

TECHNICAL REPORT
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A FAST SERVICE CONCEPT FOR ARMY DINING FACILITIES

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This report contains an evaluation of the new foodservice concept designed and implemented at Fort Devens, MA. An existing short order line was redesigned to function as a fast service outlet with the added features of a new menu, take-out service, and extended hours. The objectives of the new concept were to increase Army enlisted meal participation rates, reduce waiting times and lines, and increase customer satisfaction. All aspects of the fast service operation including menu, equipment, cost, nutrition, and staffing are described		

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in this report. Analyses of the data collected during the pre and post-test periods show of those surveyed, 82% stated that their satisfaction with the overall foodservice system had improved, while a 60% relative increase in service rates and a 13% relative increase in the meal attendance rate has been achieved. The positive effects upon the enlisted soldier achieved from the fast service concept indicate that this concept be accepted by Army foodservice. A final recommendation is that the Quartermaster School should develop a curriculum detailing fast service techniques and procedures.



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EXECUTIVE SUMMARY

Objective

The objectives of this project were to increase meal participation rates of enlisted personnel, reduce waiting lines, and increase customer satisfaction. To achieve these goals, a new concept of fast service for Army garrison dining facilities was developed and implemented at Fort Devens, Massachusetts. The key features of the new concept are:

- **Limited Menu Choices** to expedite customer service rates.
- **High Preference Fast Foods** to create customer satisfaction.
- **Pre-Packaged Food Selections** to improve service rates and facilitate progressive cooking production methods.
- **Take-Out Service** to promote increased customer demand.
- **Extended Meal Hours** to attract new customers.

New System

To provide high quality food to the customer without delay, the short order line in a dining facility was reconfigured to serve fast service food products. Only those high production, fast recovery pieces of equipment that were absolutely necessary were purchased. Existing equipment was utilized to the maximum extent, thus minimizing the costs of implementing the new concept. The total modification cost, including installation, amounted to \$38,000. This was an unmodernized facility with older equipment; renovation costs for newer facilities may be less.

Entry into the fast service area remained the same as in the short order system. After signing in, customers chose either a tray or a paper bag depending upon whether the take-out option was selected. The diner then moved through the line and was given a pre-packaged entree selection, french fries, and a fruit pie. Noon entrees consisted of beefburgers, cheeseburgers, a hot sandwich, or a submarine sandwich. The diner could select only one of these entrees. At dinner the menu featured a choice among beefburgers, cheeseburgers, and fried chicken. Beverages and salads were always available at both meals. The cost of providing meals was within BDFA tolerances. Pre-packaging costs varied between \$0.02 and \$0.18 per person per meal depending upon whether the eat-in or the take-out option was selected, the former being less costly. The cost of pre-packaging can be offset, however, by KP contract savings, since services required within the dining facility are reduced by the take-out and pre-packaging features.

Customer survey results indicate that 82% of the respondents perceived the overall foodservice system to be better after the fast service line was opened. Overall participation rates increased 12.5%. Weekday attendance increased by 14.7%. The popularity of the new

service was also evidenced by a change in meal selection patterns. The fast service line attracted 55% of all those entering the facility for lunch compared to 34% in the old short order line. Balancing the line attendance, in conjunction with a measured 60% improvement in serving rates on the fast service line, resulted in the virtual elimination of waiting lines as a customer complaint.

The importance of the take-out option is evidenced by the fact that 60% of all fast service meals were taken out during lunch and dinner meal periods.

Extended meal hours were responsible for almost 10% of the average daily attendance. Unfortunately, this service was never adequately tested. The Base Commander authorized meal service only up to 2100 hours and discontinued this operation after only two weeks.

The issue of unauthorized meal consumption was addressed. A 1.0% increase over the old system was measured. However, those customers who on any one day ate more than three meals, averaged only two meals per day when the analysis took into account the entire two-week data collection period. Thus, while some customers occasionally consumed more than three meals per day, no one ate even three meals per day when averaged over the two-week test period.

Conclusions and Recommendations

The fast service concept has demonstrated that it meets the needs of the enlisted soldier. Therefore the recommendation of this evaluation is that Army foodservice incorporate the fast service concept into its dining facilities.

Further, it is recommended that the take-out and extended hour features be stressed in future fast service operations. These two aspects of the concept are key elements that can significantly contribute to greater overall customer satisfaction and attendance. Finally, it is also recommended that the Quartermaster School develop fast service curricula for inclusion into its training program for management and cooks, and that a suitable manual be prepared for use by those who cannot attend or take a QM course.

PREFACE

During FY81, the Operations Research and Systems Analysis Office (ORSAO) of the US Army Natick Research and Development Laboratories developed and implemented a new fast service system at Fort Devens, Massachusetts. This O&MA military service requirement was conducted under Production Engineering in Support of the DoD Food Program P728012.19. To accomplish this work required the cooperative effort of many individuals. Specifically, the authors would like to thank members of the following organizations:

- **39th Engineer Battalion, Fort Devens, Massachusetts**

The efforts of CPT Michael Lee, 2LT Michael Crowley, and SFC William N. Graves in coordinating the smooth transition of the new concept into the test dining facility are gratefully acknowledged, as is the full cooperation and support of LTC Brown, LTC Miller, and MAJ Viglucci. The following foodservice personnel were also of considerable help during the evaluation: SFC Sergeant, SFC Armentrout, SFC Smagula, and SGTs Loomis and McEuen.

- **Fort Devens, Massachusetts**

The foodservice office at Fort Devens supported our efforts and was always available for assistance. CWO2 John Vargas, Food Service Adviser, cooperated fully as did his assistants MSGs Bacon and Peterson. A special thank you is extended to Mr. Phillip Demming, Self Service Supply Center; Mr. Robert Davis, Procurement Office, and Mr. Glenn Hatton, Contracting Office, for their valuable assistance in purchasing and expediting deliveries of equipment and services. Troop Issue Support Activities were provided by Mrs. Galli and Mrs. Richardson.

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In his capacity as Head, Behavioral Science Division, Dr. Herbert L. Meiselman played an active role in bringing this report to fruition.

- **Food Engineering Laboratory/Animal Products Group and Experimental Kitchen**

The work on the sensory evaluation of chicken products was accomplished by Mr. Gary Shults, Dr. George Walker, and Ms. Patricia Prell. Mr. Joseph Smith also assisted in monitoring contract specifications of meat products used in this project.

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A FAST SERVICE CONCEPT FOR ARMY DINING FACILITIES

SECTION I

INTRODUCTION

Background

A factor that is frequently identified as a problem in military foodservice is waiting in line. At Fort Lewis, Washington, a survey conducted by NLABS found that 73% of all troops interviewed stated that waiting in line was their greatest problem with foodservice. Of those respondents, 85% indicated that they would eat elsewhere instead of waiting in line.¹ Reducing the time spent waiting in line was the primary objective of a new fast service system implemented on aircraft carriers.² The result of the introduction of this new system was a 110% increase in serving rates and throughput, a 21% reduction in waiting time and an increase in participation rates. NLABS was asked by the Troop Support Agency (TSA) to develop and implement a fast service concept for the Army by modifying the system that was being used on carriers. Objectives of the new concept were to:

- Increase meal participation rates of enlisted Army personnel.
- Reduce waiting times and lines.
- Increase customer satisfaction.

These objectives are mutually reinforcing. Through the reduction of meal lines, greater customer satisfaction will occur which will in turn generate higher attendance by those enlisted members entitled to a daily food allowance (authorized to subsist).

The following characteristics served as guidelines in designing system changes:

- Limit menu choices. Reducing the number of customer selections from the current excessive number of choices to manageable levels will expedite customer service rates.
- Provide high preference fast foods. Serving only those food products that are consistently chosen by customers and are similar to commercial fast food items will increase customer demand.
- Pre-packaged food items. Maintaining a small inventory of pre-packaged food selections in conjunction with progressive cookery will improve customer service rates.

¹G. Hertweck and R.J. Byrne, "Analysis of Consumer Responses to Proposed Changes in Army Garrison Feeding System at Fort Lewis, WA," TR-72-48, OR/SA, Natick, MA: US Army Natick Research and Development Laboratories, p 22, 1972.

²R.P. Richardson, D.P. Leitch, B.M. Hill, P.M. Short, and G. Turk, "A New Foodservice System Concept for Aircraft Carriers," NATICK/TR-80/007, US Army Natick Research and Development Laboratories, 1979. (AD A083 630)

- Provide take-out service. Allowing customers to use take-out service gives patrons new alternative locations for consumption without their loss to the system, thereby enhancing customer perceptions of the foodservice system, while maintaining or even increasing attendance rates.

- Extended meal hours. Furnishing extended meal hours, especially during the evening, will bring back "lost customers" who find the typical meal hours incompatible with an active schedule.

Technical Approach

The research was conducted in three phases: Identification of the dining facility operating characteristics, concept design, and system analysis and evaluation.

Identification of Dining Facility Characteristics. Several locations at Fort Devens were viewed as possible test sites. The selected dining facility was subjected to a more thorough evaluation.

1. Layout. Facility layout drawings had to be redrawn because the existing facility blueprints were not suitable. Renovations and equipment changes had resulted in substantial differences between the drawings and the facility.

2. Equipment. Data on the operating characteristics of existing equipment were collected. The working condition and potential suitability of each piece of equipment with the new fast service concept was evaluated.

3. Participation. Actual and potential customer volumes were required to set design parameters. Personnel Administration Centers (PACS) were surveyed to obtain the number of enlisted personnel authorized to subsist. Dining facility attendance and meal participation rates were obtained from analysis of DA Forms 2970 and 3033.

Concept Design. This phase included the design of a menu and the selection of equipment compatible with the outlined fast service objectives and test site constraints.

1. Menu Design. Development of the fast service menu was consistent with the objectives for a limited, high preference, take-out foodservice operation. Previous research and consumer preference evaluations were utilized in determining the menu mix.^{3,4} Acceptability tests were conducted for those food products that had not been previously served in military dining facilities.

³See Footnote 2.

⁴G. Hertweck and R.L. Bustead, "Experimental Design of the Modular Fast Food Service Facility at Travis, AFB," TR-75-34, OR/SA, US Army Natick Research and Development Laboratories, Natick, MA, 1974. (AD A007124)

2. **Equipment Selection.** A change in the menu mix required that an evaluation of existing equipment be made. Where equipment items were determined to be inappropriate or incapable of meeting demand, new, high-production fast-recovery equipment was selected.

3. **Design Layout.** After creating the menu and selecting necessary equipment, customer flow and work centers were defined and analyzed to develop a configuration that maximized customer service rates. Appropriate signs were developed and displayed to direct customer flow in the desired pattern.

System Analysis and Evaluation. Detailed evaluations of the pre-test system and the new fast service system were conducted.

1. **Participation.** Meal card numbers at every meal during pre-test and post-test evaluation periods were recorded and analyzed. Comparisons with the authorized attendance for both periods were made to find the change in overall participation.

2. **Meal Attendance Patterns.** Analyses of meal card numbers to determine the actual number of meals eaten by those authorized to subsist before and after system implementation were undertaken.

3. **Customer Evaluations.** Surveys by NLABS Behavioral Scientists of enlisted personnel's attitudes toward a variety of foodservice issues were conducted.

4. **Food Acceptance.** Face-to-face interviews were conducted with enlisted diners after they finished eating to determine actual food acceptance.

5. **Worker Evaluations.** Interviews with both foodservice management and workers were conducted to determine their perception of the foodservice system.

SECTION II

SYSTEM DESCRIPTION

Background

The facility selected for the evaluation, Type 106, is fairly typical of Army dining facilities. Separated by a warewashing area, there are two main serving lines which are identical in configuration. Both lines are capable of serving A-rations and short order. However, in this case, one side served exclusively A-ration while the other was utilized exclusively for short order. With the exception of breakfast, two lines were generally open. On those occasions when field training exercises (FTX) would reduce attendance, and on weekends, only one line was utilized which served both A-rations and short order.

Short order in the current system is supposed to provide quick, convenient foodservice but this goal is not always realized. These lines typically include a wide variety of so-called quick foods. Beans and franks, chili-mac, and grilled sandwiches are but a few of the items now appearing on short order lines.

Beefburgers and cheeseburgers, which are also served, present another problem. However desirable cooking to order may seem for these items, it has no place in an institutional feeding system which is attempting to serve a large consumer population in a short time period. In view of customer criticism of long waiting lines, a cook to order system as currently practiced only exacerbates the problem.

Short order lines often display as many as six to eight selections. Customers have difficulty choosing among the several combinations of items, which in turn contributes to indecision, resulting in a slowdown of the service rate. In addition, further delay is incurred by serving methods more suited to full service meals. Analysis of customer selections on short order lines indicates that most customers choose menu selections within a narrow range and vary their choices only slightly. For example, on the aircraft carrier USS Saratoga, 95% of all persons selecting the beefburger line chose cheeseburgers at lunch and dinner.⁵ When customers were asked about variety issues, the Saratoga customers indicated that they preferred the limited choice, high preference menu over traditional menus.

New System

To provide the customer with high quality foods without delay, the short order line was converted to fast service with low preference foods being dropped from the menu. Contrasted to the old short order system where patrons were uncertain about the daily selections, the patron in the fast service line can expect several high preference menu choices. The soldier can select any one main entree, one beverage, and one portion of each of the other items. Table 1 presents the menu that was used at Fort Devens. If the selections were those indicated in Table 2, which are provided on the Fort Devens fast service line, a similar meal at the post exchange would cost about \$4.00.

⁵See Footnote 2.

Table 1

Fast Service Menu

Breakfast	Lunch	Dinner	Extended
Egg on a Muffin	Beefburgers	Fried Chicken	Beefburgers
Breakfast Pastry	Cheeseburgers	Beefburgers	Cheeseburgers
Fruit Juice	Chicken Fillet Sandwich	Cheeseburgers	French Fries
Fruit	Submarine Sandwich*	French Fries	Potato Chips
Coffee	French Fries	Fruit Pie	Fruit Pie
Assorted Beverages	Fruit Pies	Milkshakes	Milkshakes
	Milkshakes	Assorted Beverages	Assorted Beverages
	Assorted Beverages	Salad Bar	
	Salad Bar		

Hours of Operation

0630-0830	1130-1300	1700-1830	1830-2100
-----------	-----------	-----------	-----------

*Varies Daily

Table 2
Fast Service Meal Cost
at the
Post Exchange

Cheeseburger	\$1.50
French Fries	.45
Fruit Turnover	.40
Salad	.85
Soda	.70
Total Cost	<u>\$3.90</u>

Entry into the fast service area remained the same as in the short order system (Figures 1 and 2); however, an illuminated menuboard was added as a distinctive new feature to increase customer awareness of fast service menu offerings. This merchandising tool displayed the menu and a variety of colorful photographic prints depicting fast service food subjects and was located above the fast service sign-in station. Utilization of this style of advertising was a significant departure from previous Army practice.

After signing in, customers next chose either a tray or a paper bag depending upon whether they were eating in the facility or using the take-out option. For the hot entrees, the diner then moved through the line and was given a pre-packaged meal selection, french fries, and fruit pie. The pick-up process was slightly different when diners chose the cold submarine sandwich. The hot meal selection was by-passed. In this case, french fries and the fruit pie were taken first. The customer would then progress to the upright self-service refrigerated display case to pick up a submarine sandwich. Until this point, the selection process for eating in and take-out were identical. A slight variation occurred at the milkshake pick-up area where both take-out and eat-in diners selected a vanilla or chocolate milkshake. Take-out diners were given a milkshake in a disposable container while the eat-in diner received a glass. Diners not choosing a milkshake proceeded to a beverage area. For those customers utilizing the take-out service and not desiring a milkshake, a disposable cup was provided so that they could select the beverage of their choice. In addition disposable containers, covers, and utensils were available for take-out customers at the beverage display area so that they could use the self-service salad bar in the dining area.

Customer service aspects varied slightly during the late night service. Extended meal-hour operations were limited to **take-out service only**. Entry and exit during this period was through a side door opening onto the serving line (Figure 3), where a sign-in station was set up. Customers were prevented from entering the dining room by a movable partition and could only go to the beverage area. This was done to insure that additional cleaning requirements

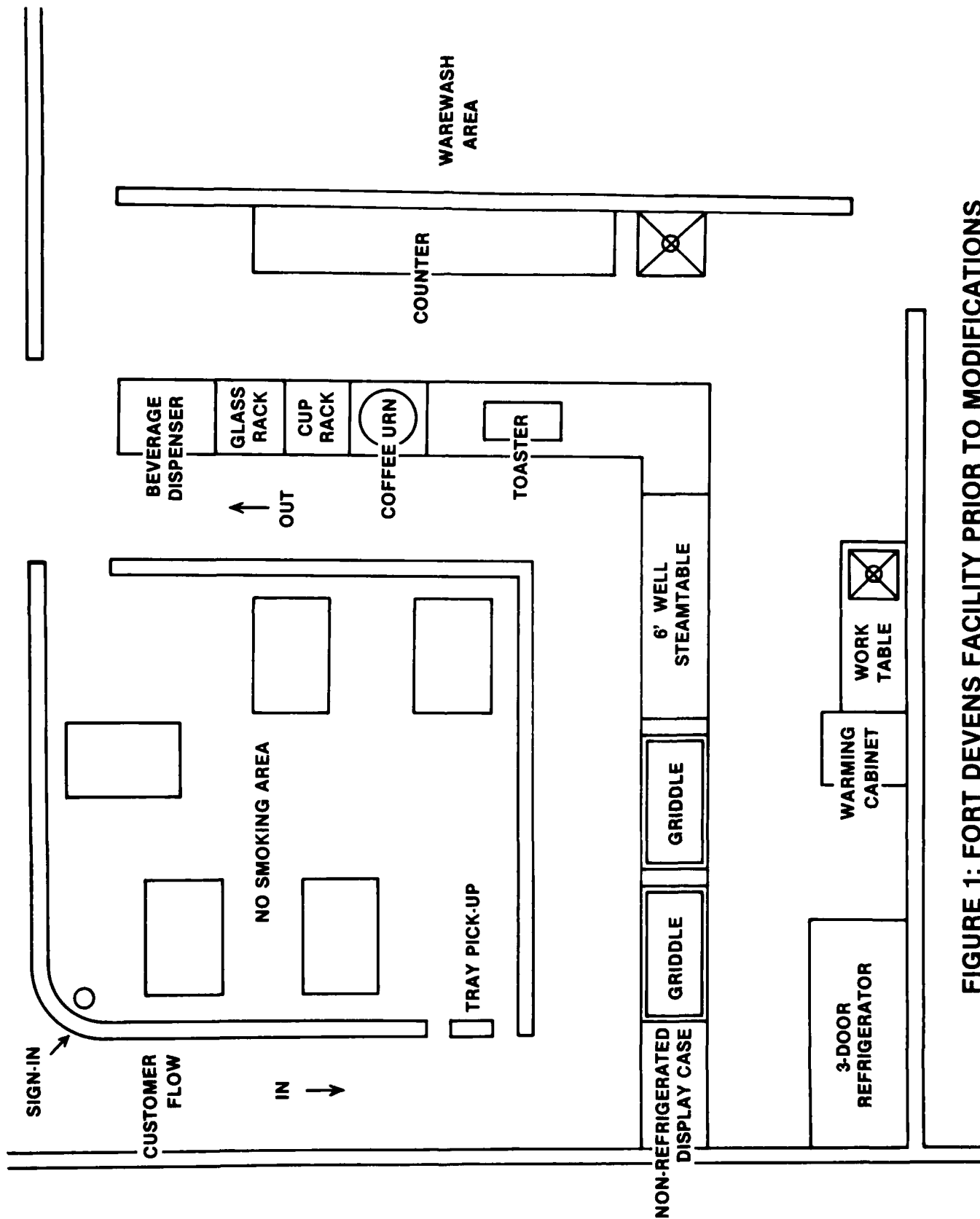


FIGURE 1: FORT DEVENS FACILITY PRIOR TO MODIFICATIONS

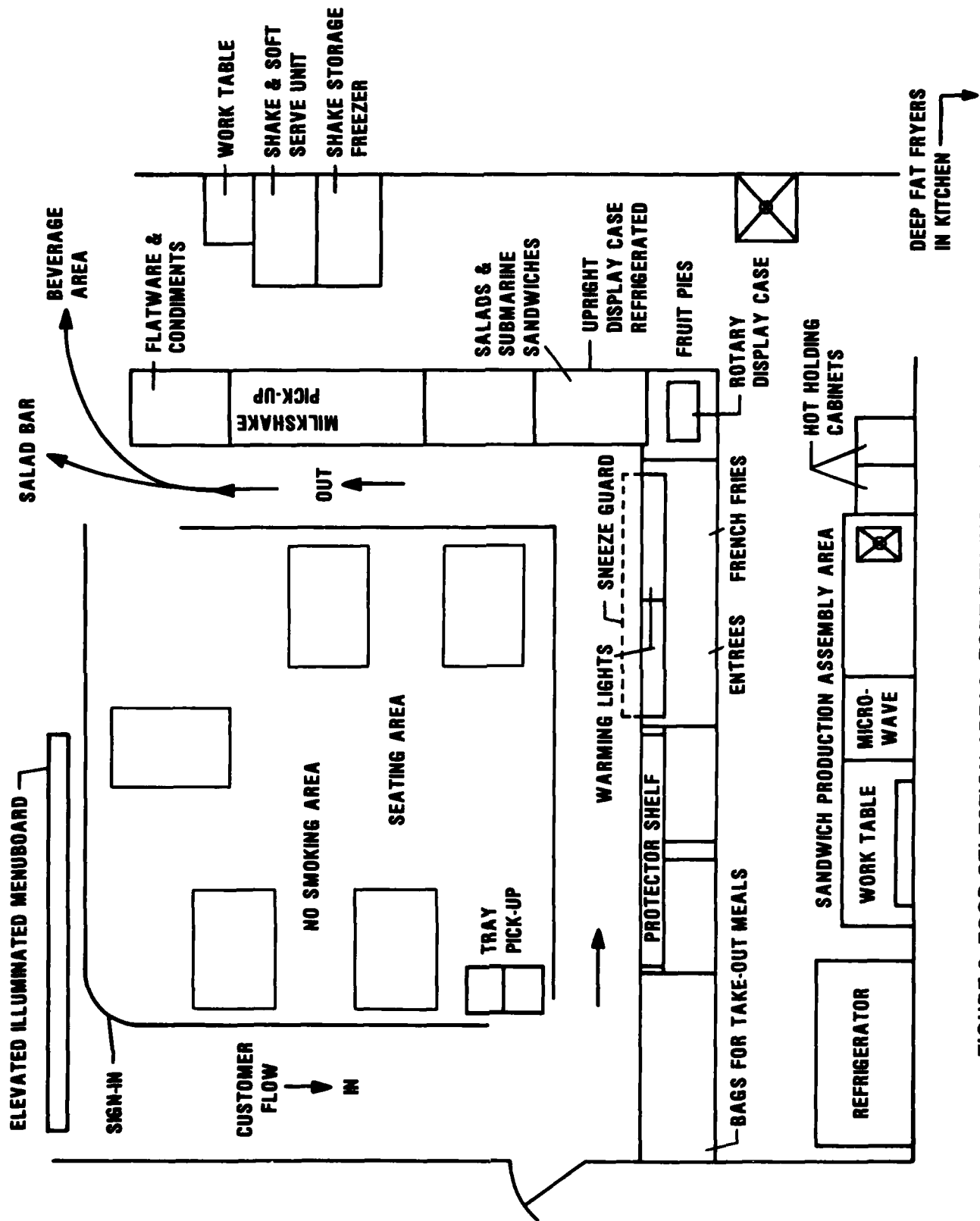


FIGURE 2: FOOD SELECTION AREAS, FORT DEVENS FAST SERVICE FACILITY

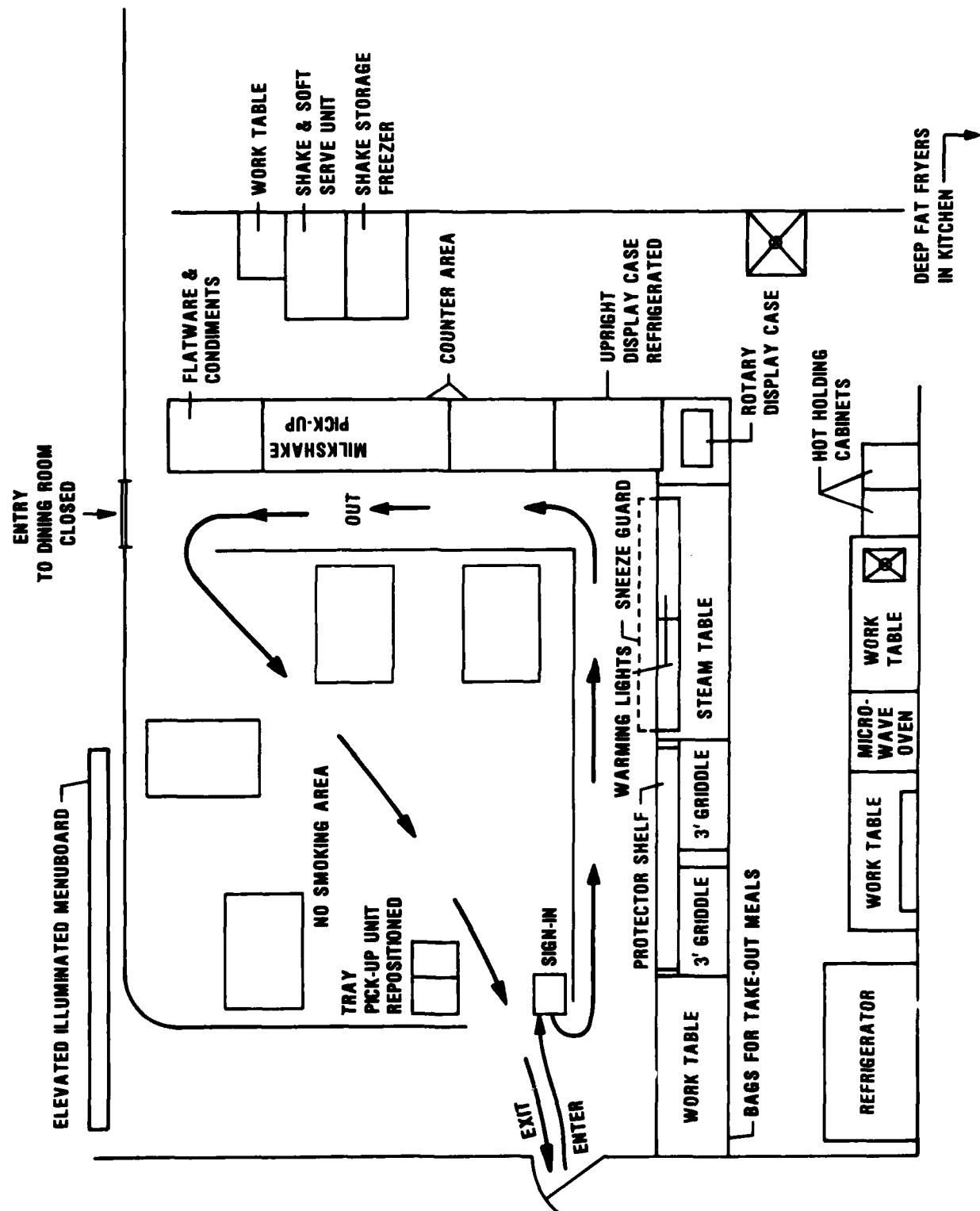


FIGURE 3: FORT DEVENS EXTENDED HOURS OPERATION

would not occur in the dining room. This concept of take-out service enables foodservice to be offered without additional cleaning demands. Customers obtained a fast service meal then left. Cleaning was limited to those areas and pieces of equipment normally cleaned immediately after the evening meal.

Nutrition

Nutritional aspects of the fast service menu were reviewed using AR 40-25, "Nutritional Standards," as a guide. The Daily Dietary Allowance (DDA) for fat, protein, and calories was compared with common menu selections made by individuals using the fast service line (see Table 3).

The fast service system offers a menu with a nutritional value at least equivalent to the short order menu that it is replacing. In fact, an in-depth nutritional analysis of fast food undertaken for Military Service Requirement, USN 7-1 "Food Service Systems Analysis," indicated that the fast food* system's menu was more nutritionally adequate than the previous short order menu.⁶ Fort Devens and the Navy experience are comparable due to the similarity of the available food selections and dining populations. In addition, studies undertaken evaluating commercial fast food have pointed out that "a fast food meal compares favorably with a home cooked meal" and that fast food may "match or surpass many a hospital or other institutional meal"⁷ nutritionally.

It is unreasonable to believe that a single food source or a few foods can be relied upon to provide total nutrition. The opposite viewpoint, that a single food source or a few foods are detrimental to an individual's nutritional well being, is also unreasonable. Therefore, customers must be made aware that diversity in their food choices is the best means of attaining nutritional well-being. This issue was addressed at Fort Devens by making customers of the fast service system aware of the need to eat a variety of foods to maximize their intake of necessary nutrients. Customers were given a handout at mealtime addressing the issue of nutrition, fast food, and suggestions for selecting food items (Figure 4).

*Although the terminology "Fast Food" is commonly used in commercial operations and was used in the Afloat report, "Fast Service" is a more appropriate descriptor for the concept implemented at Fort Devens.

⁶See Footnote 2.

⁷L. Finberg, M.D. "Fast Food for Adolescents: Nutritional Disaster or Triumph of Technology," *American Journal of Diseases of Children*, April 1976.

Table 3

Percentage of Daily Dietary Allowance Satisfied by Various Meal Combinations

Daily Dietary Allowance	Beefburger Meal %	Submarine Sandwich Meal %	Cheeseburger Meal %	Fried Chicken Meal %	Chicken Filet Meal %
Protein 100g	55	39	63	42	26
Calories 3200Kcal	32	42	35	33	33
Fat *	32	40	34	33	35

* AR 40-25, Nutritional Standards, recommends that less than 40% of daily caloric intake be obtained from fat. The figures above reflect the percentage of the 142 grams (40%) of fat per day provided by each meal.

NOTE: A meal consists of main entree item, 3 oz of french fries, 4 oz salad, 12.5 oz of carbonated beverage.

Fast Food -- Nutrition Facts

No food is bad for you but moderation is the key to maintaining a healthy body through diet. People are different and the diets needed for maintaining health are as different as the people consuming them. Because there is no ideal diet, HEW and USDA have set up the following guidelines when selecting foods.

1. Eat a variety of foods
2. Maintain ideal weight
3. Avoid too much fat, saturated fat and cholesterol
4. Eat foods with adequate starch and fiber
5. Avoid too much sugar
6. Avoid too much salt
7. If you drink alcohol, do so in moderation

The fast food menu offers choices of menus that are nutritious. If your menu choice is cheeseburger, french fries, salad, and milkshake the following nutrients are provided:

1. Cheeseburger -- protein, B vitamins, and iron
2. French Fries -- Vitamin C
3. Salad -- Vitamin A, and gives bulk to diet
4. Milkshake -- Calcium and Riboflavin

The above menu provides at least 30% of Daily Dietary Allowance for all nutrients.

A variety of foods is the best way to obtain all the necessary daily nutrients. Therefore, it is advisable to include in your daily menu those foods offered in the A-ration menu to ensure an adequate intake of all nutrients from different sources.

Figure 4: Nutritional Handout Used at Fort Devens

Food Products

To attract and bring back those customers who were going off-post to eat, food selections were required that were identifiable and comparable to commercial fast food restaurants. Except for a 4-oz chicken breast in filet, all food products were in the Group 89, Federal Supply Catalog, Subsistence. This chicken filet has been evaluated by the Armed Forces Product Evaluation Committee (AFPEC) and recommended for inclusion in the supply system. Appendix A contains a detailed analysis of this item.

The following food products were the primary components of the fast service system.

Chicken Breast Filet -- New Product. Prebreaded, prebrowned and fully cooked, this 4-oz chicken-breast filet is used as a sandwich and is similar to the new, highly popular sandwiches now being introduced throughout the fast food industry. An extremely versatile product that is cooked by placing it in a deep-fat fryer for two minutes, the breast filet may be used as either a sandwich or an entree by adding sauces to create variety. Presently, this item is being prepared for inclusion in the federal supply catalog (Appendix A).

Fried Chicken, 8905-00-079-2796. A frozen, precooked item is essential in a limited menu which features fried chicken frequently. The labor required to bread and fry raw chicken is simply too great. In addition, there are other advantages to the precooked frozen item, among which are customer acceptance (Appendix A), increased production capacity, ease in handling, and inventory control. Cooking to order takes about six minutes for frozen versus 10 to 12 minutes for raw chicken, which in turn means that fewer deep-fat fryers will be required under high demand situations.

Beef Patties, 8905-01-066-8212. A 1/4 lb beefburger was selected for two reasons. First, this item has become synonymous with fast food (fast service) and provides commercial similarity. Secondly, one 1/4 lb sandwich can be substituted for the two small 3-oz patties now served. By serving the larger product, less labor is required in cooking, wrapping and serving.

Since the 4-oz patty has not been frequently used in Army dining facilities, there was some difficulty in obtaining this item during the Fort Devens test. In fact, at the end of the first three months of operation, the supply center still did not routinely stock this item.

Milkshake Mix, Vanilla, and Chocolate, 8910-00-139-5777, 8910-00-139-5776. Both of these dairy products are procured locally. By using vanilla as a base, flavorings and coloring may be added to create variety. The serving size is 12.5 fluid ounces at a 50% overrun.

Fried Fruit Pie. The popular 3-oz dessert is easily prepared in a deep-fat fryer and ideally suited to pre-packaging and take-out meal service. Generally, this item is not part of the regular Troop Issue Support Activities (TISA) inventory, therefore the TISA must be contacted to coordinate orders.

Potatoes, Shoestring, 8915-00-080-5179. To maintain comparability with the fast food establishments, shoestring potatoes were served in 3-oz portion sizes.

Food Cost

In order to insure that the dining facility could operate within the Basic Daily Food Allowance (BDFA), a detailed cost analysis of the fast service menu was conducted. Table 4 presents the food cost associated with Fort Devens' most popular selections by meal period. These food costs represent the maximum amount the dining facility would incur per person if every item offered was selected. However, customers do not choose every item, therefore actual per person costs will vary. An important element that menu planners must consider is the effect a salad and beverage bar has on overall food costs. For those individuals eating in the dining facility, the number of times a person can return for salads and beverages is unlimited. At Fort Devens, returning for a single soft drink adds \$0.06 while each additional glass of milk contributes \$0.12. Condiments located at salad bars can also be very expensive, especially the portion control items (PC), because often four or more are taken when only one or two are needed. Table 5 lists the individual cost of fast service components and is provided as a guideline for future planning.

Table 4

The Meal Cost of Several Popular Fast Service Meal Selections

	BDFA Allowance %	\$	Size (oz.)	Servings #	Unit Cost \$	BDFA Percentage %
Breakfast Meal	20%	\$0.70				
Egg on a muffin			6.0	1	\$0.36	10.2%
Fruit juice			8.0	1	0.10	2.8
Fruit			4.0	1	0.08	2.3
Pastry			4.0	1	0.15	4.2
Beverage			12.0	1	0.12	3.4
Total					<u>\$0.81</u>	<u>22.9%</u>
Lunch Meal	40%	\$1.42				
Cheeseburger			4.0	1	\$0.48	13.6%
French Fries			3.0	1	0.07	2.0
Salad			8.0	1	0.13	3.7
Coleslaw			3.5	1	0.04	1.1
Milkshakes			12.5	1	0.22	6.2
Fruit turnover			3.0	1	0.13	3.7
Condiments			-		0.08	2.3
Total					<u>\$1.15</u>	<u>32.6%</u>
Dinner Meal	40%	\$1.42				
Fried Chicken			9.0	1	\$0.68	19.2%
French Fries			3.0	1	0.07	2.0
Salad			8.0	1	0.13	3.7
Coleslaw			3.5	1	0.04	1.1
Milkshake			12.5	1	0.22	6.2
Fruit turnover			3.0	1	0.13	3.7
Condiments			-		0.04	1.1
Total					<u>\$1.31</u>	<u>37.0%</u>
Total	100%	\$3.54				92.5%

Table 5

Food Cost of Fast Service Menu Components

	Food Cost \$	BDFA %
Entree Items		
Beefburger	\$0.40	11.3%
Cheeseburger	0.48	13.6
Chicken Sandwich	0.58	16.4
Submarine Sandwiches	0.73	20.6
Fried Chicken	0.68	19.2
Egg on a Muffin	0.36	10.2
Side Order		
French Fries	0.07	2.0
Salad Bar	0.13	3.7
Cole Slaw	0.04	1.1
Beverages		
Milk	0.15	4.2
Milkshakes	0.22	6.2
Fruit Juice	0.08	2.3
Assorted Beverages	0.06	1.7
Desserts		
Fruit	0.06	1.7
Fried Dessert	0.13	3.7
Pastry	0.10	2.8

BDFA = \$3.54

Food Packaging and Presentation

At Fort Devens, the mechanism for increasing the speed of service was to use the pre-packaging procedures developed for the aircraft carrier fast service lines. The packaging concept utilized at Fort Devens

- is compatible with the individual food products served in terms of appearance, heat retention and product protection during serving;
- enables simple wrapping and serving procedures;
- is similar to commercial serving and merchandising applications;
- minimizes funding requirements consistent with the above criteria.

Consideration was given to a wide variety of packaging mediums including paper, foil, and foam products. Products selected are listed in Table 6.

Beefburgers, cheeseburgers and submarine sandwiches were prepared and then packaged in a distinctive paper wrap. The wide variety of inexpensive colorful sandwich wraps provided the most cost-effective packaging. In addition to the ease of handling, colorful wrapping was a merchandising tool which assisted in customer identification of food products. Foam insulated containers were considered but rejected since their costs are three times the unit cost of paper. Limited storage space in and near food preparation workspace also ruled against the use of foam.

Fried chicken was served in a heat retentive foil bag. This product was also distinctive, providing immediate customer recognition. It too was selected because of limited storage space, and the ease with which the bags could be handled.

For both french fries and the fried fruit dessert, a wax greaseproof bag was selected based on prior experience and cost factors. A 4-oz plastic container was chosen for packaging pudding, gelatin desserts and cole slaw. An 8-oz plastic container was selected for tossed salad and was available in the take-out service. Take-out beverages were served in a 12.5-fl-oz paper cup. For carry out, a white 12-lb paper bag was used.

Pre-packaging costs on a per person basis varied over a wide range. Packaging costs for the diner eating in the facility were contained by having the customer use regular serviceware for salads and beverages. These service items were required to be available for the A-ration meal. The per person costs for disposables associated with a sandwich meal and fried chicken meal in this option were \$0.016 and \$0.053 respectively. Take-out service increased such costs by \$0.179 per meal. Table 7 summarizes the relevant costs.

Table 6

Fort Devens Serviceware Systems Specifications

	Company	Description	Product ID No.	Quantity/ Case	Cost Case \$	Unit	NSN
●Sandwiches							
Beefburger Wrap	Bagcraft Corp.	12" x 12"	395	6000	51.36	0.009	8135-01-091-8954
Cheeseburger Wrap	Bagcraft Corp.	12" x 12"	396	6000	51.36	.009	8135-01-091-00888
Chicken Sandwich Wrap	Bagcraft Corp.	12" x 12"	397	6000	51.36	.009	8135-01-090-2717
Submarine Sandwich Wrap	Bagcraft Corp.	12" x 16"	373	4000	51.36	.013	unavailable
Special Sandwich Wrap	Bagcraft Corp.	12" x 12"	397	6000	51.36	.009	8135-01-090-2717
●Fried Chicken							
Foil Bag, Heat Retentive	Bagcraft Corp.	4" x 3" x 10½"	480	1000	44.88	.045	unavailable
●Salads							
Plastic Container	Sweetheart	8 oz	EC85S	500	15.46	.031	unavailable
Plastic Lid	Sweetheart		LC410	500	11.00	.022	unavailable
●Cole Slaw							
Plastic Container	Sweetheart	3½ oz.	S10	1000	17.59	.018	unavailable
Plastic Lid	Sweetheart		LS10	1000	8.99	.009	unavailable
●Desserts							
Plastic Container	Sweetheart	3½ oz	S10	1000	17.59	.018	unavailable
Plastic Lid	Sweetheart		LS10	1000	8.99	.009	unavailable
Fruit Pie Waxbag	Bagcraft Corp.	Sleeve	467	4000	7.15	.002	unavailable
●French Fries							
Wax Greaseproof Bag	Bagcraft Corp.	3½ oz	461	8000	48.96	.006	8135-01-089-113

Table 6

Fort Devens Serviceware Systems Specifications (cont'd)

	Company	Description	Product ID No.	Quantity/ Case	Cost Case \$	Unit	NSN
●Beverages							
Cold Beverages	Sweetheart	16 oz	1614	1000	30.53	0.031	unavailable
Milkshakes	Sweetheart	14 oz	1614	1000	30.52	.031	unavailable
Plastic Lid	Sweetheart		L1614	2000	32.41	.016	unavailable
Hot Drink Container	Sweetheart	12 oz	P512	1000	27.04	.027	unavailable
Hot Drink Lid	Sweetheart		L512N	2000	22.33	.011	unavailable
●Accessory Items							
Napkin, White	GSA			1000	22.30	.022	8540-00-265-4601
Plastic Fork	GSA			100	1.75	.018	7340-00-022-1315
Plastic Knife	GSA			100	1.70	.017	7340-00-022-1316
Plastic Spoon	GSA			100	1.60	.016	7340-00-022-1317
Stirring Stick	GSA			1000	.93	.001	7360-00-753-5565
Towel, Hand Cleaner	GSA			1000	16.75	.016	8520-00-782-3554
●Carry-Out Container							
Paper Bag, White	Local Purchase	12 lb	10 lb	2000	19.55	.009	unavailable

Table 7
A Comparison of Eat-In and Take-Out
Packaging Costs*

Eat-In **	Take-Out
Sandwich wrap	Sandwich wrap
French fry bag	French fry bag
Dessert bag	Salad container
	Cole slaw container
	Beverage container
	Utensils
	Paper bag
Total Cost	
Per person/per meal \$0.016	\$0.195

*Add \$0.037 when fried chicken selected.

**Regular serviceware used for salads and beverages.

Staffing Requirements

With the food preparation procedures and equipment provided, the recommended staffing level was capable of servicing a minimum of 360 persons per hour. However, on several occasions, the fast service line was staffed lower than the recommended manpower levels. There were complaints that the dining facility did not have enough cooks to support fast service foods and A-rations. These complaints were unjustified and incorrect. First, because of the shift of diners away from the A-ration to the fast service line, fewer cooks were required to prepare and serve the A-ration meal. Secondly, TO & E units such as Fort Devens are staffed to feed at full unit strength. Considering that participation rates are well under authorized levels, these facilities are overstaffed. Finally, the major difficulty that existed at Fort Devens was that workers were not scheduled effectively. Staffing during the evaluation period consisted of three work shifts. Each group would work the noon and dinner meal and breakfast the following day before being relieved. Two shifts were always off. This staffing technique does not effectively take into consideration peak demand periods. Table 8 presents the staffing guidelines that were recommended to support the fast service line. The goal of effective scheduling should be to have sufficient staff available during busy periods without an excess of help during slow periods. AR 30-1, Section 3-19, states this policy as follows:

"The foodservice sergeant will develop work schedules which will result in the best utilization of assigned personnel. Arrivals and departures should be staggered so that only those personnel required to accomplish the task are on duty."

Table 8

Fort Devens Cook Requirements by Meal Period

Function	Breakfast	Lunch	Dinner	Extended
Supervisor	1	1	1	1
Grill				
Cooking	1	1	1	1
Assembly		1	1	
Deep-Fat Frying				
Cooking		1	1	
Assembly				
Serving Line	1	1	1	1
Beverage and Display				
Milkshakes		1	1	
Display Case				
Meal Requirements	3	6	6	3

A subsequent management change within the dining facility eliminated the scheduling problem. The new Food Service Sergeant was an extremely capable manager who was able to incorporate an efficient, staggered, work schedule into the facility. The result of this new schedule was that staffing was no longer a problem. In summary, the fast service system does not require more cooks to be assigned to a facility; however, it does require an increased emphasis by management on the proper scheduling of employees.

Descriptions of the functions required of workers are provided as follows:

Supervision. An E-6 or well-qualified E-5 should be in charge of the fast service line. The principal function of the supervisor is to insure that the proper service rate is maintained by seeing that runouts do not occur. While fast service food preparation is not particularly complex, an increased need for intensive management control is necessary. To maintain maximum product quality, food should be prepared only in limited quantities shortly ahead of the serving time. Management was therefore required to closely coordinate each work station's production with the demonstrated demand. With prepackaging, it becomes very easy to cook all food prior to the meal's start. A supervisor must have a sufficient quantity of the product to meet the initial line surge but no more. Progressive cookery procedures must be adhered to at all times.

Grill. The grill function required one individual at breakfast to cook, assemble and wrap sandwiches. At both lunch and dinner, the grill operator was assigned to the preparation and assembly of cheeseburgers. Another individual also assisted at lunch and dinner in assembly and wrapping and also resupplied the serving line with cheeseburgers or beefburgers as required. Toward the end of the meal, the wrapper was freed to work in other areas or to begin clean-up activities.

Deep-Fat Frying Operations. One person was required for deep-fat frying operations. Utilizing solid-state, quick-recovery, deep-fat fryers, the person assigned was able to fry and assemble sufficient quantities of product to meet demand. There was little preparation required in the foods to be fried; therefore, the cook assisted in preparation of other foods prior to starting the frying operation.

Serving Line Operations. With the proposed prepackaging and food preparation methods, one person maintained the desired serving rates throughout most of the meal period. When there was a backlog of customers such as at the opening of the dining facility, the supervisor or sandwich wrapper lent assistance.

Milkshake and Self-Service Display Operations. Because milkshakes, take-out salads and sandwiches were prepared prior to the meal period, only one individual was required to service those customers selecting a milkshake. In addition, this person would restock the display case as necessary from the undercounter refrigerator below the display case.

Foodservice Equipment

Figure 5 reflects the changes made to the existing short order line in order to provide a fast service capability. Detailed equipment descriptions are contained in Appendix B. Disposable items required for take-out service were placed in a recessed non-refrigerated display table. Shelves were removed from an existing display case for this purpose.

Two 3' griddles were left in place for use in the breakfast meal and cheeseburger production. Before modification, grilling on line presented two problems. First, there was no serving shelf; therefore, cooks had to awkwardly reach over the griddle when serving customers. Also, the griddle had no protective shielding to prevent grease from splattering customers. To rectify this situation, a stainless steel protector case with serving shelf was designed and purchased. Ideally, a partition enclosing the preparation area from the customer is necessary. However, cost and time constraints prevented testing this solution.

A serving shelf, sneeze guards, and warming lights were installed over the steamtable. These items, as well as the protector case, should have already been part of the serving line; therefore, the expense associated with their purchase and installation may not be required in modifications of other facilities.

A new rotary display case was purchased and used to merchandise and dispense fruit pies. Adjacent to the rotary display case, a specially fabricated upright refrigerated display case was used to serve pre-packaged salads and cold sandwiches. The base of the display case is an undercounter refrigerator. Cooks place pre-packaged salads and sandwiches in this

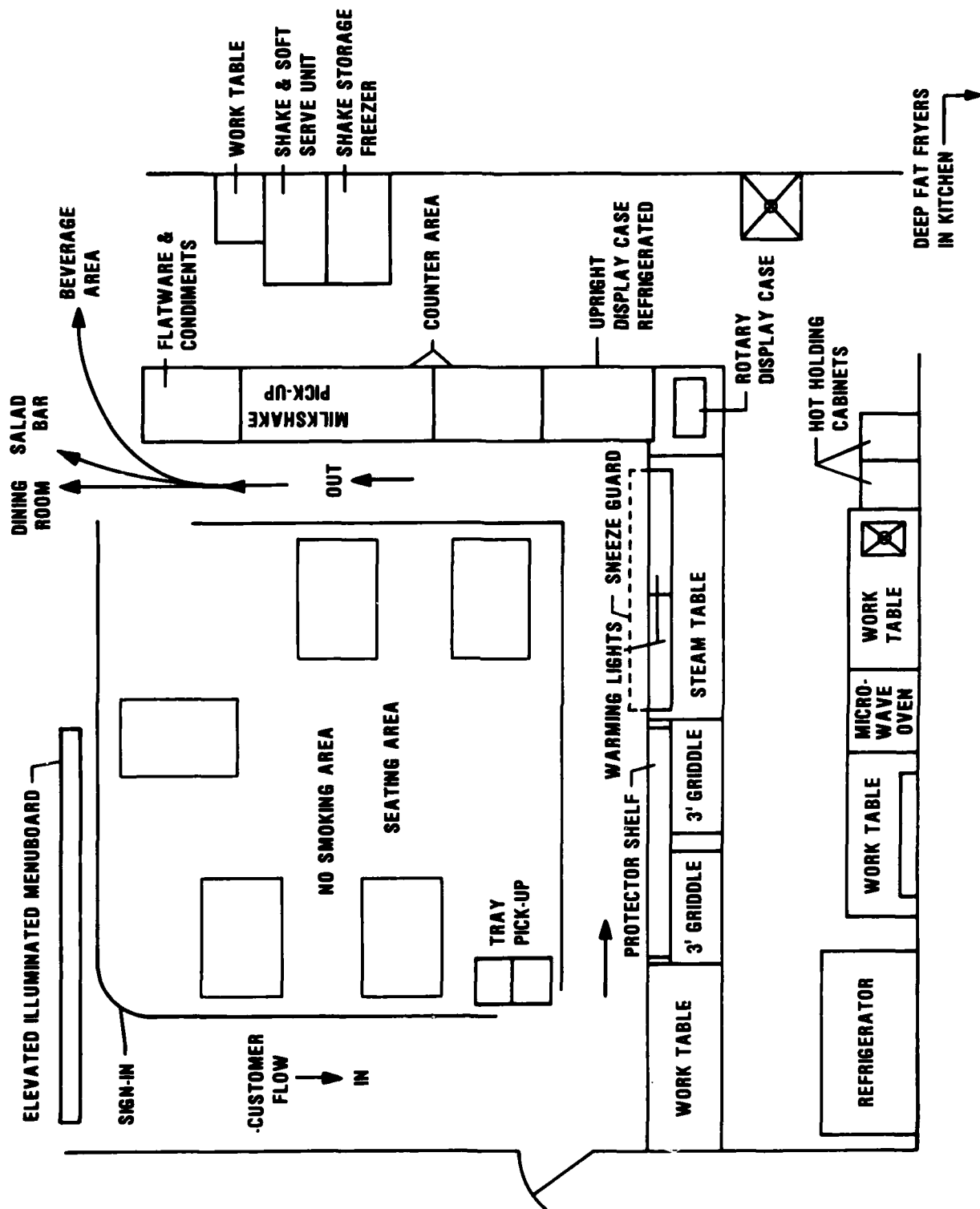


FIGURE 5: FORT DEVENS FAST SERVICE FACILITY

refrigerator for later service. In this manner, it becomes a simple procedure to restock the display case. Runouts and labor required to transfer food from the walk-in to the serving lines during a meal are thus also minimized. Installing this display case necessitated the removal of a gas conveyor toaster and a 7-1/2 gallon twin, gas, coffee urn. A toaster is not an essential item in the fast service system. Nevertheless, an electric conveyor toaster could easily be substituted for the rotary display case during breakfast.

Although a cold food counter capable of holding milkshakes would have been more appropriate at the beverage display area, cost considerations did not allow this option. Instead, two stainless steel work tables were placed adjacent to the refrigerated display case. Beverages would be placed upon these tables. A one piece, three-tubular serving rail was attached to these tables. Milkshake production was located directly behind the milkshake pick-up area. Two new equipment items were installed: a dual-head, milkshake and soft serve ice cream machine and an upright milkshake storage freezer. The latter was required during peak demand periods because production was unable to meet customer demands especially when two flavors were being offered. Because expediting customer flow is a major objective of the fast service system, by producing for inventory and then using progressive production methods, a potential runout problem is avoided. A carbonated beverage dispenser was relocated from the end of the serving line to a central beverage area.

Located directly behind the steamtable are several pieces of equipment essential to the fast service system. The most important item is a microwave oven used primarily in cheeseburger production. Before being brought to the serving line, final cheese melting for the cheeseburgers was accomplished in the microwave oven which was located on a worktable that was in place prior to the renovations. Adjacent to the microwave oven was another worktable with a shelf, which was primarily used for cheeseburger assembly and wrapping. After being wrapped, cheeseburgers were placed in a hot holding cabinet. Two hot holding cabinets were purchased. The hot holding cabinets enabled inventoried products to be properly held.

Deep-fat fryers were located in the kitchen under existing ventilation. Three new instantaneous-recovery, gas, deep-fat fryers were installed to replace inadequate older fryers. Because of the number and frequency of fried foods on the menu, the importance of these pieces of equipment should not be underestimated.

Fast Service Renovation Costs

This redesign effort was a minimum cost approach which utilized the existing facility resources to the maximum possible extent. Modification costs itemized in Table 9 amounted to approximately \$38,000 and were funded by both NLABS and TSA. Equipment costs amounting to about \$26,000 contributed the largest expense factor. Installation charges were \$10,000 and shipping charges accounted for the remainder.

Even though built to standard designs, individual dining facilities will, nevertheless, have unique characteristics. Therefore, in other modifications, planners must determine equipment condition and facility configuration before purchase of the fast service equipment listed. In this manner, unnecessary equipment and costs will be minimized if not entirely eliminated.

Table 9

**Fort Devens
Fast Service Renovation Costs**

Milkshake Dispenser	\$ 6,650
Deep Fat Fryers	4,800
Deep Fat Filters	1,100
Microwave Oven	1,950
Warming Lights	775
Hot Holding Cabinets	2,100
Milkshake Storage Freezer	3,500
Menu Board	1,900
Refrigerated Display Case	4,200
Accessory Items	1,150
Installation Charge	10,000
Total	\$38,125

Installation costs are also contingent upon the individual post or dining facility characteristics. At Fort Devens, the facility engineers were able to provide necessary coordination with a contractor already working on the base for timely and cost-effective equipment installation. Modifications at Fort Devens consisted of relatively minor electrical and plumbing changes. Utilization of the existing serving line and ventilation systems also avoided costly changes. However, in other cases, installation may require special contract efforts that will contribute to higher costs. Appendix C provides an in-depth description of all equipment recommended for future modifications.

SECTION III

ANALYSIS OF RESULTS

Participation Rates

The participation rate was derived for a given meal period by the following calculation:

$$\text{Dining Facility Participation Rate} = \frac{\text{Total number of authorized meals served}}{\text{Total number of individuals authorized to subsist}}$$

The number of meals served and the number of individuals authorized to subsist were obtained from DA Form 2970 provided by the dining facility manager and Personnel Administration Center (PAC). As a check on the validity of these figures, the number of meals served was also determined independently by NLABS data collectors recording meal card numbers of customers at each meal. Accurate authorized to subsist figures were obtained by comparing the recorded meal card numbers in the PAC with the authorized count on DA Form 2970.

Attendance rates demonstrated a relative increase of 13% to a post-test rate of 35%. These participation rates represent the periods from October through December 1980 and March through May 1981.

Weekday participation during the new fast service evaluation showed the largest relative increase of 15% rising to a rate of 42%. Weekday attendance is considered more representative of and a more accurate indicator of the success of the new fast service system, due to consistently low attendance on weekends for both pre- and post-evaluations, resulting from off-duty lifestyle habits. Participation rates for the conventional (pre-test) and the new fast service system (post-test) are shown in Table 10.

Table 10
Fort Devens
Meal Rate of Participation

	Pre-Test %	Post-Test %	Increase
Overall	31.3	35.2	12.5
Weekday	36.8	42.2	14.7
Weekend	18.3	20.3	10.9

Service Rates

An important objective of the fast service line is to reduce waiting lines. Increasing service rates is one principal means of attaining this objective. The conventional short-order line at Fort Devens served a maximum of five men per minute during peak meal periods when a line was present. There is no reason to believe this is not typical of many facilities in the Army. In contrast, the number of customers served during peak periods in the new fast service line increased 60% to eight men per minute. This higher serving rate satisfied the objective of less waiting time in line for the customers.

Serving Line Selection Patterns

During the pre-test period, the A-ration line was serving almost twice the number of customers as the short-order line. One of the purposes of the new fast service line was to establish a more favorable balance between these two lines to reduce the length of the A-ration line. A comparison of the serving lines in the pre- and post- fast service evaluations has been made. There is a statistically significant change (at the 0.05 level) in selection patterns. The fast service line now attracts 55% of those customers eating lunch versus 34% in the short-order line under the old system (see Table 11). Balancing the line attendance has therefore also reduced the long lines on the A-ration line that existed during the pre-test period.

Table 11

Selection Patterns by Serving Line

	Pre-Test		Post-Test	
	A-Ration %	Short Order %	A-Ration %	Fast Service %
Lunch	66	34	45	55
Dinner*	N/A	N/A	53	47

*Only one line was used for dinner during pre-test.

This balancing of lines in conjunction with increased service rates on the fast service line has resulted in increased customer satisfaction as will be discussed in detail later. The fast service line offered the customer the advantage of a take-out meal, while the A-ration and the old short-order line did not. This factor was a major contributor to customer line selection. The dinner meal line selection pattern offers an interesting comparison to the selection patterns at lunch. While more customers selected the fast service line at lunch, selection patterns at

dinner do not exhibit as dramatic a change. One explanation for this occurrence is that the soldiers have less time available for eating during lunch due to their work schedule, and therefore choose the fast service line with its take-out option. At dinner, generally, the individual has completed his daily routine and has more time to eat in the dining facility, and is, therefore, more likely to select a full course meal. This pattern should also ease any concerns that enlisted patrons will consume fast service foods to the exclusion of more conventional meals.

Take-Out Service

Take-out service at each meal is an important aspect of the new fast service system. This service provides an opportunity for troops to obtain a complete meal when they do not want to take the time to eat within the dining facility. It is important to note that nearly six out of every 10 customers in the fast service line at lunch and dinner chose take-out instead of dining in the mess hall. This figure underscores the popularity of this feature. Since the fast service breakfast offered take-out service only, it has been deleted from this mention of take-out versus dine-in selections.

Extended Meal Hours

The extended hours operation provides an opportunity for troops to obtain their evening meal after the regular dinner hours. The fast service line was open during an extended meal period concept evaluation from 1800 to 2100 hours for take-out only. While the dinner meal attracted the same percentage of customers with and without extended hours, the extended hours drew an additional 10% of the authorized customers per meal to the dining facility. For reasons to be discussed this was not as large an increase as had been expected.

Attendance during the extended hours was monitored in half-hour intervals in order to determine the busiest demand periods. A fairly steady demand occurred throughout the period; with the last hour serving the highest number of customers, as illustrated in Figure 6. This customer demand pattern implies that operating hours should be extended beyond 2100 to 2130 or 2200 hours.

In addition to these results, a survey conducted at the Marine Corps installation at 29 Palms, CA, provides further indication that 2100 is too early to terminate an extended evening meal period.⁸ Therefore, if customer demand is an operational consideration, then the most desirable operating hours would be those extending to 2200 or 2300 hours. Figure 7 presents the comparison of customer demand with that of dining facility operating hours at USMC Base 29 Palms, CA which supports this conclusion. Military foodservice must begin to pay attention to customer demand patterns rather than just pay lip service to them if increased participation is to be realized in military dining facilities.

⁸M. Davis, P. Brandler, W. Wilkinson, H. Meiselman, L. Birnbaum, L. Symington, and B. Bissonnett, "An Evaluation of the New ' Multi-Restaurant ' Foodservice System for the Marine Corps," NATICK/TR-81/023, US Army Natick Research and Development Laboratories, 1980, pp. 27-28.

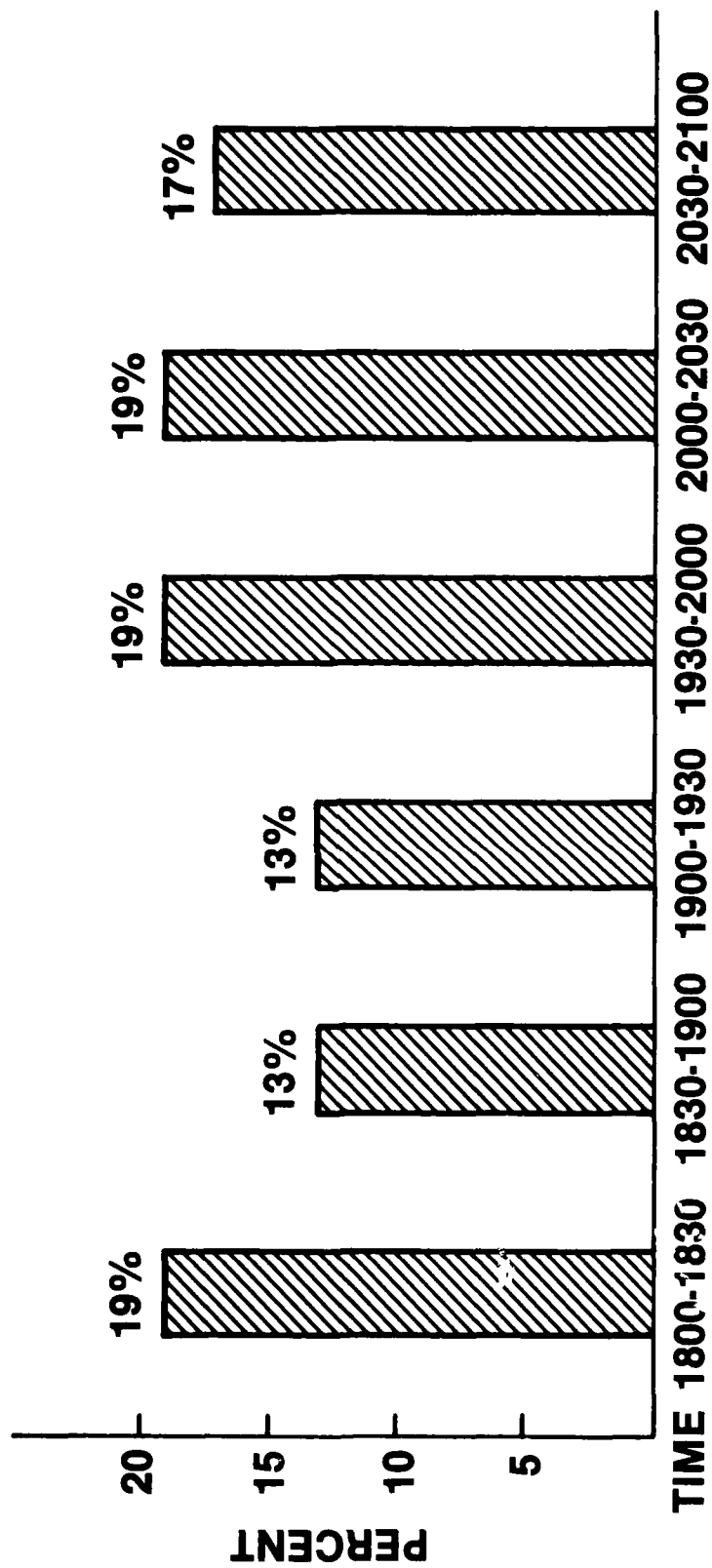


FIGURE 6: FORT DEVENS EXTENDED HOURS PERCENT PARTICIPATION BY HALF-HOUR INTERVALS

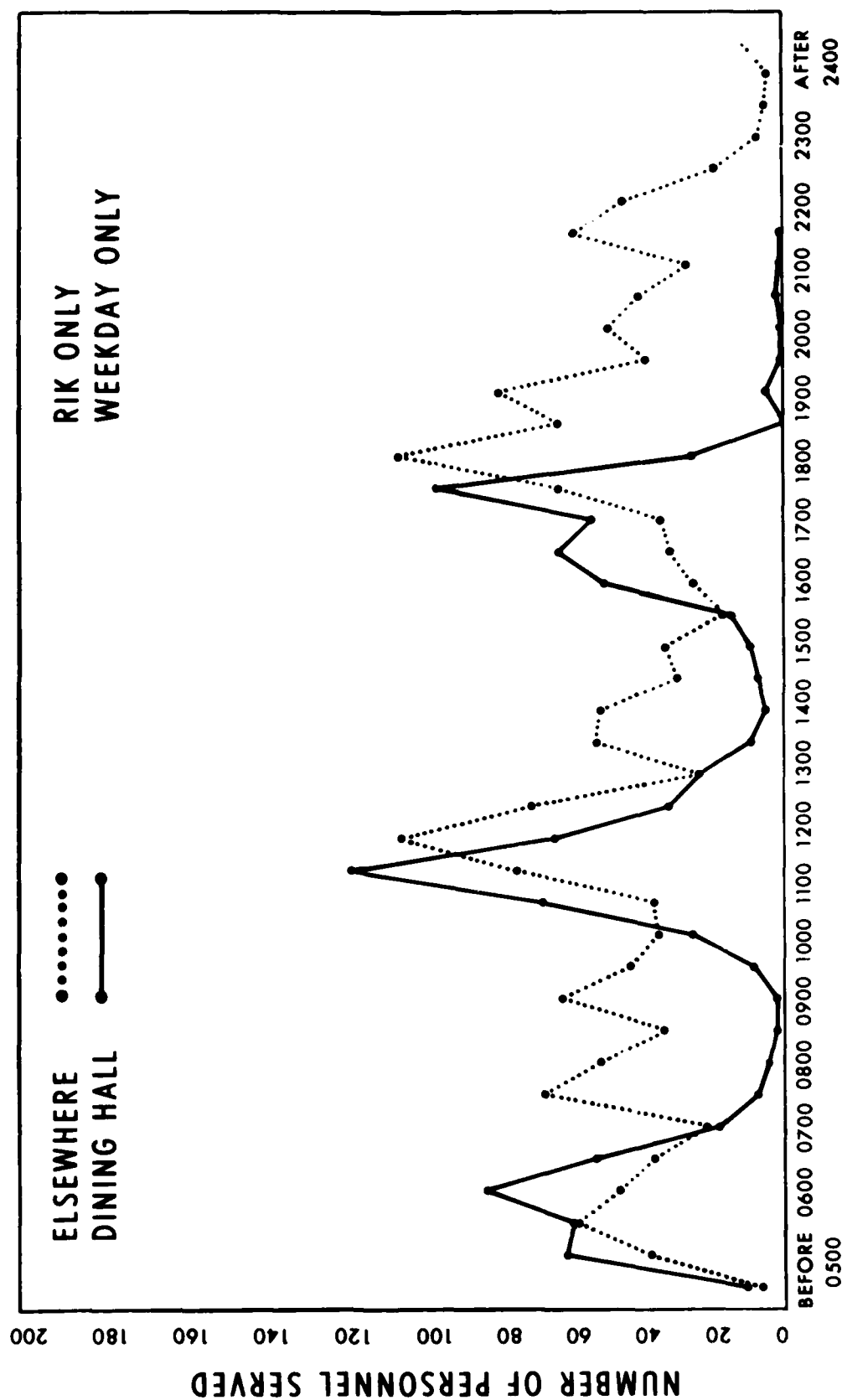


FIGURE 7: ATTENDANCE RATES AT 29 PALMS IN HALF-HOUR INTERVALS

It is our contention, therefore, that a major factor which accounted for the lower than expected extended hours participation rates was the arbitrary 2100 hours closing time. An additional hour would have attracted customers leaving the movie theater at 2130. The decision by the Fort Devens Commanding Officer to operate only until 2100 hours was not supported by past data on extended hours as already mentioned. In future implementations of this concept, it is recommended, therefore, that this meal service be provided until 2200 hours for at least a one-month period. At that time, a decision concerning how late the extended service should be open can be made based upon more realistic demand considerations than those available from Fort Devens.

Meal Attendance Patterns

The effect the new food service system had on meal attendance patterns was analyzed for both pre- and post-test periods. Meal attendance patterns are the measure of the frequency with which SIK personnel obtain meals from the dining facility and were determined by calculating the percentage of individuals on duty consuming zero, one, two, three, or four or more meals per day in the dining facility.

The percentages derived from the daily data collection were averaged to obtain mean percentages in each meal category. These categories are all inclusive and account for all of the authorized personnel on any given day, including those personnel not consuming any meals at the dining facility. Figure 8 presents the analysis of the percentages of SIK personnel eating in each of the five meal categories. Of those customers utilizing the dining facility, most consumed one or two of the three meals per day served during both pre- and post-test periods.

Differences between pre- and post-test meal attendance patterns were compared by statistical analysis to determine if significant changes (at the 0.05 level) had occurred. A two-tailed test for difference between proportions was used. A discussion of these analyses follows. Table 12 presents the relevant data for the five categories of eating patterns defined above.

Table 12

Comparison of the Overall Meal Attendance Patterns by Enlisted Personnel

Meals/Day	Before %	After %	Change in Percent %	Significance %
0	50.6	45.8	-4.8	p<0.05
1	22.3	20.5	-1.8	p<0.05
2	18.5	19.6	+1.1	NS*
3	8.3	12.9	+4.6	p<0.05
3+	0.3	1.3	+1.0	p<0.05

*NS = Not Significant

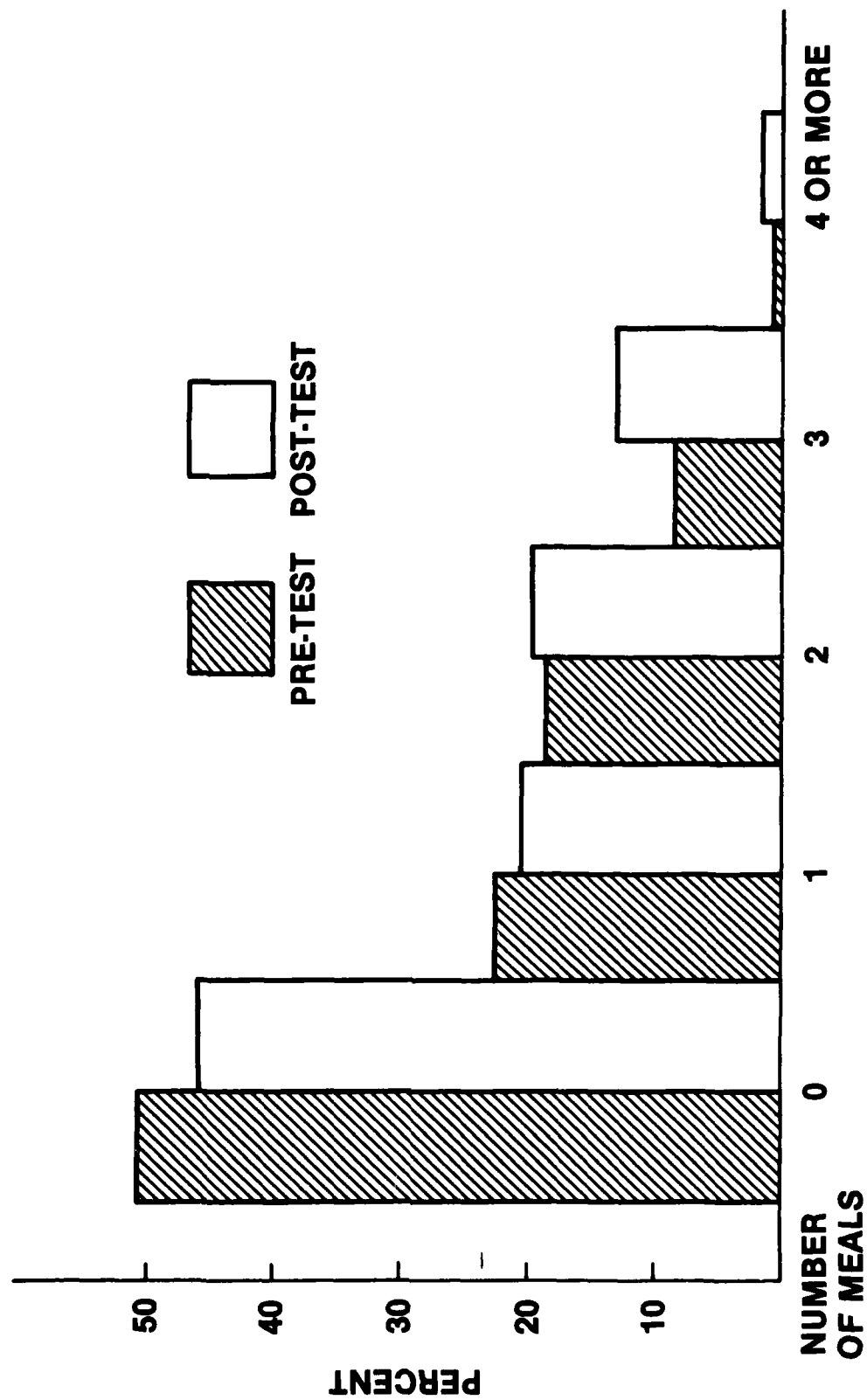


FIGURE 8: PERCENTAGE OF THE AUTHORIZED PERSONNEL CONSUMING MEALS IN VARIOUS CATEGORIES

Zero Meals. The percentage of authorized personnel not eating in the dining facility decreased from 50.6% in the pre-test to 45.8% in the post-test. The 4.8% decrease was statistically significant at the 0.05 level. Those customers not consuming meals in the dining facility on any given day were further analyzed to find out whether this represented a consistent pattern. Analysis of this group determined that 18.2% of the authorized customers during the pre-test and 12.4% during the post-test never obtained meals from the dining facility. The 6% difference in this category indicates that customers who never obtained meals at the dining facility during the pre-test were attracted to and were using the dining facility after implementation of the new fast service operation.

One Meal. The percentage of customers consuming one meal decreased by 1.8% and the drop is statistically significant. The decrease in the one-meal category and subsequent increases in the two- and three-meal categories indicate that customers are consuming more meals per day with fast service.

Two Meals. The increase of 1.7% in the two meal category was not statistically significant, but in view of the decrease in one-meal consumers and the increase in three-meal consumers, probably represents different individuals, particularly former one-meal consumers.

Three Meals. The percentage of personnel consuming three meals per day increased under the fast service system. The 4.6% increase registered was the largest increase in any of the meal categories and is statistically significant.

More Than Three Meals. An increase of 1.0% was observed for this meal category. The 1.0% change is equivalent to an additional seven meals consumed in the system per day during the post-test than was consumed during the pre-test.

An analysis of those post-test customers who consumed more than three meals on a given day was performed to determine the total number of meals consumed over the entire test period. Results show that these customers did not consume more than three meals per day on a regular basis. In fact, individuals in this category only consumed an average of 2.0 meals per day. This indicates that while some customers on occasion consume more than three meals on a particular day, over a more extended period, they do not consistently eat more than three meals per day. The net result is that if accountability for meals were based on even a weekly rather than the current daily time intervals, the test data indicate no one would consume more than the 21 meals authorized in a seven-day interval.

Customer Evaluations

Consumer opinions were assessed in three test phases: a pre-test and two post-tests, the first shortly after the project was underway, and a second about two months later. Each phase consisted of food acceptance interviews, an anonymously answered written survey, and short face-to-face interviews. The food acceptance interviews were conducted in the dining facility during meals. The interviewer approached a diner who was finished or nearly finished eating and asked their permission to be interviewed. If the response was "yes," the interviewer then proceeded to ask the diner to rate, on a standard 9-point hedonic food acceptability

scale, each food item eaten as well as the overall meal. Data were collected for three weekday meals and the weekend meals during the three test phases.

Customer surveys and face-to-face interviews were administered at the same session at locations away from the dining facility. For these sessions, each of the seven groups who were authorized to eat on a regular basis in the 39th Engineers' dining facility sent a specific number of meal card holders to the survey site at designated test times. Pre-test survey questions were directed toward determining unit integrity issues, meal hour problems, and the type of fast service food products desired. Post-test questions were relevant to both full meal and fast service foodservice. To determine the acceptability of take-out meals, a special rating card was distributed to customers taking out a meal. Receptacles for the return of the completed cards were located in the unit orderly rooms of each of the groups authorized to eat in that dining facility.

Respondents were asked to compare the new foodservice system with fast service to the previous foodservice operations. Face-to-face interview questions were designed to determine the customer's specific likes and dislikes with regard to the overall foodservice operation.

A survey question concerning satisfaction with various aspects of Army life showed little change in customer responses throughout the evaluation. Consistently, friends and benefits ranked as the most satisfying aspects, food and barracks the least satisfying (Table 13). Ratings of food quality changed throughout the study. Before introduction of the fast service operation, 25% rated the overall food system good to some degree. After the introduction of the fast service the ratings of the food system increased to 48%, but declined in the second post-test to 20% (see Figure 9). These results imply that either some of the pre-test problems returned, or that new problems with food quality were being reported by customers.

When asked in the pre-test what specific aspects of the foodservice system they did not like, the most frequent response given (57%) was the food quality. When the same question was asked at post-test 1, the complaints about the food quality had dropped to 37%. By post-test 2 that number had increased to 64% of the respondents finding food quality the main drawback of the foodservice system. However, at both post-tests, the food acceptance of fast service food remained above that of the A-ration meal service indicating a more deeply rooted problem than simple disenchantment with fast service food.

Another measure of food quality was the overall meal acceptance rating. Breakfast was always an acceptable meal and did not vary throughout the evaluation. More variability in overall meal acceptance ratings was noted at lunch and dinner. Food acceptability ratings of fast service meals (6.8, 6.3) were above pre-test ratings of A-ration and short order meals (5.8), at the noon meal. Dinner meal ratings of fast service food (6.7, 5.6) were above both the post-test ratings of the A-ration meals (6.5, 5.4) (see Table 14).

The second most frequent pre-test response (34%) contributing to poor overall quality of the foodservice system was the long waiting lines. This factor consistently showed up as a major irritant in consumer studies of military garrison foodservice. Troop dissatisfaction with long lines decreased substantially by the first post-test with only 3.3% of the customers viewing lines as a problem. By the second post-test, only 2.6% of the customers mentioned lines at all.

Table 13

Customer Satisfaction with General Aspects of the Army

Indicate how satisfied or dissatisfied you are with these aspects of the Army.*

	Pre-Test	Post-Test 1	Post-Test 2
1. Travel	3 (4.3)	4 (4.4)	3 (4.0)
2. Pay	7 (3.6)	6 (3.8)	7 (3.2)
3. Food	8 (3.1)	8 (3.1)	8 (2.6)
4. Job	5 (3.8)	3 (4.5)	4 (3.7)
5. Benefits	2 (4.7)	2 (4.9)	2 (4.1)
6. Barracks	9 (3.1)	9 (3.1)	9 (2.6)
7. Friends	1 (5.6)	1 (5.9)	1 (5.3)
8. Training	6 (3.7)	5 (4.0)	6 (3.5)
9. Discipline	4 (3.8)	7 (3.8)	5 (3.5)

Scale: 7 — Very satisfied
6 — Somewhat satisfied
5 — Slightly satisfied
4 — Neither satisfied nor dissatisfied
3 — Slightly dissatisfied
2 — Somewhat dissatisfied
1 — Very dissatisfied

*Table reflects rank ordering of factors based on the mean scores in parentheses.

HOW WOULD YOU RATE THE OVERALL QUALITY OF THE FOODSERVICE AT FORT DEVENS, NOT JUST THE FOOD, BUT THE WHOLE OPERATION?

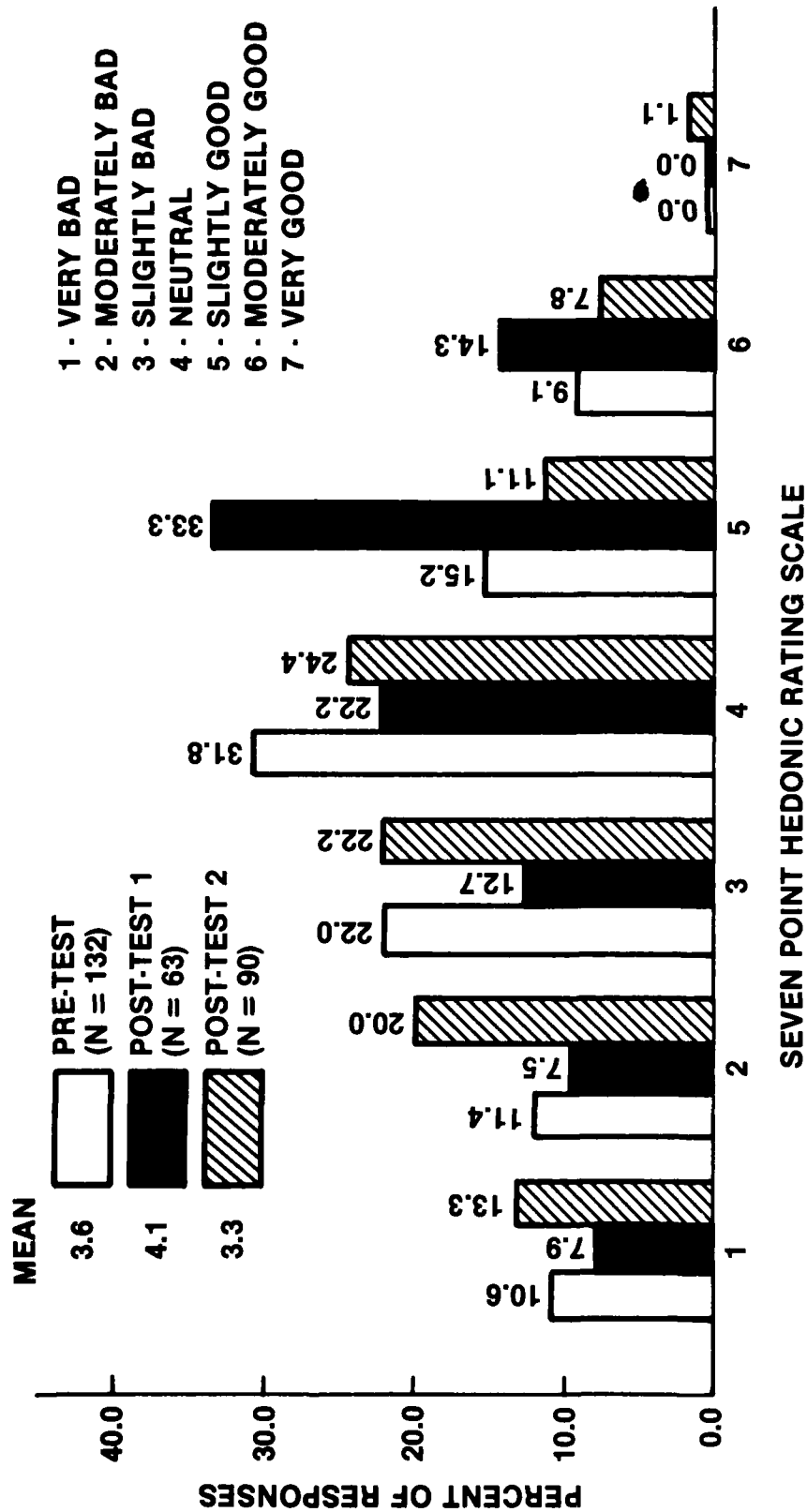


FIGURE 9: CUSTOMER RATINGS OF THE OVERALL QUALITY OF THE FORT DEVENS FOODSERVICE SYSTEM

Table 14

**Customer Food Acceptability "Overall Meal"
Ratings on 9-Point Scale**

	Pre-Test	Post-Test 1	Post-Test 2
Breakfast	6.4		
Fast Service Line		*	6.3
A-Ration Line		6.1	6.2
Noon Meal	5.8		
Fast Service Line		6.8	6.3
A-Ration Line		6.4	5.7
Evening Meal	5.6		
Fast Service Line		6.7	5.6
A-Ration Line		6.5	5.4

Scale: 1 — Dislike Extremely, 9 — Like Extremely

* Not operating at Post-1

Pre-test survey respondents were neutral on the importance of sitting with others from their own unit. When interviewed, 87% found no problems in sharing their facility with people from other units provided that they themselves would have no problems getting served.

Fast service food acceptance ratings over the course of the evaluation show variability among many of the items. Fried chicken at post-test 1 dinner rated 6.1 and 5.9 for post-test 2. Take-out diners rated this product an 8.8. Table 15 shows the food acceptability of specific fast service food menu items.

Submarine sandwiches (7.1 and 6.9) were well received as a take-out item. The take-out salads (cole slaw) with ratings of 5.3 and 5.5 were less acceptable than the salad bar. Fruit pies at lunch and dinner were equally acceptable in all instances, rating lower at post-2 dinner.

Ratings of french fries generally remained stable throughout, falling between the neutral and like-slightly categories, but dropped at post-test 2 dinner. Burgers showed less variability. Milkshakes, one of the items introduced with the take-out menu, were well received and were rated highly acceptable during both post-tests.

To measure the acceptability of the take-out meals, over 800 cards were distributed during lunches, dinners, and the extended hours, of which 75 (or 9%) were returned. Table 15 also summarizes these data. These cards yield "recalled" information as opposed to the face-to-face food acceptance data collected in the dining facility.

Table 15

Food Acceptability of Specific Fast Service Food Items Eaten in the Dining Facility
Before and After Take-Out

	Pre-Test		Post-Test 1		Take-Out ^a	Breakfast	Post-Test 2		Dinner	Take-Out	Using Rating Cards
	Lunch	Dinner	Lunch	Dinner			Lunch	Dinner			
Burgers	5.6	6.0	6.5	6.5	6.0	—	6.4	5.4	5.8		
French Fries	5.8	5.2	5.3	5.8	5.5	—	5.1	3.9	5.5		
Subs	—	—	6.3 ^b	5.0 ^b	7.1 ^b	—	6.0 ^b	6.0 ^b	6.9		
Chicken Sandwich	—	—	7.9 ^b	—	6.5 ^b	—	6.7	9.0 ^b	6.6		
Fried Chicken	—	—	—	8.1	8.8 ^b	—	6.1 ^b	5.9	7.9		
Salad Bar	6.3	7.1	7.0	7.4 ^b	—	—	—	—	—		
Salad	—	—	—	—	5.3	—	6.7	6.3	5.5		
Fruit Pie (apple)	—	—	6.8	7.0	6.5	—	6.5	5.8	6.4		
Shakes	—	—	6.3	6.1	6.7	—	7.3	7.5	6.7		
Egg Sandwich	—	—	—	—	—	6.3	—	—	—		

Scale: 1 — Dislike Extremely, 9 — Like Extremely

^aA rating card instead of face-to-face interviews was utilized.^bBased on fewer than ten observations.

The overall Fort Devens operation was compared to that at other bases. A mean response of 2.9 or "slightly worse" than other foodservice operations was determined for the pre-test evaluation. Post-test results indicate a 3.6 rating or "about the same" as other operations at post-test evaluations (see Table 16). The rating did not change between post-test 1 and post-test 2 testing, indicating that probably the perceived initial system improvements had remained satisfactory.

When asked how the new system with fast service compared to the previous system, a mean response of 5.7 on a 7-point hedonic scale or somewhat better was noted. When interviewees were asked if they felt that fast service had made the overall food system better or worse, 82% replied that the system was better with the fast service operation. Of the 6% who did not like fast service food, food quality and quantity were mentioned as reasons for their response. The remaining percentages included 5% who felt there was no change, 4% who were undecided, and 3% who felt the system was both better and worse.

Those people who stated that the system was better cited as the primary reasons: convenience (38%), faster service (38%), more time for other things (16%), and that there were fewer crowds to contend with (8%). Secondary reasons contributing to fast service food system improvement were the take-out itself (16%), fast service (16%), convenience (11%), shorter lines and the added variety (8%). The chicken and milkshakes, specifically were mentioned as positive features of the system by 5% of all interviewees.

Customers were asked to rank in order the importance of fast service meals with regard to eating in the dining facility as well as for take-out. Fast service meals at noon (54%) were the most important to dining facility patrons, while evening meals ranked second. For those customers interested in take-out service, evening meals (52%) were most important and lunch second (40%). Table 17 summarizes these results.

Worker Opinion

Cooks' opinions of the foodservice system were gathered using opinion surveys and interviews before the implementation of the fast service system with take-out service and extended hours, and again after the service had been operational for about two months. In the pre-test, 14 Army foodservice workers were interviewed and surveyed; in the post-test, 19 were interviewed and surveyed. Of the 19 post-test cooks, 15 had been at the dining facility during the pre-test and, consequently, were able to compare the pre- and post-test systems. The enlisted grades of the cooks' samples ranged from E-1 to E-7; most respondents were E-3 and E-4.

1. **Feelings about military service.** Feelings about the military in general were virtually identical in the pre-test (5.0) and post-test (4.7) samples, centering around a mean response of "like a little" (Table 18).

2. **Opinions of the present foodservice system.** Both pre- and post-test cooks rated 11 characteristics of the foodservice system (items 2 through 12 in Table 18) on a 7-point scale. Ten of the 11 characteristics were given lower ratings by the post-test cooks (sign test, 1 of 11 factors $p < 0.02$, two-tailed). Therefore, the cooks were less enthusiastic about the foodservice system that existed in the post-test. However, the only statistically significant difference for

Table 16

**Customer Rating of the Fort Devens Foodservice
System Versus Other Bases***

How does the foodservice at Fort Devens compare to other bases on which you have served?

	Pre-Test (N=130)	Post-Test 1 (N=59)	Post-Test 2 (N=90)
0. No other bases	6.2	3.4	12.2
1. Much worse	20.8	5.1	16.7
2. Somewhat worse	19.2	8.5	24.4
3. Slightly worse	16.2	28.8	18.9
4. About the same	22.3	37.3	16.7
5. Slightly better	6.9	5.1	6.7
6. Somewhat better	1.5	10.2	2.2
7. Much better	6.9	1.7	2.2
MEAN	2.9	3.6	3.5
MEDIAN	3.0	4.0	3.0

*Numbers reflect the percents.

Table 17

**Customer Rank Ordering of the Importance of the Availability
of Fast Service Take-Out Meals**

Rank	Fast Service Food in Dining Facility		Fast Service Food for Take-Out	
	Meal	Percent	Meal	Percent
1	Lunch	54	*Evening	52
2	Evening	27	Lunch	40
3	Breakfast	19	Breakfast	8

*Evening includes dinner and extended hours.

Table 18

Results of Cooks' Survey: Menu Responses

	Pre-Test Dec 80 (N = 14)	Post-Test May 81 (N = 19)	t
1. Feelings About Military	5.0	4.7	-0.35
2. Factors Influencing Opinions of Present Foodservice Operation			
3. Condition of Equipment	5.2	5.3	0.20
4. Sanitary Conditions	5.9	5.4	-1.23
5. Food Preparation Skills	5.5	5.1	-0.20
6. Support and Cooperation of Cooks	5.4	5.1	-0.74
7. Customer Satisfaction	4.9	4.3	-1.37
8. Customer Attitude to Cooks	4.4	3.1	-2.03*
9. How Long Customer Waits	5.2	5.1	-0.34
10. Food Quality	6.0	5.3	-1.40
11. Good Variety at Meal	5.9	5.3	-1.28
12. Good Variety Day-to-Day	5.6	4.9	-1.57
13. Dining Facility Overall	5.8	5.2	-1.36
14. Dining Facility Compared to Others	4.5	3.2	1.50
15. Dining Facility Compared to Last Year		3.8* 15 responses 4 were not here for pre-test	

*Significant at 0.95 Level of Confidence

Scale: 1 - Very Bad
2 - Moderately Bad
3 - Slightly Bad
4 - Neither Bad nor Good
5 - Slightly Good
6 - Moderately Good
7 - Very Good

an individual characteristic occurred in the cooks' perceptions that the customers' post-test attitude toward them was less positive than it had been in the pre-test ($t=2.03$, $p<0.05$). This perceived change in attitude of the customer occurred in a situation where another dining facility had been closed and there had been a subsequent increase in the number of customers without any corresponding increase in cooks to service them.

3. **Comparison of dining facility; to others and pre- vs post-test.** In comparing the facility with others worked in, 72% of pre-test respondents thought that the facility was better to some degree, but only 42% rated the dining facility better at post-test (Table 19). No pre-test cooks saw the dining facility as worse than others in which they had previously worked, while 36% of post-test cooks saw it as worse than others. When asked to rate the combined A-ration and fast service systems, 1/3 rated it better, 1/3 rated it worse, and 1/3 were neutral (see Table 20). Taking all of these data into consideration, the cooks' average overall response to the new system was slightly negative.

4. **Interview evaluation of dining facility; pre-test and post-test.** When asked "What's good about this dining facility or your job in it?", the cooks felt that there was an equitable allocation of work assignments which to some extent prevented monotony in their duties while also allowing for ample time off.

Responses to the reverse, "What's bad about this dining facility or your job in it?" revealed that poor food quality and lack of menu variety were the major concerns of the pre-test cooks. Less major, but nonetheless real problems, were customer complaints, long hours, the lack of experience of the young cooks, and poor equipment.

In the post-test interview, cooks were first asked if the changes implemented had made the overall food system better or worse. Of the 19 cooks interviewed, 21% perceived the new system as better while 37% perceived it as worse since the change. The remaining 42% were either unfamiliar with the old system, saw changes as both better and worse, or saw no difference between the old and new systems.

The cooks were asked the main reason they felt as they did about the new system. The cooks who were pleased with the new system overall stated that the fast service operation reduced long lines, thereby affording faster service for the troops and requiring less preparation time, thus allowing more time for main line food preparation. Three main reasons were given by the cooks who felt the new system was worse overall. First, they felt that the workload and hours were too heavy; secondly, that there was increased customer abuse directed toward them; and finally, that the customers were abusing extended hours. When asked what they would like to see changed about the fast service system, the most frequent response centered around changing the hours – specifically the elimination of the extended hours. The cooks also suggested increasing the number of cooks and increasing the variety of fast service foods. A few cooks (4 of the 19) felt that fast service should be eliminated altogether; many of the cooks (10 of 19) suggested that an existing dining facility on base be converted to a fast service/take-out with extended hours and be made available to the entire post, not just the 39th Engineers.

Table 19

Cooks' Comparison of This Dining Facility to Other Dining Facilities in Which They Worked

	Pre-Test (N = 14)	Post-Test (N = 19)
This is My First Dining Facility	21%	26%
1. Much Worse	—	—
2. Somewhat Worse	—	16%
3. Slightly Worse	—	11%
4. No Better or Worse	21%	16%
5. Slightly Better	7%	5%
6. Somewhat Better	21%	21%
7. Much Better	29%	5%
Mean	4.5	3.2

Table 20

Cooks' Comparison of Present Foodservice System (Fast Service) to the Pre-Test System

1. Much Worse Now	13% (2)*
2. Moderately Worse Now	7% (1)
3. Slightly Worse Now	13% (2)
4. Neither Better Nor Worse	33% (5)
5. Slightly Better Now	20% (3)
6. Moderately Better Now	13% (2)
7. Much Better Now	—
Mean	3.00

*Frequency of Responses (N = 15)

Table 21 summarizes the responses of the post-test cooks who were asked for their reactions to specific aspects of the new system. Cooks were favorably inclined to the fast service line concept (68%) and the concept of take-out (63%). In addition, cooks were positive about the fast service quality (63%); and fast service equipment (58%). On the other hand, 68% of the cooks were negative about the extended hours and perceived workload. Cooks also felt that the customer attitudes towards them was worse in the new system and that variety could be improved. NOTE: The authors direct the reader to the discussion **Staffing Requirements**. As mentioned, the ineffective utilization of manpower created workload problems for cooks. If scheduling had taken into account peak customer demand, the cooks would not have had to work in such an intense fashion during meals. The already detrimental situation was only aggravated with extended hours. The cooks now were required to work an extra five hours. Disenchantment with extended hours is in our opinion a direct result of poor scheduling. Customer surveys do not support the cooks' viewpoint concerning variety.

Table 21

**Post-Test Cooks' Ratings of Five Aspects of the
New Fast Service Foodservice System**

	Positive %	Negative %	Neutral %
Fast Service Line Concept	68	16	16
Take-Out	63	21	16
Fast Service Equipment	58	42	0
Fast Service Quality	63	32	5
Extended Hours	16	68	16

(N = 19)

Conclusions and Recommendations

The fast service concept has demonstrated that it meets the needs of the enlisted soldier. Objectives of the Fort Devens fast service evaluation have been met. Enlisted meal participation was increased 12.50%. Customer complaints about long waiting lines were virtually eliminated as a direct result of a 60% improvement in customer service rates in the fast service system. Results of customer surveys indicate that the new concept has improved customer perceptions of the total foodservice system by 82%. This shows a significant increase in customer satisfaction.

Take-out service is another important element of the concept that proved successful in the Fort Devens test. Sixty percent of the customers exercised their option to obtain food from the dining facility on a take-out basis and consume it elsewhere. Active schedules logically require this type of foodservice.

The observed reduction in waiting lines is attributable to two key features of the fast service concept implemented at Fort Devens. The first is a limited menu approach which provides only high preference, commercially familiar fast foods. This feature increases service time by minimizing customer decision points and attendant delay. Pre-packaging foods in conjunction with progressive cookery is a second crucial element. The pre-packaging feature facilitates the take-out option and maintains product quality during the short holding times needed to implement the progressive cooking concept.

Although arbitrarily curtailed at Fort Devens, extended hour service is a feature of the fast service concept that should be supported fully by the Army. One of the major reasons for poor attendance across all Army foodservice facilities is the fact that the traditional Army meal hours are no longer compatible with enlisted personnel lifestyles. It has been demonstrated at Fort Devens that extended hours contributed to a 10% increase in attendance. Considering the minimal support received for this service, and the fact that the extension was not sufficient to encompass the critical 2100 to 2230 time period, extended hours were nevertheless a success.

Although fast service food operations were well accepted by the customer at Fort Devens, resistance to the concept was encountered in other segments, particularly at higher levels of the command. This is a factor which needs to be considered in interpreting the test results and more importantly in considering how and where to implement the proposed fast service concept.

Based upon the results obtained at Fort Devens, it is recommended that:

- the fast service concept be incorporated into the Army Foodservice Program and that the following essential features be retained:

- limited choice, high preference menu
- pre-packed food items and progressive cookery
- take-out service
- extended hours of operation

- materials be developed to gain command support for the new fast service concept and they be used where such support is initially neutral or negative to determine implementation policy for the particular installation.

- a procedures manual be developed for use by installations in implementing the new fast service concept.

- QM courses be modified to include training in the fast service concept and procedures in both basic and management foodservice offerings.

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APPENDIX A

**RESULTS OF TECHNICAL SENSORY EVALUATION
OF BREADED, PRECOOKED FROZEN CHICKEN AND FROZEN CHICKEN PATTIES**

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APPENDIX A

RESULTS OF TECHNICAL SENSORY EVALUATION OF BREADED, PRECOOKED FROZEN CHICKEN AND FROZEN CHICKEN PATTIES

Background

Precooked frozen chicken products have been a popular item in the consumer marketplace for some time. Interest in the products by the military services arises from the establishment of "Fast Food" facilities at military posts and aboard Naval vessels.

Walker and Tuomy¹ investigated the storage life of two brands of precooked frozen chicken and concluded: (1) fully cooked, frozen chicken has the stability and acceptability needed for the military services; and (2) the simplicity and variety of ways the chicken can be reheated make it a desirable item for regular dining halls, fast food lines and specialty house items. The preceding conclusions combined with the need for chicken products in the new fast service system at Fort Devens led to the following sensory evaluation.

Sample

a. **Chicken pieces.** Chicken breast halves, thighs, drumsticks, and wings were obtained under the following brand names. The numbers in parentheses following each item description are the sample numbers assigned for evaluation.

1. Tyson Foods, Catalog No. 4418, four piece, 10 ounce portion, lightly breaded (428).

2. Banquet Foods —

(a) Catalog No. 13501, bulk pack, oven ready (501).

(b) Catalog No. 13370, Honey and Spice (237).

(c) Catalog No. 13360, Multipurpose (642).

3. OK Foods —

(a) Catalog No. 211, 3-piece, 9-ounce portion (190).

(b) Catalog No. 214, 3-piece, 10-ounce portion (203).

¹G.C. Walker and J.M. Tuomy, "The Storage Life of Precooked Frozen Chicken," Technical Report TR-75-24-FEL, (FEL 11), October 1974.

4. Holly Farms —

- (a) Catalog No. 938, 3-piece, 10-ounce portion, one-half breast, thigh, drumstick (103).
- (b) Catalog No. 933, 4-piece, 10-ounce portion, one-half breast, thigh, drumstick, wing (737).

5. Weaver — No Catalog No., 8-to 10-ounce portion (207).

b. **Chicken Patties.** Chicken patties were obtained under the following brand names. The numbers in parentheses following each item description are the sample numbers assigned for evaluation.

1. Banquet Foods

- (a) Catalog No. 13392, school lunch patty (735).
- (b) Catalog No. 13396, commodity patty (856).

2. Tyson Foods

- (a) Catalog No. 2422, hoagie style, 3-ounce (205).
- (b) Catalog No. 2433, hoagie style, 4-ounce (889).

3. Holly Farms

- (a) Catalog No. 970, breast filet, all breast meat, 3-ounce (277).
- (b) Catalog No. 971, breast filet, all breast meat, 4-ounce (405).
- (c) Catalog No. 939, natural proportion filet, blended light and dark meat (555).

4. OK Foods: No Catalog No., chicken patties (272).

5. Weaver: No Catalog No., chicken patties (chicken wings) (480).

6. Dutch Quality House: Catalog No. 4001, breast patty (295).

Reheating Methodology

a. **Chicken pieces.** Chicken pieces were reheated for six minutes in fat at a temperature of 350°F, then equilibrated on the steam table to obtain an even serving temperature. Only breast pieces, thighs, and drumsticks were used for the evaluation.

b. **Chicken patties.** Chicken patties were reheated in fat at 350°F. The chicken patties were equilibrated before serving. The cooking times varied from 2.5 to 3.5 minutes. One-half of a patty was served.

Evaluation

Products were evaluated by a panel of food technologists and home economists familiar with the products. Insofar as possible, the same panel members were used throughout the evaluation. Product descriptive phrases were furnished to each panelist (Tables A-1 and A-2).

The data were analyzed using standard statistical methods. Analysis of variance was computed following the procedures in Sokal and Rohlf² for single classification Analysis of Variance. Means and standard deviations were machine computed by procedures published by Texas Instruments, Inc.³

Results

Analysis of the data for chicken pieces shows that there were no significant difference in any of the sensory factors evaluated. Analysis of the data from the sensory evaluation of the breaded chicken patties on the other hand shows a highly significant difference ($p < 0.01$) in all of the sensory factors.

Table A-3 presents the results of the statistical analysis of the data for breaded, precooked, frozen chicken pieces. Table A-4 presents the results of the analysis of data for breaded, precooked, frozen chicken patties.

Examination of the comments indicates that breaded, precooked chicken pieces can generally be described by the phrases in Table A-1. Comments by the panelists for breaded, precooked, chicken patties shows some disagreement with the product descriptive phrases in Table A-2. Most of the negative comments for appearance indicated that the color was too dark and that some samples had dark specks (probably ground black pepper). Some samples that cooled before the panelist evaluated them were reported to have a greasy appearance. Few comments were received for odor but those received were for a lack of odor. The panelists reported a lack of flavor in some samples, a high pepper level in others, and a salty flavor in others. Also old, stale flavors or rancid flavors were noted by some panelists. The texture was found to be mushy or soggy, tough, or stringy. On the positive side, some panelists found the chicken patties to be moist, with good chicken flavor and crisp golden brown breading.

Conclusions

Any of the brands of breaded, precooked, chicken evaluated are suitable insofar as the sensory qualities are concerned.

²Robert R. Sokal and F. James Rohlf, Biometry, W. H. Freeman and Company, San Francisco, p 776, 1969.

³Texas Instruments. Manual for use with the TI-58 Model Calculator.

Table A-1

Descriptive Phrases for Fried Chicken Pieces

1. This product is Fried Chicken Pieces. The objective is to determine any deviations from typical fried chicken pieces.

2. Below are descriptive phrases to be used in evaluating this test product. Feel free to use your own descriptive terms for the product evaluation.

Appearance: breading — golden brown and not excessively dark or light; adheres to chicken piece and not falling off; appears crisp and not soggy.

 flesh — moist and not dry; appears done and not pink or red, especially near the bone.

Odor & flavor: breading — characteristic fried breading and not greasy or rancid;

 flesh — typical fresh cooked chicken, and not stale, old, rancid or reheated.

Texture: breading — crisp and not soggy or tough;

 flesh — tender and not tough; juicy and not dry.

Table A-2

Descriptive Phrases for Chicken Patties

1. This product is Chicken Patties. The objective is to determine any deviations from typical Chicken Patties.
2. Below are descriptive phrases to be used in evaluating this test product. Feel free to use your own descriptive terms for the product evaluation.

Appearance: breading — golden brown and not excessively dark or light; adhering to chicken piece and not falling off; appears crisp and not soggy.

 patty — large cohesive particles, and not fine grainy particles; moist and not dry.

Odor & flavor: breading — characteristic fried breading and not greasy or rancid.

 patty — typical fresh cooked chicken, and not cereal, stale, old, rancid or reheated.

Texture: breading — crisp and not soggy or tough.

 patty — high cohesiveness; moist and not dry; chews down to firm particles and not fine grainy particles.

Table A-3

**Means Scores, Standard Deviation and "F" Ratio for
Commercial Samples of Breaded, Precooked, Frozen, Chicken Pieces***

Sample Number	Appearance	Odor	Flavor	Texture	Overall
501	6.8±0.77	6.7±0.62	6.4±0.98	6.3±0.72	6.3±0.90
+28	6.9±1.03	6.6±0.63	6.3±0.79	6.5±0.71	6.4±0.74
237	6.5±1.19	6.6±0.83	5.9±0.99	6.1±0.99	6.1±1.10
642	6.7±0.88	6.2±0.67	6.1±0.80	6.3±0.96	6.0±0.84
190	6.7±0.59	6.6±0.74	6.3±1.17	6.6±1.12	6.3±1.18
207	6.5±0.83	6.5±0.64	6.3±0.82	6.5±0.74	6.3±0.82
103	6.8±0.67	6.9±0.52	6.5±1.19	6.5±1.09	6.5±0.99
203	6.5±0.74	6.8±0.41	6.4±0.91	6.7±0.62	6.4±0.91
737	6.3±0.80	6.5±0.52	6.5±0.52	6.4±0.74	6.1±1.06
"F" Ratio	0.53	1.40	0.81	0.60	0.50
Significance	NSD	NSD	NSD	NSD	NSD

*Technical Panel, N=15

NSD = No Significant Difference

Table A-4

**Mean Scores, Standard Deviation, and "F" Ratio
for Commercial Samples of Breaded, Precooked, Frozen, Chicken Patties***

Sample Number	Appearance	Odor	Flavor	Texture	Overall
272	6.8±0.75	6.2±0.68	5.6±1.15	6.1±0.93	5.6±1.20
480	6.0±0.82	6.2±0.82	6.1±0.80	6.2±0.98	6.0±0.81
295	6.6±0.88	6.4±0.63	6.2±1.06	6.2±1.24	6.1±0.81
405	6.4±0.81	6.4±0.63	6.4±0.72	6.4±1.02	6.4±0.72
555	6.1±1.06	6.0±0.85	5.3±1.14	5.2±0.85	5.4±1.15
735	5.6±1.46	5.8±0.98	5.1±1.26	5.4±1.41	5.2±1.33
205	6.1±1.00	6.2±0.58	5.6±1.09	6.2±0.85	5.8±0.93
856	6.0±1.32	6.0±0.77	5.4±1.15	5.4±1.15	5.4±0.96
889	6.3±0.57	6.2±0.68	5.6±1.03	6.2±1.00	5.9±0.62
277	6.8±0.58	6.7±0.60	7.1±1.06	6.8±0.83	6.9±0.96
"F" Ratio	4.43	5.55	13.76	3.86	4.53
Significance	p<01	p<01	p<01	p<01	p<01

*Technical Panel, N=16

The breaded, precooked, chicken patties were ranked in order of best liked to least liked as follows: **Appearance:** OK Foods, chicken patties, Holly Farms, 3-ounce breast filet (equal means); Dutch Quality House, breast patties; Holly Farms, 4-ounce breast filet; Tyson Foods, 4-ounce chicken patty; Holly Farms, natural proportions filet, Tyson Foods, 3-ounce chicken patties (equal means); and Weaver Chicken patties, Banquet commodity patties (equal means); Banquet Foods, school lunch patties. **Flavor:** Holly Farms, 3-ounce breast filet; Holly Farms, 4-ounce breast filet; Dutch Quality House, breast patty; Weaver, chicken patties; OK Foods, chicken patties, Tyson Foods, 3-ounce chicken patties, Tyson Foods, 4-ounce chicken patties, (equal means); Banquet Foods, commodity patties; Holly Farms, natural proportions filet; Banquet Foods, school lunch patties. **Texture:** Holly Farms, 3-ounce breast filet; Holly Farms, 4-ounce breast filet; Weaver, chicken patties, Dutch Quality House, breast patties, Tyson Foods, 3-ounce chicken patties, Tyson Foods, 4-ounce chicken patties (equal means); OK Foods, chicken patties; Banquet Foods, school lunch patties and Banquet Foods, commodity patties; Holly Farms, natural proportion filet.

Overall quality of the patties as judged by the panelists in order of best liked to least liked was: Holly Farms, 3-ounce breast filet; Holly Farms, 4-ounce breast filet; Dutch Quality House, breast patties; V.F. Weaver, chicken patties; Tyson Foods, 4-ounce chicken patties; Tyson Foods, 3-ounce chicken patties; OK Foods, chicken patties; Holly Farms, Natural proportion filet, Banquet Foods, commodity patties (equal means); Banquet Foods, school lunch patties.

Recommendations

For immediate future procurements, the following brands are recommended: Holly Farms, Dutch Quality House, and V.F. Weaver products. A specification is being prepared for the breaded precooked chicken patties. A specification has been prepared and published for the for the breaded precooked chicken — MIL—C—44051 Chicken, Precooked, Frozen, 23 September 1981.

APPENDIX B
FAST SERVICE EQUIPMENT SELECTION

APPENDIX B

FAST SERVICE EQUIPMENT SELECTION

Equipment selection was an essential planning element of the fast service system. To meet the increased expected demand on the fast service line, high production fast recovery equipment was required. Table B-1 summarizes equipment specifications. The following discussion provides in-depth descriptions of the equipment used.

Equipment Descriptions

Deep-fat Fryers. The deep-fat fryer is designed for gas operation and is capable of instantaneous recovery. Production is rated at 120 lbs of raw or tempered chicken and 120 lbs of frozen french fries per hour at 350°F. Each fryer is provided with individual temperature controls and switches. Fryer input is 165,000 British Thermal Units (Btus) per hour. The fryer operates on natural gas and is provided with electricity for the control system. This unit is also designed for electrical operation on 120-volt, 60-hertz (Hz), single-phase system. The dimensions are width 19 3/8", depth 29 1/8", and height 46 1/2".

Grease Filter. Because of the increased usage of the deep-fat fryers in the fast food system, filtering of frying compound is essential. The filter selected operates by changing the hot liquid shortening into an 80-lb capacity reservoir. It is then filtered and pumped back into the deep-fat fryers. The filter requires a 120-volt, 60-Hz, single-phase system. The dimensions are width 19 5/8", depth 31 3/4", and height 23".

Microwave Oven. The microwave oven is primarily used to warm the cheeseburgers prior to placing them on the serving line. The oven cavity is 24" wide, 14" deep, and 10" high and is capable of heating one standard full size non-metallic steamtable pan. The unit is designed for electrical operation on 208-volt, 60-Hz, single-phase, 3-wire, 30-amp system. The dimensions are width 28", depth 25", and height 24".

Shake and Soft Service Machine. The shake and soft service ice cream machine is rated to produce 240 twelve-and-one-half-ounce shakes per hours. This unit is procured with factory settings of temperature and overrun so that it produces milkshakes rather than soft serve ice cream. The unit is fabricated of 300 series stainless steel and is designed for electrical operation on a 208-volt, 60-Hz, 3-phase system. The dimensions are width 26", depth 37", and height 58 1/2".

Milkshake Storage Freezer. The milkshake storage freezer is designed to refrigerate milkshakes stored in baskets. The baskets are of the one-half size type. The shake storage freezer holds sixteen half-size baskets, two per shelf. Each basket has a capacity of fifteen milkshakes. The unit's temperature is preset at the factory for 25°F. The freezer is designed for operation on 120-volt, 60-Hz, single-phase system. The dimensions are width 29 7/8", depth 35", and height 83 1/4".

Table B-1

Foodservice Requirements - Fast Service Facility

No.	Item	Manufacturer	Model No.	Quantity Each	Unit Cost	NSN	Specification Federal Military - Commercial
1.	Fryer, Deep-Fat, Gas	Keating of Chicago, Inc.	18TS	3	\$1,590	7310-01-006-4452	S-F-700, Type I, Size 4, Model A Grade A, Class I
2.	Filters, Cooking, Grease	Keating of Chicago, Inc.	LB100	1	1,015	7310-01-009-1450	MIL-F-2296, Type II, Size 1
3.	Microwave Oven	Litton Industries	70/80	1	2,010		S-O-1425, Type II, Size H200, Group 1, Class 2, Style 3
4.	Shake & Soft Serve Machine	Taylor Freezer, Sales	777	1	5,575		Commercial
5.	Milkshake Storage Freezer	Traulsen & Co.	RLT-1-32-WUT	1	1,995		Commercial
6.	Mechandising Case Display	Bastian Blessing, Food	C 48 RRX	1	4,410		Commercial
7.	Cabinet, Holding Hot	Crescent Metal Products	130-CDD-1836	2	875		W-C-20, expect capacity to be 34 pans
8.	Merchandiser Display Rotary (Large)	Prince Castle Co.	400	1	300		Commercial
9.	Merchandiser Display Rotary (Small)	Prince Castle Co.	436 JR	1	24		Commercial
10.	French Fry Bag Rack	Prince Castle Co.	333-4	4	10		Commercial
11.	Bagging Scoop Right	Prince Castle Co.	152ARN	3	10		Commercial
12.	Bagging Scoop Left	Prince Castle Co.	152ALN	1	10		Commercial

Table B-1

Foodservice Requirements - Fast Service Facility (cont'd)

No.	Item	Manufacturer	Model No.	Quantity Each	Unit Cost	NSN	Specification Federal Military - Commercial
13.	Pie Basket	Prince Castle Co.	706	4	15		Commercial
14.	Protector Case w/ Shelf	United Show Case	405 S	1	440		Commercial
15.	Display Case w/ Adjustable Curved Sneeze Guard	United Show Case	405 C	1	885		Commercial
16.	Menu Board w/ Accessories	Posterlaid Corp.	BV 608	1	1980		Commercial
17.	Work Table (4')	Metal Master, Inc.	T-30 48E	1	125	7320-01-008-7635	MIL-T-2256, Type II, Size 3, Class I, Grade A
18.	Work Table (6')	Metal Master, Inc.	T-3072 E	1	150	7320-927-7462	MIL-T-2256, Type III, Size 3, Class I, Grade A
19.	Overhead (4') Shelf	Metal Master, Inc.	05-1048-16-3	1	60		MIL-T-2256, Type III, Size 3, Class I, Grade A

NOTE: All electrical items are for 60-hertz operations.

Actual cost was rounded to nearest \$5.00 figure.

Merchandising, Display Case, Refrigerated. The refrigerated merchandising display case is designed to maintain product temperature at 40°F in both the top and base sections. The refrigerated top section is provided with a separate temperature control; two sets of insulated, self-closing, sliding glass doors; three adjustable, plastic-coated shelves, and fluorescent lights. Sliding glass doors are located on both the customer and server sides. The base unit is provided with a separate temperature control. Fabricated of 300 series stainless steel, the storage capacity of the top unit is 21 cu ft and 5.4 cu ft for the lower unit. The display case is designed for operations on a 120-volt, 60-Hz, single-phase system. The dimensions are width 48", depth 34", and height 74".

Warming Cabinet, Non-Insulated. The non-insulated warming cabinet is electrically operated with the temperature thermostatically controlled. Temperature is uniform throughout the cabinet. The cabinet's hot unit consists of a thermostat, pilot light, timer, air intake, humidity reservoir, and switch. Two of these cabinets were used for holding hot food items such as fried chicken and cheeseburgers. Each unit is capable of holding 34 sheet pans (18" x 26" x 1") and is designed for operation on a 120-volt, 60-Hz, single-phase system. The dimensions are width 31", depth 21", and height 69 3/4".

Rotary Merchandiser Display Units. Two rotary merchandiser display units were used in the fast service operation: one large unit and one smaller unit. Rotary stainless steel racks are direct driven by an electric motor and are easily removable for cleaning. A quartz heat lamp is located in the upper area of the units and maintains the food product at the proper serving temperature. The lamp is easily accessible for servicing. The larger unit has a total capacity of twenty-four fruit pies, six per rack, and a smaller unit with a capacity of sixteen fruit pies, four per rack. Both units operate on 120 volts, 60-Hz, single-phase system drawing 500 and 400 watts, respectively. The larger unit's dimensions are width 22", depth 12 1/2", and height 33", while the smaller unit's dimensions are width 12 1/2", depth 12 1/3", and height 26 1/4".

French Fry Bag Rack. The french fry bag rack is of the accordion configuration and consists of six sections with supporting rods. The unit is fabricated of 300 series stainless steel. The rack is designed to hold up to twenty-four bags of fried potatoes or onion rings at one time. The dimensions are width 17", length 17", and height 2 1/2".

French Fry Bagging Scoops. The french fry bagging scoop is designed to make the job of loading individuals bags of fried products easier and faster. The scoop is stocked left- and right-handed with the difference being in the location of the handle. The scoop is fabricated from aluminum and the handle is fabricated of plastic.

Pie Basket. The pie basket is designed to hold up to seven fruit pies for deep-fat frying at one time. The unit is fabricated of heavy-duty nickel-plated steel rod and consists of a frame, partitions, and a product securing arm. The frame incorporates a 12" handle with basket hanger. The partitions prevent the fruit pies from sticking together during frying. The securing arm holds the fruit pies in the basket during the drying operations. The dimensions are width 4", length 24", and height 8" overall at the handle end. The basket height is 2 1/4" and the basket hanger is 4 1/4".

Protector Case with Serving Shelf. The protector case with shelf is designed as a single-assembly, two-panel unit fabricated of 300 series stainless steel. The protector case incorporates a one-piece stainless steel shelf extending the full length of the unit. The unit is provided with two stationary front panels and end panels also fabricated of 300 series stainless steel. The unit was located on the serving line in front of both griddles and extending the full length of these griddles. The width of the shelf is 10". The dimensions are width 10 1/2", length 96", and height 14".

Display Case with Adjustable Curved Sneeze Guard. The display case with adjustable curved sneeze guard is designed as a single assembly unit and consists of stainless steel framework, removable stainless steel shelf, adjustable two-section curved sneeze guard, heating elements, and two section stationary glass front and end panels. Two individual heating element units are located on the underside of the full length shelf. The shelf is of one-piece construction and extends the full length of the unit. All stainless steel components are fabricated of 300 series stainless steel. The unit is designed for operation on 120 volts, 60-Hz, single-phase system. The dimensions are width 10 1/2" overall, length 96", and height 14". The width of the shelf is 10".

Menu Board and Accessories. The menu board is of a wood grain finish with a brown background. The unit was furnished with plastic item strips and caption strips. These strips and price numbers were pumpkin orange and the caption strips were yellow. Vistachrome photographs were provided for the entrees with captions such as "cheeseburgers and drink," "hot dogs" and "fried chicken." Fluorescent lights highlight the vistachrome photo caption and price strips. The unit is designed for operation on a 120-volt, 60-Hz, single-phase system. The dimensions are length 110 1/4", depth 6", and height 24".

Work Tables. The two work tables are fabricated from stainless steel (300 series); one is 4' long and the other 6', each with a stainless steel shelf. The surface of each table is of one-piece seamless construction with rolled down edges. The smaller table dimensions are length 48", width 30", and height 36", while dimensions for the larger table are length 72", width 30", and height 36".

Overhead Shelf. The overhead shelf is designed for use with the 4' work table. The shelf is fabricated of 300 series stainless steel and is 10" wide and 48" long.

APPENDIX C
EQUIPMENT RECOMMENDATIONS

APPENDIX C

EQUIPMENT RECOMMENDATIONS

In order to minimize the cost of the fast service modifications, existing equipment was retained where possible. However, there are several pieces of foodservice equipment that we would recommend for inclusion in future fast service operations (Table C-1). These items, if used, would add to the cost of fast service modifications. While certain of these items would be replacing other equipment, the net change would be to increase equipment and installation costs. Table C-2 lists the cost of those essential equipment items that should be included in future modifications. The cost of including these items is about \$13,135.

Cold Food Counter. The present manner of serving milkshakes is adequate and functional. However, the preferred method would be to place the baskets of prepoured milkshakes into a refrigerated display case.

The recommended cold food counter would be provided with a refrigerated cold pan top and a full compartment refrigerated base with two doors located on the serving line for milkshake dispensing. Separate individual temperature controls for the cold pan and the refrigerated base are included. The unit is fabricated of stainless steel with a cold pan depth of 6".

A cover is required to completely cover the opening whenever the unit is not being utilized for serving. The cover is to be fabricated of stainless steel (300 series). Electrical characteristics are 120-volt, 60-Hz, single-phase system. The cold food counter has dimensions of width 60", depth 32", and height 35".

Fryers, Deep-Fat with Built-In Filtration System. Utilization of this system will enable the cooks to more easily operate and clean equipment. The self-filtering aspect will make filtering a safer and more efficient procedure. The current filtering system is effective but the cooks do not like to work with hot frying compound or to change the filters as required. The recommended equipment should alleviate these problems.

The system will consist of three separate deep fat fryers banked together with a built-in filtering system. The filtering system is capable of filtering individual fryers without disrupting the operation of other fryers. Electrical requirements are for 120-volt, 60-Hz, single-phase operation. As with the deep-fat fryers that were installed, these units are natural gas operated and rated at 110,000 Btu's.

Undercounter Freezer. The food production area in the kitchen that is used in conjunction with the frying operation requires a freezer. Currently, cooks remove a supply of products that they anticipate using from the freezer. It is stacked on a work table near the fryers. Often, by the time the product is required, it has begun to thaw. This is not a correct practice. To ensure product integrity, we recommend a 3-section 10' undercounter refrigerator with work surface. The unit would be provided with a temperature control and a single steel removable shelf in each of its sections. Location of the unit would be directly in front of the deep-fat fryers. Dimensions are 120" long, 34" wide, and 32" high.

Table C-1

Recommended Additional Food Service Equipment

Item	Manufacturer	Model No.	Quantity Each	Unit Cost	Specification Federal Military - Commercial
Cold Food Counter for Milkshakes	G.A. Systems, Inc.	S-5	1	\$2,580	Commercial
Deep-Fat Fryer (GAS) w/ Filtering System	Frymaster, Corp.	M41E2LSC3	1	8,830	Commercial
Undercounter, Freezer w/ Table Top (L-10', W 34", H 32")	Low Temp Industries, Inc.	12034 (10 feet)	1	3,500	Commercial
Undercounter, Refrigerator w/ Table Top (L-60", W 34", H 32")	Low Temp Industries, Inc.	6034	1	1,750	Commercial
Warming Cabinet Insulated	Crescent Metals Products	H-138-CDD-1834	1	1,100	Commercial
Pass Thru, Insulated Window	North American Manufacturing Co.	B-2 Sliding window size 36" x 36"	1	350	Commercial
Partition, with two sliding windows, Embossed stainless steel	Royal Body Sales	Size 16' x 6'	1	1,000	Commercial
Ventilator - w/passover shelf	Gaylord Industries	Model "E" series	1	6,100	Commercial

Table C-2

Cost of Recommended Equipment

Recommended Equipment Changes	Cost (\$)
Deep-fat fryer with filter system	\$8825
Cold Food Counter	2580
Insulated Warming Cabinet	2190
Undercounter Refrigerator	1750
Undercounter Freezer	3500
Pass-thru window	<u>350</u>
Total	\$19,195
Equipment Being Replaced	
Deep-fat, fryer	4770
Deep-fat, filter	1015
Worktable (6')	150
Worktable (4')	<u>125</u>
Total	\$6,060
Total Additional Cost	\$13,135

Undercounter Refrigerator. An undercounter refrigerator in the sandwich production and assembly area would promote greater worker efficiency and labor savings. Prior to a meal start-up, all cold food items required during that meal would be placed in this unit. Cooks would not have to leave their stations during the meal to restock supplies from the kitchen walk-ins. This refrigerator would be used in place of the work table in the sandwich assembly area.

This unit should be provided with temperature control and removable stainless steel shelves. Electrical requirements are 115 volts, 60-Hz, single-phase with a 1/2 HP motor.

Warming Cabinet, Insulated. An insulated warming cabinet with the same dimensions and operating characteristics would be more preferable than the non-insulated cabinet. The incremented cost per cabinet is \$225.00.

Pass-Thru Insulated Window. An outside service window has been proposed for the fast service system. It is estimated that the cost of furnishing and installing this service window on the existing Fort Devens fast service line would amount to \$350.00. Specifically, an aluminum-framed, 1/2" insulated sliding glass window would cost about \$150.00, and labor to install the unit would be approximately \$200.00.

In discussions with TSA dining facility planners, it has been learned that the outside window service in new dining facilities is to be from a separate fast service area and not from the fast service line for extended service. Estimated cost of this separate service area is \$51,800. A fast service line within the facility is more than capable of providing the extended hour service without significant additional equipment and installation expense.

Partition, Stainless Steel Decorator. As previously mentioned, no shielding of on-line griddles is present at Fort Devens. Grease and steam often are blown onto customers in the serving line. To solve this problem, a stainless steel partition on the serving line should be installed to isolate griddle operations from the customer. Service would be provided by a pass-through window with sliding doors. The partition would extend in front of the griddles from the counter top to the ceiling in one direction and from the edge of the steamtable to the wall in the other direction.

Included in this package would be a ventilator with a pass-over style service window which would be required over the griddle units. This item should be a high velocity grease extractor type with fire protection built-in.

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