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COMPARISONS OF UTILIZATIONS AND NUTRIENT CONTENTS OF *A* RATIONS AND SHORT ORDER MEALS AT THE AIR FORCE DINING FACILITY

Lowry Air Force Base, Denver, Colorado

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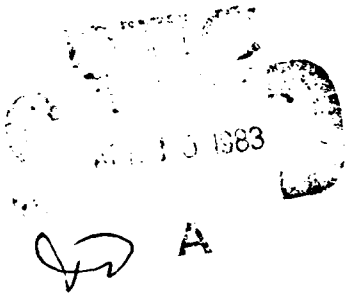

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Comparisons of Utilizations and Nutrient Contents of A Rations and Short Order Meals at the Air Force Dining Facility, Lowry Air Force Base, Denver, Colorado--Johnson et al

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The Lowry AFB survey was designed to evaluate the effects of including short order foods upon military nutrition. The study was limited to analysis of head count data, weighed food consumption, and wastes in the dining hall and diary data for foods eaten away from this facility. The majority of the results were based upon man-days. A man-day is defined as one person signing-in for a meal during a 24-hour period. When a person did not sign in during a day, he/she was excluded from that day's population. The average man-

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days for the rations-in-kind (RIK) population, for the 8 days of the survey, was 67% of the total RIK population that signed in at least once during the study. On this basis, 25% of the RIK personnel ate 3 meals per day, 43% ate two meals per day and 32% ate only one meal per day. Therefore, these personnel averaged 2 meals per day in the dining hall although the overall utilization of the dining hall, based on the total RIK personnel, was 43% or 1.3 meals/person/day. This is a poor utilization of a military dining hall by RIK personnel despite the availability of short order meals which, when offered, provided 42% of the meals.

The dining hall provided RIK personnel with 79% of their caloric intakes during weekdays and 65% on the weekends (based on man-days). Total daily intakes for these personnel were less than military allowances for calories and less than NRC and military allowances for vitamin A, thiamin, and iron. Recommendations were to increase availabilities of these nutrients, increase dining hall attendance, reduce size of meals consumed and reduce plate and kitchen wastes.

ABSTRACT

The Lowry AFB survey was designed to evaluate the effects of including short order foods upon military nutrition. The study was limited to analysis of head count data, weighed food consumption, and wastes in the dining hall and diary data for foods eaten away from this facility. The majority of the results were based upon man-days. A man-day is defined as one person signing-in for a meal during a 24-hour period. When a person did not sign in during a day, he/she was excluded from that day's population. The average man-days for the rations-in-kind (RIK) population, for the 8 days of the survey, was 67% of the total RIK population that signed in at least once during the study. On this basis, 25% of the RIK personnel ate 3 meals per day, 43% ate two meals per day and 32% ate only one meal per day. Therefore, these personnel averaged 2 meals per day in the dining hall although the overall utilization of the dining hall, based on the total RIK personnel, was 43% or 1.3 meals/person/day. This is a poor utilization of a military dining hall by RIK personnel despite the availability of short order meals which, when offered, provided 42% of the meals.

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PREFACE

We express our deepest appreciation for the expert assistance provided by the following individuals: for collection and field calculation of data to the Nutrition Reserve Officers - LTCs E.W. Hartsook, J.E. Halver, F. Konishi, and G.R. Young, MAJs J.T. Huber, R.R. Johnson, and E.T. Kornegay; for computer programming and data processing to PFC D.P. Rahman, Ms. M.J. Ferguson, and Mr. R.L. Jenkins; for chemical and microbial analyses of food samples to SP5s M.K. Knight and T.J. Brezina, Ms. Y.F. Herman and Ms. J.A. Tillotson, Messrs. P.P. Waring, W.C. Goad, W.R. Wise, and J.J. Knudsen; and for technical assistance to SFC L.E. Jones, SP5s D.G. Brown, P.J. Anderson, R.D. Johnson, G.L. Wright, and J.R. Gray, PFCs T.M. Ward, B.M. Christensen, and R.J. Seely, Ms. D. Woolridge, Ms. C.M. Robson, and Ms. A. Wilkinson, Messrs. H.J. Krzywicki, T.A. Daws, R.A. Barnhart, and W.D. Lindsey. Without the wholehearted support of these personnel, numerous other members of the United States Army Medical Research and Nutrition Laboratory, Denver, Colorado, and the food service personnel, Lowry Air Force Base, this study could not have been completed.

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The Surgeon General requested, by letter, dated 8 June, 1962, that the US Army Medical Research and Nutrition Laboratory, Fitzsimons General Hospital, Denver, Colorado (now Division of Nutrition Technology, Presidio of San Francisco, California) conduct an annual nutrition survey on representative samples of US Army personnel. AR 40-25/BUMEDINST 10110. 3B/AFR 160-95 places the responsibility for assuring the nutritional adequacy of food served and for evaluating the nutritional status of the military personnel upon The Surgeon General of the respective service. Nutrition surveys provide information which assists The Surgeon General to fulfill his responsibilities.

Department of Defense Instructions 3200.10, dated 12 July 1968, assigned the responsibility for formulating the DOD Food Research, Development, Testing and Engineering Program to the Secretary of the Army. The joint services regulation specifies that The Surgeon General of the Army (TSG) is the developing agency for the nutrition and wholesomeness portions of the program. At the direction of the TSG, the Letterman Army Institute of Research serves as the performing research laboratory for the DOD nutrition research program.

Army Regulation 40-25 (1) defines the nutritional standards of both the military male and female and is based upon the National Academy of Sciences/National Research Council's Food and Nutrition Board's Recommended Dietary Allowances (2).

With the advent of modernizing the military services, enlisted personnel have gained greater affluence and independence. This has resulted in a reduction in the utilization of the military dining facilities. In an attempt to entice these personnel to increase their attendance in these facilities, several innovations in the military feeding system are being tested. One of these innovations is adding a short order line in the dining halls where the personnel can obtain hamburgers, cheeseburgers, French fries, and other fast food items as a choice to the A ration meal. Since the military services provide free meals to junior enlisted personnel as part of their pay, and require that these personnel maintain their health and physical fitness, the services have the responsibility to assure that these meals provide the nutrients required by these personnel. This dining hall at Lowry Air Force Base, with an A ration and a short order serving line for the lunch and supper meals, provided an opportunity to evaluate nutritional quality and popularity of short order meals in comparison to the A ration meal as consumed.

Due to changing needs of the military, there is a continuing necessity to evaluate the capability of current and newly developed

ration (both freshly prepared and as altered by varied storage conditions) to provide adequate nutrition to the soldier under a variety of duty requirements and environmental situations. The present A ration system provides adequate nutrition for normal garrison training duty but may not be optimum for all phases of military life. In addition, several new innovations in military feeding (e.g., "short order" or "snack line," specialty houses, and greater variety of food items available through the new procurements system) require that close attention be devoted to the nutritional status of the individual service person. Longitudinal evaluation of the nutrient status, the body composition and the work performance and capacity of the person is essential to insure that his/her effective military performance is not impaired by improper nutrition during his/her duty career. Such impairment could limit the capability of the military at a time when instant readiness is mandatory. Innovations in the military feeding systems and military rations will require continuing surveillance and studies to ensure that military personnel maintain optimal health and physical fitness.

The objectives of the Lowry AFB nutrition survey were (a) to evaluate the effects of serving short order type foods upon nutrient intakes of airmen, (b) to determine the popularity of short order meals compared to A ration meals, (c) to observe attendance patterns in this dining facility, and (d) to compare handbook values for nutrients to analytical values for each type of meal. These objectives were accomplished by obtaining information on the average food and nutrient consumptions of personnel eating the different types of food served, analysis of attendance (headcount sign-in) data, and the calculation of nutrients consumed by the personnel based upon the meals that they ate. An additional objective of the survey was to familiarize the Nutrition Reserve Officers with the changing military feeding systems and with the problems associated with determining the nutritional intake status of personnel utilizing these feeding systems. This was accomplished by having these officers assist in collecting the data for the survey.

METHODS

After a preliminary meeting and briefing with the Commander of Lowry AFB and Food Service Personnel, a dining hall serving between 800 and 900 trainees and other personnel was selected for an 8 consecutive day survey during July, 1971. Lowry AFB was selected because of its location in Denver, and because of its experience in feeding large numbers of troops from both conventional and short order serving lines. Six separate meals during four meal periods were served per day to provide meals for students attending classes in three shifts. The meals included A ration breakfast, lunch, and supper; "short order" lunch and supper, and a midnight breakfast (primarily for men training during the late evening shift). The short order lines

included food items that one can usually purchase at snack bars or fast food outlets, such as hot dogs, hamburgers, cheeseburgers, chili, French fries, and other fast food items.

Although the dining facilities were supervised by civilian personnel (head cooks and others) the majority of the cooks and kitchen workers were Air Force personnel. All KPs were military personnel. The cooks and cooks' helpers were briefed and encouraged to utilize their usual techniques for food preparation, serving, and other tasks during the course of the survey.

The evaluation of food intake and nutrient consumption requires information on food preparation, amounts of foods served and wasted, the number of people eating in the dining hall and which serving lines they are utilizing. Laboratory personnel weighed each ingredient used in preparing a food dish and, also, recorded the final cooked weight of the food item. The amount of food prepared but not served (kitchen waste) was weighed and recorded. Total amounts of foods served were determined by weighing all foods placed on the serving lines and foods remaining unserved at the end of the meal. Accurate headcounts of personnel utilizing each serving line for each meal were obtained. Total plate wastes for each food item were determined by separating left-overs on each plate into separate containers by item and weighing these at the end of the meal. Food consumed from sources other than the military dining hall was estimated through the use of food diaries completed by approximately 35% of the personnel authorized rations-in-kind (RIK). Calculation of the average nutrient intakes was accomplished through the use of computer programs and standard handbook values for foods and food ingredients (3,4,5,6). Nutrient intakes were determined by bomb calorimetry and chemical analyses of the meal composites prepared from the average amount of food consumed.

The total headcounts, for each meal and serving line, dining hall utilization and meal patterns of the consumers were obtained by having each diner sign his/her name and recording the four digit meal card number. This card number, an identification of the meal and which serving line this individual utilized, were keypunched and entered into a computer file. The headcount for each different serving line during a meal period was obtained by a summation of the number of different meal card numbers. After eliminating individuals with illegible signatures and meal card numbers with more than one signature (indicating illegitimate use of the card), these data were used to determine the total number of meals that each individual attended during the eight day period and the number from each serving line. These data were used to determine the relative frequency at which the different meal patterns were used on a daily basis, calculated on a man-day basis. The total man-days for a given day is the total number of different persons signing-in on the day, each

person being counted only once no matter how many times that person returned during the same day. The percent of personnel eating a given number of meals or a specific meal each day was based upon man-days. Percent utilization of the dining hall was calculated from the number of meals consumed by these personnel divided by the number of man-days times three (authorized 3 meals/day).

The average food or nutrient consumed per meal was calculated from the total amount of a food item served minus the total amount of plate waste for that item divided by the total number of people eating from the serving line offering that food item. Results were obtained for all food items served. The average nutrient intake per period was calculated from individual meal patterns, average nutrients consumed for those meals and dividing by the number of man-days represented. Therefore, the average nutrient intake per person per meal was based on the total headcount for that meal while the average nutrient intake per person per period was based upon the man-days and only accepted persons with legible and legitimate sign-ins.

Food samples for analysis were prepared for each meal by taking food items from the serving line. After calculating the average amount of each food consumed at the end of the meal (amount served minus plate waste divided by number of people served in that line), this amount of each food was added to a Waring blender and the total quantity was made up to 2000 grams with distilled water. This composite was homogenized and aliquots were preserved (7) and frozen until analyzed. The analyses performed were bomb calorimetry (8), chemical analyses for water, ash, protein and fat (9), carbohydrate by difference, sodium, potassium, calcium, magnesium, and phosphorus (9), iron after dry ashing (10), vitamin A (11), and microbial analyses for thiamin, riboflavin, niacin and vitamin B_6 (12).

RESULTS

A summary of the nutrient contents of the average meals consumed during this survey is presented in Tables 1a, 1b and 1c. Comparisons between handbook values for nutrients versus analyses of composites showed that calculated calories were significantly less than analyzed calories for main breakfasts (15%), main lunches (11%) and short order suppers (13%) and less than calorimetry values for main breakfasts (12%) and short order suppers (8%). Calorimetry values were consistently less than analyzed values for calories and these differences (3 to 7%) were significant for all meals except main breakfasts. Analyzed values for protein were consistently (2 to 11 g/meal) higher than handbook values and differences were significant except for midnight breakfasts and main suppers. Analyzed values for fat were consistently (23 to 42%) less than handbook values and these differences were significant for all meals. Since analytical carbohy-

drate values were obtained by differences, these averaged from 20 to 27 g/meal higher than calculated values and the differences were significant for all meals except midnight breakfasts and main suppers. Calcium and phosphorus values were comparable for the two methods (only the calcium difference for short order lunches was significant). Analyzed values for iron were between 70 and 200% higher than the handbook derived values; however, these differences were not consistently significant, e.g., see midnight breakfasts and short order suppers. Sodium values were generally higher by analyses, significant for main lunch, short order lunch and supper while potassium values were consistently lower by analyses, significant differences for all meals except main suppers. Analytical values for vitamin A were consistently lower by analyses, significant differences for all meals except main suppers. Analytical values for vitamin A were consistently and significantly less (33 to 65%) than handbook values while those for thiamin, riboflavin and niacin were significantly higher (31 to 85%) than the handbook values. Comparisons of the nutrient contents of the average meals consumed from the short order line to those from the A ration line shows that short order meals contained significantly more calories and carbohydrate than A ration meals. In addition, short order meals contained more fat and protein (significant for suppers but not lunches) and potassium and riboflavin (significant for computer values) than meals consumed from the main line. Comparing the average nutrient consumptions for all meals indicates that breakfast provided the least nutrients, short order meals the most, and A ration lunches, suppers, and midnight breakfasts were intermediate in their nutrient contents.

The number of meals served by meal and per day and number of meals consumed per patron are depicted in Table 2. There was a total of 1179 RIK and 332 additional persons that signed into the dining hall during the survey. Only about 74% of these RIK people appeared in the dining hall each weekday and about 54% on each weekend day with 36% not eating any weekend meals in the dining hall. During the week, 40% of the lunch meals and 46% of the supper meals were obtained from the short order line and these percentages decreased to 33 and 44% during the weekends for lunches and suppers. Of the RIK people who ate in the dining hall during any given weekday, only 30.5% ate 3 meals, 42.0% ate 2 meals and the remaining 27.3% ate only one meal. During the two weekend days, 3.7% ate 3 meals, 45.8% ate 2 meals and over half of these people had only one meal in the dining hall. Inclusion of the other personnel did not substantially change these values. Based upon 3 meals per day, RIK personnel ate one-half of their meals in the dining hall during the week and one-quarter of them on the weekends. During the 8 days of the survey, each RIK person ate an average of 10.3 meals in the dining hall or 1.3 meals per day. Total sign-ins or man-days per day show the decrease in attendance during the work week and the low attendance during the weekend days.

The meal patterns for the dining hall patrons are depicted in Table 3. The one meal per day patrons divided their attendance between lunch and supper meals with less than 1% of the population eating only the midnight meal and less than 4% eating only breakfast. Lunch and supper was the most popular meal combination and about as many people consumed both meals from the main line as consumed one from the short order and one from the main line. Each of these groups was almost twice as large as the group that ate both meals from the short order line. The percentages of patrons combining either lunch or supper with breakfast or supper with midnight were less than one-fifth as large as the lunch-supper group. Most of the 3-meal-per-day patrons ate breakfast, lunch, and supper although about one-sixth of these people ate the lunch, supper, and midnight meal combination. Comparing meal patterns for all personnel versus comparing those for only the RIKs did not significantly change the results, although the percent of "one-mealers" increased at the expense of the 3-meal-per-day group. Other patterns, not shown, were exhibited by less than 1% of the population.

The average daily nutrient intakes per dining hall patron (Table 4) indicated that the RIK personnel obtained more nutrients from the dining hall during weekdays than the other personnel. This was not observed during the weekend days. Since RIK personnel accounted for about 90% of all personnel attending the dining hall, the non RIKs consumptions would have to differ from RIKs consumptions by 10 times the differences between the two groups.

Milk, soft drink, and ice cream consumptions for the eight-day survey are summarized in Table 5. The data show that consumptions of these three foods were higher for the short order meals than for the A ration meals, although the differences were not significant. Milk consumptions were higher during lunch and supper meals than during breakfast and midnight meals.

Food consumption from sources other than the military dining hall, as reported on questionnaires (a diary method), is presented in Table 6. As expected, food intakes from these sources were higher during the weekend, 937 kcal/day, than during the weekdays, 634 kcal per person per day. Soft drinks contributed 159 and alcoholic beverages 105 kcal per workday. Alcoholic beverage consumption increased to 216 kcal per day for the weekend.

The total nutrient consumptions for the RIK personnel are presented in Table 7. The dining hall provided 76% of the calories, 86% of the protein, 84% of the fat, 71% of the carbohydrate, 90% of the iron, 93% of the vitamin A, 88% of the thiamin, and 85% of the riboflavin consumed by personnel.

The distributions of calories available from protein, fat, and carbohydrate in the meals served in the dining hall and in the foods consumed by the RIK personnel are depicted in Table 8. Dining hall meals had 15% of the calories as protein, 42% as fat and 43% as carbohydrate. The foods consumed from other sources had only 9% of the calories as protein and 28% as fat but were high in carbohydrate (64% of the calories). The total food consumed by these personnel contained 14% protein, 39% fat and 47% carbohydrate calories.

Plate waste data are summarized in Tables 9a, 9b, and 9c. The total average plate waste, based upon weight, for the combined regular and midnight breakfast (Table 9a) was 3.65%. The largest percent wastes were 9.24% for pancakes, 8.45% for canned pears and 7.92% for coffee cake. Quantitatively, the largest amounts of wastes were milk, orange juice, and hash brown potatoes. Although the total average plate waste for the short order lunches and suppers (Table 9b) was 2.99%, wastes for certain food items were high, e.g. over 20% for cheese cake and lettuce and over 15% for onions, cakes, and franks and beans. The largest quantities of wastes were for franks and beans, cakes, and hamburger rolls. Wastes for the A ration lunches and suppers (Table 9c) were much higher, averaging 6.88% overall. Percent wastes were over 40% for cucumber salad, coleslaw, barbecued chicken (including bones) and relish tray. Total quantities of wastes were greatest for green salad, fried chicken (including bones), pies, cakes and mashed potatoes.

The plate wastes by food group combined for all meals (Table 10) show that salads had the greatest wastes (28.6%) and that desserts, mixed dishes or casseroles and vegetables had just over 11% wastes. The lower percentage wastes were 0.8% for soft drinks, 1.4% for dairy products and 3.0% for sugar items and fruit juices.

Potatoes (91.98 kg including all types) and gravy (65.49 kg) accounted for much of the edible foods discarded in the kitchen (Table 11). However, 41.63 kg of tuna and noodles, 18.15 kg of vegetable soup, 17.38 kg of Spanish franks, and lesser amounts of numerous other foods were also wasted.

DISCUSSION

Establishment of the nutritional standards for military personnel is the responsibility of The Surgeons General of the three services (1). These standards are based upon the National Research Council dietary allowances (2). The military allowances are intended to provide adequate nutrition for the military person, under normal conditions, and to provide sufficient calories for maintenance of body weight of all personnel and optimal growth of the younger individuals.

They are also intended to provide some margin of safety for variations in body size and/or individual variations in requirements.

The Master Menu is the basic guide for the feeding of enlisted personnel within the military services. The daily issue ranges from 4400 to 4800 kcal to assure that 3600 to 3800 edible calories are provided to these personnel.

The Lowry Air Force Base Nutrition Survey provided the first opportunity for an evaluation of short order serving lines in the military dining facility. This was a limited study designed to (a) measure and evaluate food intakes and wastes in the military dining hall, (b) examine the acceptability of a new feeding system that included short order type meals and (c) observe the attendance patterns for this new system. This study was limited to observations within the dining hall and the data from the food diaries submitted by these personnel.

The differences of nutrient contents of these meals, between analytical values and those calculated using standard handbook concentrations, were significant. Analytical values for calories were significantly greater than calculated values for main breakfasts, main lunches, and short order suppers, despite the fact that analytical values for fat were significantly less than calculated values for all meals. Low analytical values for fat in food composites have been attributed to incomplete extraction (9). Therefore, the increased calories from analytical values were due to higher values for protein and carbohydrate. Since carbohydrate is calculated by difference, any errors in the determination of the other constituents (e.g., low fat values) contributes to errors in the amount of carbohydrate present. The higher analytical values for iron and the B-vitamin in comparison to those obtained from the computer programs and nutrient factor file assembled from the handbooks (3-6) probably reflect the fortification of many food items with micronutrients and the need to update these standard references. The low analytical values for vitamin A compared to handbook values may reflect a greater specificity for vitamin A by this method (11) or an interference in the analytical procedure.

Comparing the food consumptions from the main serving line to those from the short order line shows that caloric intakes were greater for short order meals for both lunches and suppers. This was attributable primarily to increased carbohydrate consumption for the short order lunch, while protein, fat and carbohydrate were higher for the short order supper than for the main supper. None of the differences between main and short order meals for the analytical values for vitamins and minerals were significant and only the calcium, phosphorus, potassium and riboflavin differences were significant for the handbook values.

The number of lunch and supper meals were about equal, both for weekdays and for weekend days, although the number of meals during the weekends were reduced over 30% compared to weekdays. Breakfast attendance was reduced by approximately 75% during the weekends and no midnight meals were served during the weekends. The number of meals was reduced by about 45% for the two weekend days. The number of people eating in the dining hall was reduced by 29% for all personnel and only 24% for RIK personnel. This is shown by the reduction from 30.5 to less than 4% of RIK personnel eating 3 meals per day during the weekends with a comparable increase in those eating only one meal per day, and by the reduction of dining hall utilization from 50 to less than 28%. During the weekdays, each RIK person who ate in the dining hall on a particular day consumed 2.1 meals per day in the dining hall (based on man-days). However, an average of 29% of the RIK personnel did not eat a meal in the dining hall for each day and this reduces the number of meals per day per RIK person to 1.5. Similar data for the weekend days were 1.6 meals per day for attenders, an average of 46% did not eat in the dining hall for each weekend day and the average was 0.8 meals per day per person for the total RIK population. During the 8-day survey period each RIK person ate 1.3 meals per day in the dining hall, which must be considered as poor utilization. Short order meals accounted for 32% of the meals served to RIK personnel and whether or not the availability of short order meals affected dining hall utilization could not be evaluated from these data.

The meal patterns of the RIK personnel shifted drastically for the weekends since the number of personnel eating one meal per day increased 23% while those eating 3 meals per day decreased 27%. The percentage of these personnel eating only breakfast remained at less than 4%, but doubled for those eating only lunch (12 to 24%) and only supper (10 to 23%). Although the number of these personnel eating two meals per day only increased from 42.0% for weekdays to 45.8% for weekend days, the pattern shifted to 40.2% eating lunch and supper during the weekends compared to 25.5% during weekdays. This would be expected since most of these personnel would not get up for breakfast on the weekends when they did not have any duties and no midnight meals were served during the weekends.

During the work week, RIK personnel obtained about 79% of the caloric intakes from the dining hall and this was reduced to 65% during the weekends (Tables 4, 6 and 7). Caloric intakes averaged 2975 kcal per day for the 8 days, 3036 kcal for weekdays and 2658 kcal per day for weekends. Although these were significantly less than the 3400 kcal per day recommended in the Military Standards (1) at that time, they were adequate by the NRC allowances of 2800 kcal per day for moderately active men (2). Intakes of vitamin A, thiamin, and iron

were less than the recommended amounts of either Army or NRC standards. These intakes were calculated from the handbook values for nutrients in the foods. If the analytical values had been used, iron and thiamin intakes would have been adequate; but vitamin A intakes would have been much lower. Therefore, these low vitamin A intakes are a serious nutritional problem that needs correction before it becomes a serious medical problem. The vitamin A content of the short order meals was considerably lower than that of the A ration consumptions, thereby aggravating the problem.

The calories provided by the dining hall meals averaged 42% from fat (range of 39 to 45%). This exceeds the 35% maximum recommended by the Office of The Surgeon General (OTSG) Committee of Nutrition Consultants during their meeting in 1973. The fat content of the short order meals was not greater than that of A ration meals. These values for fat are consistent with values found in earlier dining hall studies (13,14). These levels of fat are comparable to those of normal American diets and result from large intakes of animal and dairy products and the popularity of deep fat frying and grilling as methods of food preparation. The issuing of government surplus commodities, including butter, without charge to food allowances in military dining facilities, encourages the use of fat as seasoning for foods. Although the foods consumed from sources other than the dining hall contained less than 28% of their calories from fat, fat contributed almost 39% of the total caloric intake of the RIK personnel (Table 8).

The consumption of over 290 g of milk per meal was higher than expected considering the ad libitum availability of soft drinks and ice cream. Although soft drink consumption was higher for short order meals than main meals, milk and ice cream consumptions also were increased for these meals. This milk intake was higher than that observed during the Ft. Myer study (15) where soft drinks were similarly available but was considerably lower than intakes observed in military dining halls (13,14,16) before soft drinks were available in these facilities.

Plate wastes can provide indications of food acceptability. One must make these evaluations cautiously and include other influences upon plate wastes such as serving sizes, total amounts of foods served for the meal, the availability of other foods and the activity, and consequently hunger of the patrons. Plate wastes for breakfast meals were relatively low with an overall average of 3.65% and the highest waste of 9.2% for pancakes. Short order foods were well-accepted with an average waste of less than 3%. Some of the higher wastes for desserts, lettuce, onion, and beans with franks may be a reflection of excess food available, average consumptions of 1400 kcal/meal, rather than poor quality foods. The average of 6.88% total plate waste for A

ration lunches and suppers, was more than twice that of short order meals despite that food consumptions averaged over 200 kcal less. The high amounts of wastes for salads and cottage cheese could be indicative of the quality of these items due either to preparation or storage time and conditions.

Plate wastes of 7.8% for an expensive food category, such as meats, fish and poultry, could cause some concerns initially. However, removing chicken and its waste (including bones) from this average reduces the value to 5.1%. Several of the other items with high wastes have sauces, e.g., beef stew, barbecued ham, Spanish franks, sweet and sour pork, and Swiss steak. Generally, most of these wastes are the sauces. The large amounts of wastes for casseroles would suggest that serving sizes were too large or the items were poorly prepared. It appears that dairy products and eggs were highly acceptable with the exception of cottage cheese (previously mentioned) and butter (wastes probably due to patrons taking excessive amounts). Plate wastes for potatoes were dependent upon how the item was prepared. Wastes ranged from 1.4% for French fries to 23.2% for baked potatoes. Plate wastes of 10 to 15% for vegetables is normal for military dining facilities and is related to the specific vegetable. The large wastes for the desserts could be related to the total amount of food offered, portion sizes of food items, or to the quality and or portion size of the dessert item. Plate wastes for the remainder of the food groups are relatively small.

Large amounts of edible kitchen wastes of certain food items can be attributed to preparation of excessive amounts and or unacceptability by the patrons. Certain food items (Spanish franks, green beans, and lyonnaise potatoes) had large amounts of kitchen wastes and high percentages of plate wastes, reflecting poor acceptability. Other food items, such as tuna and noodles, Spanish beef patties, mashed potatoes, French fries, and gravies were prepared in excess or as a replacement for other food items; but, were not served.

CONCLUSIONS

An 8-day nutrition survey was conducted at Lowry AFB to evaluate the serving of short order foods in the military dining facility.

The nutrient contents of the short order meals, as consumed, were equivalent to those of A ration meals except short order meals contained more calories and less vitamin A than conventional meals. About 32% of the total meals per day or 42% of the lunch and supper meals consumed by RIK personnel were short order type meals.

RIK personnel were eating about 1.3 meals/day in the dining hall for the 8-day study, 1.5 meals/day for week days and 0.8 meals/day during the weekend, which is poor utilization. Based upon man-days (personnel who ate at least one meal in the dining hall within a 24-hour period equal to 67% of the RIK personnel), each person obtained about 79% of their calories from the dining hall during the week and 65% during the weekend.

Nutrient intakes for the RIK personnel, based upon average consumptions, were less than allowances for calories, vitamin A, iron and thiamin.

Waste data suggests that portion sizes were too large, some foods were of poor quality and excessive amounts of foods were prepared.

RECOMMENDATIONS

- Vitamin A, iron, and thiamin availabilities in the meals should be increased. This could be done by the addition of liver, carrots, tomatoes, breads, cereals and leafy green vegetables.

- Fat consumption should be reduced by using meats of lower fat content. Surplus food commodities have been eliminated which should contribute to reducing fat in these meals.

- Food quality should be improved through better preparation and shorter storage times; kitchen wastes could be reduced through better training for supervisory personnel, and plate wastes could be reduced by serving smaller portions and improving food quality.

- Military personnel should be encouraged to attend more meals in the dining hall but to eat smaller meals when attending. Attendance should be increased by improved food quality (better training and careers for military cooks), better atmosphere in the dining hall (lighting, decor, sound, and mood of staff), and increased length of meal hours. Meal sizes could be reduced by reducing portion sizes, making it convenient to obtain additional food (either second helpings or other foods) and increasing nutritional education and information available to patrons.

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Table 1a. Average Amounts of Nutrients Consumed per Person per Meal as Calculated from Computer Files and as Determined from Analyses of Composites. Midnight Breakfast and Main Breakfast

Parameter	Midnight Breakfast					Main Breakfast				Comp vs. Analyzed
	Computer		Analyzed		Significant	Computer		Analyzed		Significant
	Average	S.D.	Average	S.D.	Paired-t	Average	S.D.	Average	S.D.	Paired-t
Energy, kcal	1333	80	1304	271	NS	887	128	1024	124	0.002
Calorimetry, kcal	---	---	1270	275	NS (0.05)*	---	---	990	127	0.002 (NS)*
Protein, g	45.3	3.7	47.1	10.5	NS	33.1	4.1	39.5	6.3	0.003
Fat, g	65.3	3.4	38.1	11.1	0.002	43.5	8.9	32.5	7.6	0.010
Carbohydrate, g	143.6	15.5	163.9	35.9	NS	92.3	10.0	119.5	14.5	0.001
Calcium, mg	633	68	613	42	NS	504	89	474	89	NS
Phosphorus, mg	778	96	796	21	NS	621	93	672	127	NS
Iron, mg	7.1	0.6	14.8	9.3	NS	4.8	0.7	14.4	10.2	0.040
Sodium, mg	2166	359	2491	628	NS	1784	1282	1567	300	NS
Potassium, mg	1475	279	1001	187	0.020	995	167	700	127	0.001
Magnesium, mg	---	---	121	19	---	---	---	84	12	---
Vitamin A, IU	2695	374	1687	629	0.006	2166	327	1457	379	0.001
Thiamin, mg	0.86	0.14	1.41	0.16	0.003	0.51	0.08	0.93	0.14	0.001
Riboflavin, mg	1.28	0.09	1.93	0.67	0.050	0.97	0.14	1.49	0.26	0.001
Niacin, mg	6.60	0.70	9.80	2.20	0.025	3.40	0.50	6.10	1.10	0.001
Ascorbic acid, mg	60	48	---	---	---	46	30	---	---	---
Vitamin B-6, mg	---	---	0.71	0.11	---	---	---	0.59	0.11	---
Head Count	133	14	---	---	---	334	151	---	---	---

*Bomb calorimetry versus analyzed.

Table 1b. Average Amounts of Nutrients Consumed per Person per Meal as Calculated from Computer Files and as Determined from Analyses of Composites. Main Lunch and Short Order Lunch

Parameter	Main Lunch					Short Order Lunch					Comp vs. Anal.	Main vs. Short Order
	Computer		Analyzed		Significant	Computer		Analyzed		Significant	Paired-t	
	Average	S.D.	Average	S.D.	Paired-t	Average	S.D.	Average	S.D.	Paired-t	Computer	Analyzed
Energy, kcal	1165	153	1291	177	0.002	1424	111	1480	134	NS	0.008	0.011
Calorimetry, kcal	---	---	1205	185	NS(0.001)*	---	---	1413	125	NS(0.007)*	---	0.008
Protein, g	47.8	5.6	58.3	14.1	0.030	51.0	4.5	55.6	4.0	0.002	0.050	NS
Fat, g	58.7	15.0	40.6	12.1	0.003	66.0	8.0	42.5	8.0	0.001	NS	NS
Carbohydrate, g	114.5	20.3	139.8	30.1	0.050	162.5	14.9	184.8	25.5	0.002	0.003	0.005
Calcium, mg	529	80	539	126	NS	684	86	517	80	0.001	0.001	NS
Phosphorus, mg	727	82	836	146	NS	875	80	889	58	NS	0.002	NS
Iron, mg	5.9	1.4	13.0	6.1	0.025	7.0	0.6	13.5	7.0	0.040	NS	NS
Sodium, mg	1725	492	2650	547	0.020	2140	521	3068	1080	0.020	NS	NS
Potassium, mg	1388	284	1245	169	NS	2131	198	1355	125	0.001	0.001	NS
Magnesium, mg	---	---	143	20	---	---	---	145	12	NS	---	---
Vitamin A, IU	2315	789	1265	808	0.040	1789	259	1023	504	0.004	NS	NS
Thiamin, mg	0.64	0.22	1.01	0.33	0.002	0.61	0.05	1.06	0.13	0.001	NS	NS
Riboflavin, mg	1.07	0.13	1.46	0.28	0.006	1.21	0.13	1.58	0.25	0.006	0.022	NS
Niacin, mg	9.4	1.3	17.4	8.2	0.025	10.0	0.70	15.1	4.6	0.020	NS	NS
Ascorbic acid, mg	26	9	---	---	---	38	12	---	---	---	0.028	---
Vitamin B-6, mg	---	---	0.78	0.07	---	---	---	0.78	0.09	---	---	NS
Head Count	448	69	---	---	---	252	64	---	---	---	0.001	---

*Bomb calorimetry versus analyzed

Table 1c. Average Amounts of Nutrients Consumed per Person per Meal as Calculated from Computer Files and as Determined from Analyses of Composites. Main Supper and Short Order Supper

Parameter	Main Supper					Short Order Supper			
	Computer		Analyzed		Significant	Computer		Analyzed	
	Average	S.D.	Average	S.D.	Paired-t	Average	S.D.	Average	S.D.
Energy, kcal	1108	160	1163	181	NS**	1375	155	1554	192
Calorimetry, kcal	---	---	1122	191	NS(.025)*	---	---	1490	173
Protein, g	43.9	6.0	48.9	9.1	NS	48.8	5.1	58.0	7.0
Fat,g	52.2	10.3	31.3	8.6	0.003	63.9	7.5	49.1	15.0
Carbohydrate,g	119.8	14.8	142.8	39.9	NS	157.1	18.8	184.3	22.1
Calcium, mg	526	58	501	98	NS	639	91	546	144
Phosphorus, mg	684	70	757	171	NS	832	85	884	169
Iron, mg	5.8	1.0	11.1	2.9	0.0025	7.0	0.6	11.9	10.1
Sodium, mg	2045	621	2404	629	NS	2001	260	2873	593
Potassium, mg	1317	259	1111	355	NS	2000	163	1382	297
Magnesium, mg	---	---	131	26	---	---	---	150	22
Vitamin A, IU	3207	688	1107	623	0.001	1818	643	893	314
Thiamin, mg	0.62	0.15	0.88	0.22	0.011	0.59	0.04	0.90	0.26
Riboflavin, mg	1.02	0.09	1.46	0.39	0.011	1.12	0.13	1.55	0.35
Niacin, mg	9.1	1.9	12.5	4.3	NS	9.9	0.70	13.6	2.7
Ascorbic acid, mg	32	12	---	---	---	35	6	---	---
Vitamin B6, mg	---	---	0.74	0.16	---	---	---	0.85	0.11
Head Count	419	86	---	---	---	269	53	---	---

*Bomb Calorimetry versus Analyzed
**NS = Not Significant

Table 1c. (cont.) Average Amounts of Nutrients Consumed per Person per Meal as Calculated from Computer Files and as Determined from Analyses of Composites. Main Supper and Short Order Supper

Parameter	Computer vs. Analyzed Significant Paired-t	Main vs. Short Order Paired-t	
		Computer	Analyzed
Energy, kcal	0.001	0.001	0.001
Calorimetry, kcal	0.005(.009)*	---	0.001
Protein, g	0.0025	0.030	0.013
Fat, g	0.010	0.013	0.042
Carbohydrate, g	0.012	0.001	0.020
Calcium, mg	NS	0.005	NS
Phosphorus, mg	NS	0.005	NS
Iron, mg	NS	0.009	NS
Sodium, mg	0.003	NS	NS
Potassium, mg	0.001	0.001	NS
Magnesium, mg	---	---	NS
Vitamin A, IU	0.004	0.002	NS
Thiamin, mg	0.013	NS	NS
Riboflavin, mg	0.006	0.027	NS
Niacin, mg	0.003	NS	NS
Ascorbic acid, mg	---	NS	---
Vitamin B-6, mg	---	---	NS
Head Count	---	0.001	---

*Bomb Calorimetry versus Analyzed
**NS = Not Significant

Table 2. Dining Hall Attendance and Utilization

Meal	RIK Personnel			All Personnel		
	Weekdays 6	Weekends 2	All Days 8	Weekdays 6	Weekends 2	All Days 8
	Number Signed-In					
Breakfast	350	84	284	399	106	326
Lunch, Main	399	302	375	480	340	445
Lunch, S. O.	265	150	236	280	155	249
Supper, Main	354	256	329	409	296	381
Supper, S.O.	298	201	278	303	207	279
Midnight	109	-	109	124	-	124
Total/Day	1775	993	1606	1995	1104	1804
Average Man-Days		839	638	788	955	685
	Percent of Man-Days					
No. of Meals Eaten/Day						
1	27.3	50.5	32.0	32.0	49.3	35.4
2	42.0	45.8	42.9	40.4	46.6	41.4
3	30.5	3.7	25.0	27.4	3.9	23.0
4	0.2	-	0.1	0.2	-	0.2
% Utilization	50.1	27.6	43.1	42.5	23.5	3[illegible].6

Total RIK Sign-Ins (Man-days in parentheses) Per Day

Tuesday	1927 (862)	Saturday	939 (609)
Wednesday	1891 (863)	Sunday	1047 (666)
Thursday	1782 (832)	Monday	1854 (841)
Friday	1524 (791)	Tuesday	1667 (821)

Table 3. Percentage of Personnel Eating Various Combination of Meals in the Dining Hall

	RIK Personnel			All Personnel		
Meals	Weekdays 6	Weekends 2	All Days 8	Weekdays 6	Weekends 2	All Days 8
Breakfast	3.7	3.8	3.8	5.5	3.0	5.0
Lunch	12.4	23.6	14.7	15.8	22.8	17.2
Main	(7.2)	(15.0)	(8.8)	(10.8)	(14.6)	(11.5)
Short Order	(5.2)	(8.6)	(5.9)	(5.0)	(8.2)	(5.7)
Supper	10.2	23.1	12.6	9.2	23.4	12.0
Main	(5.5)	(14.3)	(7.1)	(5.2)	(14.9)	(7.0)
Short Order	(4.7)	(8.8)	(5.5)	(4.0)	(8.5)	(5.0)
Midnight	1.0	-	0.9	1.6	-	1.2
Total (one Meal)	27.3	50.5	32.0	32.1	49.2	35.4
Breakfast & Lunch	5.8	2.9	5.2	6.3	2.6	5.6
Main & Main	(2.9)	(2.0)	(2.7)	(3.6)	(1.4)	(3.2)
Main & S.O.	(2.9)	(0.9)	(2.5)	(2.7)	(1.2)	(2.4)
Breakfast & Supper	4.8	2.7	4.4	4.3	3.6	4.1
Main & Main	(2.8)	(1.8)	(2.5)	(2.6)	(2.0)	(2.4)
Main & S.O.	(2.0)	(0.9)	(1.9)	(1.7)	(1.6)	(1.7)
Lunch & Supper	25.5	40.2	28.6	24.1	40.4	27.2
Main & Main	(9.5)	(16.59)	(10.9)	(9.5)	(18.8)	(11.3)
Main & S.O.	(5.7)	(11.4)	(7.0)	(5.2)	(10.4)	(6.2)
S.O. & Main	(4.6)	(5.1)	(4.7)	(4.2)	(4.9)	(4.3)
S.O. & S.O.	(5.7)	(6.3)	(6.0)	(5.2)	(6.3)	(5.4)
Supper & Midnight	4.8	-	3.8	4.5	-	3.6
Main & Main	(2.1)	-	(1.7)	(1.9)	-	(1.6)
S.O. & Main	(2.7)	-	(2.1)	(2.6)	-	(2.0)
TOTAL (two meals)	42.0	45.8	42.9	40.4	46.6	41.4
Breakfast, Lunch,& Supper	24.7	3.6	20.4	22.3	3.9	18.9
Main, Main & Main	(9.6)	(1.1)	(7.8)	(8.8)	(1.3)	(7.4)
Main, Main & S.O	(5.2)	(0.9)	(4.4)	(4.7)	(1.0)	(4.0)
Main, S.O. & Main	(4.7)	(0.4)	(3.8)	(4.2)	(0.4)	(3.5)
Main, S.O. & S.O.	(5.2)	(1.2)	(4.4)	(4.6)	(1.2)	(4.0)
Lunch, Supper, & Mid	5.3	-	4.2	4.7	-	3.9
Main, Main & Main	(2.7)	-	(2.1)	(2.3)	-	(1.9)
Main, S.O. & Main	(1.5)	-(1.2)	(1.2)	(1.3)	-	(1.1)
TOTAL (three meals)	30.5	3.7	25.0	27.4	3.9	23.0

S.O. = Short Order.

Table 4. Average Nutrient Intake per Person per Day as Calculated from Nutrient Factor File and Eating Patterns

Nutrient	RIK Personnel			All Personnel		
	Weekdays 6	Weekends 2	All Days 8	Weekdays 6	Weekends 2	All Days 8
Energy, kcal	2304	1715	2191	2402	1721	2265
Protein, g	87.2	68.7	83.7	90.7	69.0	86.3
Fat, g	109.1	77.5	103.1	113.4	77.8	106.2
Carbohydrate, g	247.5	189.7	236.4	259.3	189.9	245.4
Calcium, mg	1059	862	1022	1106	857	1056
Phosphorus, mg	1369	1104	1318	1427	1104	1361
Iron, mg	11.8	9.3	11.3	12.3	9.3	11.7
Sodium, mg	3667	2411	3425	3823	2414	3539
Potassium, mg	2731	2300	2650	2862	2311	2751
Vitamin A, IU	4058	3773	4007	4205	3727	4106
Thiamin, mg	1.23	0.85	1.15	1.28	0.84	1.19
Riboflavin, mg	2.05	1.63	1.97	2.13	1.62	2.03
Niacin, mg	15.9	13.5	15.5	16.6	13.6	16.0
Ascorbic acid,mg	64	43	60	67	44	62
	Vitamins/1000 kcal Consumed					
Thiamin	0.53	0.50	0.52	0.53	0.49	0.53
Riboflavin	0.89	0.95	0.90	0.89	0.94	0.90
Niacin	6.90	7.90	7.10	6.90	7.90	7.10

Table 5. Average Consumption of Milk, Soft Drinks, and Ice Cream (grams/person/meal)

Meal	Milk		Soft Drinks		Ice Cream	
	Average	S.D	Average	S.D.	Average	S.D.
Breakfast	293.2	78.7	-	-	-	-
Lunch, Main	339.9	43.0	71.8	24.5	14.6	13.7
Lunch, Short Order	383.2	38.5	121.6	73.2	21.6	14.7
Supper, Main	305.1	34.8	88.9	51.9	14.1	10.7
Supper, Short Order	337.2	62.0	137.0	67.2	22.4	8.6
Midnight	294.9	108.5	-	-	-	-

Table 6. Food Intake from Sources Other than the Dining Hall*

Nutrient	6 Workdays	2 Weekend Days	All Days
Energy, kcal	634.0	937.0	710.0
Protein,g	11.1	21.3	13.7
Fat, g	17.4	26.9	19.8
Carbohydrate,g	93.4	125.3	101.4
Calcium, mg	137.0	197.0	152.0
Phosphorus	233.0	379.0	269.0
Iron, mg	1.2	1.7	1.3
Sodium, mg	399.0	803.0	500.0
Potassium, mg	376.0	590.0	429.0
Vitamin A, IU	264.0	512.0	326.0
Thiamin, mg	0.14	0.26	0.17
Riboflavin, mg	0.30	0.49	0.35
Niacin, mg	3.4	6.2	4.1
Ascorbic acid, mg	5.0	11.0	3.0

*Average/person/day. Questionnaires from 410 of the RIK personnel.

Table 7. Average Nutrient Consumptions for RIK Personnel for 8 Days from the Military Dining Hall and Other Sources

Nutrient	Dining Hall	Outside Dining Hall	TOTAL
Energy, kcal	2265	710	2975
Protein, g	86.3	13.7	100.0
Fat, g	106.2	19.8	126.0
Carbohydrate, g	245.4	101.4	346.8
Calcium, mg	1056	152	1208
Phosphorus, mg	1361	269	1630
Iron, mg	11.7	1.3	13.0
Sodium, mg	3539	500	4039
Potassium, mg	2751	429	3180
Vitamin A, IU	4106	326	4432
Thiamin, mg	1.19	0.17	1.36
Riboflavin, mg	2.03	0.35	2.38
Niacin, mg	16.0	4.1	20.1
Ascorbic acid, mg	62.0	3.0	65.0
Vitamin Intake/1000 kcal Consumed			
Thiamin	0.53		0.46
Riboflavin	0.90		0.80
Niacin	7.10		6.80

Table 8. Percent of Calories from Protein, Fat, and Carbohydrate

Dining Hall Meal	Protein	Fat	Carbohydrate
Breakfast	14.8	44.4	40.8
Lunch, Main	16.3	44.4	39.3
Lunch, Short Order	15.8	42.3	41.9
Supper, Main	14.4	39.6	46.0
Supper, Short Order	14.4	39.0	46.6
Midnight	13.7	45.3	41.0
Average of All Meals Served	14.9	42.5	42.6
RIK Consumption			
From Dining Hall	15.1	41.9	43.0
From Other Sources	8.6	27.9	63.5
TOTAL	13.7	38.8	47.5

Table 9a. Summary of Plate Wastes: Combined Regular and Midnight Breakfasts

Food Items	Grams Served	Grams Wasted	Percent Wasted
Pancakes	231.6	21.4	9.24
Pears (canned)	59.2	3.6	8.45
Coffee Cake	142.7	11.3	7.92
Cereal, Dry	135.9	10.7	7.87
Sausage	106.3	8.2	7.71
Grits (hominy)	210.7	15.7	7.45
Ham	115.6	7.3	6.31
Bacon	132.1	8.1	6.13
Cream of Wheat	33.2	2.0	6.02
French Toast	209.8	16.9	5.81
Syrup, Maple	212.7	12.2	5.74
Potatoes, Hash Brown	509.5	28.8	5.65
Bread (toast)	440.2	23.2	5.27
Butter	81.3	23.2	5.27
Pineapple Juice	158.1	7.8	4.93
Oatmeal	105.8	4.3	4.06
Orange Juice	1112.5	33.8	3.94
Jam-Jelly	48.2	1.8	3.74
Tomato Juice	246.0	3.1	3.62
Eggs	1141.7	37.5	3.28
Peaches (canned)	280.9	5.0	3.06
Farina	33.2	1.0	3.01
Creamed Beef	446.4	11.4	2.55
Milk	4142.9	97.0	2.34
Grape Juice	798.2	15.9	1.99
Fruit Cocktail	186.7	8.9	1.93
Cheese	51.8	0.7	1.35
Sugar	67.3	0	0
Ice Cream	9.4	0	0
Salt	7.4	0	0
Average			3.65

Table 9b. Summary of Plate Wastes. Combined Short Order Lunches and Suppers

Food Items	Grams Served	Grams Wasted	Percent Wasted
Cakes, Cheese	103.3	20.8	20.13
Lettuce	192.2	38.6	20.08
Onions, Fresh	75.1	12.3	16.38
Franks and Beans	488.1	76.8	15.73
Cakes, Regular	357.4	56.1	15.68
Puddings	109.8	17.1	10.07
Cakes, Cream	60.9	5.8	9.52
Pies, All Types	357.2	33.8	9.47
Tomatoes, Fresh	222.7	16.0	7.18
Cupcakes	27.9	1.8	6.45
Rolls, Hot Dog	142.9	9.1	6.37
Pickles	181.6	9.9	5.73
Turnovers	54.5	3.1	5.69
Rolls, Hamburger	957.4	54.0	5.64
Potatoes, French Fried	1366.6	15.5	5.52
Chili	214.7	11.7	4.84
Cookies	39.9	1.5	3.76
Fish, Fried	168.8	5.0	2.96
Soups	153.5	3.3	2.15
Mustard	47.3	0.9	1.90
Relish Tray	12.6	0.2	1.59
Hamburgers	1322.4	20.9	1.58
Franks	197.9	2.6	1.35
Potato Chips	88.7	1.2	1.35
Cheese	136.1	1.6	1.18
Tartar Sauce	59.5	0.7	1.18
Catsup	335.5	3.1	0.92
Ice Cream	333.6	2.8	0.84
Kool-Milk	5790.1	28.2	0.48
Lemonade	652.1	0.8	0.13
Sugar	78.3	0	0
Crackers	34.2	0	0
Salt	5.6	0	0
AVERAGE			2.99

Table 9c. Summary of Plate Wastes. Combined A Ration Lunches and Suppers

Food Items	Grams Served	Grams Wasted	Percent Wasted
Salad, Cucumber	3.4	2.6	76.47
Coleslaw	5.9	3.4	57.62
Chicken, BBQ	126.4	55.5	43.90*
Relish Tray	10.3	4.2	40.77
Cottage Cheese	27.6	8.9	32.24
Salad, Vegetable, Green	458.6	130.6	28.37
Fruit Cocktail - Jello	35.1	9.6	27.35
Pork, Sweet & Sour	36.2	9.1	25.13
Chicken, Fried	394.9	97.3	24.63*
Potatoes, Baked	25.4	5.9	23.22
Cookies	22.4	2.4	20.11
Peas, Black-Eyed	30.5	5.7	18.68
Potatoes, Buttered	107.4	18.0	16.80
Succotash	78.5	12.5	15.92
Catsup	12.7	1.9	14.96
Cakes, Assorted	435.3	64.8	14.89
Bean, Lima	70.6	10.5	14.87
Pies, Assorted	490.3	72.2	14.73
Potatoes, Hash Browned	117.5	16.7	14.21
Peas, Buttered	102.9	14.3	13.89
Cabbage	34.4	4.7	13.66
Franks, Spanish	77.3	10.4	13.45
Chili Macaroni	427.8	44.0	13.42
Bread, Whole Wheat	38.3	5.0	13.05
Macaroni and Cheese	93.9	12.2	13.00
Puddings	48.7	6.2	12.73
Beef Stew	113.0	14.0	12.38
Beans, Green	28.5	3.5	12.28
Ham, BBQ	54.9	6.5	11.84
Swiss Steaks	47.5	5.5	11.60
Bread, Rye	43.7	5.0	11.44
Noodles	21.9	2.5	11.41
Bread, White	242.4	27.0	11.22
Potatoes, O'Brien	76.7	7.8	10.16
Beef Steaks	301.4	28.9	9.59

Table 9c (cont). Summary of Plate Wastes. Combined A Ration Lunches and Suppers

Food Items	Grams Served	Grams Wasted	Percent Wasted
Pork Loin	80.6	7.7	9.55
Carrots	100.7	9.4	9.33
Corn	127.8	11.3	8.84
Pork Chops	107.0	9.4	8.78
Beef Roast	107.3	9.4	8.70
Spaghetti	417.3	36.3	8.69
Rice	270.9	21.4	7.89
Meat Sauce	438.0	34.5	7.87
Potatoes, French Fried	59.6	4.6	7.71
Potatoes, Mashed	772.8	58.0	7.50
Bread, Garlic	46.8	3.5	7.47
Butter	84.3	6.2	7.35
Broccoli	61.8	4.4	7.11
Beets	15.1	1.0	6.62
Soups	99.5	6.4	6.40
Cauliflower	29.5	1.8	6.10
Rolls, Hot	142.0	8.3	5.84
Beef, BBQ	74.4	4.0	5.37
Fish, Fried	27.2	1.3	4.77
Spinach	113.4	5.0	4.40
Turkey a la King	120.5	5.1	4.23
Gravies	306.9	12.0	3.91
Meat Loaf	169.6	5.1	3.00
Onions, Fried	7.3	0.2	2.73
Lemonade	539.7	9.4	1.74
Kool-Aid	596.3	7.1	1.19
Pears (canned)	5.4	7.1	1.19
Turnovers	34.4	0.4	1.16
Milk	5338.7	41.3	0.77
Ice Cream	215.5	0.9	0.41
Cupcakes	361.2	1.2	0.33
Salad Dressing	87.8	0	0
Sugar	64.0	0	0
Crackers	33.7	0	0
Salad, Macaroni	10.6	0	0
Cheese Parmesan	3.8	0	0
Salt	6.2	0	0
Tartar Sauce	1.8	0	0
AVERAGE			6.88

*Including bones

Table 10. Plate Wastes by Food Groups: Summations of Average Grams/ Person for All Meals

Food Items	Grams Served	Grams Wasted	Percent Wasted
	Meats, Fish, and Poultry		
Bacon	132.1	8.1	6.1
Beef, Creamed	446.4	11.4	2.6
Beef, BBQ	74.4	4.0	5.4
Beef, Roast	107.3	9.4	8.8
Beef, Steaks	301.4	28.9	9.6
Beef Stew	113.0	14.0	12.4
Chicken, BBQ	126.4	55.5(some bones)	43.9
Chicken, Fried	394.9	97.3(some bones)	24.6
Franks	197.9	2.6	1.3
Franks, Spanish	77.3	10.4	13.4
Fish, Fried	196.0	6.3	3.2
Ham, BBQ	54.9	6.5	11.8
Ham, Grilled	115.6	7.3	6.3
Hamburgers	1322.4	20.9	1.6
Meat Loaf	169.6	5.1	3.0
Meat Sauce	438.0	34.5	7.9
Pork Chops	107.0	9.4	8.8
Pork Lion	80.6	7.7	9.6
Pork, Sweet & Sour	36.2	9.1	25.1
Sausage	106.3	8.2	7.7
Swiss Steak	47.5	5.5	11.6
AVERAGE			7.8
	Mixed Dishes		
Chili	214.7	11.7	5.4
Chili-Macaroni	427.8	44.0	10.3
Franks and Beans	488.1	76.8	15.7
Macaroni and Cheese	93.9	12.2	13.0
Turkey a la King	120.5	5.1	4.2
AVERAGE			11.14
	Diary Products and Eggs		
Butter	165.6	29.4	17.6
Cheese, American	187.9	1.6	1.2
Cheese, Cottage	27.6	8.9	32.2
Cheese, Parmesan	3.8	0	0
Eggs	1141.7	37.5	3.3
Ice Cream	558.5	3.7	0.7
Milk	15251.6	166.5	1.1
AVERAGE			1.43

Table 10. (cont) Plate Wastes by Food Groups: Summation of Average Grams/ Person for All Meals

Food Items	Grams Served	Grams Wasted	Percent Wasted
	Potatoes		
Potatoes, Hash Browned	627.0	85.5	7.3
Potatoes, Baked	25.4	5.9	23.2
Potatoes, Boiled	107.4	18.0	16.8
Potatoes, Masned	772.8	58.0	7.5
Potatoes, O'Brien	76.7	7.8	10.2
Potatoes, French Fried	1426.2	20.1	1.4
Potatoes, Chips	88.7	1.2	1.4
AVERAGE			6.29
	Vegetables		
Beans, Green	28.5	3.5	12.3
Beans, Lima	70.6	10.5	14.9
Beets	15.1	1.0	6.6
Broccoli	61.8	4.4	7.1
Cabbage	34.4	4.7	13.7
Cauliflower	29.5	1.8	6.1
Corn	127.8	11.3	8.8
Carrots	100.7	9.7	9.6
Lettuce, Fresh	192.2	38.6	20.1
Onions, Fried	7.3	0.2	2.7
Peas	102.9	14.3	13.9
Peas, Black-Eyed	30.5	5.7	18.7
Spinach	113.4	5.0	4.4
Succotash	78.5	12.5	15.9
Tomatoes	222.7	16.0	7.2
AVERAGE			11.40
	Breads and Cereals		
Cereal, Dry	135.9	10.7	7.9
Cream of Wheat	33.2	2.0	6.0
Grits, (hominy)	210.7	15.7	7.4
Farina	33.2	1.0	3.0
Oatmeal	105.8	4.3	4.1
Bread, Toast	440.2	23.2	5.3
Bread, White	242.4	27.0	11.1
Bread, Garlic	46.8	3.5	7.5
Bread, Rye	43.7	5.0	11.4
Bread, Whole Wheat	38.3	5.0	13.0
Rolls, Hot	142.0	8.3	5.8
Rolls, Hot Dog	142.9	9.1	6.4
Rolls, Hamburger	957.4	54.0	5.6
Crackers	67.9	0	0

Table 10. (cont) Plate Wastes by Food Groups: Summations of Average Grams/ Person for All Meals

Food Items	Grams Served	Grams Wasted	Percent Wasted
	Bread and Cereals (Cont)		
French Toast	290.8	16.9	5.8
Noodles	21.9	2.5	11.4
Pancakes	231.6	21.4	9.2
Spaghetti	417.3	36.3	8.7
Rice	270.9	21.4	7.9
AVERAGE			6.90
	Salads		
Coleslaw	5.9	3.4	57.6
Salad, Cucumber	3.4	2.6	76.5
Salad, Vegetable, Green	458.6	130.6	28.5
Salad, Macaroni	10.6	0	0
AVERAGE			28.55
	Soups, Gravies, and Dressings		
Soup, Assorted	253.0	9.7	3.8
Gravies	306.9	12.0	3.9
Salad Dressing	87.8	0	0
Tartar Sauce	61.3	0.7	1.1
AVERAGE			3.16
	Fruits and Juices		
Orange Juice	1112.5	33.8	3.0
Tomato Juice	246.0	3.1	1.3
Pineapple Juice	158.1	7.8	4.9
Grape Juice	798.2	15.9	2.0
Fruit Cocktail	186.7	8.9	4.8
Peaches (canned)	280.9	5.0	1.8
Pears (canned)	64.6	10.7	8.6
AVERAGE			2.99
	Desserts		
Coffee Cake	142.7	11.3	7.9
Cakes, Cream	60.9	5.8	9.5
Cake, Cheese	103.3	20.8	20.1
Cupcakes	389.1	3.0	0.8
Cookies	62.3	3.9	6.3
Turnovers	88.9	3.5	3.9
Cakes, Assorted	792.7	120.9	15.3

Table 10. (cont) Plate Wastes by Food Groups: Summations of Average Grams/ Person for All Meals

Food Items	Grams Served	Grams Wasted	Percent Wasted
	Desserts (Cont)		
Pies, Assorted	847.5	106.0	12.5
Puddings	158.5	23.3	14.7
Jello Fruit Cocktail	35.1	9.6	27.4
AVERAGE			11.46
	Sugar Items		
Jam-Jelly	48.2	1.8	3.7
Sugar	209.0	0	0
Syrup, Maple	212.7	12.2	5.7
AVERAGE			2.98
	Soft Drinks		
Kool-Aid	1653.3	13.5	0.8
Lemonade	1191.8	10.2	0.9
AVERAGE			0.83
	Miscellaneous Items		
Catsup	348.2	5.0	1.4
Mustard	47.3	0.9	1.9
Pickles	181.6	9.9	5.4
Relish Tray Items	22.9	4.4	19.1
Salt	19.2	0	0
AVERAGE			3.26

Table 11. Total Edible Foods Not Served (Kitchen Wastes), kg.

Food	Wasted	Food	Wasted
Potatoes, Mashed	52.87	Franks, Spanish	17.38
Gravy, Brown	43.07	Potatoes, French Fried	16.33
Tuna and Noodles	41.63	Turnip Greens	12.89
Gravy, Cream	22.42	Beans, Green	12.44
Soup, Vegetable	18.15	Potatoes, Lyonnaise	10.62
Potatoes, Oven-Browned	10.16	Grits, (hominy)	6.51
Soup, Onion	8.59	Oatmeal	6.50
Rice, Boiled	8.41	Sauce, BBQ	6.31
Beef Patties, Spanish	7.54	Cabbage, Boiled	5.93
Meat Sauce	7.41	Beans, Lima	5.76
Spaghetti	5.23	Soup, Chef's	3.98
Franks	4.91	Broccoli, Boiled	3.89
Succotash	4.17	Peas and Carrots, Boiled	3.20
Beans and Franks	4.11	Carrots, Boiled	2.05
Sauce, Chili Dog	4.11	Potatoes, Hash-Browned	2.00
Chili	1.52	Pancakes	0.98
Chicken, BBQ	1.46	Meatloaf	0.60
Fish, Fried	1.40	Chicken, Fried	0.53
Sauce, Spanish	1.29	Onions, Fresh	0.36
Beef, Creamed	1.14	Rolls, Hot Dog	0.30

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