	1	2	3	4	5
7. I have muscle cramps	0	1	2	3	4	5
8. My muscles feel tight or stiff	0	1	2	3	4	5
9. I feel relaxed	0	1	2	3	4	5
10. I feel weak	0	1	2	3	4	5
11. I am drinking more water than usual	0	1	2	3	4	5
12. I feel sick to my stomach (nauseous)	0	1	2	3	4	5
13. I enjoy the comradship of my friends	0	1	2	3	4	5
14. I'm constipated	0	1	2	3	4	5
15. I have to urinate LESS than usual	0	1	2	3	4	5
16. I am sleeping well at night	0	1	2	3	4	5
17. I feel warm and comfortable	0	1	2	3	4	5
18. I learn a lot on winter exercises	0	1	2	3	4	5

	NOT AT ALL	SLIGHT	SOMEWHAT	MODERATE	QUITE A BIT	EXTREME
19. My hands or feet are cold	0	1	2	3	4	5
20. I am drinking less water than usual	0	1	2	3	4	5
21. My vision bothers me	0	1	2	3	4	5
22. My ears bother me	0	1	2	3	4	5
23. My nose is stuffed up or runny	0	1	2	3	4	5
24. Doing this exercise well is rewarding	0	1	2	3	4	5
25. I feel more hungry than usual	0	1	2	3	4	5
26. My mouth is dry	0	1	2	3	4	5
27. My appetite is good	0	1	2	3	4	5
28. I'm thirsty	0	1	2	3	4	5
29. I have adapted to the cold	0	1	2	3	4	5
30. I feel tired	0	1	2	3	4	5
31. My concentration is off	0	1	2	3	4	5
32. I feel nervous or irritable	0	1	2	3	4	5
33. I feel depressed	0	1	2	3	4	5
34. I feel good	0	1	2	3	4	5

Comments: _____

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes the need for transparency and accountability in financial reporting.

2. The second part of the document outlines the various methods and techniques used to collect and analyze data. It includes a detailed description of the experimental procedures and the statistical analysis performed.

3. The third part of the document presents the results of the study. It includes a series of tables and graphs that illustrate the findings of the research. The data shows a clear trend of increasing activity over time.

4. The fourth part of the document discusses the implications of the findings. It suggests that the results have significant implications for the field of study and may lead to further research in this area.

5. The fifth part of the document provides a conclusion and summarizes the key points of the study. It reiterates the importance of accurate record-keeping and the need for ongoing research in this field.

Appendix B
Acceptance Interview

EMERGENCY/ASSAULT FOOD PACKET ACCEPTABILITY

Date:	REC #:	Time:										
	Mode	E	Like V	M	S	N	S	Dislike M	V	E		
1. Beef Jerky	D		1	2	3	4	5	6	7	8	9	
2. Beef Pepperoni	D		1	2	3	4	5	6	7	8	9	
3. Beef Hash	D	C	H	1	2	3	4	5	6	7	8	9
4. Beef & Vegetables	D	C	H	1	2	3	4	5	6	7	8	9
5. Chicken A-La-King	D	C	H	1	2	3	4	5	6	7	8	9
6. Chicken & Rice	D	C	H	1	2	3	4	5	6	7	8	9
7. Chicken Stew	D	C	H	1	2	3	4	5	6	7	8	9
8. Pork & Escal Pots	D	C	H	1	2	3	4	5	6	7	8	9
9. Caramels	D		1	2	3	4	5	6	7	8	9	
10. Chocolate Bar	D		1	2	3	4	5	6	7	8	9	
11. Fudge	D		1	2	3	4	5	6	7	8	9	
12. Granola	D		1	2	3	4	5	6	7	8	9	
13. Oatmeal Cookie	D		1	2	3	4	5	6	7	8	9	
14. Starch Jelly	D		1	2	3	4	5	6	7	8	9	
15. Chocolate Pudding	D	C	H	1	2	3	4	5	6	7	8	9
16. Vanilla Pudding	D	C	H	1	2	3	4	5	6	7	8	9
17. Coffee	D	C	H	1	2	3	4	5	6	7	8	9
18. Orange Beverage	D	C	H	1	2	3	4	5	6	7	8	9

Date:	REC #:	Time:										
	Mode	E	Like V	M	S	N	S	Dislike M	V	E		
1. Beef Jerky	D		1	2	3	4	5	6	7	8	9	
2. Beef Pepperoni	D		1	2	3	4	5	6	7	8	9	
3. Beef Hash	D	C	H	1	2	3	4	5	6	7	8	9
4. Beef & Vegetables	D	C	H	1	2	3	4	5	6	7	8	9
5. Chicken A-La-King	D	C	H	1	2	3	4	5	6	7	8	9
6. Chicken & Rice	D	C	H	1	2	3	4	5	6	7	8	9
7. Chicken Stew	D	C	H	1	2	3	4	5	6	7	8	9
8. Pork & Escal Pots	D	C	H	1	2	3	4	5	6	7	8	9
9. Caramels	D		1	2	3	4	5	6	7	8	9	
10. Chocolate Bar	D		1	2	3	4	5	6	7	8	9	
11. Fudge	D		1	2	3	4	5	6	7	8	9	
12. Granola	D		1	2	3	4	5	6	7	8	9	
13. Oatmeal Cookie	D		1	2	3	4	5	6	7	8	9	
14. Starch Jelly	D		1	2	3	4	5	6	7	8	9	
15. Chocolate Pudding	D	C	H	1	2	3	4	5	6	7	8	9
16. Vanilla Pudding	D	C	H	1	2	3	4	5	6	7	8	9
17. Coffee	D	C	H	1	2	3	4	5	6	7	8	9
18. Orange Beverage	D	C	H	1	2	3	4	5	6	7	8	9

Date:	REC #:	Time:										
	Mode	E	Like V	M	S	N	S	Dislike M	V	E		
1. Beef Jerky	D		1	2	3	4	5	6	7	8	9	
2. Beef Pepperoni	D		1	2	3	4	5	6	7	8	9	
3. Beef Hash	D	C	H	1	2	3	4	5	6	7	8	9
4. Beef & Vegetables	D	C	H	1	2	3	4	5	6	7	8	9
5. Chicken A-La-King	D	C	H	1	2	3	4	5	6	7	8	9
6. Chicken & Rice	D	C	H	1	2	3	4	5	6	7	8	9
7. Chicken Stew	D	C	H	1	2	3	4	5	6	7	8	9
8. Pork & Escal Pots	D	C	H	1	2	3	4	5	6	7	8	9
9. Caramels	D		1	2	3	4	5	6	7	8	9	
10. Chocolate Bar	D		1	2	3	4	5	6	7	8	9	
11. Fudge	D		1	2	3	4	5	6	7	8	9	
12. Granola	D		1	2	3	4	5	6	7	8	9	
13. Oatmeal Cookie	D		1	2	3	4	5	6	7	8	9	
14. Starch Jelly	D		1	2	3	4	5	6	7	8	9	
15. Chocolate Pudding	D	C	H	1	2	3	4	5	6	7	8	9
16. Vanilla Pudding	D	C	H	1	2	3	4	5	6	7	8	9
17. Coffee	D	C	H	1	2	3	4	5	6	7	8	9
18. Orange Beverage	D	C	H	1	2	3	4	5	6	7	8	9

Date:	REC #:	Time:										
	Mode	E	Like V	M	S	N	S	Dislike M	V	E		
1. Beef Jerky	D		1	2	3	4	5	6	7	8	9	
2. Beef Pepperoni	D		1	2	3	4	5	6	7	8	9	
3. Beef Hash	D	C	H	1	2	3	4	5	6	7	8	9
4. Beef & Vegetables	D	C	H	1	2	3	4	5	6	7	8	9
5. Chicken A-La-King	D	C	H	1	2	3	4	5	6	7	8	9
6. Chicken & Rice	D	C	H	1	2	3	4	5	6	7	8	9
7. Chicken Stew	D	C	H	1	2	3	4	5	6	7	8	9
8. Pork & Escal Pots	D	C	H	1	2	3	4	5	6	7	8	9
9. Caramels	D		1	2	3	4	5	6	7	8	9	
10. Chocolate Bar	D		1	2	3	4	5	6	7	8	9	
11. Fudge	D		1	2	3	4	5	6	7	8	9	
12. Granola	D		1	2	3	4	5	6	7	8	9	
13. Oatmeal Cookie	D		1	2	3	4	5	6	7	8	9	
14. Starch Jelly	D		1	2	3	4	5	6	7	8	9	
15. Chocolate Pudding	D	C	H	1	2	3	4	5	6	7	8	9
16. Vanilla Pudding	D	C	H	1	2	3	4	5	6	7	8	9
17. Coffee	D	C	H	1	2	3	4	5	6	7	8	9
18. Orange Beverage	D	C	H	1	2	3	4	5	6	7	8	9

EMERGENCY/ASSAULT FOOD PACKET ACCEPTABILITY

Date:	REC #:			Time:									
				Like					Dislike				
Mode				E	V	M	S	N	S	M	V	E	
1. Beef Jerky	D			1	2	3	4	5	6	7	8	9	
2. Beef Pepperoni	D			1	2	3	4	5	6	7	8	9	
3. Beef Hash	D	C	H	1	2	3	4	5	6	7	8	9	
4. Beef & Vegetables	D	C	H	1	2	3	4	5	6	7	8	9	
5. Chicken A-La-King	D	C	H	1	2	3	4	5	6	7	8	9	
6. Chicken & Rice	D	C	H	1	2	3	4	5	6	7	8	9	
7. Chicken Stew	D	C	H	1	2	3	4	5	6	7	8	9	
8. Pork & Escal Pots	D	C	H	1	2	3	4	5	6	7	8	9	
9. Caramels	D			1	2	3	4	5	6	7	8	9	
10. Chocolate Bar	D			1	2	3	4	5	6	7	8	9	
11. Fudge	D			1	2	3	4	5	6	7	8	9	
12. Granola	D			1	2	3	4	5	6	7	8	9	
13. Oatmeal Cookie	D			1	2	3	4	5	6	7	8	9	
14. Starch Jelly	D			1	2	3	4	5	6	7	8	9	
15. Chocolate Pudding	D	C	H	1	2	3	4	5	6	7	8	9	
16. Vanilla Pudding	D	C	H	1	2	3	4	5	6	7	8	9	
17. Coffee	D	C	H	1	2	3	4	5	6	7	8	9	
18. Orange Beverage	D	C	H	1	2	3	4	5	6	7	8	9	

Date:	REC #:			Time:									
				Like					Dislike				
Mode				E	V	M	S	N	S	M	V	E	
1. Beef Jerky	D			1	2	3	4	5	6	7	8	9	
2. Beef Pepperoni	D			1	2	3	4	5	6	7	8	9	
3. Beef Hash	D	C	H	1	2	3	4	5	6	7	8	9	
4. Beef & Vegetables	D	C	H	1	2	3	4	5	6	7	8	9	
5. Chicken A-La-King	D	C	H	1	2	3	4	5	6	7	8	9	
6. Chicken & Rice	D	C	H	1	2	3	4	5	6	7	8	9	
7. Chicken Stew	D	C	H	1	2	3	4	5	6	7	8	9	
8. Pork & Escal Pots	D	C	H	1	2	3	4	5	6	7	8	9	
9. Caramels	D			1	2	3	4	5	6	7	8	9	
10. Chocolate Bar	D			1	2	3	4	5	6	7	8	9	
11. Fudge	D			1	2	3	4	5	6	7	8	9	
12. Granola	D			1	2	3	4	5	6	7	8	9	
13. Oatmeal Cookie	D			1	2	3	4	5	6	7	8	9	
14. Starch Jelly	D			1	2	3	4	5	6	7	8	9	
15. Chocolate Pudding	D	C	H	1	2	3	4	5	6	7	8	9	
16. Vanilla Pudding	D	C	H	1	2	3	4	5	6	7	8	9	
17. Coffee	D	C	H	1	2	3	4	5	6	7	8	9	
18. Orange Beverage	D	C	H	1	2	3	4	5	6	7	8	9	

31

Date:	REC #:			Time:									
				Like					Dislike				
Mode				E	V	M	S	N	S	M	V	E	
1. Beef Jerky	D			1	2	3	4	5	6	7	8	9	
2. Beef Pepperoni	D			1	2	3	4	5	6	7	8	9	
3. Beef Hash	D	C	H	1	2	3	4	5	6	7	8	9	
4. Beef & Vegetables	D	C	H	1	2	3	4	5	6	7	8	9	
5. Chicken A-La-King	D	C	H	1	2	3	4	5	6	7	8	9	
6. Chicken & Rice	D	C	H	1	2	3	4	5	6	7	8	9	
7. Chicken Stew	D	C	H	1	2	3	4	5	6	7	8	9	
8. Pork & Escal Pots	D	C	H	1	2	3	4	5	6	7	8	9	
9. Caramels	D			1	2	3	4	5	6	7	8	9	
10. Chocolate Bar	D			1	2	3	4	5	6	7	8	9	
11. Fudge	D			1	2	3	4	5	6	7	8	9	
12. Granola	D			1	2	3	4	5	6	7	8	9	
13. Oatmeal Cookie	D			1	2	3	4	5	6	7	8	9	
14. Starch Jelly	D			1	2	3	4	5	6	7	8	9	
15. Chocolate Pudding	D	C	H	1	2	3	4	5	6	7	8	9	
16. Vanilla Pudding	D	C	H	1	2	3	4	5	6	7	8	9	
17. Coffee	D	C	H	1	2	3	4	5	6	7	8	9	
18. Orange Beverage	D	C	H	1	2	3	4	5	6	7	8	9	

Date:	REC #:			Time:									
				Like					Dislike				
Mode				E	V	M	S	N	S	M	V	E	
1. Beef Jerky	D			1	2	3	4	5	6	7	8	9	
2. Beef Pepperoni	D			1	2	3	4	5	6	7	8	9	
3. Beef Hash	D	C	H	1	2	3	4	5	6	7	8	9	
4. Beef & Vegetables	D	C	H	1	2	3	4	5	6	7	8	9	
5. Chicken A-La-King	D	C	H	1	2	3	4	5	6	7	8	9	
6. Chicken & Rice	D	C	H	1	2	3	4	5	6	7	8	9	
7. Chicken Stew	D	C	H	1	2	3	4	5	6	7	8	9	
8. Pork & Escal Pots	D	C	H	1	2	3	4	5	6	7	8	9	
9. Caramels	D			1	2	3	4	5	6	7	8	9	
10. Chocolate Bar	D			1	2	3	4	5	6	7	8	9	
11. Fudge	D			1	2	3	4	5	6	7	8	9	
12. Granola	D			1	2	3	4	5	6	7	8	9	
13. Oatmeal Cookie	D			1	2	3	4	5	6	7	8	9	
14. Starch Jelly	D			1	2	3	4	5	6	7	8	9	
15. Chocolate Pudding	D	C	H	1	2	3	4	5	6	7	8	9	
16. Vanilla Pudding	D	C	H	1	2	3	4	5	6	7	8	9	
17. Coffee	D	C	H	1	2	3	4	5	6	7	8	9	
18. Orange Beverage	D	C	H	1	2	3	4	5	6	7	8	9	

Appendix C

Post Surveys

MEAL-COMBAT INDIVIDUAL CONSUMER SURVEY (Post-Exercise)

For the field exercise just completed, you were issued samples of the Meal Combat Individual (MCI). Your experience with these items and your reactions to them are important to their future development.

Please answer all questions by circling ONE letter or number unless otherwise indicated. Your responses on this survey are confidential and will not be identified with you individually.

1. How long have you been in the Marine Corps? _____ years, _____ months.
2. What is your rank? _____
3. Which of the following military rations have you eaten before this exercise? Please circle ALL THAT APPLY:
 - a. A-ration (regular dining facility food on base)
 - b. B-ration (canned food, no fresh food)
 - c. C-ration (Meal, Combat Individual (MCIs) — canned combat ration)
 - d. MREs (Meal, Ready to Eat — combat ration in a pouch)
 - e. LRPs (Long Range Patrol Food Packet)
 - f. Emergency/Assault Food Packet
 - g. K-ration (older C-ration)
4. Would you characterize yourself as a (Circle ONE):
 - a. LIGHT b. MODERATE c. HEAVY eater (on the average)?
5. Did you eat your rations (Circle ONE):
 - a. At regular meal intervals.
 - b. Throughout the day as time permitted.
 - c. Both of the above.
6. Were you able to get enough water to satisfy your thirst? (Circle ONE):

YES NO

7. How adequate was the QUANTITY (AMOUNT) of the food ration issued to you for the conditions of the exercise? (Circle ONE):

Extremely ADEQUATE	Moderately ADEQUATE	Slightly ADEQUATE	Neutral	Slightly INADEQUATE	Moderately INADEQUATE	Extremely INADEQUATE
1	2	3	4	5	6	7

8. Overall, all things considered, how would you RATE the MCI? (Circle ONE):

Extremely GOOD	Moderately GOOD	Slightly GOOD	Neutral	Slightly BAD	Moderately BAD	Extremely BAD
1	2	3	4	5	6	7

9. How CONVENIENT was the MCI to carry with you into the field? (Circle ONE):

Extremely CONVENIENT	Moderately CONVENIENT	Slightly CONVENIENT	Neutral	Slightly INCONVENIENT	Moderately INCONVENIENT	Extremely INCONVENIENT
1	2	3	4	5	6	7

10. All things considered, please rank-order your preference for carrying the following rations with you on maneuvers similar to the exercise just completed. That is, place the number "1" in the blank next to the ration you would MOST prefer to be issued for field maneuvers (your #1 favorite), the number "2" next to your second most favorite, etc. If you are completely unfamiliar with one of the rations, just leave it blank:

_____ MEAL, COMBAT INDIVIDUAL (MCI)

_____ MEAL, READY TO EAT (MRE)

_____ LONG RANGE PATROL FOOD PACKET (LRP)

11. Please feel free to use the space below to comment on any issues not adequately addressed above: _____

EMERGENCY/ASSAULT FOOD PACKET CONSUMER SURVEY (Post-Exercise)

For the field exercise just completed, you were issued samples of a new type of food ration packet utilizing compressed food bars. Some of these bars are intended to be eaten either dry, with drinking water on the side, or after rehydration with either hot or cold water. Your experience with these bars and your reactions to them are important to their future development.

Please answer all questions by circling ONE letter or number unless otherwise indicated. Your responses on this survey are confidential and will not be identified with you individually.

1. How long have you been in the Marine Corps? _____ years, _____ months.
2. What is your rank?
3. Which of the following military rations have you eaten before this exercise? Please circle ALL THAT APPLY:
 - a. A-ration (regular dining facility food on base)
 - b. B-ration (canned food, no fresh food)
 - c. C-ration (Meal, Combat Individual (MCIs) — canned combat ration)
 - d. MREs (Meal, Read to Eat — combat ration in a pouch)
 - e. LRPs (Long Range Patrol Food Packet)
 - f. Emergency/Assault Food Packet (prior to this exercise)
 - g. K-ration (older C-ration)
4. Would you characterize yourself as a (Circle ONE):
 - a. LIGHT b. MODERATE c. HEAVY eater (on the average)?

Please answer the following questions based on your experience with those food bars that you ate DRY (without rehydration), including bars that were not intended for rehydration.

5. Please rank-order your preferences for the ENTREE BARS that you ate DRY by placing the number "1" in the blank next to the entree bar that you liked the MOST (your #1 favorite) eaten dry, the number "2" next to your second most favorite, "3" next to your third, etc. If you did not eat one of the entree bars dry, just leave it blank. If you did not eat ANY of the ENTREES DRY, skip to Question #6:

_____ BEEF JERKY
_____ BEEF HASH
_____ BEEF PEPPERONI
_____ BEEF & VEGETABLES
_____ CHICKEN A-LA-KING
_____ CHICKEN & RICE
_____ CHICKEN STEW
_____ PORK & ESCALLOPED POTATOES

6. Next, please rank-order your preferences for the CEREAL/DESSERT BARS that you ate by placing the number "1" in the blank next to the cereal/dessert bar that you liked the MOST (your #1 favorite), the number "2" next to your second most favorite, "3" next to your third, etc. If you did not eat one of the cereal/dessert items, just leave it blank. If you did not eat ANY of the CEREAL/DESSERT BARS, skip to Question #7:

_____ CARAMELS
_____ CHOCOLATE BAR
_____ FUDGE BAR
_____ GRANOLA BAR
_____ OATMEAL COOKIE BAR
_____ STARCH JELLY BAR

7. Next, please rank-order your preferences for the PUDDING BARS that you ate DRY by placing the number "1" in the blank next to the pudding bar that you liked the MOST (your #1 favorite) eaten dry, etc. If you did not eat one of the pudding bars dry, just leave it blank. If you did not eat ANY of the PUDDING BARS DRY, skip to Question #8:

_____ CHOCOLATE PUDDING

_____ VANILLA PUDDING

Please answer the following question based on your experience with those food bars that you ate REHYDRATED (with water added):

8. Please rank-order your preferences for the ENTREE BARS that you ate REHYDRATED by placing the number "1" in the blank next to the entree bar that you liked the MOST (your #1 favorite) rehydrated, the number "2" next to your second most favorite, "3" next to your third, etc. If you did not eat one of the entree bars rehydrated, just leave it blank. If you did not eat ANY of the ENTREES REHYDRATED, skip to Question #9:

_____ BEEF HASH

_____ BEEF & VEGETABLES

_____ CHICKEN A-LA-KING

_____ CHICKEN & RICE

_____ CHICKEN STEW

_____ PORK & ESCALLOPED POTATOES

9. Next, please rank-order your preferences for the PUDDING BARS that you ate REHYDRATED by placing the number "1" in the blank next to the pudding bar that you liked the MOST (your #1 favorite) rehydrated, etc. If you did not eat one of the pudding bars rehydrated, just leave it blank. If you did not eat ANY of the PUDDINGS REHYDRATED, skip to Question #10:

_____ CHOCOLATE PUDDING

_____ VANILLA PUDDING

10. a. Did you have any difficulty in understanding or following the instructions for rehydration printed on the labels? (Circle ONE):

YES

NO

- b. If you circled YES, please explain the difficulty: _____

- c. Can you think of any changes that would improve the instructions? _____

11. a. Did you have any problems using the inner zip-lock bag for rehydration? (Circle ONE):

YES

NO

- b. If you circled YES, please explain the problem: _____

12. Please circle the number below that indicates how difficult it was to rehydrate each item.
Skip those items that you did not try to rehydrate:

	Very EASY	Moderately EASY	Slightly EASY	Neutral	Slightly HARD	Moderately HARD	Very HARD
BEEF JERKY	1	2	3	4	5	6	7
BEEF HASH	1	2	3	4	5	6	7
BEEF PEPPERONI	1	2	3	4	5	6	7
BEEF & VEGETABLES	1	2	3	4	5	6	7
CHICKEN A--LA--KING	1	2	3	4	5	6	7
CHICKEN & RICE	1	2	3	4	5	6	7
CHICKEN STEW	1	2	3	4	5	6	7
PORK & ESCAL POTS	1	2	3	4	5	6	7
CHOCOLATE PUDDING	1	2	3	4	5	6	7
VANILLA PUDDING	1	2	3	4	5	6	7
ORANGE BEVERAGE	1	2	3	4	5	6	7

13. Can you suggest any changes that would make rehydration easier? _____

14. Did you eat your rations? (Circle ONE):

- a. At regular meal intervals.
- b. Throughout the day as time permitted.
- c. Both of the above.

15. a. Were you able to get enough water to rehydrate the food items that you wanted to rehydrate? (Circle ONE):

YES

NO

b. Were you able to get enough water to satisfy your thirst? (Circle ONE):

YES

NO

16. How adequate was the QUANTITY (Amount) of the food ration issued to you for the conditions of the exercise? (Circle ONE):

Extremely ADEQUATE	Moderately ADEQUATE	Slightly ADEQUATE	Neutral	Slightly INADEQUATE	Moderately INADEQUATE	Extremely INADEQUATE
1	2	3	4	5	6	7

17. Overall, all things considered, how would you RATE the new emergency/assault food ration packet? (Circle ONE);

Extremely GOOD	Moderately GOOD	Slightly GOOD	Neutral	Slightly BAD	Moderately BAD	Extremely BAD
1	2	3	4	5	6	7

18. How CONVENIENT was the emergency/assault food ration packet to carry with you into the field? (Circle ONE):

Extremely CONVENIENT	Moderately CONVENIENT	Slightly CONVENIENT	Neutral	Slightly INCONVENIENT	Moderately INCONVENIENT	Extremely INCONVENIENT
1	2	3	4	5	6	7

19. In comparison to the following rations (if you have ever carried them into the field), how CONVENIENT was the emergency/assault food packet to carry with you into the field?

Emergency/Assault Food Packet was (Circle ONE for each):

Much MORE	Somewhat MORE	Slightly MORE	Neutral	Slightly LESS	Somewhat LESS	Much LESS	convenient than the MCI (Meal, Combat Individual).
1	2	3	4	5	6	7	

Much MORE	Somewhat MORE	Slightly MORE	Neutral	Slightly LESS	Somewhat LESS	Much LESS	convenient than the LRP
1	2	3	4	5	6	7	

20. In comparison to the following rations (if you have ever carried them into the field), how much better or worse was the QUALITY of the emergency/assault food packet?

Emergency/Assault Food Packet was (Circle ONE for each):

Much BETTER	Somewhat BETTER	Slightly BETTER	Neutral	Slightly WORSE	Somewhat WORSE	Much WORSE	than the MCI (Meal, Combat Individual).
1	2	3	4	5	6	7	

Much BETTER	Somewhat BETTER	Slightly BETTER	Neutral	Slightly WORSE	Somewhat WORSE	Much WORSE than the LRP
1	2	3	4	5	6	7 (Long Range Patrol Rat.).

21. All things considered, please rank-order your preference for carrying the following rations with you on maneuvers similar to the exercise just completed. That is, place the number "1" in the blank next to the ration you would MOST prefer to be issued for field maneuvers (your #1 favorite), the number "2" next to your second most favorite, etc. If you are completely unfamiliar with one of the rations, just leave it blank:

_____ MEAL, COMBAT INDIVIDUAL (MCI)

_____ EMERGENCY/ASSAULT FOOD PACKET

_____ LONG RANGE PATROL FOOD PACKET (LRP)

22. How many times each day would you like hot coffee?

_____ None.

_____ Once per day.

_____ Twice per day.

_____ Three times per day.

_____ More than three times per day.

23. Please feel free to use the space below to comment on any issues not adequately addressed above: _____
