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THE BASIC LEVEL OF FEEDING: A COMPARISON
OF MILITARY AND COMPARABLE CIVILIAN FOOD
UTILIZATION

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SUMMARY

A survey of food utilization in five civilian organizations considered comparable to the military, including a state university, a professional football team, a law enforcement academy, a merchant marine ship, and an off-shore oil drilling rig, has been conducted. Results indicate that the level of feeding within these organizations is generally somewhat higher than in the military. In view of the findings, the cost of the military ration as determined by the Food Cost Index, including recent and planned changes to the Index which will increase the cost of the ration to approximately that of the civilian average, is considered to be reasonable and appropriate.

PREFACE

During fiscal year 1974, the Operations Research and Systems Analysis (OR/SA) Office conducted an investigation aimed at developing a Uniform Ration Cost System under Task 01 of Project No. IT762713AJ45, "Identification of Existing Feeding Systems, System Components and Alternatives," of the DoD Food Research, Development, Test and Engineering Program. The objectives of this total effort were to develop and evaluate a ration cost system which would be directly related to known consumer requirements, including the derivation of a supporting method for the computation of a recommended basic daily food allowance; to define a more flexible food service management system which would be more responsive to feeding requirements in military food service and innovations and new technology in food and food service systems; and to develop effective procedures for cost/benefit evaluation of proposed changes in the military food service system. The subject of this report addresses the problem of determining an appropriate level of military feeding to serve as a baseline for the development of the method for the computation of the basic daily food allowance.

Very few projects of this scope can be successfully completed without the cooperation and assistance of many individuals. Specifically, the guidance, support, and many helpful suggestions provided by Mr. Richard P. Richardson, Project Manager of the Uniform Ration Cost System Program, are gratefully acknowledged. In addition, special thanks go to Mr. Peter Walsh of the General Services Administration without whose extraordinary programming talents the completion of this task would have been considerably delayed.

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I. INTRODUCTION

Both within the Armed Forces and without, concern has been voiced for many years over the appropriateness of the level of military feeding (including quantity, cost, quality and nutrition). Quite correctly, one would like to be certain that monies expended on feeding DoD personnel are appropriate for their intended purpose. On the one hand, complaints frequently voiced by members of the Armed Forces, as well as other measures of consumer acceptance such as dining hall attendance rates, suggest that the level of feeding may indeed be inadequate. Alternatively, there have been comments in the past that have suggested that military forces are fed too well.

Although a study to determine food utilization patterns within DoD was underway⁽¹⁾, the results could only provide historical information on what the military level of feeding had been and not on the absolute level at which it should be operating. A definitive approach to relating the level or quality of military feeding to U.S. "community standards" was necessary to establish the reasonableness of current and future food allowances, as well as to provide supporting information on food expenditures and budgets for the Congress. There was no indication that any investigation in this area had been made in the past; hence, the development of a suitable analytical approach was necessary.

Many factors, of course, influence the acceptability of food presented in a food service operation. In addition to the quality and quantity of the food products used, the relevant factors include the proficiency of food preparation (i.e., the skill of the preparation personnel), the attractiveness of the surroundings, the selection of the menu in relation to the population group served, and environmental factors affecting the serving of the food.

Thus, it is clear that a comprehensive comparison of consumer acceptance of the food served in military operations with that served in civilian operations would be a complex undertaking. The consideration of such a diverse set of factors was beyond the scope and objective of this effort. Rather than assess the level of acceptability of military feeding with all of its ramifications, the intent here has been to compare and evaluate the basic food procured for use in military dining halls versus that purchased for use in selected civilian operations which parallel military feeding.

(1) Brandler, P., Deacon R., "Patterns of Food Utilization in DoD,"
U.S. Army Natick Laboratories TR 75-65-OR/SA.

II. OBJECTIVES

The objectives of this study were:

1. To establish in a quantitative fashion how the military diet compares with the diets of comparable civilian organizations in terms of food quantity, quality, variety, nutrition, and cost.

2. To provide a basis for evaluating the reasonableness of the level of feeding established by the Basic Daily Food Allowance as compared with similar civilian feeding.

The objectives of this report are:

1. To present the results of a survey of five civilian feeding operations deemed comparable to military feeding.

2. To perform the requisite comparisons between military and civilian sectors and draw conclusions as to what constitutes an appropriate level of military feeding.

III. DEFINITION OF "COMPARABLE CIVILIAN ORGANIZATIONS"

The following general characteristics were selected to identify those groups of the civilian sector that would, in fact, be comparable to military populations in terms of feeding requirements:

- (a) Age and sex distribution, caloric expenditure and nutritional requirements comparable to those encountered among military enlisted personnel.
- (b) Meals served free as part of compensation.
- (c) Three meals a day served.
- (d) Voluntary participation in the activity providing feeding. In addition, since no single civilian operation is exactly comparable to the military, a final criterion was that a number of different types of organizations be included in the survey so as to provide a range of situations with characteristics encompassing those of the military. Based on the above criteria, the organizations selected included a state university with university operated food service, a professional football team, a law enforcement academy, an off-shore oil drilling installation, and a merchant marine vessel.

Obviously, the above criteria were used as general rather than specific guidelines in selecting the civilian case studies. For example, the average age of personnel involved in the merchant marine or off-shore oil drilling rig was from ten to twenty years older than that of military personnel. However, in nearly all other respects, these situations closely paralleled military feeding and were, therefore, relevant for purposes of this study. Hard data on caloric expenditures in various civilian groups were not readily available; however, the nature of the work involved permitted one to speculate that caloric requirements were substantially similar in the various situations with the exception of professional athletes.

The voluntary nature of the activity and the free or prepaid nature of the food service were deemed to be highly relevant in terms of their comparability to military feeding. In voluntary employment situations, food, as a significant morale factor, is important in determining the individual's willingness to reenlist or continue to serve in his job. In this regard, merchant marine, oil drilling and university feeding parallel military feeding.

The criterion that the case studies be limited to those instances where three meals a day are served was deemed necessary to making a meaningful comparison between a civilian operation and military feeding. It can be appreciated that this criterion limited the study in that it automatically excluded virtually all instances of industrial or in-plant feeding. While there are many instances of well organized and excellently managed industrial feeding operations in this country, it was felt that no meaningful comparison could be made between the pattern of food utilization in an operation feeding one or two meals/few days a week and the military environment in which three meals are fed seven days a week. An operation feeding less than three meals per day has a different viewpoint on nutrition and menu planning.

In addition, such an operation could demonstrate differences in its pattern of food usage due to, for example, not serving breakfasts, even though it follows exactly the same pattern as the military for the meals it does serve.

Even after imposing constraints of comparability with the military situation, a large number of organizations were considered suitable for inclusion in this survey. The final choice of the five operations studied was determined primarily by the availability of suitable records of item by item food utilization and meal attendance. While certain other organizations were equally willing to participate in the study, their record keeping was not such as to provide a valid data base for inclusion in this survey. The question of data availability not only constrained our choice of organizations, but also determined the time span encompassed by each study. Because of the phasing of this analysis relative to the completion of the Uniform Ration Cost System program, it was necessary to use existing data. In the future, periodic reviews of the level of military feeding should be based on a program of predetermined data capture. That is, the cooperation of chosen organizations should be elicited beforehand to conduct an organized program of keeping specific records of food utilization and meal counts for the desired survey period. With such a formalized procedure the quality of the data base should be improved, the quantity of available data increased, and the time required for the analysis decreased.

The characteristics of the organizations finally chosen for study were:

University

The university has a number of feeding operations including snack bars and varied facilities used by faculty and non-resident students. The facilities studied in this survey were four dining halls used by resident students. These students are of both sexes and represent primarily the undergraduate population of the campus. The age group was typical of a resident undergraduate college (i.e., approximately 18-22 years).

Professional Football Team

The professional football team uses the facilities of the university as a training camp each summer. While raw materials used in preparing meals for the team are substantially comparable to those used in the university feeding, the menus are specially planned and are different than those normally used by the university. The members of the team itself are, of course, all males, but some females, i.e., guests, participated in the consumption of the meals. Nevertheless, the data collected represent the types of food and quantities consumed by a group of active professional athletes in their twenties.

Law Enforcement

This institution serves as a short-term training site for personnel from various state and municipal agencies around the country. The average training period is 12 weeks. New trainees attend the academy for 14 weeks, while others attend from 1-to-4 weeks. In-service training courses last two weeks. No distinction is made between trainees and others in the food service operations. Participation in the meals is primarily by males. Food service is provided by a contract caterer.

Off-Shore Oil Drilling

The off-shore oil drilling station studied was a permanent drilling platform located in the mouth of the Mississippi River near the Gulf Coast. This station, which is staffed by a crew of 28 including four persons involved in food service and housekeeping, is catered by a specialized caterer whose sole business consists in servicing off-shore oil drilling units. The personnel involved in oil drilling are generally all male, although the caterer has used female personnel on the platform in some of his operations. The work pattern for oil drilling workers as well as caterer's employees is 7 days on - 7 days off. Personnel work 12 hours per shift while on the platform.

Merchant Marine Vessel

The ship studied is operated by a shipping line and is semi-automated. It cruises primarily in the Atlantic and calls on U.S., South American and South African ports. The specific voyage of the ship, for which food consumption data were collected, involved a 45-day voyage to South America. The average age of merchant marine personnel is about 40 and the complement of the ship consisted of about 41 persons: 15 officers and 26 unlicensed crew members. An average of 5 passengers were also on board and dined with the officers. Four crew members, including a chief cook, second cook, baker and galley man, operated the food service.

IV. SURVEY METHODOLOGY AND ASSUMPTIONS

The method used in the study was to secure precise information on all of the food used in the preparation of meals served during a specified time interval for which the number of meals served could also be precisely determined. This goal was achieved by securing written evidence of the quantities of the various food items used during the period. The facility with which these data could be secured depended largely upon the sophistication of accounting procedures used in the various operations. Specifically:

State University - Data at the university were available in the form of computerized records of shipments made to each dining hall from a central distribution point. These records were expressed in terms of the food issued during the month, and it was necessary to tabulate the monthly totals. The number of meals consumed in the dining halls during the survey was determined from available records on meals served which the university tabulates for each dining hall on a monthly basis.

Professional Football Team - Quantities of each food item used in the preparation of meals for the team were determined by an analysis of menus used for each of the meals during the survey period, from menu instruction sheets which indicate the exact quantity of raw materials required per portion, and by accurate counts on the numbers served at each of the meals. Information on such ancillary items as condiments, beverages, and bread were obtained from the food service department at the university. These data sources had to be used in the case of the football team since the university food service does not maintain computerized issue records on food issued in support of this particular program.

Law Enforcement Academy - Records of food products received by the caterer from a central warehouse and from various purveyors were used as a basis for determining the foods consumed in the cafeteria during the survey period. Virtually all canned and frozen products were distributed by the caterer from the central warehouse. The items supplied by purveyors included milk, ice cream, cake mix, and fresh baked goods. Headcount data were readily available since the caterer was reimbursed based upon the number of persons served at each meal.

Off-Shore Oil Drilling - Food quantities utilized were determined by examining the beginning and ending monthly inventories relevant to the survey period and by taking into account the quantities of food received weekly during the survey period. With the exception of milk, bread, and ice cream which were shipped to dockside by purveyors, other food products were shipped from the caterer's central service point. Exact meal count data were available since the caterer's remuneration by the oil company was based upon the number of persons served at each meal.

Merchant Marine Vessel - All food consumed during the sea voyage, with minor exceptions, was boarded in New York at the outset of the journey. Food records include a beginning inventory (representing the closing inventory from the prior trip plus supplies boarded for the upcoming trip) and a closing inventory. For this reason the data for a specific cruise were readily available in the records of the shipping company. The log for each cruise showed on a daily basis the number of crew members, officers, passengers, and other individuals on board ship (e.g., pilots and shore personnel). While an exact meal count was not available, the existing records provided, in the estimation of the shipping lines food service management, a reliable basis for calculating the number of meals served.

Table I presents the survey periods for each civilian organization, as well as the number of rations included in each sample. The definition of the unit of measure "ration" with respect to meal headcounts is the military one; that is, the total number of rations served equals 20% of the breakfast headcount, plus 45% of the dinner headcount, plus 35% of the supper count.

The state university represented the largest sample taken. In this case the four dining halls surveyed served approximately 5500 to 6000 meals per day to a co-ed population and adhered to a twenty-day menu cycle for the five weekdays. No restrictions were placed on seconds with the exception of entrees at holiday meals.

The survey period for the professional football team was their training period. Like the student population, the athletes were not restricted as to quantity of food and had no limits on second servings, including entrees. Attendance at meals, however, was mandatory. The caloric intake of a day's meals ranged from 3500 to 6500 calories and such items as steaks and chops were served frequently.

At the Law Enforcement Academy a 4-week cycle was used. These meals were consumed by both students and other individuals, such as instructors, paying cash for the meal. Based on the meal attendance data for the student population alone, the average student participation was 72% for breakfast, 82% for lunch and 73% for supper.

In the case of the off-shore oil drilling station no menu cycle was used; however, while meal choices were left to the discretion of the galley staff, steak was served twice a week. A comparison of lodging counts versus meal counts also suggests that most personnel on the station do, in fact, consume three meals per day.

During the survey period the merchant marine vessel sailed from New York with stops in Philadelphia, Baltimore, and Norfolk, back to New York and then to Santos, Rio De Janeiro, Buenos Aires, Montevideo, Paraguay, Santos, Jacksonville and returned to New York. No menu cycle was followed. Menus were made up five days in advance by the chief steward and the chief cook. In this case, poultry was generally served twice a week.

TABLE 1**Civilian Food Utilization Sample Data**

Civilian Organization	Time Period Spanned by Sample Data	Number of Rations Included in the Sample
State University	Sep 1972 – Jan 1973	555,352
Football Team	July 1973 – Aug 1973	2,591
Law Enforcement Academy	July 1973 – Aug 1973	11,208
Off-Shore Oil Drilling	Aug 1973 – Oct 1973	4,801
Merchant Marine Vessel	Sep 1973 – Nov 1973	2,852

No major problems were encountered in securing data in the above-described operations although, obviously, the approach to data collection had to be tailored to fit each particular situation. This required in-depth discussion with the food service management in each instance to gain the necessary understanding of the methods used in record keeping both for foods issued and for meal counts and to gain the necessary confidence in the accuracy and completeness of the data required by the study.

A detailed discussion of the survey methodology for the DoD data is presented in the report "Patterns of Food Utilization in the DoD," U.S. Army Natick Laboratories, TR-75-65-OR/SA.

V. DATA ANALYSIS: METHODOLOGY AND ASSUMPTIONS

The general procedure for data analysis consisted of making comparisons between the experience in the civilian sector and that of the military with respect to food utilization, expenditures, quality, and nutrition.

With certain exceptions, the utilization of all food items by each civilian organization was tabulated. While entries for different process types of a food item were kept separate so that consumption of fresh versus frozen versus canned versus dehydrated could be prepared, within each process type package sizes were pooled. In addition, certain items which are not utilized in the military, or are used very infrequently, were pooled with similar items in the data base to enhance the ability of the analysis system to make comparisons with the military situation. For example, the usage of fresh leeks is pooled with green onions. Finally, in the case of the university, a number of convenience food items (entrees) were converted into component raw ingredients since the military does not purchase such preprepared items.

The limited availability of data in the civilian sector precluded the gathering of data for a full year so as to eliminate any possible seasonal effects. However, data were collected for a minimum of one full cycle of operation in each case, e.g., a full semester at the university and an entire training season for the football team. Once the data on the utilization of a particular food item during the survey period had been entered into the system along with the consequent number of rations served in that period, the quotient of the former divided by the latter yielded the average utilization per ration. These data were then aggregated into the food groupings utilized to analyze the military data and discussed in U.S. Army Natick Laboratories TR. 75- -OR/SA "Patterns of Food Utilization in the DoD." Comparisons were then made between military and civilian food utilization experience on a group by group basis, with the item by item detailed information providing the explanation for any differences noted. The utilization per ration data also provided the basis for the nutritional audits, cost and quality ratio comparisons.

Any quality judgment is likely to be subjective since it presupposes a knowledge of preference patterns. However, certain meaningful quality indicative factors were selected which were considered to be generally acceptable quality "yardsticks," e.g., steak better than ground beef, butter better than margarine, fresh vegetables better than canned. By calculating the ratios in a number of specific food categories of the utilization per ration of better items to the less desirable ones in each civilian situation, and comparing these figures with the military, a measure of relative quality was obtained.

The nutritional audit of the foods used by the various organizations was carried out using DSAH 1338.1 "Composition of Foods Used by the Armed Forces" as a basis for all the evaluations.

With respect to expenditures, it was felt that meaningful comparisons could not be made between actual civilian food costs and military food costs for a number of reasons. First, questions of geographical location, volume purchasing, special packaging, or unique transportation costs could cloud the analysis. Secondly, variations in the time periods covered by the data for the civilian organizations and the military would confuse the situation with differences caused by price fluctuation and inflation. Therefore, all civilian usage data were costed item-by-item on the same basis as the military data; that is, using April 1, 1974 Defense Personnel Supply Center (DPSC) food prices as revised by Change Notices 1 (May 1974) and 2 (June 1974). The use of this "military equivalent cost" provided, in effect, a "Standard Cost" basis for comparing civilian operations with each other and with the military. As with the utilization data, comparisons between civilian expenditures per ration and military expenditures were drawn on a group-by-group basis with item data providing the detail necessary for explaining any differences noted.

Further details on the specific methodology and assumptions used in the analysis of the military data can be found in the previously referenced U.S. Army Natick Laboratories TR-75-65-OR/SA, "Patterns of Food Utilization in the DoD."

VI. RESULTS AND DISCUSSION

A. Quantity and Cost Comparisons:

Comparisons were made between DoD and civilian operations in various areas deemed to be significant in determining differences in their usage and/or expenditure for the total daily ration. "Ration" as used here means the amount of food utilized to feed one man for one day. Thus, attention was focused on per ration variations in parameters such as total food usage and expenditures, consumption of beef, and the amount of animal protein food consumed.

Table 2 presents the usage/ration of such categories of food as meat, poultry and fish, eggs, milk and milk products, etc., as well as a comparison of total ration weights. Results show that in terms of total ration weight the DoD usage of 6.69 lbs. is higher than that of the state university, the law enforcement academy, and the merchant marine vessel, but lower than that for off-shore oil drilling and the professional football team. A comparison of total ration weights can be misleading in terms of the quality of the diet since potatoes in the vegetable category are given the same weight consideration as beef in the meat, poultry, fish category. A better expression of quality is found by examining the pounds/ration data for each food group individually.

From Table 2, it is apparent that the DoD ration consists of significantly less meat, poultry, and fish than off-shore oil drilling, merchant marine, and professional football but that this category accounts for approximately the same percentage of the total ration as for the off-shore oil drilling case. The amount of meat, poultry, and fish used by DoD is more nearly like that of the state university and much greater than that of the law enforcement academy.

It should be noted that beverages account for significant portions of the total daily ration for professional football (juices) and off-shore oil drilling (canned soft drinks). These beverages greatly increase the weight of the total daily ration for these two organizations, thereby lowering the percent usage of any other major food group when compared to total utilization.

Table 2 also shows that four major food groups:

- 1 - Meat, poultry, fish
- 2 - Milk and Milk Products
- 3 - Vegetables
- 4 - Grain and Cereal Products

account for very substantial portions of the total ration for all installations studied. For DoD in particular these four categories represent about three-fourths of the total daily DoD ration. This is comparable to the state university. Since all remaining categories combined do not constitute more than 25% usage for DoD, it is probably safe to assume that consideration of the four categories cited gives a reasonable representation and basis for comparison of the total daily ration.

TABLE 2

Food Utilization by Major Food Groups
(Pounds Per Ration and Percent of Ration)

	State University Students		Professional Football Team		Law Enforcement Academy		Off-Shore Oil Crew	
	Lbs.	%	Lbs.	%	Lbs.	%	Lbs.	%
Meat, Poultry, Fish	.8379	14.03	1.9728	21.37	.5882	11.01	1.3307	16.11
Eggs	.1118	1.87	.3154	3.42	.2061	3.86	.1347	1.63
Milk & Milk Products	2.0838	34.88	1.6672	18.06	1.3956	26.12	1.5189	18.39
Beverages	.3062	5.14	1.6077	17.42	.5437	10.17	1.9601	23.73
Vegetables	.8112	13.41	1.1939	12.93	.9783	16.44	.9402	11.38
Legumes & Nuts	.1558	2.61	.0729	0.79	.1545	2.89	.1592	1.93
Grain & Cereal Products	.5877	9.84	.7453	8.07	.5944	11.12	1.1341	13.73
Fruits	.5023	8.41	.9607	10.41	.3184	5.96	.5149	6.23
Fats, Oils, & Salad Dress.	.1541	2.58	.0790	0.86	.1954	3.66	.1985	2.40
Sugars & Sweets	.1858	3.11	.2087	2.26	.2034	3.81	.2221	2.69
Soups & Gravies	.0750	1.26	.1638	1.77	.1331	2.49	.0497	.60
Condiments	.1406	2.35	.1644	1.78	.1325	2.48	.0828	1.00
Specialty Items	.0314	0.53	.0782	0.85	-	-	.0146	.18
Total	5.9736	100.00	9.2300	100.00	5.3436	100.00	8.2605	100.00

TABLE 2

Food Utilization by Major Food Groups
(Pounds Per Ration and Percent of Ration)
(Continued)

	Merchant Marine		Civilian Average %	Civilian Range		DOD Composite %		
	Ship Lbs.	%		Min. Lbs.	Max. Lbs.			
Meat, Poultry, Fish	1.4881	26.07	1.2435	18.00	0.5882	1.9728	.9796	14.64
Eggs	.1888	3.31	0.1914	2.77	0.1118	0.3154	.2202	3.29
Milk & Milk Products	.890F	15.60	1.5112	21.87	0.8905	2.0838	2.1075	31.50
Beverages	.3218	5.64	0.9479	13.72	0.3062	1.9601	.3570	5.34
Vegetables	1.2188	21.35	1.0065	14.57	0.8012	1.2188	1.1118	16.62
Legumes & Nuts	.0695	1.22	0.1224	1.77	0.0695	.1592	.1587	2.37
Grain & Cereal Products	.5527	9.68	0.7228	10.46	0.5527	1.1341	.7235	10.81
Fruits	.6202	10.86	0.5833	8.44	0.3184	0.9607	.4502	6.73
Fats, Oils, & Salad Dress.	.1144	2.00	0.1483	2.15	0.0790	0.1985	.1597	2.39
Sugars & Sweets	.1555	2.72	0.1951	2.82	0.1555	0.2221	.3528	3.79
Soups & Gravies	.0091	.16	0.0861	1.25	0.0091	0.1638	.0174	0.26
Condiments	.0754	1.32	0.1191	1.72	0.0754	0.1644	.1249	1.87
Specialty Items	.0042	.07	0.0321	0.46	0.0042	0.0782	.0262	0.39
Total	5.7090	100.00	6.9097	100.00	5.3394	9.1578	6.6905	100.00

Table 3 presents the data contained in Table 2 as percentages of DoD utilization for each of the food groups cited. This method of presentation facilitates comparison of the utilization patterns. Again, as in Table 2, one finds that with respect to the meat, poultry, and fish group only two organizations are lower than DoD. In one case, i.e., the law enforcement academy, usage is significantly lower by 40%. The professional football team usage of meat, poultry, and fish is more than double that for DoD.

Consumption of milk and milk products is the same for the state university as for DoD; this can probably be attributed to the similarity in age groups in the two populations. The consumption for this food group on the merchant marine ship, where the average age is higher, is less than half the DoD consumption.

Vegetable consumption tends to be quite similar among the DoD and civilian operations, but this is not true of the grain and cereal products group. Here the law enforcement academy's consumption is less than half that of DoD while the off-shore oil crew's consumption is greater than one and one-half times that of DoD.

When each food group's utilization is averaged out for the civilian operations and expressed as a percentage of DoD as shown in Table 4, it indicates a greater average civilian utilization of meat, poultry, fish than DoD. Recognizing that the professional football team, with its exceptionally high caloric and protein requirements, unduly distorts the average for this food group in particular, civilian data were recalculated excluding the football team and are so presented in Table 5. It will now be noted that food utilization for the civilian installations for the majority of the food groups falls within $\pm 15\%$ of the DoD figure. Of the four major food groups referred to previously, milk product utilization is lower while meat, poultry, and fish utilization is higher in the civilian sector.

Table 6 presents the military equivalent expenditures, as described in the previous section on data analysis, for the various food groups. The total expenditures range from a minimum of \$1.76 to a maximum of \$4.13. DoD expenditures most closely parallel those of the state university. Even a quick scan of the data reveals that the meat, poultry, fish group represents the most significant contribution to the total ration cost.

Table 7 through 10 are derived from Table 6 and permit further meaningful comparisons to be made among installations and their relative food expenditures. Table 7 shows that the DoD expenditure for meat, poultry, fish represents 44% of the total expenditure per ration. This category represents the principal expenditure for all of the operations studied.

Second in cost importance is the milk and milk products group, both for the military and civilian average. However, the vegetable group is second in importance for merchant marine, while the grain and cereal products group is second in the case of off-shore oil drilling. In both these cases the higher average age for personnel probably accounts for the slightly lower dairy product usage.

TABLE 3

**Food Utilization as a Percentage
of DOD Utilization**

	Law Enforcement Academy	Professional Football Team	State University Students
Meat, Poultry, Fish	60	202	86
Eggs	94	143	51
Milk & Milk Products	66	79	99
Beverages	152	450	86
Vegetables	79	107	72
Legumes & Nuts	97	46	98
Grain & Cereal Products	43	103	81
Fruits	71	213	112
Fats, Oils & Salad Dressings	122	50	96
Sugar & Sweets	80	82	73
Condiments	106	132	113
Miscellaneous	305	555	244
Total	80	138	89

TABLE 3

**Food Utilization as a Percentage
of DOD Utilization
(Continued)**

	Merchant Marine Ship	Offshore Oil Crew	Average
Meat, Poultry, Fish	152	136	127
Eggs	86	61	87
Milk & Milk Products	42	72	72
Beverages	90	549	266
Vegetables	110	85	91
Legumes & Nuts	44	100	77
Grain & Cereal Products	76	157	100
Fruits	138	114	130
Fats, Oils & Salad Dressings	72	124	93
Sugar & Sweets	61	88	77
Condiments	60	66	95
Miscellaneous	31	147	271
Total	85	123	103

TABLE 4
Food Utilization as a Percentage
of DOD Utilization

	Civilian Average	Range
Meat, Poultry, Fish	127	60 - 202
Eggs	87	51 - 143
Milk & Milk Products	72	42 - 99
Beverages	266	86 - 549
Vegetables	91	72 - 110
Legumes & Nuts	77	44 - 100
Grain & Cereal Products	100	43 - 157
Fruits	130	71 - 213
Fats, Oils & Salad Dressings	93	50 - 124
Sugar & Sweets	77	61 - 88
Condiments	95	60 - 132
Miscellaneous	271	31 - 555
Total	103	80 - 138

TABLE 5

**Food Utilization as a Percentage
of DOD Utilization**

	Civilian Average *	Range *	Professional Football Team
Meat, Poultry, Fish	109	60 - 152	202
Eggs	73	51 - 194	143
Milk & Milk Products	70	42 - 99	79
Beverages	219	86 - 549	450
Vegetables	87	72 - 110	107
Legumes & Nuts	85	44 - 100	46
Grain & Cereal Products	89	43 - 157	103
Fruits	109	71 - 138	213
Fats, Oils & Salad Dressings	104	72 - 124	50
Sugar & Sweets	76	61 - 88	82
Condiments	86	60 - 113	132
Miscellaneous	182	31 - 305	555
Total	94	80 - 123	138

*Excluding Football Team

TABLE 6

Military Equivalent Food Expenditures¹

	(In \$/Ration)			
	Law Enforcement Academy	Professional Football Team	State University Students	DOD
Meat, Poultry, Fish	.556	2.376	.895	1.006
Eggs	.077	.139	.049	.086
Milk & Milk Products	.254	.349	.403	.384
Beverages	.168	.291	.078	.091
Vegetables	.194	.315	.168	.220
Legumes & Nuts	.043	.026	.054	.043
Grain & Cereal Products	.156	.207	.160	.177
Fruits	.056	.188	.100	.091
Fats, Oils & Salad Dressing	.079	.032	.070	.063
Sugar & Sweets	.070	.067	.069	.066
Condiments	.062	.059	.067	.035
Miscellaneous	.047	.082	.040	.020
Total ²	1.761	4.129	2.152	2.283

¹ Civilian utilization priced at June 74 DPSC item prices.

² Totals may not add due to rounding.

TABLE 6

Military Equivalent Food Expenditures¹

	(In \$/Ration) (Continued)				
	Merchant Marine Ship	Off-Short ¹ Oil Crew	Civilian Average ²		DOD
Meat, Poultry, Fish	1.640	1.577	1.167		1.006
Eggs	.071	.051	.062		.086
Milk & Milk Products	.212	.302	.293		.384
Beverages	.164	.165	.144		.091
Vegetables	.269	.171	.201		.220
Legumes & Nuts	.019	.042	.040		.043
Grain & Cereal Products	.165	.349	.208		.177
Fruits	.107	.073	.084		.091
Fats, Oils & Salad Dressing	.052	.084	.071		.063
Sugars & Sweets	.043	.056	.060		.066
Condiments	.025	.025	.045		.035
Miscellaneous	.005	.037	.032		.020
Total ³	2.733	2.932	2.395		2.283

¹ Civilian utilization priced at June 74 DPSC item prices.

² Excluding Football Team.

³ Totals may not add due to rounding.

TABLE 7

Food Expenditures by Group as a Percentage of Total Expenditures

	Law Enforcement Academy	Professional Football Team	State University Students	DOD
Meat, Poultry, Fish	31.5	57.5	41.6	44.0
Eggs	4.4	3.4	2.3	3.7
Milk & Milk Products	14.4	8.5	12.7	16.8
Beverages	9.5	7.0	3.6	4.0
Vegetables	11.0	7.6	7.8	9.7
Legumes & Nuts	2.4	.6	2.5	1.9
Grain & Cereal Products	8.9	5.0	7.4	7.8
Fruits	3.2	4.6	4.6	4.0
Fats, Oils & Salad Dressings	4.5	.8	3.2	2.8
Sugar & Sweets	4.0	1.6	3.2	2.9
Condiments	3.5	1.4	3.1	1.5
Miscellaneous	2.7	3.0	1.8	.9

TABLE 7

Food Expenditures by Group as a Percentage of Total Expenditures
(Continued)

	Merchant Marine Ship	Off-Shore Oil Crew	Civilian Average*	DOD
Meat, Poultry, Fish	60.0	53.8	46.7	44.0
Eggs	2.6	1.7	2.8	3.7
Milk & Milk Products	7.8	10.3	12.8	16.8
Beverages	6.0	5.6	6.2	4.0
Vegetables	9.9	5.8	8.6	9.7
Legumes & Nuts	.7	1.4	.8	1.9
Grain & Cereal Products	5.0	11.9	8.6	7.8
Fruits	3.9	2.5	3.6	4.0
Fats, Oils & Salad Dressings	1.9	2.9	3.1	2.8
Sugar & Sweets	1.6	1.9	2.7	2.9
Condiments	.9	.8	2.1	1.5
Miscellaneous	.2	1.3	1.5	.9

*Excluding Football Team

While the beverage group, as noted previously is important on a usage/ration basis, it is clearly of minor importance on a cost basis, averaging 4% for DoD and slightly over 6% for the civilian operations.

The four major groups in terms of ration weight (meat, poultry, fish; milk and milk products; vegetables; grain and cereal products) account for 78.3% of DoD expenditures and 76.7% of the civilian average excluding the football team. For the football team they represent 78.6%.

Table 8, which compares civilian expenditures by food group with DoD expenditures, shows more clearly than Table 6 the relative amount of money spent by civilian operations as compared to the military. Thus, it will be noted that only the state university and the law enforcement academy spent less on meat, poultry, and fish than did DoD. The merchant marine and off-shore oil crews spent about 1-1/2 times the amount spent by DoD, and the professional football team spent 2-1/2 times as much as DoD. Because its utilization in several major food categories, including meat, poultry, fish, eggs, beverages, vegetables, and fruits, is so much greater than the other operations studied, data from the football team are, again, left out of the civilian average.

The civilian use of such items as cuts of meat (steaks, chops, etc.), canned soft drinks, rolls, margarine, and canned condensed soups are partially responsible for the appreciably higher average civilian expenditures shown in Table 8 in six of the twelve food groups. Again, one finds that sugar and sweets, dairy, and egg expenditures are significantly higher in the military than in the civilian sector. Average civilian expenditures in the three remaining produce categories are closest to the level of military expenditures. It should also be noted that overall expenditures were 5% higher for civilian organizations than the military, even excluding the football team.

Tables 9 and 10 provide a listing in descending order of magnitude of the top 50 DoD items according to both usage and expenditure per ration, respectively. The corresponding rank (as determined from a similar listing in order of magnitude for each civilian organization) for the item in each civilian organization is listed in the appropriate column. This permits a comparison of the relative importance of these items in the civilian sector as compared to DoD. The importance of the top 50 items (in this case the particular top 50 unique to each organization) is readily apparent when their aggregate contribution to either usage or expenditure is considered. On both a usage and expenditure basis the top 50 items represented the following percentages of total ration:

	<u>Usage</u>	<u>Expenditure</u>
Merchant Marine Ship	74	83
State University	73	72
Professional Football Team	81	90
Off-Shore Oil Drilling Crew	86	93
Law Enforcement Academy	76	75
DoD	73	71

TABLE 8

Food Expenditures as a Percentage

of DOD Expenditures

	State University Students	Law Enforce- ment Academy	Professional Football Team
Meat, Poultry, Fish	89	55	236
Eggs	57	90	162
Milk & Milk Products	105	66	91
Beverages	85	183	318
Vegetables	76	88	143
Legumes & Nuts	124	100	60
Grain & Cereal Products	90	88	117
Fruits	110	61	207
Fats, Oils, & Salad Dressings	111	126	51
Sugar & Sweets	104	105	101
Condiments	190	175	167
Miscellaneous	194	231	400
Total	94	77	181

TABLE 8

Food Expenditures as a Percentage

of DOD Expenditures
(Continued)

	Merchant Ship	Marine	Off-Shore Oil Crew	Civilian Average*	Civilian Range*
Meat, Poultry, Fish	163		157	116	55 - 163
Eggs	83		59	72	57 - 90
Milk & Milk Products	55		79	76	55 - 105
Beverages	179		180	157	85 - 183
Vegetables	122		78	91	76 - 122
Legumes & Nuts	44		97	91	44 - 124
Grain & Cereal Products	93		197	117	88 - 197
Fruits	118		80	92	61 - 118
Fats, Oils & Salad Dressings	83		134	114	83 - 134
Sugar & Sweets	64		84	89	64 - 105
Condiments	69		70	126	69 - 190
Miscellaneous	25		182	158	25 - 231
Total	120		128	105	77 - 128

*Excluding the Football Team

TABLE 9

DOD Top 50 Items in Descending Order of Usage
and Comparable Civilian Usage

	DOD			State University			Professional Football		
	Rank	Lbs.	% of Ration	Rank	Lbs.	% of Ration	Rank	Lbs.	% of Ration
Milk, white, fresh	1	1.5549	23.24	1	1.2585	21.15	2	.8962	9.79
Potatoes, white, fresh	2	.3238	4.84	5	.1374	2.31	22	.1109	1.21
Milk, chocolate, fresh	3	.2971	4.44	3	.2440	4.10	7	.2293	2.50
Bread, white, fresh	4	.2181	3.26	10	.0868	1.46	26	.1003	1.10
Eggs, shell	5	.2094	3.13	34	.0355	0.60	23	.1024	1.12
Flour, wheat, bread	6	.1425	2.13	77	.0167	0.28	-	-	-
Beef, ground, frozen	7	.1211	1.81	9	.0903	1.52	15	.1524	1.60
Sugar, granulated	8	.1157	1.73	49	.0285	0.48	70	.0288	0.31
Lettuce	9	.1024	1.53	45	.0295	0.50	24	.1023	1.12
Chicken, cut up, frozen	10	.1004	1.50	4	.1398	2.35	6	.2582	2.82
Potatoes, white, frozen	11	.0983	1.32	8	.0922	1.55	17	.1448	1.58
Ice Cream	12	.0796	1.19	7	.0932	1.57	10	.1801	1.97
Beverage, base, cherry	13	.0716	1.07	12	.0821	1.38	-	-	-
Butter	14	.0676	1.01	40	.0310	0.52	77	.0237	0.26
Tomatoes, canned	15	.0676	1.01	16	.0692	1.16	92	.0189	0.21
Bacon, sliced, frozen	16	.0662	0.99	183	.0034	0.06	77	.0232	0.25
Rolls, bread, fresh	17	.0642	0.96	11	.0859	1.44	27	.0948	1.04
Shortening Compound	18	.0511	0.92	170	.0003	0.01	-	-	-
Oranges	19	.0515	0.77	54	.0249	0.42	113	.0114	0.12
Tomatoes, fresh	20	.0508	0.76	21	.0572	0.96	21	.1172	1.28
Apples, fresh	21	.0495	0.74	24	.0533	0.90	-	-	-
Beef Patties, frozen	22	.0495	0.74	51	.0276	0.46	-	-	-
Beef Oven Roast, boneless frozen	23	.0495	0.74	24	.0502	0.84	25	.1015	1.11

TABLE 9

DOD Top 50 Items in Descending Order of Usage
and Comparable Civilian Usage
(Continued)

	DOD			State University			Professional Football		
	Rank	Lbs.	% of Ration	Rank	Lbs.	% of Ration	Rank	Lbs.	% of Ration
Ham, canned	24	.0488	0.73	95	.0133	0.22	55	.0378	0.41
Cabbage, fresh	25	.0475	0.71	50	.0283	0.48	31	.0795	0.87
Beef Pot Roast, boneless frozen	26	.0455	0.68	—	—	—	—	—	—
Catsup, tomato	27	.0448	0.67	31	.0364	0.61	52	.0409	0.45
Bananas	28	.0422	0.63	23	.0512	0.86	127	.0079	0.09
Beef, grill steak, boneless, frozen	29	.0415	0.62	14	.0762	1.28	5	.3034	3.31
Syrup, maple	30	.0415	0.62	114	.0098(b)	0.16	101	.0154(b)	0.17
Coffee, roasted	31	.0395	0.59	253	.0006	0.01	19	.1208	1.32
Onions, dry	32	.0368	0.55	85	.0145	0.24	107	.0138	0.15
Potatoes, white, instant	33	.0341	0.51	65	.0216	0.36	75	.0255	0.28
Celery	34	.0335	0.50	33	.0358	0.60	51	.0411	0.45
Carrots, fresh (a)	35	.0328	0.49	130	.0072(a)	0.12	106	.0132	0.16
Beverage, base, grape	36	.0301	0.45	111	.0103	0.17	—	—	—
Beans, white, canned	37	.0291	0.44	—	—	—	—	—	—
Salad, dressing	38	.0294	0.44	33	.0363	0.61	76	.0255	0.28
Pork, spareribs, frozen (b)	39	.0274	0.41	244	.0010(b)	0.02	148	.0056(b)	0.06
Beef, swiss steak, boneless frozen	40	.0268	0.40	—	—	—	—	—	—
Juice, pineapple, canned	41	.0261	0.39	100	.0121	0.20	—	—	—
Turkey, raw, boneless frozen	42	.0261	0.39	13	.0776(c)	1.31	18	.1237(c)	1.35
Beverage, base, orange	43	.0248	0.37	153	.0053	0.09	—	—	—

TABLE 9

DOD Top 50 Items in Descending Order of Usage
and Comparable Civilian Usage
(Continued)

	Law Enforces. Academy			Off-Shore Oil Drill.			Merchant Marine		
	Rank	Lbs.	% of Ration	Rank	Lbs.	% of Ration	Rank	Lbs.	% of Ration
Milk, white, fresh	1	.7960	14.91	2	1.1284	13.80	1	.6033	10.62
Potatoes, white, fresh	40	.0323	0.60	4	.3124	3.82	-	-	-
Milk, chocolate, fresh	-	-	-	-	-	-	-	-	-
Bread, white, fresh	15	.0742	1.39	6	.1806	2.21	14	.0947	1.67
Eggs, shell	3	.2061	3.86	11	.1347	1.65	4	.1888	3.32
Flour, wheat, bread	45	.0290	0.54	5	.2031	2.48	48	.0317	0.56
Beef, ground, frozen	14	.0785	1.47	75	.0160	0.20	24	.0628	1.11
Sugar, granulated	38	.0374	0.70	9	.1375	1.68	8	.1140	2.01
Lettuce	8	.0985	1.84	33	.0519	0.63	20	.0666	1.17
Chicken, cut up, frozen	36	.0384	0.72	10	.1371	1.68	3	.2048(f)	3.60
Potatoes, white, frozen	4	.1092	2.05	-	-	-	34	.0508	0.89
Ice Cream	13	.0817	1.53	8	.1533	1.87	54	.0284	0.50
Beverage, base, cherry	107	.0104	0.19	40	.0386	0.47	-	-	-
Butter	55	.0241	0.45	-	-	-	23	.0631	1.11
Tomatoes, canned	22	.0614	1.15	34	.0492	0.60	63	.0231	0.41
Bacon, sliced, frozen	9	.0937	1.75	22	.0798	0.98	38	.0442	0.78
Rolls, bread, fresh	37	.0374	0.70	133	.0042	0.05	57	.0274	0.48
Shortening compound	31	.0422	0.79	28	.0646	0.79	75	.0175	0.31
Oranges	100	.0114	0.21	12	.1271	1.55	10	.1043	1.84
Tomatoes, fresh	20	.0642	1.20	20	.0896	1.10	-	-	-

TABLE 9
DOD Top 50 Items in Descending Order of Usage
and Comparable Civilian Usage
(Continued)

	Law Enforc. Academy			Off-Shore Oil Drill.			Merchant Marine		
	Rank	Lbs.	% of Ration	Rank	Lbs.	% of Ration	Rank	Lbs.	% of Ration
Apples, fresh	101	.0112	0.21	25	.0733	0.90	18	.0789	1.39
Beef Patties, frozen	17	.0688	1.29	39	.0450	0.55	-	-	-
Beef Oven Roast, boneless frozen	-	-	-	13	.1210	1.48	32	.0536	0.94
Ham, canned	62	.0209	0.39	44	.0329	0.40	40	.0421	0.74
Cabbage, fresh	24	.0553	1.04	50	.0281	0.34	43	.0386	0.68
Beef Pot Roast, boneless frozen	-	-	-	-	-	-	-	-	-
Catsup, tomato	51	.0267	0.50	66	.0183	0.22	128	.0070	0.12
Bananas	98	.0116	0.22	16	.1000	1.22	35	.0491	0.86
Beef, grill st.ak, boneless, frozen	112	.0094	0.18	77	.0156	0.19	19	.0729	1.28
Syrup, maple	118	.0086	0.16	99	.0091	0.11	136	.0065	0.11
Coffee, roasted	30	.0471	0.88	19	.0910	1.11	9	.1108	1.95
Onions, dry	29	.0491	0.92	18	.0916	1.12	7	.1157	2.04
Potatoes, white, instant	52	.0262	0.49	95	.0102	0.12	124	.0079	0.14
Celery	90	.0137	0.26	73	.0162	0.20	26	.0614	1.08
Carrots, fresh	121	.0075	0.14	126	.0050	0.06	39	.0421	0.74
Beverage, base, grape	-	-	-	41	.0345	0.42	-	-	-
Beans, white, canned	123	.0074	0.14	-	-	-	-	-	-

TABLE 9

Top 50 Items in Descending Order of Usage

and Comparable Civilian Usage
(Continued)

	Law Enforce. Academy			Off-Shore Oil Drill.			Merchant Marine		
	Rank	Lbs.	% of Ration	Rank	Lbs.	% of Ration	Rank	Lbs.	% of Ration
Salad, dressing	46	.0296	0.54	57	.0232	0.28	79	.0169	0.30
Pork, spareribs, frozen(b)	-	-	-	65	.0188	0.23	47	.0319	0.56
Beef, swiss steak, boneless frozen	136	.0054	0.10	-	-	-	-	-	-
Juice, pineapple, canned	-	-	-	-	-	-	69	.0202	0.36
Turkey, raw, boneless frozen	54	.0244(d)	0.46	67	.0179	0.22	30	.0565(e)	0.99
Beverage, base orange	63	.0209	0.39	151	.0020	0.02	-	-	-
Ham, cooked, smoked, boneless frozen	58	.0209	0.39	27	.0689	0.84	11	.1024	1.80
Frankfurters, frozen	67	.0193	0.36	118	.0058	0.07	112	.0102	0.18
Watermelons, fresh	19	.0660	1.24	17	.0916	1.12	22	.0631	1.11
Cheese, cottage	10	.0932	1.75	-	-	-	170	.0035	0.06
Beef, diced, frozen	111	.0094	0.18	14	.1114	1.36	42	.0414	0.73
Pork, sausage, frozen	77	.0170	0.32	23	.078	0.95	53	.0295	0.52
Grapefruit, fresh	47	.0286	0.54	-	-	-	17	.0843	1.48
Total		2.6233	49.14		4.0176	49.09		2.8720	50.54

NOTES:

- (a) State university uses many frozen carrots.
- (b) Some civilian installations list "Pork, Country Style Ribs".
- (c) Includes boneless frozen raw and frozen RTC.
- (d) Boneless, frozen cooked.
- (e) Only frozen RTC.
- (f) Also includes frozen duck.

TABLE 10

DOD Top 50 Items in Descending Order of Expenditure
and Comparable Civilian Expenditure

	DOD			State University			Professional Football		
	Rank	\$	% of total Ration Expend.	Rank	\$	% of total Ration Expend.	Rank	\$	% of total Ration Expend.
Milk, white, fresh	1	.2100	9.20	2	.1699	8.03	7	.1210	3.02
Beef, grill steak, boneless, frozen	2	.0956	4.19	1	.1752	8.28	1	.6997	17.44
Beef, ground, frozen	3	.0918	4.02	6	.0686	3.24	10	.1158	2.89
Eggs, shell	4	.0785	3.44	35	.0133	0.63	23	.0384	0.96
Beef oven roast, boneless, frozen	5	.0596	2.61	8	.0607	2.87	6	.1228	3.06
Bread, white, fresh	6	.0546	2.39	25	.0217	1.03	34	.0251	0.63
Chicken, cut up, frozen	7	.0532	2.33	3	.0741	3.50	4	.1364	3.40
Butter	8	.0520	2.28	22	.0239	1.13	43	.0183	0.46
Beef pot roast, boneless, frozen	9	.0482	2.11	-	-	-	-	-	-
Bacon, sliced, frozen	10	.0470	2.06	137	.0024	0.11	48	.0164	0.41
Ham, canned	11	.0450	1.97	38	.0124	0.59	24	.0351	0.87
Coffee, roasted	12	.0438	1.92	217	.0007	0.03	5	.1353	3.37
Veal, sliced boneless, frozen	13	.0438	1.92	11	.0430	2.03	53	.0144	0.36
Potatoes, white, fresh	14	.0420	1.84	29	.0188	0.89	48	.0170	0.42
Beef, swiss steak, boneless, frozen	15	.0418	1.83	-	-	-	-	-	-

TABLE 10

DOD Top 50 Items in Descending Order of Expenditure

and Comparable Civilian Expenditure
(Continued)

	DOD Ration Cost:2.2828			State University Ration Cost:2.1157			Professional Football Ration Cost:4.0123		
	Rank	\$	% of total Ration Expend.	Rank	\$	% of total Ration Expend.	Rank	\$	% of total Ration Expend.
Beef patties, frozen	16	.0397	1.74	23	.0221	1.04	-	-	-
Beef, diced, frozen	17	.0304	1.33	18	.0310	1.46	37	.0227	0.57
Milk, chocolate, fresh	18	.0297	1.30	21	.0244	1.15	36	.0229	0.57
Sugar, granulated	19	.0283	1.24	68	.0070	0.33	86	.0070	0.17
Ice cream	20	.0281	1.23	15	.0331	1.56	17	.0639	1.59
Pork, sliced, boned, frozen	21	.0276	1.21	-	-	-	-	-	-
Ham, cooked, smoked, boneless, frozen	22	.0276	1.21	38	.0130	0.61	14	.1008	2.51
Pork, spareribs, frozen (a)	23	.0260	1.14	191	.0011(a)	0.05	91	.0064(a)	0.16
Turkey, raw, boneless, frozen	24	.0244	1.07	5	.0698(b)	3.30	11	.1120(b)	2.79
Tomatoes, fresh	25	.0219	0.96	20	.0246	1.16	20	.0504	1.26
Shortening, compound	26	.0217	0.95	266	.0001	0.005	-	-	-
Pork roast, boned, frozen	27	.0203	0.89	-	-	-	-	-	-
Pork, ham, boneless	28	.0203	0.89	-	-	-	-	-	-
Potatoes, white, frozen	29	.0185	0.81	28	.0194	0.92	27	.0304	0.76
Flour, wheat, bread	30	.0185	0.81	145	.0022	0.10	-	-	-
Shrimp, raw, breaded, frozen	31	.0180	0.79	33	.0141	0.67	-	-	-
Cheese, American	32	.0178	0.78	19	.0309	1.46	19	.0578	1.44
Frankfurters, frozen	33	.0167	0.73	40	.0118	0.56	143	.0014	0.03

TABLE 10

DOD Top 50 Items in Descending Order of Expenditure

and Comparable Civilian Expenditure
(Continued)

	DOD Ration Cost:2.2828			State University Ration Cost:2.1157			Professional Football Ration Cost:4.0123		
	Rank	\$	% of total Ration Expend.	Rank	\$	% of total Ration Expend.	Rank	\$	% of total Ration Expend.
Rolls, bread, fresh	34	.0135	0.59	31	.0180	0.85	41	.0189	0.50
Pork, sausage, frozen	35	.0135	0.59	51	.0095	0.45	28	.0295	0.74
Potatoes, white, instant	36	.0114	0.50	66	.0072	0.34	74	.0085	0.21
Beef, corned, frozen	37	.0110	0.48	44	.0105	0.50	60	.0111	0.28
Tomatoes, canned	38	.0107	0.47	42	.0111	0.52	120	.0130	0.07
Beef, minute steak, boneless frozen	39	.0105	0.46	29	.0188	0.89	-	-	-
Lettuce	40	.0103	0.45	125	.0030	0.14	64	.0102	0.25
Milk Shake Mix	41	.0096	0.42	-	-	-	-	-	-
Pork loin, boneless, frozen	42	.0094	0.41	16	.0323	1.53	-	-	-
Salad, dressing	43	.0091	0.40	42	.0112	0.53	79	.0079	0.20
Beef, tenderloin, frozen	44	.0089	0.39	-	-	-	12	.1052	2.62
Cod, portions, frozen	45	.0089	0.39	38	.0130	0.61	3	.1712	4.27
Salad oil	46	.0089	0.39	67	.0071	0.34	51	.0149	0.37
Catsup, tomato	47	.0087	0.38	66	.0069	0.33	80	.0078	0.19
Apples, fresh	48	.0084	0.37	53	.0091	0.43	-	-	-
Syrup, maple	49	.0084	0.37	151	.0020	0.09	117	.0031	0.08
Shrimp, peeled, deveined, frozen	50	.0082	0.36	53	.0092	0.43	8	.1174	2.93
TOTALS		1.6118	70.61		1.1582	54.715		2.4811	61.85

TABLE 10

DOD Top 50 Items in Descending Order of Expenditure
and Comparable Civilian Expenditure
(Continued)

	Law Enforcement Academy			Off-shore Drilling			Merchant Marine		
	Rank	\$	% of total Expend.	Rank	\$	% of total Expend.	Rank	\$	% of total Expend.
Milk, white, fresh	1	.107E	6.13	3	.1523	5.44	9	.0815	2.99
Beef, grill steak, boneless frozen	22	.0215	1.23	22	.0359	1.28	2	.1677	6.16
Beef, ground, frozen	4	.0597	3.40	43	.0122	0.44	17	.0477	1.75
Eggs, shell	2	.0773	4.41	15	.0505	1.80	10	.0708	2.60
Beef oven roast, boneless frozen	-	-	-	5	.1464	5.23	11	.0649	2.38
Bread, white, fresh	26	.0186	1.06	17	.0451	1.61	31	.0237	0.87
Chicken, cut up, frozen	24	.0203	1.16	10	.0726	2.59	4	.1218(g)	4.47
Butter	27	.0185	1.05	-	-	-	16	.0486	1.79
Beef pot roast, boneless frozen	-	-	-	-	-	-	-	-	-
Bacon, sliced, frozen	3	.0665	3.79	13	.0566	2.02	24	.0314	1.15
Ham, canned	25	.0194	1.11	-	-	-	-	-	-
Coffee, roasted	8	.0528	3.01	7	.1019	3.64	3	.1241	4.56
Veal, sliced, boneless frozen	21	.021	1.26	52	.0086	0.31	14	.0525(f)	1.93
Potatoes, white, fresh	87	.0047	0.27	19	.0406	1.45	-	-	-
Beef, swiss steak, boneless frozen	57	.0085	0.48	-	-	-	-	-	-

TABLE 10

DOD Top 50 Items in Descending Order of Expenditure

and Comparable Civilian Expenditure
(Continued)

	Law Enforcers. Academy			Off-Shore Drilling			Merchant Marine		
	Rank	\$	% of total Ration Expend.	Rank	\$	% of total Ration Expend.	Rank	\$	% of total Ration Expend.
Beef patties, frozen	7	.0550	3.13	21	.0360	1.29	-	-	-
Beef, diced, frozen	39	.0126	0.72	4	.1493	5.33	13	.0554	2.03
Milk, chocolate, fresh	-	-	-	-	-	-	-	-	-
Sugar, granulated	52	.0092	0.52	25	.0337	1.20	27	.0279	1.02
Ice cream	14	.0290	1.65	14	.0544	1.94	51	.0101	0.37
Pork, sliced, boned, frozen	-	-	-	8	.0887	3.53	-	-	-
Ham, cooked, smoked, boneless frozen	18	.0251	1.43	9	.0793	2.83	5	.1177	4.32
Pork, spare ribs, frozen (a)	-	-	-	38	.0176	0.63	26	.0230	0.84
Turkey, raw, boneless	16	.0270(b)	1.54	39	.0170	0.61	22	.0339(b)	1.25
Tomatoes, fresh	15	.0276	1.57	20	.0385	1.38	-	-	-
Shortening, compound	32	.0148	0.84	34	.0226	0.81	75	.0061	0.22
Pork roast, boned, frozen	-	-	-	-	-	-	-	-	-
Pork, ham, boneless	-	-	-	24	.0346	1.24	19	.0442	1.62
Potatoes, white, frozen (c)	19	.0229(c)	1.31	-	-	-	47	.0107(c)	0.39
Flour, wheat, bread	100	.0038	0.22	29	.0264	0.94	100	.0041	0.15
Shrimp, raw, breaded, frozen	-	-	-	12	.0583	2.08	-	-	-
Cheese, American	28	.0172	0.98	23	.0357	1.28	35	.0154	0.57
Frankfurters, frozen	35	.0135	0.77	79	.0041	0.15	63	.0071	0.26
Rolls, bread, fresh	60	.0079	0.45	141	.0009	0.03	77	.0058	0.21

TABLE 10

DOD Top 50 Items in Descending Order of Expenditure
and Comparable Civilian Expenditure
(Continued)

	Law Enforce. Academy			Off-Shore Drilling			Merchant Marine		
	Rank	\$	% of total Ration Expend.	Rank	\$	% of total Ration Expend.	Rank	\$	% of total Ration Expend.
Pork, sausage, frozen	46	.0100	0.57	16	.0461	1.65	33	.0174	0.64
Potatoes, white, instant	56	.0087	0.50	86	.0034	0.12	129	.0026	0.10
Beef, corned, frozen	162	.0008	0.05	129	.0013	0.05	-	-	-
Tomatoes, canned	49	.0098	0.56	54	.0079	0.28	105	.0037	0.14
Beef, minute steak, boneless, frozen	-	-	-	-	-	-	-	-	-
Lettuce	48	.0099	0.56	67	.0052	0.19	67	.0067	0.25
Milk shake mix	-	-	-	-	-	-	-	-	-
Pork loin, boneless, frozen	103	.0036(d)	0.21	-	-	-	42	.0244	0.90
Salad dressing	54	.0089	0.51	58	.0072	0.26	85	.0052	0.19
Beef, tenderloin, frozen	44	.0108	0.62	1	.3496	12.49	1	.1749	6.42
Cod, portions, frozen	78	.0053	0.30	48	.0100(e)	0.36	71	.0064(h)	0.24
Salad oil	115	.0027	0.15	32	.0240	0.86	39	.0136	0.50
Catsup, tomato	82	.0051	0.29	85	.0035	0.13	163	.0013	0.05
Apples, fresh	127	.0019	0.11	42	.0125	0.45	40	.0134	0.49

TABLE 10

DOD Top 50 Items in Descending Order of Expenditure
and Comparable Civilian Expenditure
(Continued)

	Law Enforce. Academy		% of total Ration Expend.		Off-shore Drilling		% of total Ration Expend.		Merchant Marine		% of total Ration Expend.	
	Rank	\$	Rank	\$	Rank	\$	Rank	\$	Rank	\$	Rank	\$
Syrup, maple	132	.0017	0.10		116	.0018	0.06		166	.0013	0.05	
Shrimp, peeled, deveined, frozen	-	-	-		11	.0594	2.12		20	.0410	1.51	
TOTALS		.8422	48.02		1.9617		70.10		1.5080		55.38	

NOTES:

- (a) Some civilian installations list "Pork, Country Style Ribs".
- (b) Includes boneless frozen raw and frozen RTC.
- (c) "Turkey, boneless, frozen cooked".
- (d) Pork Tenderloin, frozen.
- (e) Only "Perch, frozen portions".
- (f) This installation also has "Veal boneless Roast" which is not included in this item; combined rank would be 3.
- (g) Includes "duck, frozen".
- (h) This installation also uses: cod frozen fillet; salmon steaks, frozen; haddock fillets frozen; flounder fillets, frozen; halibut steaks, frozen etc., not included here.

Tables 11 and 12 show the top 10 items by usage and expenditure, respectively, in each of the civilian organizations and the corresponding DoD ranking for the same items. In terms of usage, fresh milk is No. 1 or 2 for all installations studied. Chicken was the next highest product in terms of usage appearing among the top 10 for all installations except the law enforcement academy. Those items which appear among the top ten for more than three of the operations are: chocolate milk, fresh white potatoes, ice cream, fresh white bread and granulated sugar. Thirty-one items account for the top 10 items in the civilian operations and DoD.

In terms of expenditure, grilled steaks or beef tenderloins are the first or second most important product for all installations studied except the law enforcement academy. Milk was first or second in DoD, state university and law-enforcement academy and is the only product among the top 10 for all installations. A total of 27 items make up the top 10 items in the civilian operations. Items among the top 10 for DoD but not for civilian operations are: fresh white bread (6), butter, (8) and beef pot roast (9). Meat or poultry or fish products account for 17 out of 27 top expenditure items, milk products for 3 and beverages for 2.

The relative importance of the major food groups as measured by the top 50 items in usage and expenditure is readily apparent from an examination of Table 13 and 14. Table 13 shows how many of the top 50 items appear in each of the major food groups. Meat, poultry, and fish items account for at least 1/4 of the top 50 items for DoD, pro football, off-shore oil, and merchant marine, but only about 1/10 for state university and law enforcement academy. In terms of expenditures for this category (Table 14), 40-50% of the top 50 items are included even for state university and law enforcement academy. This would seem to indicate that the state university and law enforcement academy operations are feeding fewer of the more expensive meat, poultry, and fish items than the other organizations, so that while few items in this category rank high among the top 50 in usage, many items in the same category contribute significantly to the top 50 expenditure items. Results for DoD and the merchant marine, when taken in this context, are quite similar in both usage and expenditure.

The next highest category in terms of usage for the top 50 items is vegetables. All installations including DoD show a usage for this category of approximately 20% of the top 50 items. As one might expect, vegetables include fewer costly items (approximately 10% of the top 50). All installations including DoD are consistent for this category in both usage and expenditure.

Milk and milk products account for only about 5 out of the top 50 items in usage, and only slightly more for expenditure.

B. Quality Comparisons:

Grade specifications provide a basis for a comparison of the quality of food purchased by food service operations. Accordingly, the applicable specifications in use by the operations studied are summarized in Table 15.

TABLE 11

Top Ten Items by Usage in Civilian Organizations

and DOD Ranking for the Same Items

	DOD	State Univ.	Professional Football	Law Enforc.	Off-Shore	Merchant Marine
Milk, fresh	1	1	2	1	2	1
Milk, Evap.		2				5
Milk, Choc.	3	3	7			
Chicken (+Ducks)	10	4	6		10	3
Potatoes, white, fresh	2	5			4	
Margarine		6				
Ice cream	12	7	10		8	
Potatoes, white, froz. fried		8		4		
Beef, ground, frozen	7	9				
Bread, fresh, white	4	10			6	
Soda, canned			1		1	
Juice, orange, canned	53		3	6		
Beef, ribs, frozen			4			
Beef, boneless, grilled stk.	29		5			
Milk, skim			8	2		
Eggs, whole, frozen			9			
Eggs, shell	5			3		4
Beverage, base, lime				5		
Soup, frozen				7		
Lettuce, fresh	9			8		
Bacon, sliced, frozen	16			9		
Cheese, cottage	47			10		
Cookies, vanilla wafer					3	
Flour, wheat, bread	6				5	
Beef, tenderloin, frozen					7	
Sugar, granulated	8				9	7
Peas and Carrots, frozen						2
Onions, dry	32					6
Coffee, roasted	31					8
Orange, fresh	19					9
Ham, cooked, froz; smoked boneless	44					10

TABLE 12

Top Ten Items by Expenditure in Civilian Organizations

and DOI) Ranking for the Same Items

	DOD	State Univ.	Professional Football	Law Enforce.	Off-Shore	Merchant Marine
Beef, boneless froz. grilled steaks	2	1	1			2
Milk	1	2	7	1	3	9
Chicken (+Ducks)	7	3	4		10	4
Milk, evap.		4				
Turkey	24	5				
Beef, ground, frozen	3	6	10	4		
Beef, boneless, froz; oven roast	5	7	6		5	
Margarine	51	8				
Beef, bone in, froz.		9		6		
Veal, boneless	52	10				6
Beef ribs, froz.			2			8
Cod, frozen, portions	45		3			
Coffee, roasted	12		5	8	7	3
Shrimp, froz. pld, deveined	50		8			
Pork chops, froz.			9		6	
Eggs, shell	4			2		10
Bacon, sliced, frozen	10			3		
Tea, instant				5		
Beef patties	16			7		
Milk, skim				9		
Soup, frozen				10		
Beef tenderloin, frozen	44				1	1
Cookies, vanilla wafers					2	
Beef, diced, frozen	17				4	
Pork slices, froz. boned	21				8	
Ham, cooked, froz. smoked boneless	22				9	5
Peas and Carrots, frozen						7

TABLE 13**Number of Items in Each Major Food Group,****From Top 50 Items, by Usage**

	DOD	State Univ.	Professional Football	Law Enforce.	Off-Shore	Merchant Marine
Meat, poultry, fish	15	7	12	5	14	17
Milk, milk products	5	8	5	5	5	3
Vegetables	11	11	10	12	8	12
Grain, cereal	3	6	6	7	5	4
Eggs	1	2	2	1	1	1
Beverages	4	2	3	2	5	1
Legumes and nuts	1	—	—	3	1	—
Fruits	6	9	9	6	6	10
Fats, oils, dressing	2	2	—	4	3	1
Sugar and sweets	2	2	1	2	1	1
Soups and gravies	—	—	1	1	1	—
Condiments	—	1	—	1	—	—
Miscellaneous items	—	—	1	—	—	—

TABLE 14

**Number of Items in Each Food Group,
From Top 50 Items, By Expenditure**

	DOD	State Univ.	Professional Football	Law Enforce.	Off-Shore	Merchant Marine
Meat, poultry, fish	27	21	19	19	25	27
Milk, milk products	6	9	7	7	5	6
Vegetables	6	5	7	6	3	5
Grain, cereal	3	4	5	4	5	4
Eggs	1	2	2	1	1	1
Beverages	1	1	3	2	3	1
Legumes and nuts	—	2	1	2	—	—
Fruits	1	2	5	3	3	4
Fats, oils, dressing	3	2	1	3	3	2
Sugar and sweets	2	2	—	1	1	1
Soups and gravies	—	—	—	1	1	—
Condiments	1	—	—	1	—	—
Miscellaneous items	—	—	1	—	—	—

TABLE 15

Compilation of Grade Specifications Used By Institutions Surveyed

	State Univ.	Professional Football	Law Enforce. Academy	Off-shore Drilling	Merchant Marine	DOD
Beef, cured products, luncheon meat and frankfurters, pork	U.S. Good or Better	U.S. Choice	U.S. Choice or Better	U.S. Choice	U.S. Good or Better	U.S. Good or Better, Excellent condition, cured or cured and smoked, 50% beef and pork; excellent condition
Veal						
Pork and Beef Sausage						U.S. Standard or Better, 15% beef 85% pork mix and precooked
Bacon						NMT 68% fat, U.S.D.A. Moisture half sheet, NMT 31 lbs.
Spareribs						NMT 24% fat
Ground meat	U.S. Good	U.S. Choice	U.S. Grade A	U.S. Grade A	20% fat	U.S. Grade B or better
Poultry						
Fish squares						
Salmon						Cod and haddock mix
Tuna						Red sockeye
Shrimp						Light, boneless
Eggs, Shell						Headless, peeled and deveined
Eggs, whole, frozen Milk	U.S. Grade A	U.S. Grade A	U.S. Grade A (Large)	U.S. Grade AA	U.S. Grade A	U.S. Grade A or Better
Butter						
Ice cream	NLT 10.5% fat	NLT 10.5% fat	93 score		Grade A (92 Score or above)	Grade A, pasteurized, vitamin D Homogenized U.S. Grade A (or 92 score)
Non fat dry milk						Category 2, NLT 10% fat
Evaporated milk						U.S. Extra Grade
Cheese						High Commercial Grade

TABLE 15

Compilation of Grade Specifications Used By Institutions Surveyed
(Continued)

	State Univ.	Professional Football	Law Enforce. Academy	Off-shore Drilling	Merchant Marine	DOD
Fruits, vegetables, juices, potatoes, nuts						
Potatoes, frozen	U.S. Grade A	U.S. Grade A				All U.S. Grade A or U.S. No. 1 where applicable
Potatoes, fresh Produce				U.S. #1 Strictly fresh	U.S. #1 U.S. #1	U.S. #1 U.S. #1
Vegetables, frozen			Grade A			
Vegetables, canned	Grade B	Grade B	Grade A	Accepted well-known brands	Grade A Grade A	Grade A Grade A
Fruits, frozen						
Strawberries, frozen	Grade A	Grade A	Grade A		Grade A	Grade A
Fruits, canned	Grade B	Grade B				Grade A
Fruits, canned Applesauce			Grade A	"	Grade A	Grade A
Fruit, canned, peaches, pears, pineapple			Grade B			Grade A
Juices, canned: (Pineapple, Tomato)						
Juices, canned (General)	Grade B	Grade B	Grade A		Grade A	Grade A Grade A
Bakery, cereal, pasta products						All good commercial grade

TABLE 15

Compilation of Grade Specifications Used By Institutions Surveyed
(Continued)

	State Univ.	Professional Football	Law Enforce. Academy	Off-shore Drilling	Merchant Marine	
Soups — Chicken noodle						
Onion						
Green pea						
Tomato/Vegetable						
Sugar, syrups, condiments, oil and misc. necessary foods						Uniform blend 50% beef base, 25% toasted and reg. chp. onion NLT 80% green pea NLT 11% tomato, 12% vegetable All good commercial grade
Ketchup	Grade A	Grade A				
Margarine	Grade AA	Grade AA				
						Grade A

For beef, U.S. choice or better is required by the professional football team, the law enforcement academy, and off-shore oil drilling while the grade specified by DoD, merchant marine, and state university was good or better. For ground meat only DoD and merchant marine specified the fat content (24% for DoD; 20% for merchant marine). Poultry grades were specified by DoD, merchant marine, law enforcement academy, and off-shore oil drilling. All but DoD require Grade A poultry. Grade A or better was required by all installations for eggs. Ninety-two Score butter is specified by DoD and merchant marine as compared to 93 Score butter for the law enforcement academy. Comparable butter fat contents are required for ice cream for DoD, the state university, and professional football team. Canned vegetables offer another valuable basis for comparing the specifications used by the various installations. Along with DoD, the law enforcement academy and the merchant marine specify Grade A vegetables while Grade B are specified by the university and football team. "Accepted well known brands" are purchased for the off-shore oil crew. Thus, it would appear that the civilian operations tend to use equivalent or better grades of meat, poultry, eggs, butter, and ice cream than DoD, but DoD requirements for processed fruits and vegetables tend to be higher than those used by some of the civilian operations.

The total number of types of food items purchased by the civilian installations and DoD were as follows:

DoD	505
State University	303
Professional Football Team	173
Law Enforcement Academy	194
Off-Shore Oil Drilling Crew	178
Merchant Marine Ship	250

One indicator of meal quality is variety, and the number of different items purchased is, naturally, an indicator of variety. The large disparity between the very large number of different items served in the military as compared with the civilian sector can partially be explained by the fact that DoD data were gathered for a full year while the longest period represented by a civilian organization was the five-month survey period at the state university. Naturally, a longer period permits the serving of a wider variety of foods. However, recommended menus in the military are cyclical and of 28 to 42 days in duration, both periods being comparable to the survey periods for all the civilian organizations. Recent research has also indicated that only a relatively limited number of items, on the order of 200 to 250, are required to yield a high preference menu. In view of all of this, it would seem that the extreme breadth of items served in the military is somewhat large.

A more quantitative measure of quality differences is provided in Tables 16 and 17 which summarize the amounts of animal protein foods included in the rations of the various installations and their expenditures. The professional football team consumes the largest quantity of animal protein (3.88 lb.) followed by DoD (3.31 lb.). The high ranking for DoD is due primarily to its high milk usage. The state university and off-shore oil drilling operations are quite close to the DoD usage (3.01 and 2.90 lb., respectively), but the law

TABLE 16

Comparison of Amounts of Animal Protein Foods Used

	State University		Professional Football		Law Enforce. Academy		Off-Shore Drilling	
	Lbs Per Ration	% of Total Ration Wt.	Lbs Per Ration	% of Total Ration Wt.	Lbs Per Ration	% of Total Ration Wt.	Lbs Per Ration	% of Total Ration Wt.
Total Ration Weight	5.9510		9.1578		5.3394		8.1784	
Beef	.3596	6.04	.9902	10.81	.2512	4.70	.4991	6.10
Veal	.0238	.40	.0073	.08	.0112	0.21	.0044	0.06
Pork	.0701	1.18	.1541	1.68	.1391	2.61	.2826	3.46
Lamb	.2174	3.65	.3819	4.17	.0627	1.17	.1550	1.90
Poultry	.0573	0.96	.2171	2.37	.0624	1.17	.0461	0.56
Fish	.0362	0.61	.0542	0.59			.0675	0.83
Shell fish	.0509	0.86	.0958	1.05	.0573	1.07	.1940	2.37
Sausages, Cold Cuts								
Eggs	.1118	1.88	.3154	3.44	.2061	3.86	.1347	1.65
Milk and milk drinks	1.8516	31.11	1.3547	14.79	1.1654	21.83	1.2544	15.34
Cream, Ice cream (a)	.1030	1.73	.1848	2.02	.0874	1.64	.2275	2.78
Cheese	.0981	1.65	.1040	1.14	.1187	2.22	.0371	0.45
Butter	.0310	0.52	.0237	0.26	.0241	0.45		
Total Animal Protein Food	3.0108	50.59	3.8832	42.40	2.1856	40.93	2.9024	35.49

NOTES:

(a) Except sherbet

TABLE 16

Comparison of Amounts of Animal Protein Foods Used
(Continued)

	Merchant Marine		Average		Range			DOD
	Lbs Per Ration	% of Total Ration Wt.	Civilian Installations Lbs Per Ration	Civilian Installations % of Total Ration Wt.	Maximum	Minimum	Mean	
Total Ration Weight	5.6788		6.7875		9.1578	5.3394	7.2486	
Beef	.5214	9.18	.5243	7.72	.9902	.2512	.6207	6.08
Veal	.1024	1.80	.0298	0.44	.1024	.0044	.0534	.48
Pork	.2884	5.08	.1869	2.75	.2884	.0701	.1793	3.72
Lamb	.0589	1.04	.0589	0.87	.0589	.0589	.0589	.03
Poultry	.2752	4.85	.2184	3.22	.3819	.0627	.2223	2.21
Fish	.0722	1.27	.0910	1.34	.2171	.0461	.1316	.52
Shell fish	.0306	0.54	.0471	0.69	.0675	.0306	.0491	.42
Sausages, Cold Cuts	.1087	1.91	.1013	1.49	.1940	.0509	.1225	1.18
Eggs	.1889	3.33	.1914	2.82	.3154	.1118	.2136	3.29
Milk and milk drinks	.7494	13.20	1.2751	18.79	1.8516	.7494	1.3005	28.33
Cream, Ice cream (a)	.0284(a)	0.50	.1262	1.86	.2275	.0284	.1280	1.33
Cheese	.0417	0.73	.0799	1.18	.1187	.0371	.0779	.83
Butter	.0631	1.11	.0355	0.52	.0631	.0237	.0434	1.01
Total Animal Protein Food	2.5293	44.54	2.9658	43.69	3.3832	2.1856	3.0344	49.43

NOTES:

(a) Except sherbet

TABLE 17

Comparison of Dollars Spent for Animal Protein Foods

	State University		Professional Football		Law		Off-Shore Drilling	
	\$ Per Ration	% of Total Ration Exp.	\$ Per Ration	% of Total Ration Exp.	\$ Per Ration	% of Total Ration Exp.	\$ Per Ration	% of Total Ration Exp.
Total Ration Expenditures	2.1157		4.0123		1.7546		2.7990	
Beef	.4588	21.60	1.4140	35.24	.2542	14.49	.7454	26.63
Veal	.0444	2.10	.0144	0.36	.0221	1.26	.0086	0.31
Pork	.0635	3.00	.1587	3.96	.1147	6.54	.2933	10.48
Lamb								
Poultry	.1439	6.80	.2489	6.20	.0474	2.70	.0897	3.20
Fish	.0608	2.87	.2175	5.42	.0611	3.48	.0491	1.75
Shell fish	.0474	2.24	.1265	3.15			.1177	4.21
Sausage, Cold Cuts	.0397	1.88	.0789	1.97	.0492	2.80	.1407	5.03
Eggs	.0490	2.32	.1385	3.45	.0773	4.41	.0505	1.80
Milk and milk drinks	.2676	12.65	.1714	4.27	.1518	8.65	.1674	5.98
Cream, Ice cream (a)	.0379	1.79	.0665	1.66	.0314	1.79	.0952	3.40
Cheese	.0739	3.49	.0928	2.31	.0527	3.00	.0397	1.42
Butter	.0239	1.13	.0183	0.46	.0185	1.05		
Expenditure for Total Animal Protein Food	1.3108	61.96	2.7464	68.45	.8804	50.17	1.7973	64.21

NOTES:

(a) Except sherbet

TABLE 17

Comparison of Dollars Spent for Animal Protein Foods
(Continued)

	Merchant Marine		Average		Range		JOD		
	\$ Per Ration	% of Total Ration Exp.	Civilian \$ Per Ration	% of Total Ration Exp.	Civilian Maximum \$	Minimum \$		Mean \$	\$ Per Ration
Total Ration Expenditures	2.7224		2.6841		4.0123	1.7546	2.8835	2.2828	
Beef	.6858	25.19	.7116	26.51	1.4140	.2542	.8341	.4679	20.50
Veal	.1680	6.17	.0515	1.92	.1680	.0086	.0883	.0556	2.44
Pork	.2708	9.95	.1802	6.71	.2933	.0635	.1784	.2408	10.55
Lamb	.0811	2.98	.0811	3.02	.8111	.8111	.8111	.0042	.18
Poultry	.1592	5.85	.1378	5.13	.2489	.0474	.1482	.0980	4.29
Fish	.0835	3.07	.0944	3.52	.2175	.0491	.1333	.0361	1.58
Shell fish	.0605	2.22	.0880	3.28	.1265	.0474	.0870	.0445	1.95
Sausage, Cold Cuts	.0827	3.04	.0782	2.91	.1407	.0397	.0902	.0586	2.57
Eggs	.0708	2.60	.0772	2.88	.1385	.0490	.0938	.0856	3.75
Milk and milk drinks	.1095	4.02	.1735	6.46	.2676	.1095	.1886	.2583	11.32
Cream, Ice cream (a)	.0101(a)	0.37	.0482	1.80	.0952	.0101	.0527	.0313	1.37
Cheese	.0421	1.55	.0602	2.24	.0928	.0397	.0663	.0419	
Butter	.0486	1.79	.0273	1.02	.0486	.0183	.0335	.0521	
Expenditure for Total Animal Protein.. Food	1.8727	68.80	1.8092	67.40	2.7464	.8804	1.8134	1.4749	64.62

NOTES:

(a) Except sherbet

enforcement academy is considerably lower (2.19 lb.). Expenditures for animal protein foods for DoD and civilian installations range from \$.88 to \$2.75, with \$1.47 for DoD. The DoD expenditure is higher than that for law enforcement academy (\$.88) and state university (\$1.31), but lower than that for off-shore oil (\$1.88), merchant marine (\$1.87), and professional football (\$2.75).

Even though usage of milk and milk drinks is the greatest of all animal protein foods for all installations, expenditures for beef are the greatest for all organizations. For DoD it is \$.48 per ration, as compared to \$.25 for law enforcement, \$.46 for state university, \$.69 for merchant marine, \$.75 for off-shore oil drilling, and \$1.41 for professional football. The DoD expenditure for butter is \$.05, which is higher than for any of the civilian installations (range of 0 - \$0.049).

Table 18 summarizes usage quantities of certain foods from which quality inferences can be drawn. These inferences are presented in the form of ratios which are utilized as indicators of quality.

All civilian installations use significantly more meat cuts (2.15 to 5.67: 1) than diced and ground meat except for the law enforcement academy where these quantities are about equal. DoD by comparison serves only 1.35 times as much meat cuts as diced and ground. Since cuts of meat include roasts, steaks, and chops, while diced and ground meats are used in the preparation of lower cost entrees, this ratio provides a meaningful yardstick of relative quality.

Shellfish usage and expenditure are similar for DoD, state university, and merchant marine but higher than DoD for football and off-shore oil drilling. When compared to usage of fish, however, all installations including DoD serve less shellfish than fish except for off-shore oil drilling which serve no shellfish at all. It is noteworthy that the off-shore oil crew is located in the Gulf of Mexico where increased shrimp consumption would simply represent a regional preference and availability characteristic.

DoD and the off-shore oil operation both use .15 lb./ration of poultry. This is higher than the law enforcement academy (.06 lb.) but lower than all others (.21 - .38 lb.). In terms of ratios of meat to poultry all installations including DoD serve at least two times as much meat as poultry (4.67 for DoD). While the ratio of meat to poultry is greatest for the law enforcement academy, this fact must be tempered by the fact that the actual quantities involved are less than for the other installations studied. Expenditure for meat is at least four times as great as poultry for all installations including DoD (7.84) and runs as high as 11.67 for off-shore oil drilling operations.

The state university uses only frozen orange juice, while professional football, off-shore oil, and merchant marine operations use only canned. DoD uses equal amounts of both canned and frozen, while the law enforcement academy uses 100 times as much canned as frozen orange juice. The same usage trends

TABLE 18

Comparison of Selected Quality Indicative Ratios Based on Usage/Ration & Expenditure/Ration

Quality indicator Rates	State University		Professional Football		Law Enforcement Academy	
	lbs./Ration	\$/Ration	lbs./Ration	\$/Ration	lbs./Ration	\$/Ration
Cuts of Meat to Dices & Ground Meat (a)	2.15:1	3.55:1	5.67:1	10.34:1	0.94:1	1.46:1
Shell Fish to Fish	0.63:1	0.78:1	0.25:1	0.58:1	0.00:1	0.00:1
Meat to Poultry	2.09:1	4.21:1	3.02:1	6.38:1	6.40:1	8.25:1
Total Animal Protein to Total Ration	0.51:1	0.62:1	0.42:1	0.68:1	0.41:1	0.50:1
Frozen Orange Juice to Canned Orange	100.0:0	100.0:0	0.00:1	0.00:1	0.01:1	0.03:1
Frozen Juice to Canned Juice	0.90:1	1.84:1	0.00:1	0.00:1	0.003:1	0.009:1
Fresh Frozen Vegetables & Legumes to Total Veg. & Legumes (b)	0.61:1	0.65:1	0.77:1	0.71:1	0.60:1	0.65:1
Fresh Frozen Fruit to Total Fruit	0.42:1	0.40:1	0.61:1	0.57:1	0.62:1	0.60:1
Rolls & Specialty Bread to Bread (c)	0.86:1	0.75:1	1.94:1	2.30:1	0.94:1	1.18:1
Ice Cream to Total Dairy Products (d)	0.04:1	0.08:1	0.11:1	0.18:1	0.06:1	0.11:1
Butter to Margarine	0.32:1	0.50:1	1.00:0	1.00:0	0.38:1	0.58:1

Notes:

- (a) Total meat excludes sausages, cold cuts, luncheon meats
- (b) Vegetables and legumes total includes dehydrated instant potatoes recalculated to reconstituted form, i.e. 1 part solid and 5.5 parts liquid
- (c) Civilian figures for rolls include canned brown bread and corn bread
- (d) Excludes sherbet

TABLE 18

Comparison of Selected Quality Indicative Ratios Based on Usage/Ration & Expenditure/Ration (Continued)

	Off-Shore Oil		Merchant Marine		DOD	
	Lbs./Ration	\$/Ration	Lbs./Ration	\$/Ration	Lbs./Ration	\$/Ration
Cuts of Meat to Diced & Ground Meat (a)	2.68:1	3.52:1	4.40:1	9.57:1	1.35:1	
Shell Fish to Fish	1.46:1	2.40:1	0.42:1	0.72:1	0.82:1	1.23:1
Meat to Poultry	5.07:1	11.67:1	3.53:1	7.57:1	4.67:1	7.84:1
Total Animal Protein to Total Ration	0.35:1	0.64:1	0.45:1	0.69:1	0.49:1	0.65:1
Frozen Orange Juice to Canned Orange Juice	0.00:1	0.00:1	0.00:1	0.00:1	0.97:1	
Frozen Juice to Canned Juice	0.00:1	0.00:1	0.00:1	0.00:1	0.29:1	
Fresh Frozen Vegetables & Legumes to Total Vegetables & Legumes (b)	0.50:1	0.49:1	0.75:1	0.83:1	0.64:1	
Fresh Frozen Fruit to Total Fruit	0.88:1	0.85:1	0.91:1	0.88:1	0.64:1	
Rolls & Specialty Bread to Bread (c)	0.02:1	0.02:1	0.60:1	0.68:1	0.27:1	
Ice Cream to Total Dairy Products (d)	0.10:1	0.18:1	0.03:1(d)	0.05:1	0.04:1	0.07:1
Butter to Margarine	0.00:1	0.00:1	1.15:1	1.78:1	4.43:1	6.86:1

for orange juice persist for juices in general for football, off-shore oil, and merchant marine, but the state university uses equal amounts of both canned and frozen juices other than orange.

It would be unfair to draw quality indicative conclusions based on the usage of canned products by merchant marine and off-shore oil crews since the determining factor in these instances is the constraint on storage facilities. The state university and the law enforcement academy use the same amount of fresh to frozen vegetables and legumes. Off-shore oil uses no frozen vegetables and about 50% fresh vegetables of the total. Merchant marine uses twice as much frozen as fresh vegetables which is the reverse of the football team. Fresh and frozen vegetables account for 75% of total usage for the football team and merchant marine and 60% for DoD, the state university, and the law enforcement academy. Dollar expenditures for fresh and frozen vegetables and legumes account for approximately the same percentage of dollars spent for vegetables as was shown for usage. The remaining usage and expenditure not explicitly accounted for could be expected to be for canned vegetables.

The state university serves ten times as much fresh fruit as frozen fruit but both categories account for less than 50% of total fruit, thus indicating a large usage of canned fruit. All civilian installations use little frozen fruit and off-shore oil uses none. Fresh and frozen fruit amount to as little as 42% (as already noted for state university) and as much as 91% (merchant marine) of total fruit. Expenditure ratios are comparable to those for usage.

There is a wide spread in the usage of rolls to regular bread, from 2% for off-shore to 200% for football (DoD = 27%). Figures for bread and rolls would be more meaningful if they were based on quantities actually served, but since these products are prepared on site in some of the installations and their usage is reflected in raw ingredients (mixes, flour, etc.), the ratios shown here are not considered to be truly significant.

Ice cream does not amount to more than 11% of total dairy products (football). It accounts for 4% for DoD. Expenditures range from 5 to 18% (7% for DoD). DoD consumption is comparable to that of the state university, law enforcement academy, and merchant marine but less than half that of the football team and the off-shore oil crew.

The usage of butter by DoD in relation to its margarine usage (5.82 : 1) is significantly greater than that of state university (.5 : 1), law enforcement academy (.58 : 1), merchant marine (1.78 : 1), and off-shore oil crew (0 : 1). The DoD ratio of expenditure for butter compared to margarine is almost 10 times higher than this ratio for the civilian operations exclusive of the football team. This high usage undoubtedly results from the fact that butter is an entitlement under the Navy Ration Law, 10 USC 6082 (hence it is almost exclusively used rather than margarine by the Navy and Marine Corps), plus the fact that USDA surplus butter has been available for military use at appreciably reduced cost up until July 1973. With a possible impending change to the Navy

Ration Law and the currently higher price of butter in military use, it can be expected that DoD butter to margarine usage will decrease to a level more comparable to civilian practice.

As an overall evaluation of the data in Table 18, it is readily apparent that no installation consistently ranks highest or lowest with respect to the ratios shown, and it would be fair to say that DoD is somewhat lower than the civilian average.

C. Nutrition Comparisons:

The nutrient content of foods utilized by the various installations in the study with respect to calories, protein, fat, two minerals (calcium and iron), and five vitamins (A, thiamine, riboflavin, niacin, and ascorbic acid) is presented in Tables 19 and 20. As might be expected from the food quantity and expenditure data, the food provided by the law enforcement academy supplied the least calories (3577/day), while the off-shore oil crew and the professional football team are supplied with the most (6144 and 5617, respectively). However, the high calorie content of the off-shore oil crew diet reflects a large consumption of carbonated beverages, and is, therefore, lower in protein content than the professional football team diet (193 gm vs. 245 gm).

As shown by Tables 20 and 21, the DoD nutrient profile is remarkably close to the civilian average in nearly all respects, except calcium, Vitamin A, and iron. The difference in calcium, which is higher in the DoD diet, can probably be explained on the basis of the smaller civilian utilization of milk and milk products. The civilian Vitamin A average appears to be distorted by the unusually high consumption of carrots by the merchant marine ship, which resulted in a level of over 29,000 IU/day compared to 9,437 to 12,207 for the other civilian operations.

It is important to evaluate nutrient data in relation to both the NAS-NRC Food and Nutrition Board's Recommended Dietary Allowances (RDA) which represent the civilian standards, as well as AR 40-25/BUMEDINST 10110.3D/AFR 160-95 Daily Dietary Allowances (DDA) which represent the military standards for nutrition. Table 22 shows that with one exception, the thiamine content of the law enforcement academy's diet, all diets exceeded the RDA's for the nutrients examined. Table 23 shows that with two exceptions, the thiamine content of both the law enforcement academy and the state university, all diets equal or exceed the Surgeon General's DDA's. It should be noted that the DDA for thiamine for women is 1.2 mg. Remembering that the state university population is 50% women, the thiamine content of the state university is 110% of the average DDA for men and women. Also of interest is the fact that both energy and niacin values for the law enforcement academy's diet are approximately equal to the DDA.

Since the data collected in this study represent food utilization (i.e., food purchased per ration) and not actual food consumption it would be hazardous to draw any inferences from the excesses shown, as for example, the 205% of RDA energy level of the off-shore oil crew diet and the 584% of RDA Vitamin A

TABLE 19

A Nutritional Analysis of Food Utilized

	Energy (KCAL)	Protein (G)	Fat (G)	Calcium (MG)	Iron (MG)
Law Enforcement Academy	3577	123.2	173.1	1316	26.0
Professional Football Team	5617	245.4	273.1	1809	34.7
State University	4316	156.7	207.0	2003	24.4
Merchant Marine Ship	3698	170.7	209.4	1209	30.8
Off-Shore Oil Crew	6144	193.1	271.9	1656	28.7
Civilian Average	4670	177.8	226.9	1598	28.9
DOD	4869	172.8	220.4	1831	27.7

TABLE 19

**A Nutritional Analysis of Food Utilized
(Continued)**

	Vitamin A (IU)	Thiamine (MG)	Riboflavin (MG)	Niacin (MG)	Ascorbic Acid (MG)
Law Enforcement Academy	11,865	1.4	2.8	23.8	148.4
Professional Football Team	11,797	2.3	3.7	46.8	240.0
State University	12,207	1.6	3.4	26.7	157.6
Merchant Marine Ship	29,183	2.3	2.9	36.6	185.5
Off-Shore Oil Crew	9,437	2.5	3.5	36.3	141.8
Civilian Average	14,898	2.0	3.3	34.0	174.7
DOD	10,676	2.1	3.5	31.9	173.1

TABLE 20
A Nutritional Analysis of Food Utilized

	D.O.D.	Civilian Average	Range
Energy (KCAL)	4,869	4,670	3,577 ---- 6,144
Protein (G)	173	178	123 ---- 245
Fat (G)	220	227	173 ---- 273
Calcium (MG)	1,831	1,598	1,209 ---- 2,003
Ascorbic Acid (MG)	173	175	142 ---- 240
Vitamin A (IU)	10,676	14,898	9,437 ---- 29,183
Iron (MG)	27.7	28.9	24.4 ---- 34.7
Thiamine (MG)	2.1	2.0	1.4 ---- 2.5
Riboflavin (MG)	3.5	3.3	2.8 ---- 3.7
Niacin (MG)	31.9	34.0	23.8 ---- 46.8

TABLE 21

Nutrition Levels of Average Civilian Food

Utilization as a Percentage of DOD

	Percentage
Energy	96
Protein	103
Fat	103
Calcium	87
Iron	104
Vitamin A	140
Thiamine	95
Riboflavin	94
Niacin	107
Ascorbic Acid	101

TABLE 22

Percent of Recommended Dietary Allowances (RDA'S)

Provided by Foods Utilized

RDA Value*	Energy	Protein	Calcium	Iron	Vitamin A
	(KCAL) 3000 %	(G) 54 %	(MG) 800 %	(MG) 10 %	(IU) 5000 %
Law Enforcement Academy	119	228	165	260	237
Professional Football Team	187	454	226	347	236
State University Students	144	290	250	244	244
Merchant Marine Ship	123	316	151	308	584
Off-Shore Oil Crew	205	358	207	287	189
Civilian Average	156	329	200	289	298
ΣOD	162	320	229	277	214

*For 19 - 22 Year Old Males (1974 RDA)

TABLE 22
Percent of Recommended Dietary Allowances (RDA'S)
Provided by Foods Utilized
(Continued)

RDA Value*	Thiamine	Riboflavin	Niacin	Ascorbic Acid
	(MG)	(MG)	(MG)	(MG)
	1.5	1.8	20	45
	%	%	%	%
Law Enforcement Academy	93	156	119	330
Professional Football Team	153	206	234	533
State University Student	107	189	134	350
Merchant Marine Ship	153	161	183	412
Off-Shore Oil Crew	167	194	182	315
Civilian Average	133	183	170	388
DOD	140	194	160	385

*For 19-22 Year Old Males (1974 RDA)

TABLE 23

Percent of Daily Dietary Allowances (DDA'S)

Provided by Foods Utilized

	Energy (KCAL)	Protein G	Calcium (MG)	Iron (MG)	Vitamin A (IU)	Thiamine (MG)	Riboflavin (MG)	Niacin (MG)	Ascorbic Acid (MG)
DDA Value	3400	100	800	14	5000	1.7	2.0	22	60
	%	%	%	%	%	%	%	%	%
Law Enforcement Academy	105	123	165	186	237	82	140	108	247
Professional Football Team	165	245	226	248	236	135	185	213	400
State University Student	127	157	250	174	244	94	170	121	263
Merchant Marine Ship	109	171	151	220	584	135	145	166	309
Off-Shore Oil Crew	181	193	207	205	189	147	175	165	236
Civilian Average	137	178	200	207	298	118	165	155	291
DOD	143	173	229	198	214	124	175	145	289

level of the merchant marine ship. This point cannot be overemphasized. The significance of these figures to this study can only be found in two areas:

1. They permit a comparison between different operations and hence a ranking.

2. They should exceed the RDA's and DDA's by a significant margin in order to insure that despite preparation, serving, and plate food wastage, as well as nutrient losses in cooking, the quantities finally consumed provide the minimum daily requirements of nutrients.

On the other hand, since there is bound to be a significant difference between the amount of food utilized by the operation and the amount of food consumed by its customers, one can state, with reasonable assurance, that on an "as consumed" basis the law enforcement academy's diet is, indeed, too low in thiamine and marginally low in energy and niacin with respect to the DDA.

Of considerable interest also from a nutritional standpoint is the percent of calories derived from fat in the diet. The nation's food purchases, according to a 1972 study,⁽²⁾ yielded the following nutrients on a per capita per day basis:

3,330 calories
101 g protein - 12% of calories
156 g fat - 42% of calories
381 g carbohydrate - 46% of calories

Many nutritionists feel that 42% of calories from fat is too high in the light of our present day concerns with obesity and other diet-related diseases such as cardiovascular disease. It is felt that a lowering of the fat content of the American diet to 30-35% of calories would be preferable. The Surgeon General specifies a fat content not to exceed 40% of calories. Table 24 presents the fat-derived calorie content of the diets studied. With the exception of the off-shore oil operation, all may be considered too high in fat, especially in the light of the overall high caloric content. The 51% of calories from fat in the merchant marine diet is particularly high. The DoD fat content of the diet is in line with the national pattern, and in fact has the most favorable fat content of the installations studied when one considers that the off-shore oil crew diet contains a larger absolute quantity of fat.

(2) Friend, Berta, "The National Food Situation" NFS-142 Consumer and Food Economics Institute, USDA, November 1972.

TABLE 24**Calories from Fat**

	Energy (KCAL)	Fat (G)	Calories from Fat (%)
Law Enforcement Academy	3577	173.1	43.6
Professional Football Team	5617	273.1	43.8
State University Student	4316	207.0	43.2
Merchant Marine Ship	3698	209.4	51.0
Off-Shore Oil Crew	6144	271.9	39.8
Civilian Average	4670	226.9	43.7
DOD	4869	220.4	40.7

Vii. CONCLUSIONS

1. In nearly all respects considered (quantity, cost, and quality), the level of DoD feeding as defined by food purchases and related to recorded attendance (headcount) is marginally lower than that of the civilian food service systems studied herein. This is true even when the football team data is excluded from the civilian averages.

In the last analysis the single most efficient figure of merit on which to base a quantified judgment as to the size of the differential in the level of feeding between military and civilian sectors is the military equivalent cost (civilian usage costed at military prices). Table 25 reiterates the observed military equivalent expenditure per ration experience. Again one notes that three organizations are higher than DoD, the state university is most comparable, and the law enforcement academy is distinctly lower. If one takes into account that the student population at the university was approximately 50% female, it can be extrapolated that the level of expenditure between it and the military would be even closer for a more predominantly male situation with necessarily higher nutritional requirements. The markedly lower level of feeding for the law enforcement academy could be the result of: (1) a conscious effort to provide a reducing diet as part of a physical conditioning program, (2) budgetary limitations resulting in the use of lesser amounts of, and lower priced foods in general, (3) being a contractor operation in which the contractor is quite successful in making lower price and quality foods eye-appealing, plus the fact that he benefits from a large scale central preparation facility for some items, or (4) less need for concern for the morale implications of food service due to the limited duration and uniqueness of the training situation to an overall law enforcement career. Further, the nutritional audit of food as purchased for this installation indicated a deficiency in thiamine content and probable deficiencies in niacin and energy content with respect to the Surgeon General's DDA's. These facts seem to indicate that, whatever the reason, lower costs at the academy are being achieved at the expense of nutrition in terms of current military requirements.

As Table 25 indicates, the simple average of per ration expenditures for all five civilian operations was 20% higher than the military. If one ignores the implications of the previous comments on the state university and the law enforcement academy and if the football team is dropped from consideration, the resulting expenditure average for the four remaining civilian organizations is still 5% higher than the military.

To further substantiate this conclusion, Table 26 presents a number of comparative actual (not military equivalent) costs to feed. In this case the military food utilization data was priced at DPSC prices for the particular periods in question so as to avoid the factor of inflation in the

TABLE 25**Total Cost Per Ration at DPSC Prices**

	Percent of DOD Cost	\$/Ration
Law Enforcement Academy	77	1.761
State University Student	94	2.152
DOD	100	2.283
Merchant Marine Ship	120	2.733
Off-Shore Oil Crew	128	2.932
Professional Football Team	181	4.129
Civilian Average	120	2.741
Civilian Average W/O Football Team	105	2.395
DOD	100	2.283
DOD with Programmed Improvements	106	2.415

TABLE 26**Comparative Actual Costs to Feed**

Period	Organization	\$/Ration
April - June 73	72 Colleges	2.166
	DOD	2.145
April - September 73	Canadian Isolated Bases	2.680*
	DOD	2.165
April - June 74	Coast Guard	2.350
	DOD	2.284

*Canadian Dollars

Individual comparisons. The average meal costs for student feeding as determined in a survey of 72 colleges and universities across the country by NACUFS (National Association of College and University Food Services) indicates, as suggested by previously described sample data, very close agreement between military and university feeding.

Of all foreign military food service systems, it is considered that the Canadian represents the one in which cultural eating habits are closest to the U.S. The Canadian system, however, does not incorporate a headcount system; hence, equitable per ration comparisons are difficult to make. Therefore, in order to draw a valid comparison with DoD, data concerning food usage at Canadian isolated bases, where attendance rates are closest to 100%, were utilized. (3) It will be noted that differences in excess of 25% are indicated. A partial explanation for this can be found in the fact that the Canadian data are for isolated bases where the morale implications of food service are so much more important, and where food service receives proportionately more attention and emphasis. Nevertheless, even after one discounts this factor the indications are that the general level of Canadian Armed Forces feeding exceeds that in US military situations.

Finally, it will be noted in the table that Coast Guard feeding is of a marginally higher level than the military and is, in fact, within 1% of the average of the military equivalent food cost of the four civilian operations. The Coast Guard controls on the cost of food vary slightly from those in use within DoD.

2. Referring back to Table 25, one notes the final entry for "DoD with Programmed Improvements." This refers to the costing of a Food Cost Index⁽⁴⁾ which was recommended by a special task group of service dieticians in February 1972 and which has been updated to include the usage of uniform federal stock numbered items, the substitution of open market for USDA surplus butter and the substitution of "choice" for "good" quality meats. The adoption of this Food Cost Index with these proposed changes has been scheduled for FY 76. Given the scope and constraints of the data compiled in the previously described surveys and recognizing that certain judgments have necessarily been incorporated in the analysis, the findings of this study lead to the conclusion that the adoption of this Food Cost Index or one that provides an equivalent level of feeding is reasonable and justifiable for use within the DoD.

3. Although the utilization of meat, poultry, fish by DoD is less than three of the five civilian organizations studied, the protein content of the DoD diet is more than nutritionally adequate. Generally, with respect to the nutrient composition of the "as purchased" food, DoD compares favorably with the civilian systems.

4. The extremely large number of types of food items utilized in military food service is perhaps indicative of particular concern for variety.

(3) Richardson, Richard P. "An Analysis of Foreign Military and U.S. Institutional Ration Cost Systems," U.S. Army Natick Laboratories, TR 75-66-OR/SA.

(4) Brandier, P., "The Development of Alternative Food Cost Indexes," U.S. Army Natick Laboratories, TR 75-67-OR/SA.

Recent research on preference menus indicates that the large number of items used within DoD could possibly be reduced without any concomitant reduction in consumer acceptability.

5. If item usage or expenditure per ration for all organizations studied is ranked in descending order of size, the top 50 items represent approximately 75% of the total. Therefore, if payoffs in inventory control are possible, the greatest gains would probably accrue by tightening the control of these items.

6. In the longer term the methodology developed and employed herein to evaluate the level of feeding is perhaps as significant as the above conclusions relative to military versus civilian food utilization comparability. The methodology includes:

- (a) the collection of civilian food utilization data within the constraints of general comparability with the military,
- (b) the use of the same food price data in reaching cost comparisons,
- (c) the broad view taken of the quality or level of feeding, and
- (d) the diversity of criteria utilized in analyzing and comparing the level of feeding.

VIII. RECOMMENDATIONS

Based on the above conclusions it is recommended that:

1. The Food Cost Index programmed for implementation by DoD in FY 76, or one providing an equivalent level of feeding, be adopted as planned.
2. General patterns of food utilization in comparable civilian organizations, as indicated herein, receive consideration in any future modification of the Food Cost Index (e.g., butter versus margarine).
3. The practicability of simplifying logistics and the inventory control of food items within military organizations by reducing the number of individual items utilized (in line with civilian practices and the findings of preference menu research) be explored.
4. A periodic survey to determine the level of military feeding relative to comparable civilian operations be conducted on a regular basis (i.e., every two to four years). Such a survey should: (1) adopt the broad view of the level of feeding taken by the current study in a program of future data capture (rather than an investigation of historical records), and (2) utilize the diversity of criteria and the general approach suggested in this analysis.

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