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PASSIVE NUTRITION INTERVENTION IN A MILITARY-OPERATED GARRISON DINING FACILITY FT DEVENS II

U S ARMY RESEARCH INSTITUTE
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In January 1988, the second nutrition assessment of 52 male soldier volunteers from Ft. Devens, Massachusetts, subsisting in Consolidated Dining Facility #2 was completed. This study was planned as a passive nutrition intervention study in an attempt to moderate soldiers high intakes of cholesterol at the breakfast meal. The study was completed by the Military Nutrition Division of the U.S. Army Research Institute of Environmental Medicine (USARIEM), in response to a tasking from the Office of the Deputy Chief of Staff for Logistics (ODCSLOG) and is the fourth in a continuing series of nutrition assessments of soldiers subsisting in garrison dining facilities. The purpose of the garrison dining facility studies is to evaluate the impact of nutrition initiatives planned to moderate soldiers' sodium, fat and cholesterol intakes and provide soldiers low calorie menu selections. Nutrient intakes were evaluated by comparing average daily nutrient intakes, expressed

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as group means, with the Office of the Surgeon General (OTSG) Military Recommended Dietary Allowances (MRDA AR 40-25).

Previous garrison dining facility nutrition studies results indicated that test subjects average daily cholesterol intakes were at least two times the levels (<300 mg/day) recommended by the American Heart Association, the National Cholesterol Education Program and others. Fifty to sixty percent of total daily cholesterol was obtained at breakfast meals with egg entrees contributing 70% to 80% of breakfast cholesterol. On four days of the eight day garrison dining facility passive nutrition intervention study, a commercially available low cholesterol egg product was mixed with one egg (versus the two usually used), for scrambled egg and omelet entrees. This reduced the cholesterol obtained from scrambled egg and omelet entrees from 272 ± 117 mg to 135 ± 34 mg, respectively, which was statistically significant ($P<0.01$). Total breakfast cholesterol which includes all foods consumed at the breakfast meal that contain cholesterol, e.g., breakfast meats, etc., was reduced by 141 mg (427 ± 171 mg to 286 ± 133 mg) and was also statistically significant ($P<0.01$). Average daily cholesterol intakes were reduced by 108 mg (749 ± 238 mg vs 641 ± 240 mg) on the four intervention days using the low cholesterol egg product and one egg. Hedonic rating data indicated no difference in acceptability for the scrambled egg and omelet entrees prepared with one egg and 2 ounces of low cholesterol egg product compared to the usual scrambled egg and omelet entrees.

Nutrient intakes of the Ft. Devens II test subjects met or exceeded the MRDA for energy, protein, vitamins, and minerals. Sodium intakes for the test subjects of 1709 mg/1000 kcals were slightly above the OTSG guidelines of 1400-1700 mg sodium per 1000 kcals. Approximately 9% of total sodium was obtained from salt added by the test subjects. Test subjects fat intakes of 40.3%, were approximately five percent higher than what was reported for similarly aged males in the 1985 Nationwide Food Consumption Survey and exceeded the MRDA target level of 35% (maximum) of total calories. A military standard for cholesterol intakes is needed. Cholesterol intakes of test subjects were at least two to two-and-one-half times higher than what civilian cholesterol standards recommend (<300 mg/day).

PASSIVE NUTRITION INTERVENTION

IN A MILITARY-OPERATED GARRISON DINING FACILITY

FT DEVENS II

EILEEN G. SZETO, CPT, SP[1]
JEANNE A. GALLO, MAJ, SP[2]
KENNETH W. SAMONDS, Ph.D[3]

[1]U.S. Army Research Institute of Environmental Medicine
Natick, MA 01760-5007

[2]Cutler Army Community Hospital
Nutrition Care Division
Ft. Devens, MA 01433-6401

[3]University of Massachusetts
Dept. of Food Science and Nutrition
Amherst, MA 01003

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Human Subjects participated in these studies after giving their free and informed voluntary consent. Investigators adhered to AR 70-25 and USAMRDC Regulation 70-25 on Use of Volunteers in Research.

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ABSTRACT

In January 1988, the second nutrition assessment of 52 male soldier volunteers from Ft. Devens, Massachusetts, subsisting in Consolidated Dining Facility #2 was completed. This study was planned as a passive nutrition intervention study in an attempt to moderate soldiers high intakes of cholesterol at the breakfast meal. The study was completed by the Military Nutrition Division of the U.S. Army Research Institute of Environmental Medicine (USARIEM), in response to a tasking from the Office of the Deputy Chief of Staff for Logistics (ODCSLOG) and is the fourth in a continuing series of nutrition assessments of soldiers subsisting in garrison dining facilities. The purpose of the garrison dining facility studies is to evaluate the impact of nutrition initiatives planned to moderate soldiers' sodium, fat and cholesterol intakes and to provide soldiers with low calorie menu selections. Nutrient intakes were evaluated by comparing average daily nutrient intakes, expressed as group means, with the Office of the Surgeon General (OTSG) Military Recommended Dietary Allowances (MRDA AR 40-25).

Previous garrison dining facility nutrition studies results indicated that test subjects average daily cholesterol intakes were at least two times the levels (<300 mg/day) recommended by the American Heart Association, the National Cholesterol Education Program and others. Fifty to sixty percent of total daily cholesterol was obtained at breakfast meals with egg entrees contributing 70% to 80% of breakfast cholesterol. On four days of the eight day garrison dining facility passive nutrition intervention study, a commercially available low cholesterol egg product was mixed with one egg (versus the two usually used), for scrambled egg and omelet entrees. This reduced the cholesterol obtained from scrambled egg and omelet entrees from 272 ± 117 mg to 135 ± 34 mg, respectively, which was statistically significant ($P<0.01$). Total breakfast cholesterol which includes all foods consumed at the

breakfast meal that contain cholesterol, e.g., breakfast meats, etc., was reduced by 141 mg (427 ± 171 mg to 286 ± 133 mg) and was also statistically significant ($P<0.01$). Average daily cholesterol intakes were reduced by 108 mg (749 ± 238 mg vs 641 ± 240 mg) on the four intervention days using the low cholesterol egg product and one egg. Hedonic rating data indicated no difference in acceptability for the scrambled egg and omelet entrees prepared with one egg and 2 ounces of low cholesterol egg product compared to the usual scrambled egg and omelet entrees.

Nutrient intakes of the Ft. Devens II test subjects met or exceeded the MRDA for energy, protein, vitamins, and minerals. Sodium intakes for the test subjects of 1709 mg/1000 kcals were slightly above the OTSG guidelines of 1400-1700 mg sodium per 1000 kcals. Approximately 9% of total sodium was obtained from salt added by the test subjects. Test subjects fat intakes of 40.3%, were approximately five percent higher than what was reported for similarly aged males in the 1985 Nationwide Food Consumption Survey and exceeded the MRDA target level of 35% (maximum) of total calories. A military standard for cholesterol intakes is needed. Cholesterol intakes of test subjects were at least two to two-and-one-half times higher than what civilian cholesterol standards recommend (<300 mg/day).

INTRODUCTION

Literature Review

Despite a 40% decrease in deaths from coronary heart disease in the past two decades; coronary heart disease is the leading cause of death in the United States, outnumbering deaths from cancer and accidents combined (1,2,3). In the military population heart disease is the second leading cause of death (4). More than half of all American adults have total blood cholesterol levels that exceed federal guidelines of 200 milligrams per deciliter of blood (1,5,42). During the 1985 Combat Field Feeding System - Force Development Test and Experimentation (CFFS-FDTE) in Hawaii, a pretest screening revealed that approximately 40% of the 200 soldiers sampled had serum cholesterol levels greater than 200 mg/dl (6). A recently reported nutritional survey of U.S. Navy Sea, Air and Land (SEAL) trainees indentified 38% of 277 study participants with serum cholesterol levels above 205 mg/dl (7).

Although dietary fat intake has declined somewhat in recent years, a report by a committee of the National Research Council claims that most Americans still consume too much fat, cholesterol and saturated fatty acids, which, in excessive amounts, have been linked to heart disease, stroke and some types of cancer (8). The committee's report provided 18 recommendations to promote leaner and healthier animal products such as: changing beef grading so meatpackers could remove an outer layer of fat immediately after slaughter, changing government standards to encourage lower fat in ice cream, lower fat and sodium in cheese, and consumer nutrition education (8).

Cholesterol was established as a cardiovascular risk factor more than 20 years ago and is the focus of intense interest (5). The lay press has recently reported on the existence of a "health information glut"; claiming that consumers are bewildered, and the existence of remarkable gaps in consumer knowledge of how to protect themselves against heart disease (5). A U.S. Department of Agriculture survey conducted between 1977 and 1985 and released last fall, found that only one-third of

those questioned were aware that dietary cholesterol is found exclusively in animal products (5). The Tufts University Diet and Nutrition Letter reported that the majority of consumers who took part in a national survey when asked "if you wanted to make sure you'd be getting beef that is low in fat, which grade would you buy--Prime, Choice, or Good?" incorrectly selected "Prime" (9).

The lay press claims that cholesterol confusion is epidemic and the confusion is understandable because researchers have repeatedly changed their minds about the health implications of cholesterol (5). Scientists now say foods that were once believed to raise blood cholesterol levels, such as fatty fish and olive oil, can lower cholesterol levels (5). An editorial written in Circulation discusses the "ecological fallacy" which the author claims, is an important source of the current misunderstanding and controversy about diet-disease relationships (10). The author describes an inappropriate extrapolation of evidence from group data to the individual and vice versa. Similarly, a report written by the Department of Health and Human Services and Department of Agriculture states that epidemiologic studies are confounded by the effects of other dietary variables on blood cholesterol that make it very difficult to isolate the effect of dietary cholesterol on blood cholesterol. Saturated fat is implicated in this respect, but other factors such as total fat content of the diet, fatty acid composition and fiber are also of importance. In addition, obesity, lack of exercise, and increasing age are associated with increased blood cholesterol levels. Dietary cholesterol appears to raise blood cholesterol in most people, but there is marked variability in individual responses. Ten to twenty percent of adults appear to be "hyper-" or "high-responders" and will manifest a more pronounced increase in blood cholesterol. Reliable measurement of an individual's response is quite difficult. No simple discrete marker for sensitivity is available, but the response is probably under genetic control (1).

Recent findings of the 25-year Western Electric Company study of 1969 men have shown a direct link between increased cholesterol in the diet and an increased risk of a fatal heart attack (11). The men studied in the Chicago plant, had a median cholesterol intake of 737 milligrams per day. The results of 6 (including the subject of this report) Military Nutrition Research Division Studies have shown that cholesterol intakes of test subjects consuming primarily A-rations average over 700 milligrams of cholesterol per day (6,12,13,14,15). A number of studies reported between 1981 and 1985 are remarkably similar in their estimates of cholesterol intake for Americans in the mid-1970's. The average intake for Americans was reported as 300-600 mg cholesterol per day with great between person variability (1).

The costs associated with coronary heart disease are staggering: in excess of $60 billion per year in direct health care costs, lost wages and productivity (16,17). The costs of treating high serum cholesterol levels (>240 mg/dl) with cholesterol reducing drugs is also quite high: up to $2,000 per year and for each year of life saved through lowering blood cholesterol with widely prescribed drugs range from $31,000 to $117,400 per year of life saved, not to mention the unpleasant side effects of drug therapy (5,18).

Autopsy reports of American soldiers killed during the Korean and Vietnam Conflicts indicated that 77% of Korean Conflict casualties and 45% of Vietnam Conflict casualties had some evidence of atherosclerosis (19,20). An article published in the New England Journal of Medicine on data obtained from the Bogalusa Heart Study suggests that a rational approach to the prevention of cardiovascular disease should begin early in life (21). This theme is echoed in an article published by Preventive Medicine on an institutional approach to the dietary regulation of blood cholesterol in adolescent males. Atherosclerosis and those factors of life-style which are associated with its premature clinical manifestations among adults have their onset by the second decade of life. The results of this study revealed an interrelationship

between diet and the level of blood cholesterol in males as early as the second decade of life. Recognition and alteration of environmentally determined risk factors during the adolescent years may result in lessened atherosclerotic vascular disease in later life (22).

While some experts debate the need for a population-based approach to dietary modification of fat and cholesterol, it has been shown that a reduction in blood cholesterol levels leads to a reduced incidence of heart attack and other manifestations of coronary heart disease (1,11,16,23,24). For each one percent reduction of blood cholesterol the risk for heart attack is reduced by approximately two percent (1). Blood cholesterol levels are of paramount importance in determining risk of coronary heart disease. Average blood cholesterol for Americans is 210 mg/dl (1,42). Certain experts argue that individuals with blood cholesterol levels modestly exceeding 200 mg/dl and who are not hypertensive or have a family history of heart disease, are not candidates for dietary modification of fat and cholesterol (5,25). Opponents of the American Heart Association diet cite evidence that replacing dietary fat with increased carbohydrate may result in postprandial hyperglycemia in people with glucose intolerance, decreased HDL cholesterol levels, increased gall stone formation, potentiation of the action of chemical carcinogens and a suppressant of the immune system (25,26,27,28,29,30,31). However many studies have used high fiber diets to control glucose intolerance (32,33). Lack of adequate fiber in the diet is implicated in the etiology of coronary artery disease, gastrointestinal diseases, including gallbladder disease and obesity. Calorie intake, speed of passage through the intestine, levels of intracolonic pressures, number and type fecal bacteria, as well as levels of serum cholesterol and changes in bile-salt metabolism have all been shown to be related to the amount of dietary fiber consumed (32,33,34).

Background and Military Relevance

Physical Fitness was the Army's theme for the year 1982 and since then, considerable emphasis has been placed on physical fitness because of its direct impact on combat readiness. Health promotion activities in the Army are burgeoning (35). Total fitness includes: physical fitness, weight control, diet and nutrition, smoking cessation, avoidance of substance abuse, and stress management (36). The renewed interest in physical fitness in the Army parallels interest in the civilian community which has become increasingly health-oriented and nutrition conscious. In support of total fitness and health promotion, the Vice Chief of Staff of the Army, tasked ODCSLOG and OTSG to plan nutrition initiatives that would heighten soldiers' awareness of the importance of nutrition, educate soldiers to make appropriate food choices, and provide a variety of nutritious menu alternatives to soldiers subsisting in garrison dining facilities (13).

Medical Research and Development Command was tasked by DCSLOG to conduct a series of evaluations and U.S. Army Forces Command (FORSCOM) and U.S. Army Training and Doctrine Command (TRADOC) to provide the test units (13). The Military Nutrition Division, USARIEM, was responsible for conducting these nutrition evaluations. To assess nutrition awareness and attitudes of soldiers and food service personnel USARIEM requested participation from Behavioral Sciences Division, Science and Advanced Technology Directorate, U.S. Army Natick Research, Development and Engineering Center (NRDEC), of Natick, Massachusetts.

Nutrition assessments of three garrison dining facilities have been completed. In July-August 1986, the Ft. Riley study was completed at the contractor-operated NCO Academy Dining Facility (13). In November 1986, the Ft. Lewis study was completed at the military-operated 80th Ordnance Battalion Dining Facility (14). In August 1987, the third study was completed at Consolidated Dining Facility #2 (CDF #2) which serves the soldiers of the 39th Engineer Battalion Combat and 10th Special

Forces Group Airborne of Ft. Devens, Massachusetts (15). In January 1988, CDF #2 was reassesed, however, passive nutrition intervention was planned in an attempt to moderate test subjects cholesterol intakes at the breakfast meal.

Objectives and Approach

Unlike the Ft. Riley and Ft. Lewis garrison dining facility studies, the Ft. Devens II study was designed as a two part passive nutrition intervention study. Results from the Ft. Riley, Ft. Lewis and Ft. Devens I dining facility studies demonstrated that test subjects cholesterol intakes were of concern as they were more than two to two and one half times the levels recommended by the American Heart Association, the National Cholesterol Education Program and others (13,14,15,42,43). Consequently, the Ft. Devens II study was planned to moderate soldiers' cholesterol intakes. Ft. Devens II was conducted using passive nutrition intervention to decrease test subjects cholesterol intakes at the breakfast meal.

Passive nutrition intervention involves menu and or recipe modification without nutrition education (37). Passive intervention is a population-based approach to dietary modification (22,37). Advantages of passive nutrition intervention include no disruption of the target populations normal food habits and does not require the target population's consent. Disadvantages would include additional costs for food and time required for planning and modification of recipes, menus, and or reformulation of commercially available products. On four days of the eight day passive nutrition intervention study a commercially available, low cholesterol egg product was used in place of one of the eggs used in scrambled egg and omelet entrees.

Objectives of the Ft. Devens II garrison dining facility study were:

(1) To evaluate the nutritional adequacy of meals consumed by soldiers eating in garrison dining facilities.

(2) To evaluate whether the nutrition initiatives implemented in military dining facilities were working to moderate soldiers' sodium, fat and cholesterol intakes, and provide soldiers low calorie menu selections.

(3) To determine the influence of low cholesterol, low fat breakfast menu alternatives, i.e., low cholesterol egg product and the breakfast fitness bar, on soldiers' intakes of cholesterol and fat.

(4) To assess the impact of the Army's nutrition initiatives on the awareness, perceptions, attitudes, behaviors, and knowledge of soldiers eating in military dining facilities.

The Military Nutrition Division was responsible for the first three objectives. Food intake data were collected by trained data collectors who utilized a modified visual estimation method (6,12,13,14,15,38). Nutrient intakes of the test subjects, expressed as group means, were compared with the MRDA to determine whether they met the MRDA standards (39). The Installation Food Service Advisor supplied information documenting the implementation and status of the nutrition initiatives.

The Behavioral Sciences Division of NRDEC, addressed the fourth objective using questionnaires designed to assess nutrition knowledge, attitudes, and behaviors. The results of the Ft. Riley and Ft. Lewis questionnaires are published in a NRDEC technical report (40). The results of the Ft. Devens I & II questionnaire will also be published as a NRDEC technical report.

METHOD

Test Facility

Consolidated Dining Facility #2 is a military-operated dining facility which feeds approximately 300 soldiers per meal. The Food Service Sergeant is required to meet Army Regulation 30-1 (41) requirements and to use the Master Menu for menu planning. A copy of the menu used during the Ft. Devens II and I studies can be found in Appendix A and B respectively. CDF #2 was 1st runner-up (First Army) in the annual Connelly Award competition for excellence in Army Food Service.

Selection and Recruitment of Test Subjects

Soldiers who volunteered to participate in this study attended a briefing on the purpose of the study. After being given an opportunity to ask questions, the volunteers signed a Volunteer Agreement in accordance with the approved Human Use protocol. Demographic questionnaires (Appendix C) which included information regarding usual eating habits were administered to the volunteers. Height and weight data and Army Physical Fitness Training (APFT) Test Card scores were obtained. The majority of the Ft. Devens test subjects were in compliance with AR 600-9 standards (44). Information obtained and compiled from the test subjects Army Physical Readiness Test Scorecard, DA form 705 (36), revealed a mean score of 221 points. Mean height for the test subjects was 70 inches; mean weight was 172 pounds.

In preparation for the Ft. Devens I nutrition study, a special effort was made to identify soldiers who usually ate the majority of their meals in the dining facility (15). The Ft. Devens II study also solicited volunteers who were meal card holders. Thirty-eight percent (20) of the 52 subjects selected had participated in the Ft. Devens I study.

The Ft. Devens II dining facility study results are based on food intake data collected from 52 male soldiers who ate the majority (>90%) of their meals in the dining facility. Attendance at meals was encouraged. Data on food intake outside the dining facility was collected via 24-hour written recalls from the test subjects. The analysis of food intake outside of the dining facility will be included in a forthcoming USARIEM technical report.

Food Intake Data

A modified visual estimation method was used to collect the food intake data. Modified visual estimation has been used in preceeding USARIEM studies (6,12,13,14,15,38). A copy of the data collection forms used during the Ft. Devens II dining facility study are in Appendix D. Before each meal, data collectors gave each of their assigned test subjects a weighed and labeled salt shaker. After the meal the test subjects returned the salt shaker to their data collector. The data collectors weighed the returned salt shakers to determine the amount of salt used by the test subject. Individual assignment of salt shakers resulted in a more precise estimation of the amount of salt added by test subjects. Blatant tampering with the salt shakers was discouraged by using tamper-proof tape to seal the shakers where the metal head connects to the glass body of the shaker.

Passive Nutrition Intervention

On four randomly chosen days of the eight day study a commercially available, low cholesterol frozen egg product was defrosted according to the manufacture's directions. Two ounces of low cholesterol egg product were mixed with one fresh egg (instead of the two eggs usually used), and was served for scrambled egg and omelet entrees. To avoid bias, test subjects were not aware that scrambled eggs and omelets were modified with the low cholesterol egg product. The cooks knew the

eggs would be modified, but did not know which days the modified scrambled eggs and omelets would be served.

Acceptability Data

A nine-point hedonic scale was used to determine acceptability of the scrambled egg and omelet entrees. Acceptability data was collected on all foods served at the breakfast meal.

Limitations

Samples of the foods served during the Ft. Devens II dining facility study were not obtained for chemical analysis. Nutrient composition data for some foods is lacking or incomplete, e.g., data are lacking on dietary fiber and data on folic acid and polyunsaturated fatty acids are incomplete. Intakes of vitamin B_6, folacin, magnesium, and zinc were not included since food composition data for these nutrients was incomplete and conclusions made could be misleading. Although there are MRDA for vitamin D, vitamin E, and iodine, lack of food composition data precluded evaluation of the adequacy of these nutrients. Baseline data were not collected prior to implementation of nutrition initiatives which makes it difficult to fully assess the influence of nutrition education and menu modifications on soldiers eating habits.

Nutrient Data Base

A nutrient data base was created for this study by monitoring food preparation methods and recipes followed by the cooks in the dining facility kitchen. Standard recipes from TM 10-412, were used for developing the data base (45). Recipe information was obtained for food items prepared that were not part of the Tri-Service Recipe File. Recipe specialists observed food preparation at each meal and

recorded deviations in preparation from the standard recipe file. The actual amount of certain ingredients, with particular attention directed to sodium and fat sources, and food yields were measured for selected foods. Information was obtained on commercial products used and nutrient composition information was compiled for these items. The University of Massachusetts Nutrient Data Base was used to calculate the nutrient composition of recipe ingredients used during the study. Nutrient information was compiled to provide nutrient data on a per serving and per 100 gram basis.

RESULTS

Demographics

Analysis of test subjects' responses on the demographics questionnaire, revealed a mean age of 21 years with two years and two months time in service. Rank structure for the test subjects was as follows: 2% E-6, 8% E-5, 36% E-4, 38% E-3, 12% E-2 and 4% E-1. Distribution by racial category was: 76% White, 18% Black, 4% Hispanic, and 2% Other. Forty-two percent indicated that they wanted to lose weight with a mean amount of 16 pounds. Twenty percent indicated that they wanted to gain weight with a mean amount of 15 pounds. Six percent claimed to use vitamin supplements. Use of minerals and or other nutritional supplements, e.g., protein powders, was not admitted by any of the test subjects. Ninety-six percent answered that they had completed high school (including GED) (70%) or beyond (26%) which included technical training. Four percent indicated that they had not completed high school. Thirty-six percent of test subjects claimed to smoke cigarettes and 4% chew tobacco.

Thirty-two percent of test subjects indicated that they usually (6 to 7 days per week) eat breakfast in the dining facility. Twenty-seven percent indicated that they usually eat lunch in the dining facility. Thirty-two percent indicated that they usually eat dinner in the dining facility.

Nutrient Intake

Nutrient intakes were calculated by two methods because not all test subjects attended every meal over the 8 days of the study. Day means were calculated by obtaining a sum for each nutrient as consumed for each meal and dividing by the number of subjects who attended the meal. Study means were calculated by averaging the total number of breakfast, lunch and dinner meals consumed and dividing by the number of test subjects who attended each meal. These averaged

nutrient intakes were compared with the Office of the Surgeon General Military Recommended Dietary Allowances (MRDA) provided in AR 40-25 (39). Comparison of nutrient intakes, expressed as a mean for each nutrient, with MRDA levels are presented in the preceeding table. For comparison purposes the Ft. Devens I data is included in Table 1. Table 2 provides information by meal and by day on subjects' average energy intakes.

Food intake data analysis at Ft. Devens II indicated that the nutrient intakes either met or exceeded AR 40-25 allowances. Test subjects' energy intakes were 3165 kcals per day and were within the 2800-3600 kcals per day MRDA range for moderately active males. Mean daily protein intakes of the test subjects were 132 grams which exceeded the MRDA of 100 grams per day. Protein consumed by the test subjects contributed 16.6% of total calories. Fat intakes averaged 143 grams per day. Fat consumed by the test subjects contributed 40.3% of the total calories. AR 40-25 specifies that not more than 35% of total calories should be provided as fat. Fat intakes will be discussed in greater detail later in this report.

The MRDA for carbohydrate is also expressed as a percent of total calories. Although carbohydrate is not included in the table of nutrients with specific MRDA in AR 40-25, the text provides a guideline of 50-55% of total calories to be supplied by carbohydrate. Following this guideline, soldiers consuming 2800-3600 calories should consume 350-495 grams of carbohydrate per day. Average daily carbohydrate intakes of 348 grams, 43.5% of total calories, did not meet the MRDA guidelines of 50-55%.

Vitamin and mineral intakes, including sodium met the MRDA guidelines. Figures 1 and 2 provide a comparison of vitamin and mineral intakes of the Ft. Devens II test subjects compared to the Ft. Riley, Ft. Lewis and Ft. Devens I test subjects. Sodium intake is not included on the graph of mineral intakes, as it will be discussed separately in more detail. Data were collected on foods consumed outside the dining facility. The analysis of that data is not included in this report.

Table 1

Comparison of Average Daily Intakes of Selected Nutrients with AR 40-25 MRDAs

Nutrient	Ft. Devens II	Ft. Devens I	AR 40-25
Energy (Kcal)	3165 ± 511[a]	2978 ± 527[a]	2800-3600
Protein (gm)	132 ± 26	111 ± 17	100
Vitamin A (mcg RE)	1553 ± 1001	1680 ± 1073	1000
Ascorbic Acid (mg)	189 ± 82	184 ± 67	60
Thiamin (mg)	2.3 ± .4	2.2 ± .5	1.6
Riboflavin (mg)	3.1 ± .8	2.5 ± .7	1.9
Niacin (mg)	29.0 ± 5.4	28.7 ± 5.8	21
Vitamin B_{12} (mcg)	6.4 ± 2.2	6.5 ± 3.2	3.0
Calcium (mg)	1711 ± 678	1236 ± 493	800-1200
Phosphorous (mg)	2235 ± 584	1879 ± 457	800-1200
Iron (mg)	18.6 ± 3.3	16.8 ± 2.9	10-18

[a] mean ± SD

AVERAGE CALORIC INTAKE BY MEAL, BY DAY AND NUMBER OF SUBJECTS

STUDY DAYS	1	2	3	4	5	6	7	8	SUM OF MEAL MEANS OVER 8 DAYS
BREAKFAST	N= 51 x̄=1019 SD= 286	N= 47 x̄= 872 SD= 311	N= 50 x̄=1073 SD= 346	N= 45 x̄=1002 SD= 359	N= 45 x̄= 986 SD= 319	N= 46 x̄= 906 SD= 401	N= 44 x̄=1011 SD= 341	N= 45 x̄=1029 SD= 334	x̄= 987 SD= 338
LUNCH	N= 45 x̄=1101 SD= 314	N= 47 x̄=1084 SD= 362	N= 45 x̄=1172 SD= 370	N= 41 x̄=1138 SD= 332	N= 43 x̄=1124 SD= 377	N= 44 x̄=1183 SD= 399	N= 41 x̄=1161 SD= 486	N= 45 x̄=1126 SD= 352	x̄=1136 SD= 377
DINNER	N= 51 x̄= 978 SD= 371	N= 50 x̄=1359 SD= 427	N= 47 x̄=1002 SD= 371	N= 44 x̄= 935 SD= 446	N= 45 x̄=1136 SD= 332	N= 45 x̄= 916 SD= 360	N= 41 x̄=1119 SD=401	N= 39 x̄=1022 SD= 438	x̄=1058 SD= 363
DAY TOTALS (SUM OF B L D)	3098	3315	3247	3075	3246	3005	3291	3177	

x̄=GROUP MEAN CALORIES N=NUMBER OF SUBJECTS SD=STANDARD DEVIATION

Table 2

DISCUSSION

Assessment of Nutrient Intakes

Meals consumed by the male test subjects in CDF #2 were nutritionally adequate. The test subjects' mean nutrient intakes were compared with MRDA values for selected nutrients. Test subjects consumed greater than 100% of the MRDA for protein, vitamins and minerals evaluated. The Ft. Devens II data supports, as does the data from previously conducted garrison dining facility studies, that there is no need for vitamin and or mineral supplementation for male soldiers eating regularly in garrison dining facilities. The nutritional adequacy of the diet consumed by soldiers eating meals from a variety of sources, i.e., home, restaurants and fast food outlets is unknown. The nutritional adequacy of female soldiers diets is also unknown. These issues will have to be addressed in future studies.

Acceptability of Modified Scrambled Egg and Omelet Entrees

A 9-point hedonic scale was used to determine acceptability of all the breakfast entrees served not just the egg entrees. To avoid bias, the subjects were unaware of the scrambled egg and omelet modification. On non-intervention days the mean rating for scrambled eggs and omelets was 6.8 and 7.1 for fried eggs and hard or soft cooked eggs. Eighty percent of test subjects selected egg entrees with 54% of test subjects selecting scrambled eggs or omelets and 26% chosing fried and hard or soft cooked eggs. On the intervention days the mean rating for scrambled eggs and omelets was 6.8, and 7.2 for fried eggs and hard or soft cooked eggs. Seventy-two percent of test subjects selected egg entrees with 48% selecting scrambled eggs or omelets and 24% chosing fried and hard or soft cooked eggs.

The approved human use protocol for the Ft. Devens II study specified using 4 ounces of low cholesterol egg product in place of the two fresh eggs used for

scrambled eggs and omelet entrees. However, despite pretesting, it was not possible to use 4 ounces of low cholesterol egg product as planned because it took longer to cook, was more difficult to cook, e.g., stuck to the grill, and was easily distinguished from fresh whole eggs. Although the original plan would have resulted in a complete reduction of cholesterol obtained from scrambled egg and omelet entrees; a 50% reduction was achieved by using two ounces of low cholesterol egg product and one whole egg. In considering the feasibility of using eggs substitutes it may be more practical from a variety of vantage-points, i.e., acceptability and cost, to use a mixture as was done in the Ft. Devens II study.

Sodium Intake

The Ft. Devens II cooks were using the Change 2 version of TM 10-412. Cooks were using the recipe cards for food preparation, however the amount of salt individual cooks used varied from cook to cook. Old information, e.g., reduce salt 25%, is still posted which may be a source of confusion. Nutrient intake data calculations reflect the amount of salt and other sodium-containing compounds used by the cooks in recipe preparation.

Average daily sodium intakes of the Ft. Devens II test subjects were 5458 milligrams and were similar to Ft. Riley test subjects sodium intakes of 5668 milligrams. Sodium intakes of Ft. Devens I test subjects averaged 4935 milligrams and were more similar to Ft. Lewis test subjects sodium intakes of 5020 milligrams as presented in Figure 3. Sixty-six percent of the Ft. Devens II tests subjects indicated that they add salt to their food at the table and 4% indicated that they use the herbal seasoning shakers found in the dining facility. The amount of sodium contributed by food as served and the amount of sodium contributed by salt added by the test subjects is also represented by the stacked bar graphs as indicated. Salt added by the test subjects contributed approximately 9% of the total sodium which is

very similar to what has been previously reported in dining facility nutrition studies.

The MRDA guideline for sodium intakes for garrison feeding has been established as a range of 1400-1700 milligrams sodium per 1000 kcals. Daily sodium intakes of the Ft. Devens II test subjects averaged 1709 milligrams per 1000 kcals compared to 1764 milligrams per 1000 kcals for the Ft. Devens I test subjects, which was slightly higher than what was found at Ft. Lewis (1585 milligrams per 1000 kcals) but lower than Ft. Riley (1821 milligrams per 1000 kcals). Average sodium intakes presented at Figure 4, compare average sodium intakes at the dining facilities per 1000 kcals with the MRDA minimum and maximum levels represented by the horizontal broken lines. The amount of sodium test subjects obtained from food itself and the amount of sodium they obtained from salt they added at the table is also depicted in Figure 4.

Fat Intake

Menu, preparation and serving standards designed to decrease soldiers' fat intakes prescribed by Appendix J of AR 30-1 include: trimming excess fat from meat, offering non-fried entree alternatives, cooking vegetables and starches without added fat and using 2% low fat milk as the primary milk source. The MRDA for fat specifies that not more than 35% of total calories should be provided as fat. Fat consumed by Ft. Devens II test subjects contributed 40.3% of total calories compared to 38.2% of total calories for Ft. Devens I test subjects which was above the amount of calories obtained from fat by Ft. Riley and Ft. Lewis test subjects of 37.5% and 37.4%, respectively. Figure 5 provides a comparison of the percentage of calories obtained from fat in the three dining facilities studied. Mean fat intakes for similarly aged males as reported in the 1985 Nationwide Food Consumption survey were 35.3% (49).

It's interesting to note that mean fat intakes of the Ft. Devens II test subjects at the breakfast meal were 1.5% lower than fat intakes of the Ft. Devens I test

subjects because the low cholesterol egg product was used. Mean fat intakes of the Ft. Devens II test subjects at lunch and dinner meals were 4.1% and 3.6% higher respectively than the Ft. Devens I test subjects mean fat intakes at lunch and dinner meals. Figure 6 provides a comparison of average fat intakes on a per meal basis in each of the three dining facilities studied.

Since fat intakes were two to three percent higher for the Ft. Devens II test subjects additional analyses were performed to determine why this occurred. Coding of the meat was suspected since the USDA grade of "good" was used for beef cuts served during previous dining facility studies versus using "choice" or "prime". It is often difficult to determine what grade of meat is being used because meat specifications vary and the grade of meat is not always indicated on the packaging or elsewhere. Various grades of meat are procurred by the Military Services and this information is not always readily available or discernible. Although coding disparities could have resulted in the difference in test subjects' fat intakes, as has occurred in two national surveys (48,49), an analysis of the percent of fat obtained from meat entrees eaten by subjects at Ft. Devens I and II revealed that the differences in meat coding was not the contributing factor for the higher fat intakes of the Ft. Devens II test subjects.

The additional fat consumed by the Ft. Devens II test subjects can be attributed to test subjects drinking more milk as mean calcium and riboflavin intakes were 486 milligrams and 0.7 milligrams higher respectively, than those of the Ft. Devens I test subjects. Their caloric intake was also higher, 215 kcals, and they obtained more fat from cheddar cheese, and cheese-containing entrees. Although unsubstantiated in the scientific literature in human studies, seasonal differences in food intake may possibly have had an effect on soldiers' nutrient intakes. Ft. Devens I was completed in August and Ft. Devens II was completed in January. The mean temperature for the month of August was 68 degrees Fahrenheit with a daily mean maximum of 78

degrees and a daily mean minimum of 58.5 degrees. During the month of January the mean temperature was 24 degrees Fahrenheit with a daily mean maximum of 31.5 degrees and a daily mean minimum of 15.1 degrees.

Compliance to nutrition initiatives varies within each dining facility. The nutrition initiative complied to the most consistently appears to be the use of two percent low fat milk instead of whole milk. Because test subjects drink milk, the low fat milk initiative may be the most effective initiative in decreasing the amount of calories obtained from fat. In previous studies the impact of the low fat milk initiative was calculated (13,14). Low fat milk is also lower in cholesterol than whole milk. Two percent low fat chocolate milk was also available. Skim milk was served only at breakfast at Ft. Devens I and II and was not available at Ft. Riley. Skim milk was available each day, every meal at Ft. Lewis. Whole milk and buttermilk were not served in any of the dining facilities studied.

Saturated Fat Intake

The hypercholesterolaemic-atherogenic potential of a food is related to its cholesterol and saturated-fat content; this applies also to the total diet (50). The National Cholesterol Education Program recommends that saturated fatty acids be decreased to less than 10% of calories (42). Ft. Devens II Test subjects obtained at least 16.0% of total kcals from saturated fat, 13.7% from monounsaturated fat and 6.3% from polyunsaturated fat. Ft. Devens I test subjects obtained 15.2% from saturated fat, 12.9% from monounsaturated fat and 5.7% from polyunsaturated fat. At Ft. Lewis test subjects obtained 13.3% of total kcals from saturated fat, 12.7% from monounsaturated fat and 6.0% from polyunsaturated fat. Ft. Riley test subjects obtained 14.1% of total kcals from saturated fat, 12.1% from monounsaturated fat and 5.0% from polyunsaturated fat. Figure 7 provides a comparison of fat intakes by type of fat on a per meal basis for Ft. Devens I and II.

Cholesterol Intake

Despite nutrition initiatives planned to provide soldiers low cholesterol alternatives to traditional high cholesterol breakfast selections; Ft. Devens II test subjects' cholesterol intakes averaged 689 milligrams per day. Mean cholesterol intakes for similarly aged males as reported in the 1985 Nationwide Food Consumption survey were 450 milligrams (49). Although average cholesterol intakes for the Ft. Devens I test subjects were slightly lower, 677 milligrams per day, their cholesterol intakes per 1000 kcals were 227 milligrams versus 215 milligrams for Ft. Devens II test subjects. Cholesterol intakes per 1000 kcals were the highest for the Ft. Riley test subjects, 244 milligrams, followed closely by the Ft. Lewis test subjects, 234 milligrams.

Figure 8 provides a comparison of average daily cholesterol intakes on a per meal basis. The stacked bars represent breakfast cholesterol intakes, lunch cholesterol intakes and dinner cholesterol intakes. As shown in Figure 8, the breakfast meal supplied 50% to 60% of the total dietary cholesterol. Seventy-seven percent of the Ft. Devens II test subjects selected egg entrees on a daily basis. Overall, 86% of test subjects studied in the previous garrison dining facility nutrition studies, selected egg entrees on a daily basis. Eggs served at breakfast supplied 70% to 80% of breakfast cholesterol as illustrated by the stacked bar graph at Figure 9. The stacked bars represent the amount of cholesterol contributed by eggs, cholesterol from other sources, i.e., breakfast meats, donuts, pancakes, etc., and cholesterol provided by french toast.

Figure 10 provides a comparison of average breakfast cholesterol intakes obtained from egg entrees on the 4 non-intervention days and the 4 passive intervention days. Cholesterol intakes from scrambled egg and omelet entrees were reduced by approximately 108 milligrams on the intervention days by using the low cholesterol egg product (2 ounces) and one egg for scrambled eggs and omelets versus the two eggs usually used for these entrees. Mean cholesterol intakes on the non-intervention

days were 749 ± 238 milligrams versus 641 ± 240 milligrams on the intervention days. Breakfast cholesterol intakes for scrambled eggs and omelets were 272 ± 117 milligrams on the non-intervention days versus 135 ± 34 milligrams on the intervention days which was statistically significant ($P<0.01$). Total breakfast cholesterol which includes all foods consumed at the breakfast meal that contain cholesterol, e.g., breakfast meats, etc., was reduced by 141 mg (427 ± 171 mg to 286 ± 133 mg) and was also statistically significant ($P<0.01$).

Although Appendix J of AR 30-1 specifies the use of margarine in place of butter, using polyunsaturated fat for frying, trimming meats of visible fat and the breakfast bar; compliance to these initiatives varies considerably. Margarine was unavailable during the Ft. Devens I study. Margarine and butter were available for soldiers at Ft. Devens II, but margarine was not used in cooking. Butter was purchased at surplus prices which were one half to one quarter the cost of margarine. Since the dining facility manager is reimbursed approximately $0.65 for the breakfast meal there is reluctance to offer a wider variety of foods, especially foods which are more expensive or are perceived to be more expensive to serve. Yogurt for example, was not available on the salad bar but was a controlled item as soldiers had to request it from behind the serving line.

SUMMARY

The cholesterol soldiers obtain from eggs served at the breakfast meal can be lowered by modifying the cholesterol obtained from scrambled eggs and omelets without affecting the acceptability of these entrees. Modified low cholesterol egg products are commercially available in at least two forms, i.e., frozen or powdered. Test subjects subsisting in Consolidated Dining Facility #2 selected a nutritionally adequate diet which met or exceeded the MRDA for all nutrients evaluated. In comparing nutrient intake data from this study to the results of the three preceeding garrison dining facility studies, the results were remarkably similar with the exception of fat intakes for the Ft. Devens II test subjects. Fat intakes of 35-40% of total calories for the 4 military populations studied are similar to those reported for the civilian population. At Ft. Devens I a special effort was made to identify soldiers who usually ate the majority of their meals in the dining facility. The Ft. Devens I test subjects' energy intakes were lower than those of the Ft. Devens II test subjects which may reflect seasonal variations in nutrient intakes or a "study effect".

Sodium intakes were slightly above AR 40-25 guidelines. Table salt used by the test subjects contributed approximately 9% of the total sodium. Fat intakes were five percent above the target level of 35% or less. Average cholesterol intakes were more than twice the levels recommended by The American Heart Association and National Cholesterol Education Program. Fifty to sixty percent of total dietary cholesterol was obtained at the breakfast meal. Egg entrees are a major source of cholesterol intake at the breakfast meal. Additional issues that need to be addressed in future studies include: lowering fat and cholesterol intakes of soldiers without compromising their nutritional status, assessing the nutritional adequacy of diets consumed by female soldiers eating regularly in garrison dining facilities and the adequacy of diets consumed by soldiers who do not eat in garrison dining facilities.

Additional effort is required to determine why AR 40-25 goals have not been reached. Further work is needed to identify the major food sources of sodium, fat, and cholesterol selected by soldiers in garrison dining facilities. A Nutrition Education Cholesterol Subcommitte (NECS) will be convened to review military garrison dining facility study data and civilian institutional feeding data, military and civilian dietary recommendations to determine if military sodium and fat standards are in keeping with current guidelines and to recommend establishing a military standard for dietary cholesterol intake. Depending on the findings of the NECS, AR 40-25 and AR 30-1 Appendix J will more than likely need to be revised to reflect the NECS recommendations. Consideration should also be given to standardizing and tailoring nutrition education programs to meet the needs of soldiers and dining facility personnel and any other groups targeted for nutrition intervention.

RECOMMENDATIONS

1. Additional effort should be made to meet AR 40-25 guidelines and reassess the appropriateness of these guidelines in light of current nutrition information.

2. Identify major food sources of sodium, fat, and cholesterol selected by soldiers in garrison dining facilities and continue revision of Armed Forces Recipe Service (TM 10-412) recipes as indicated.

3. Provide soldiers low cholesterol, low fat alternatives to eggs, to moderate soldiers' cholesterol intakes.

4. Continue nutrition education endeavors at all levels with emphasis on tailoring to meet the needs of the populations targeted and standardizing to prevent duplication of effort.

5. Assess nutrient intakes of soldiers, including females, in unique garrison dining facilities such as basic training and cadets at West Point.

6. Expand garrison dining facility nutrition research methodology to include monitoring blood lipids, and selected vitamins and minerals, particularly iron status in females.

FIGURE 1

AVERAGE DAILY VITAMIN INTAKES COMPARED WITH MRDA VALUES

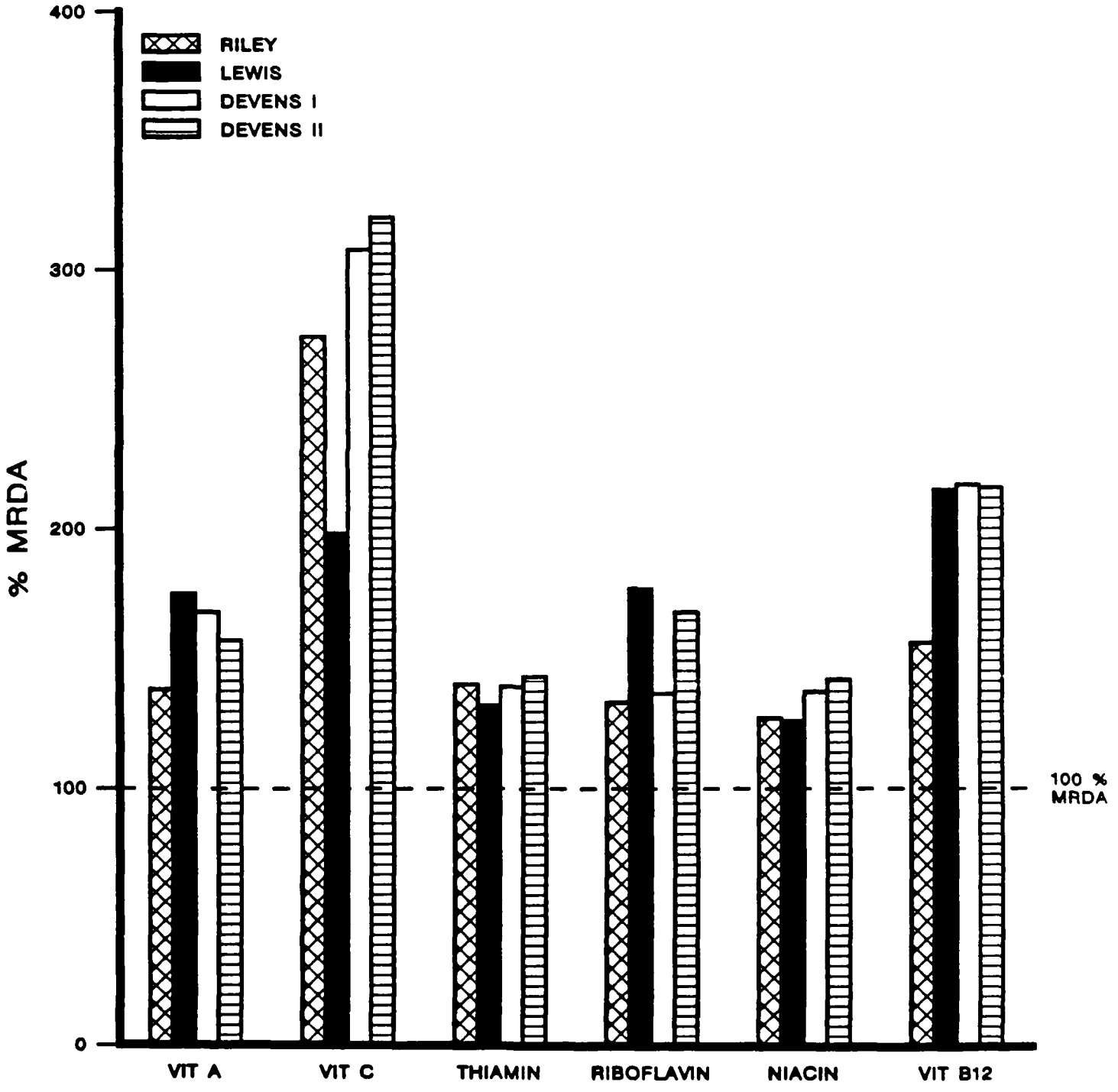


FIGURE 2

AVERAGE DAILY MINERAL INTAKES COMPARED WITH MRDA VALUES

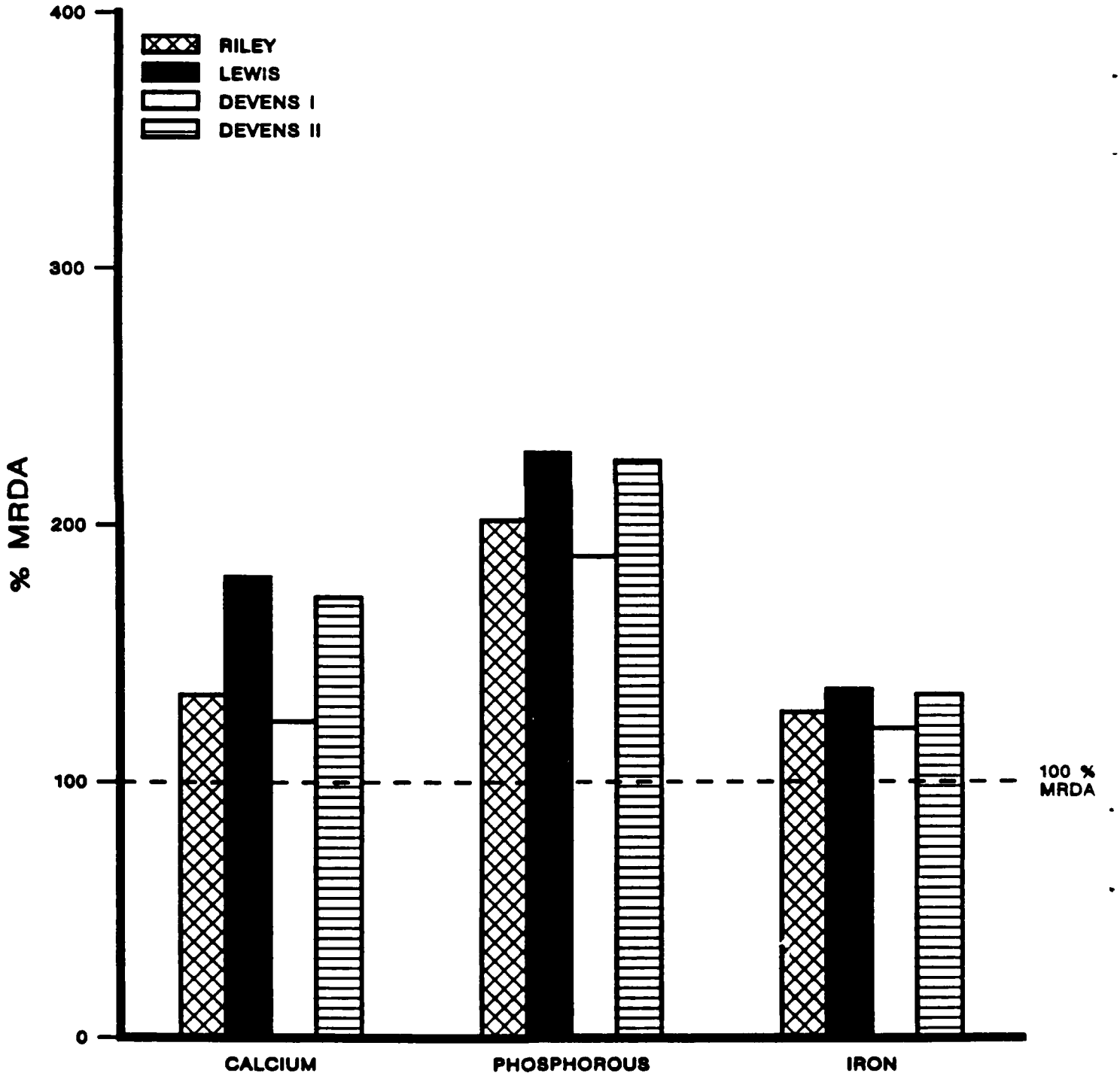
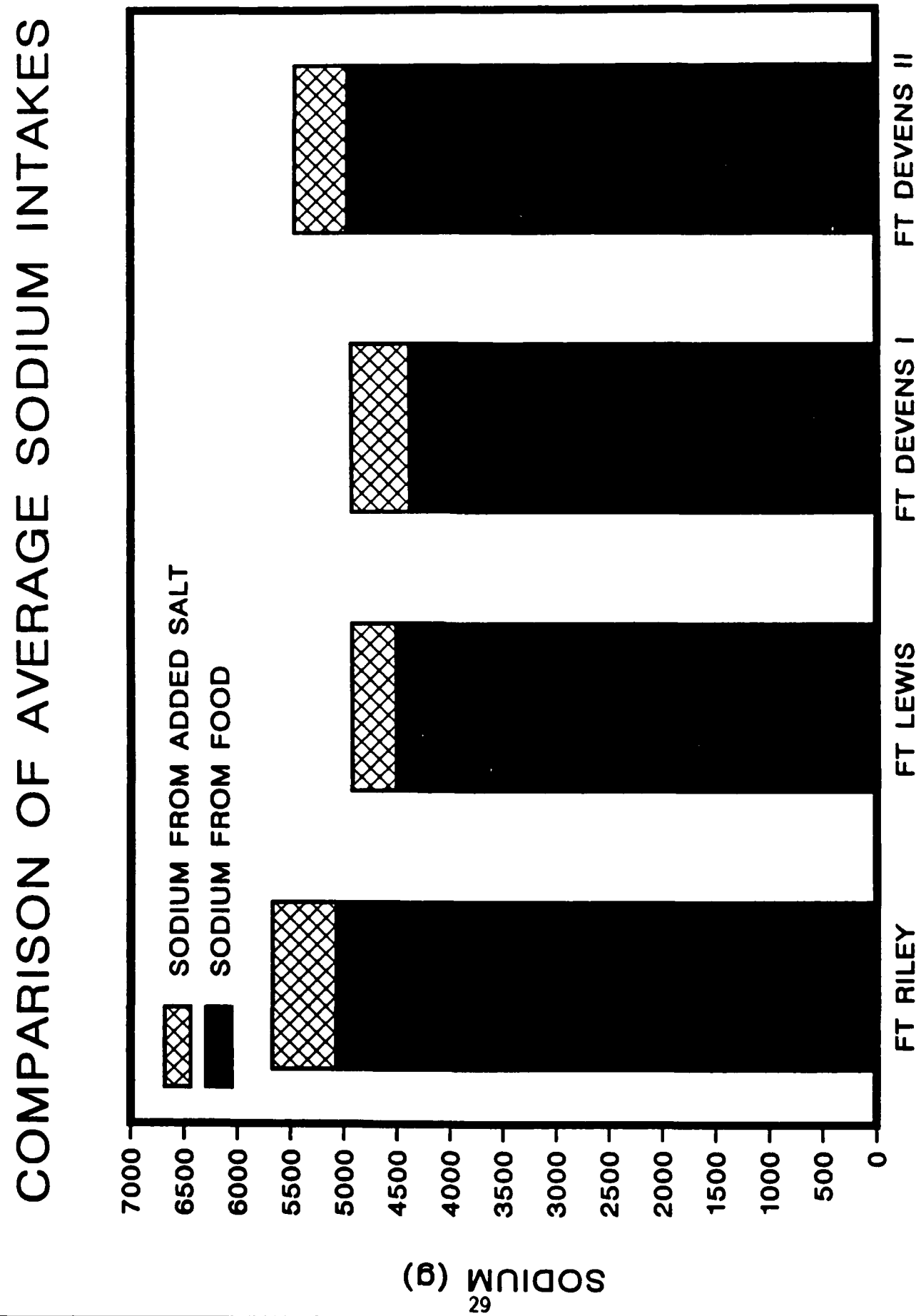


FIGURE 3


COMPARISON OF AVERAGE SODIUM INTAKES
SODIUM FROM ADDED SALT
SODIUM FROM FOOD
SODIUM (g)
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
FT RILEY
FT LEWIS
FT DEVENS I
FT DEVENS II

COMPARISON OF AVERAGE SODIUM INTAKES PER 1000 CALORIES

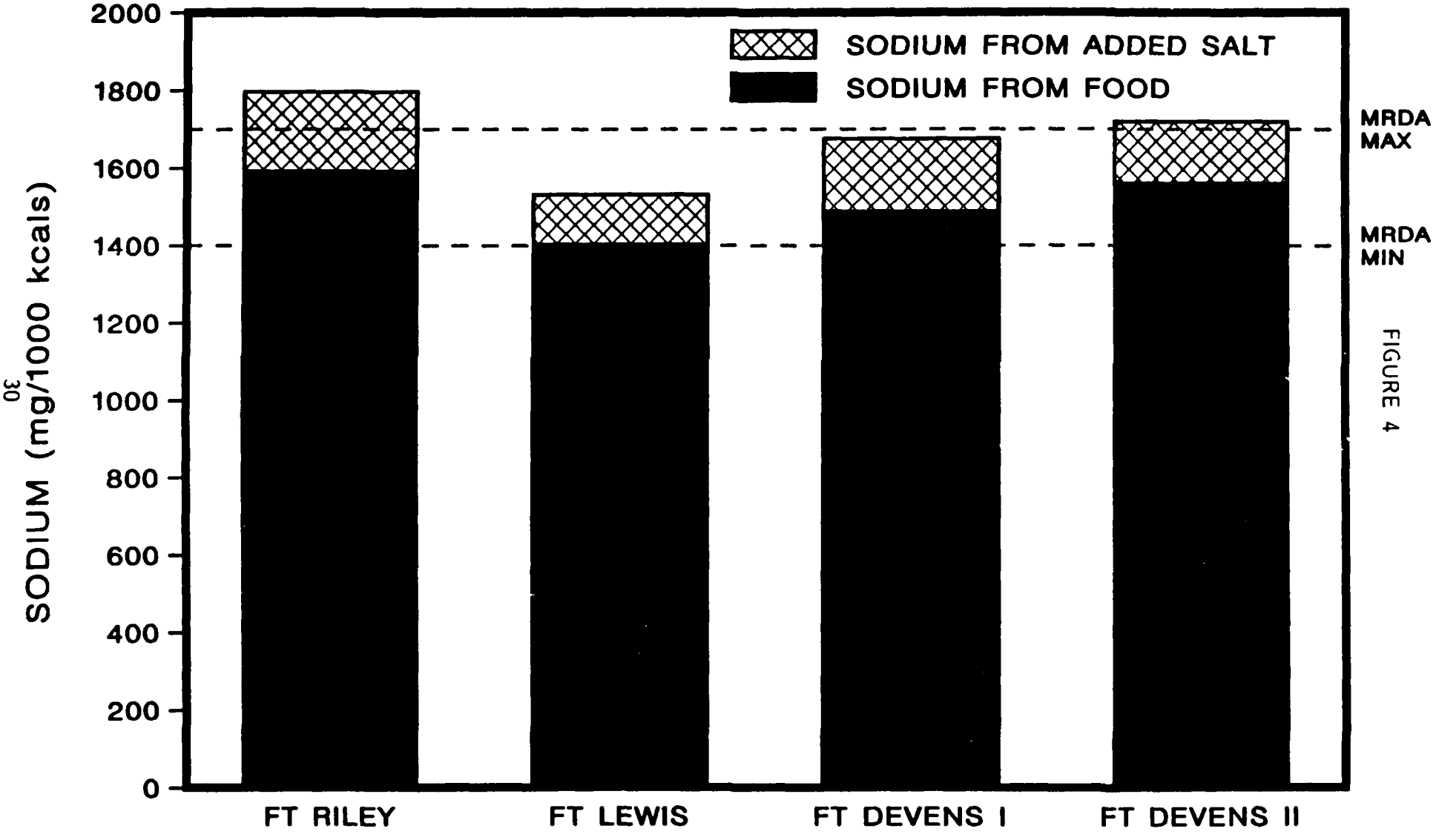


FIGURE 4

FIGURE 5

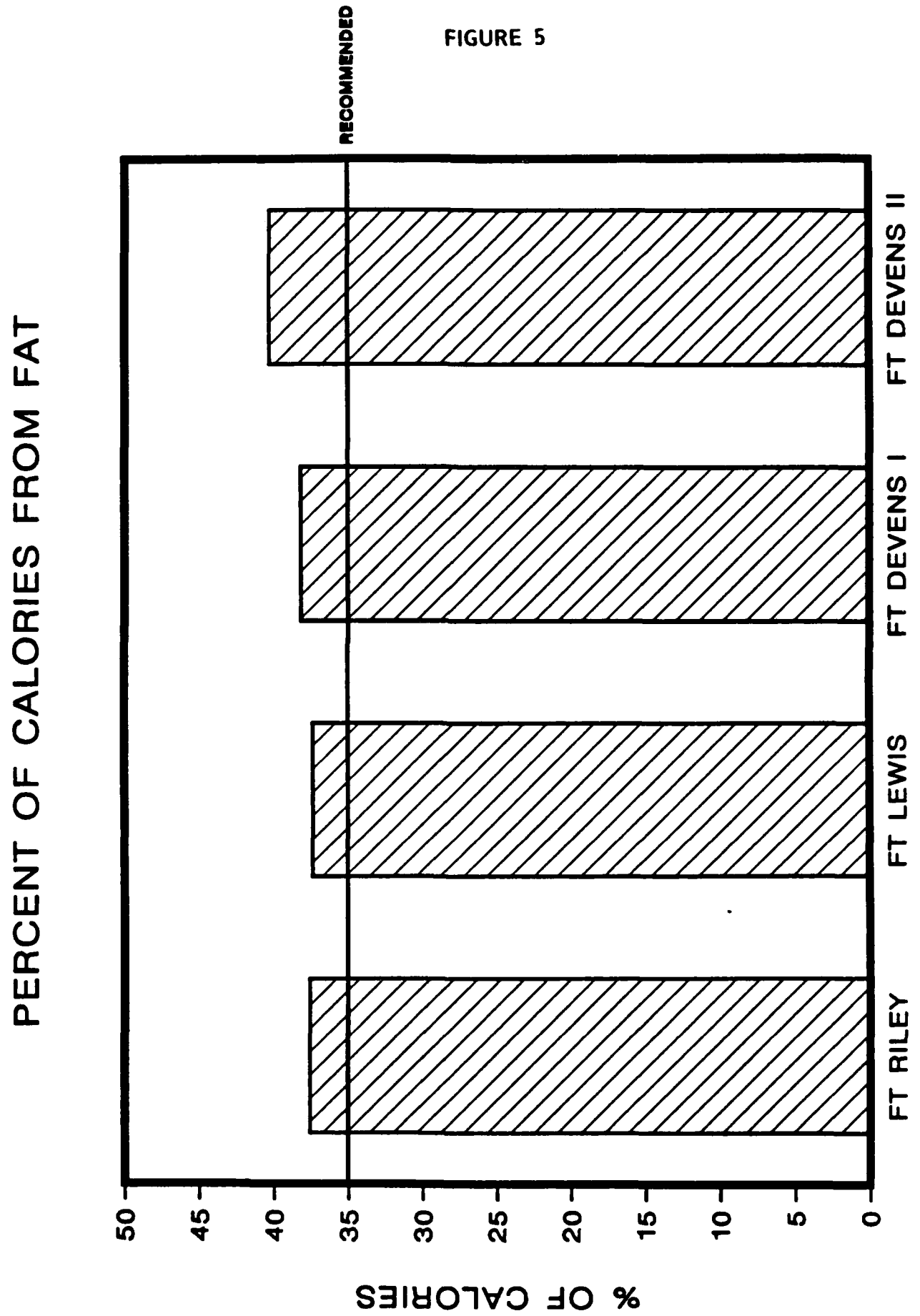

PERCENT OF CALORIES FROM FAT
RECOMMENDED
% OF CALORIES
50
45
40
35
30
25
20
15
10
5
0
FT RILEY
FT LEWIS
FT DEVENS I
FT DEVENS II

FIGURE 6

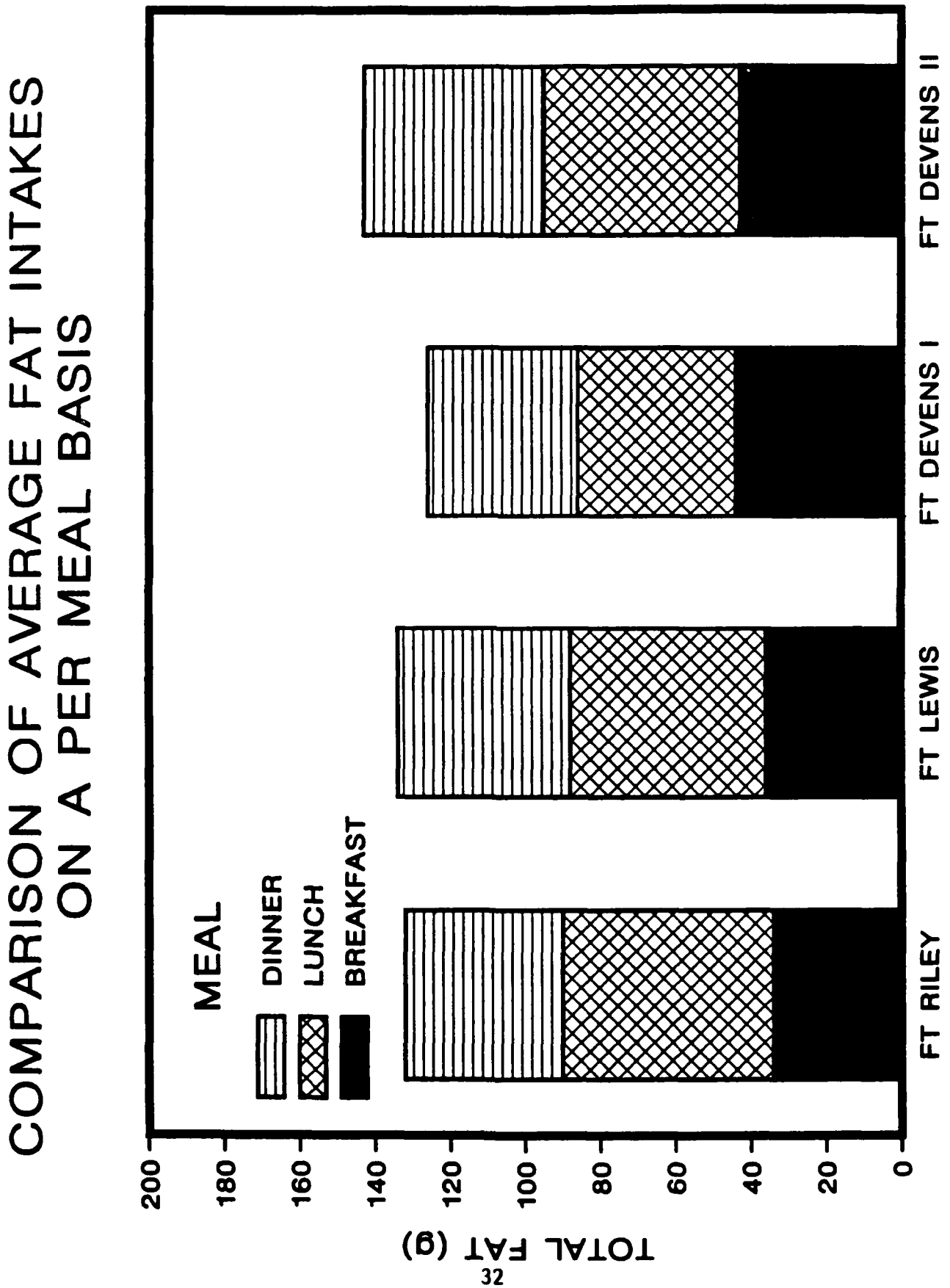

COMPARISON OF AVERAGE FAT INTAKES
ON A PER MEAL BASIS
MEAL
DINNER
LUNCH
BREAKFAST
TOTAL FAT (g)
0
20
40
60
80
100
120
140
160
180
200
FT RILEY
FT LEWIS
FT DEVENS I
FT DEVENS II

FIGURE 7

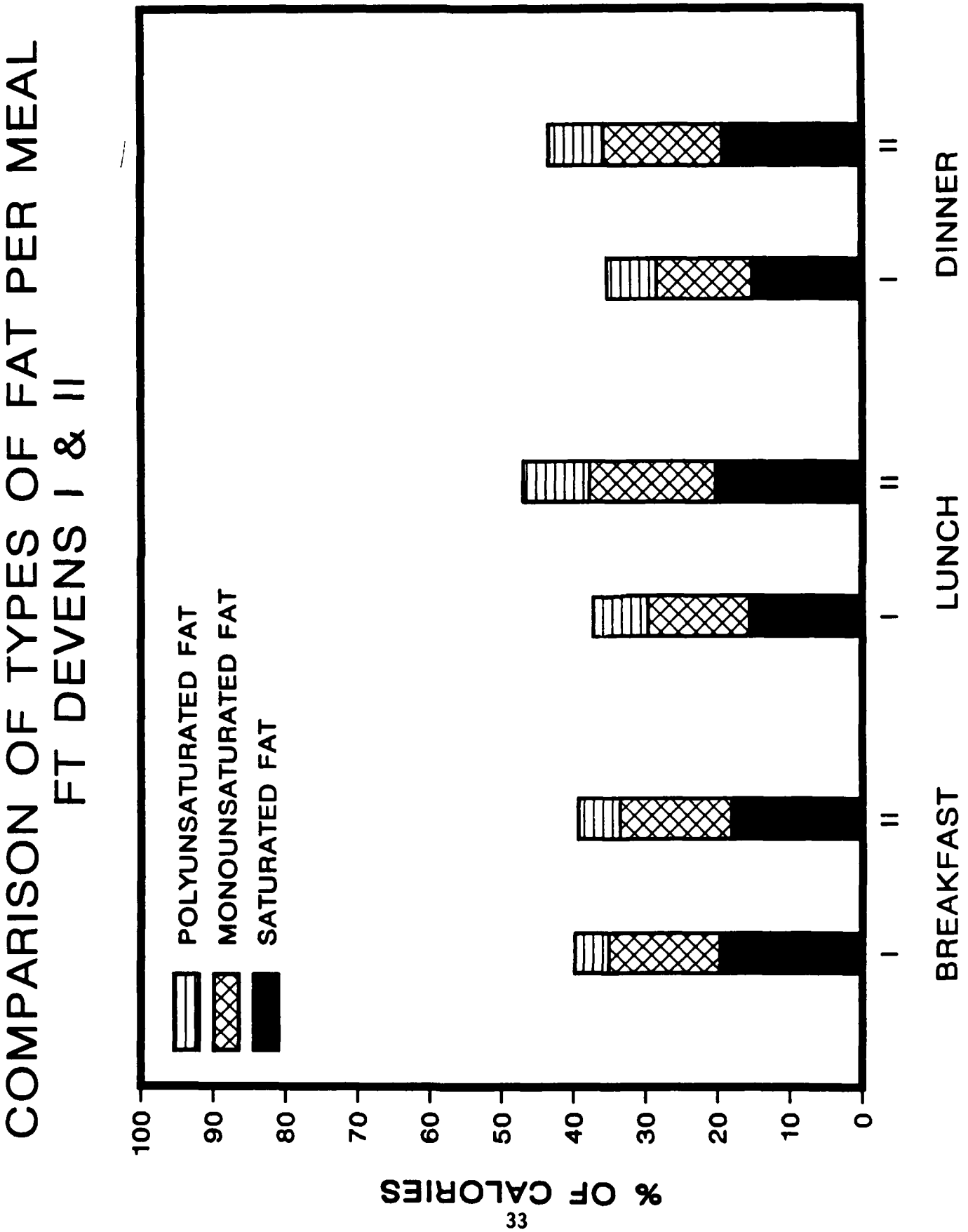

COMPARISON OF TYPES OF FAT PER MEAL
FT DEVENS I & II
POLYUNSATURATED FAT
MONOUNSATURATED FAT
SATURATED FAT
% OF CALORIES
100
90
80
70
60
50
40
30
20
10
0
I
II
I
II
I
II
BREAKFAST
LUNCH
DINNER

FIGURE 8

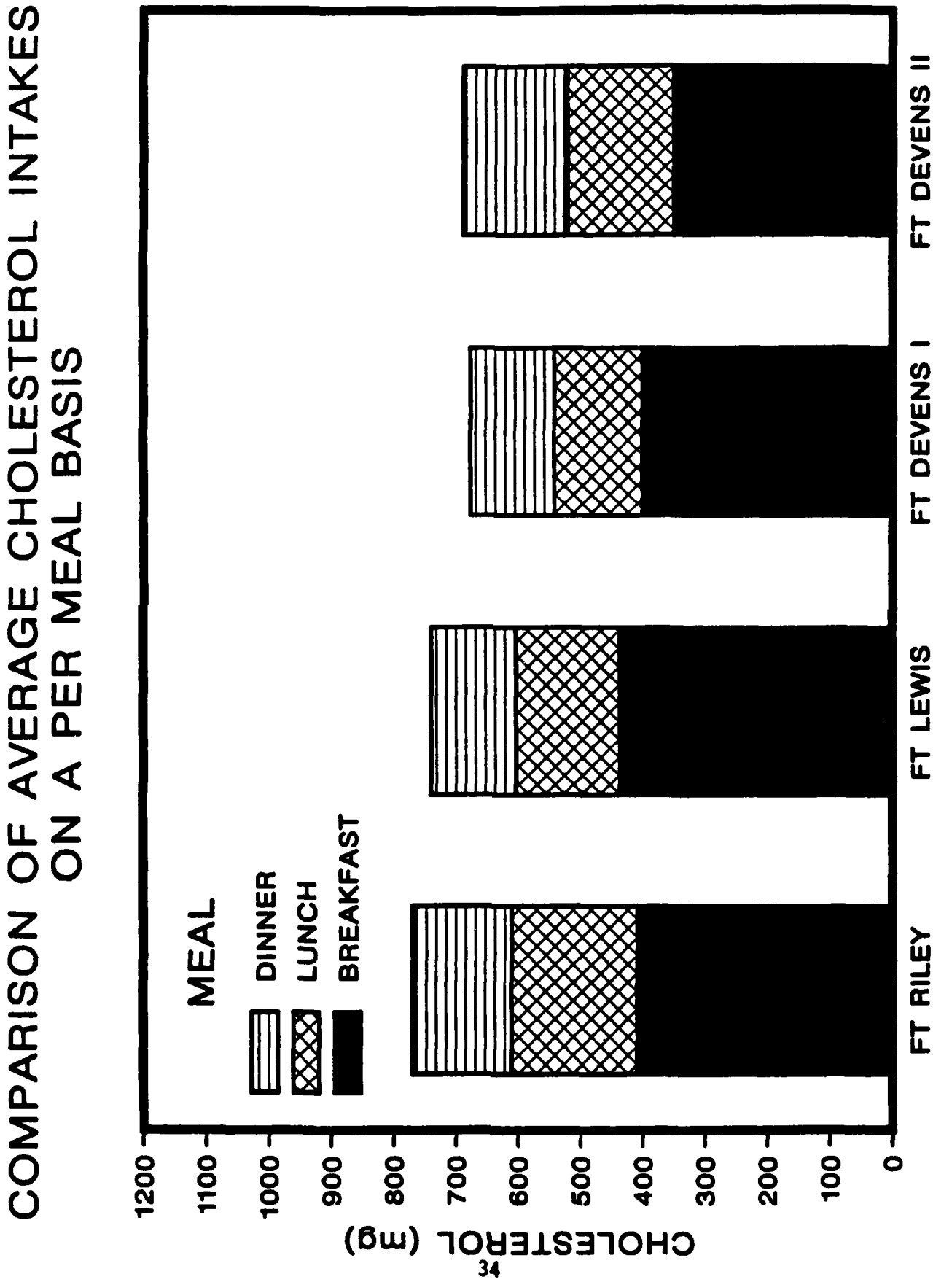
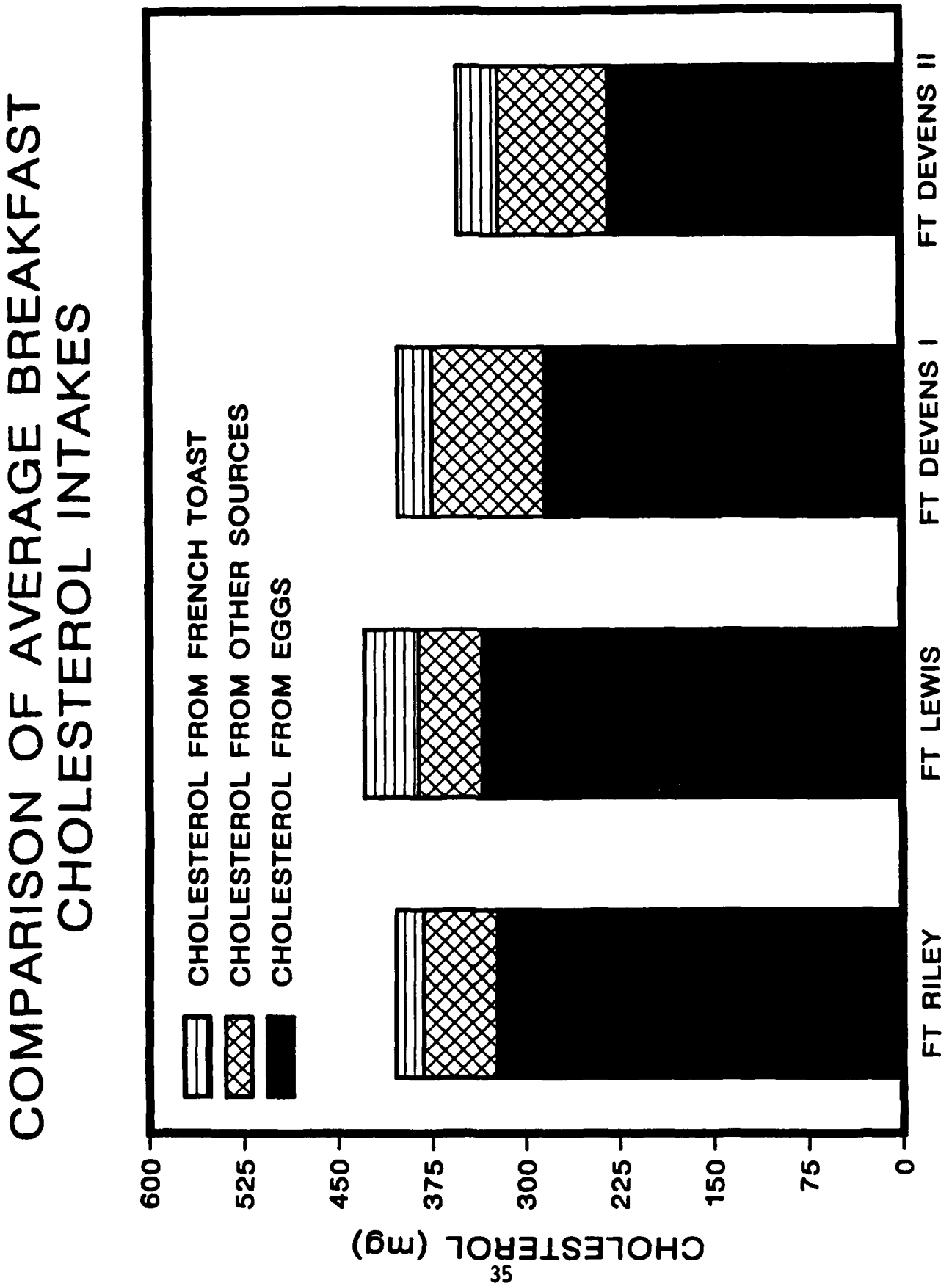

COMPARISON OF AVERAGE CHOLESTEROL INTAKES
ON A PER MEAL BASIS
MEAL
DINNER
LUNCH
BREAKFAST
CHOLESTEROL (mg)
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
FT RILEY
FT LEWIS
FT DEVENS I
FT DEVENS II

FIGURE 9


COMPARISON OF AVERAGE BREAKFAST CHOLESTEROL INTAKES
CHOLESTEROL FROM FRENCH TOAST
CHOLESTEROL FROM OTHER SOURCES
CHOLESTEROL FROM EGGS
CHOLESTEROL (mg)
600
525
450
375
300
225
150
75
0
FT RILEY
FT LEWIS
FT DEVENS I
FT DEVENS II

FT DEVENS II
COMPARISON OF CHOLESTEROL INTAKES FROM SCRAMBLED EGGS & OMELETS WITH AND WITHOUT EGG SUBSTITUTE

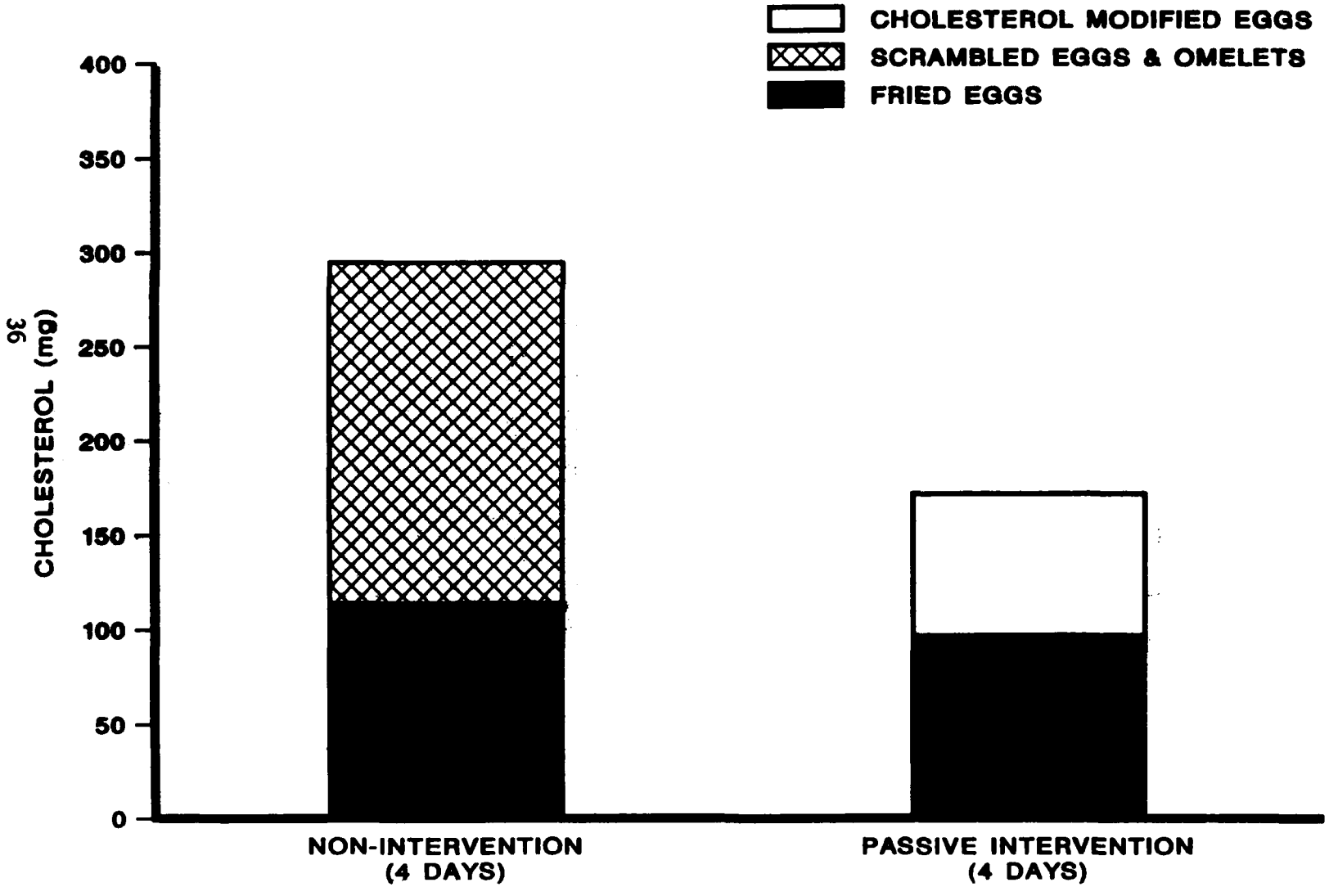


FIGURE 10

REFERENCES

1. Department of Health and Human Services Department of Agriculture. The relationship between dietary cholesterol and blood cholesterol and human health and nutrition. A report to the congress pursuant to the food security act of 1985 P.L. 99-198, Subtitle B, Section 1453,1986.

2. Passamani, Eugene R.: Editorial cholesterol reduction in coronary artery bypass patients. Journal of the American Medical Association. Vol 257, No.23, 1987.

3. The Health Letter. News America Syndicate. Vol. XXV, No. 12, P.O. Box 19622, Irvine, CA,1985

4. Department of the Army Pamphlet 600-32-2, The Army Health Promotion Program, Fit to Win, Commander's Guide. Headquarters Department of the Army, 1987.

5. Newsweek. The cholesterol connection. February 8,1988.

6. Combat Field Feeding System-Force Development Test and Experimentation Test Report. U.S. Army Research Institute of Environmental Medicine and U.S. Army Combat Development Experimentation Center. CDEC-TR-85-006A,1986.

7. DeBolt, J.E., Singh, A., Day, B.A., Deuster, P.A.: Nutritional Survey of the U.S. Navy SEAL Trainees. American Journal of Clinical Nutrition. 48:1316, 1988.

8. Board on Agriculture, Committee on Technological Options to Improve the Nutritional Attributes of Animal Products, Designing Foods Animal Product Options in the Market Place. National Academy Press,1988.

9. Tufts University Diet & Nutrition Letter. Vol. 6, No. 3, May,1988.

10. Blackburn, Henry, Jacobs David.: Sources of the diet-heart controversy: confusion over population versus individual correlations. Circulation. 70:775, 1984.

11. Shekelle, Richard B., Shryock, Anne MacMillan, Oglesby, Paul, Lepper, Mark, Stamler, Jeremiah, Shuguey Liu, Raynor, William, J.: Diet, serum cholesterol, and death from coronary heart disease the western electric study. New England Journal of Medicine. 304:65,1981.

12. Rose, M.S. and D.E. Carlson. Effects of A-Ration Meals on Body Weight During Sustained Field Operations. U.S. Army Research Institute of Environmental Medicine Report No. T2-87,1986.

13. Carlson, D.E., Dugan, T.B., Buchbinder, J.C., Allegretto, J.D., and Schnakenberg, D.D.: Nutritional Assessment of the Ft. Riley Non Commissioned Officer Academy Dining Facility. U.S. Army Research Institute of Environmental medicine Report No. T14-87,1987.

14. Szeto, E.G., Carlson, D.E., Dugan, T.B., Buchbinder, J.C.: A comparison of nutrient intakes between a Ft. Riley contractor-operated and a Ft. Lewis military-operated garrisor, dining facility. U.S. Army Research Institute of Environmental Medicine Report No. T2-88,1987.

15. Szeto, E.G., Dugan, T.B., Gallo, J.A.: Nutrient intakes of habitual diners in a military-operated garrison dining facility - Ft. Devens I. U.S. Army Research Institute of Environmental Medicine Report No. T3-89,1988.

16. The Lipid Research Clinics Coronary Primary Prevention Trial results: 1. Reduction in incidence of coronary heart disease. Lipid Research Clinics Program. JAMA 251:351,1984.

17. Olendzki, Margaret C., Tolpin, Harriet G., Buckley, Eileen L.: Evaluating nutrition intervention in atherosclerosis: some theoretical and practical considerations. Journal of the American Dietetic Association. 79:9,1981.

18. Kinosian, Bruce P., Eisenberg, John M.: Cutting into cholesterol cost- effective alternatives for treating hypercholesterolemia. JAMA 259:2249,1988.

19. Enos, W.F., Holmes, R.H., Beyer, J.: Coronary disease among United States soldiers killed in action in Korea, preliminary report. JAMA 152:1090,1953.

20. McNamara, Judson J., Molot, Mark A., Stremple, John F., Cutting, Robert T.: Coronary Artery Diesase in Combat Casualties in Vietnam, preliminary communication. JAMA 216:1185,1971.

21. Newman, William P., Freedman, David S., Voors, Antonie W., Gard, Paul D., Srinivasan, Sathanur R., Cresanta, James L., Williamson, G.D., Webber, Larry S., Berenson, Gerald S.: Relation of Serum Lipoprotein Levels and Systolic Blood Pressure to early atherosclerosis, the Bogalusa heart study. NEJM 314:138,1986.

22. Ford, Cynthia H., McGandy, Robert B., Stare, Frederick J.: An institutional approach to the dietary regulation of blood cholesterol in adolescent males. Preventive Medicine 1:426,1972.

23. Costelli, W.P., Garrison, R.J., Wilson, P.W.F., Abbott, R.D., Kalousdion, S., Kannel, W.B.: Incidence of coronary heart disease and lipoprotein cholesterol levels, the Framingham Study. JAMA 256:2835,1986.

24. Stamler, J., Wentworth, D., Neaton, J.D.: Is the relationship between serum cholesterol and risk of premature death from coronary heart disease continuous and graded? Findings in 356,222 primary screenees of the Multiple Risk Factor Intervention Trial (MRFIT). JAMA 256:2823,1986.

25. Merz, B.: Low-fat diet may be imprudent for some, say opponents of population-based cholesterol control. JAMA 256:2779,1986.

26. Grundy, S.M.: Cholesterol and coronary heart disease. JAMA 256:2849,1986.

27. FarQuhar, J.W., Frank, A., Gross, R.C., Reaven, G.M.: Glucose, insulin, and triglyceride responses to high and low carbohydrate diets in man. J Clin Invest 46:1648,1966.

28. Grundy, S.M., Nix, D., Whelan, M.F., and Franklin, Z.: Comparison of three cholesterol-lowering diets in normolipidemic men. JAMA 256:2351,1986.

29. Mattson, F.H., Grundy, S.M.: Comparison of dietary saturated, monusaturated, and polyunsaturated fatty acids on plasma lipids and lipoproteins in man. J Lipid Res 26:194,1985.

30. Meade, C.J., Merten, J.: The mechanism of immunoinhibition by arachidonic and linoleic acid. Allergy Appl Immunol 51:2,1976.

31. Carroll, K.K., Gammel, E.B., Plunkett, E.R.: Dietary fat and mammary cancer. Can Med Assoc J 98:590,1968.

32. Anderson, J.W. and Chen, W.J.: Plant fiber, carbohydrate and lipid metabolism. Am. J. Clin. Nutr. 32:346,1979.

33. Anderson, James W., Chen, Wen-Ju, Sieling, Beverly.: Hypolipidemic Effects of High-Carbohydrate, High-Fiber Diets. Metabolism 29:551,1980.

34. Burkitt, D.P., Walker, A.R.P., Painter, N.S.: Dietary fiber and disease. JAMA 229:1068,1974.

35. Army Regulation 600-32, Army Health Promotion Regulation. Headquarters, Department of the Army, 1986.

36. Army Field Manual 21-20, Physical Fitness Training. Headquarters, TRADOC, Ft. Monroe, VA, 1985.

37. University of Massachusetts Medical Center Researcher. Summer 1986.

38. Rose, M.S., J.C. Buchbinder, T.B. Dugan, E.G. Szeto, J.D. Allegretto, R.W. Rose, D.E. Carlson, K.W. Samonds, Schnakenberg D.D.: Determination of nutrient intakes by a modified visual estimation method and computerized dietary analysis for dietary assessments. U.S. Army Research Institute of Environmental Medicine Report No. T6-88, 1987.

39. Army Regulation 40-25 (Naval Command Medical Instruction 10110.1, Air Force Regulation 160-95), Nutrition Allowances, Standards, and Education. Headquarters, Department of the Army, the Navy, and The Air Force,1985.

40. Quigley, B., Engell, D. and Hirsch, E.: Soldier and food service personnel attitudes toward nutrition initiatives. U.S Army Research, Development, and Engineering Center, Technical Report No. Natick/TR-88/02,1987.

41. Army Regulation 30-1, The Army Food Service Program. Headquarters, Department of the Army,1986.

42. Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. National Cholesterol Education Program, Coordinated by the National Heart Lung and Blood Institute, National Institutes of Health, Public Health Service, U.S. Department of Health and Human Services,1987.

43. American Heart Association Special Report: Recommendations for treatment of hyperlipidemia in adults: Circulation 69:1065A,1984.

44. Army Regulation 600-9, The Army Weight Control Program. Headquarters, Department of the Army,1986.

45. U.S. Army Ch 1, TM 10-412 (U.S. Navy NAVSUP Publication 7, Ch 1; U.S. Air Force Ch 1, AFM 146-12, Vol I; U.S. Marine Corps NAVMC 2778, Ch 1), Armed Forces Recipe Service. Departments of the Army, the Navy, and the Air Force, Washington, DC,1984.

46. Shank, F.R., Park, Y.K., Harland, B.F., Vanderveen, J.E., Forbes, A.L., and Prosky, L.: Perspective of Food and Drug Administration on dietary sodium. J Am Diet Assoc 80:29,1982.

47. Witschi, Jelia C., Ellison, R. Curtis, Doane, Donald D., Vorkink, Gaye L., Slack, Warner V., Stare, Fredrick J.: Dietary sodium reduction among students: feasibility and acceptance. Journal of the American Dietetic Association 85:816,1985.

48. Nutrition Monitoring in the United States: A Progress Report from the Joint Nutrition Monitoring Evaluation Committee. U.S. Department of Health and Human Services and U.S. Department of Agriculture, DHHS Publication No. (PHS) 86-1255,1986.

49. Nationwide Food Consumption Survey - Continuing Survey of Food Intakes by Individuals: Min 19-50 Years, 1 Day, 1985. U.S. Department of Agriculture, NFCS, CSF11 Report No. 85.3,1986.

50. Connor, Sonja L., Gustafson, Joyce R., Artaud-Wild, Sabine M., Flavell, Donna P., Classick-Kohn, Carolyn J., Hatcher, Lauren R., Connor, William E.: The cholesterol/saturated-fat index: an indication of the hypercholesterolaemic and atherogenic potential of food. Lancet 1229,1986.

APPENDIX A

A copy of the menu served on each day of the Ft. Devens II study is provided in this appendix.

The breakfast menu consisted of a variety of foods which were available on a daily basis as listed:

French Toast
Pancakes
Hot Cereal
Oven Fried Bacon
Baked Sausage Patties
Creamed Ground Beef
Home Fried Potatoes
Fried Eggs
Scrambled Eggs
Hard Cooked Eggs
Omelets to Order
Biscuits
Cheese Biscuits
Baking Powder Biscuits

Assorted Fruit Juices
Assorted Fresh Fruit
Assorted Dry Cereals
Fresh Hot Toast
Hot Maple Syrup
Peanut butter
Ketchup
Skim Milk
Fresh Brewed Coffee
Tea/Lemon Wedges
Assorted Condiments
Hot Melted butter
Apple butter
Butter patties
Assorted Yogurt
Cream Substitute
Hot Chocolate
Assorted Jams & Jellies
2% Lowfat Milk
Lowfat Chocolate Milk

Assorted breakfast pastries were attractively displayed in a revolving mirrored and chilled pastry case as follows: glazed, frosted and or filled donuts, bear claws, coffee cake, Swedish tea rings, assorted muffins, kolaches and frosted longjohns.

A variety of fresh fruits were served daily on the salad bar along with cold cereals and condiments. The assortment of fresh fruits included: bananas, cantaloupe, honeydew, grapefruit halves, apples and oranges.

FT DEVENS II

Lunch and dinner menus included short order which offered the following items daily: assorted grilled and cold sandwiches including submarine sandwiches, assorted pizzas, fried chicken, chili con carne, ravioli, baked beans, french fries, onion rings, potato chips, salad, soup, fresh fruit, assorted breads, soft serve ice cream, and beverage items. The menus are as follows:

Short Order

Grilled Hamburgers
Grilled Cheeseburgers
Grilled Frankfurters
Hamburger & Frankfurter Buns
Assorted Pizzas
Ravioli
Chili con Carne
Fried Chicken
Grilled Knockwurst
French Fries
Potato Chips

Sandwiches

Egg Salad
Tuna Salad
Ham and Cheese
Grilled Cheese
Sloppy Joe Sandwiches
Grilled Bologna & Cheese
Bacon Lettuce Tomato
Soup du Jour

Beverages

2% Fat Milk
Skim Milk
Chocolate Milk (2%)
Coffee
Tea
Fruit flavored drink mix
Carbonated Beverages

Salad Bar

Cucumber Slices
Cherry Tomatoes
Block Cheddar Cheese
Flavored Gelatin
Grated Cheese
Cottage Cheese
Macaroni Salad
Potato Salad
Cranberry Sauce
Carrot Sticks
Celery Sticks
Sliced Mushrooms
Chopped Hard Cooked Egg
Cucumber & Onion Salad
Green Pepper
Quartered Tomatoes
Cole Slaw
Black Olives
Green Olives
Sliced Onions
Sliced Pickles
Chopped Lettuce Leaves
Apple Sauce
Chopped Onions
Tabasco Sauce
Mayonnaise
Mustard
Catsup
Worcestershire Sauce
Saltine Crackers
Jalepeno Peppers
Bean Sprouts
Sliced Radishes
Green Onions
Assorted Salad Dressing
Assorted Diet Salad Dressing

FT DEVENS II

11 January 1988 (Day 1)

Lunch

Tomato Bouillon Soup
Veal Parmesan
Breaded Veal Steaks
Baked Fish Portions
Brown Gravy
Oven Glo Potatoes
Steamed Rice
Herbed Green Beans
Mixed Vegetables
Vanilla Creme Pie
Strawberry Shortcake
Cherry Pie
Coconut Drop Cookies
Brownies

Dinner

Tomato Bouillon Soup
Stuffed Green Peppers
Steamship Round
Baked Fish w/ Creole Sauce
Veal Patties
Brown Gravy
Mashed Potato
Noodles Jefferson
Seasoned Greens
Seasoned Summer Squash
Vanilla Creme Pie
Strawberry Shortcake
Cherry Pie
Coconut Drop Cookies
Brownies

12 January 1988 (Day 2)

Lunch

Chicken Rice Soup
Roast Turkey
Creole Macaroni
Breaded Veal Steaks
Brown Gravy
Fried Fish Portions
Grilled Ham
Mashed Potato
Scalloped Potato
Whole Kernel Corn
Savory Bread Dressing
Seasoned Beets
Boston Cream Pie
Dutch Apple Pie
Chocolate Chip Cookies
Blueberry Pie

Dinner

Chicken Rice Soup
Roast Beef
Sweet & Sour Spareribs
Breaded Veal Steaks
Fried Fish Portions
Brown Gravy
Mashed Potato
Fried Rice
Seasoned Spinach
Cauliflower Combo
Dinner Rolls
Boston Cream Pie
Dutch Apple Pie
Chocolate Chip Cookies
Blueberry Pie

FT DEVENS II

13 January 1988 (Day 3)

Lunch

Onion Soup
Roast Beef
Baked Pork Chops
Baked Stuffed Pork Chops
BBQ Pork Cubes
Brown Gravy
Mashed Potato
Oven Brown Potato
Seasoned Green Beans
Glazed Carrots
Cheese Cake w/ Fruit Topping
Chocolate Cream Pie
Oatmeal Cookies
Chocolate Chip Cookies
Apple Cake Brownies
Dutch Apple Pie

Dinner

Onion Soup
Meatloaf
Pepper Steak
Brown Gravy
Seasoned Potato
Oven Browned Potato
Steamed Rice
Seasoned Squash
Pea Combo
Glazed Carrots
Cheese Cake w/ Fruit Topping
Chocolate Cream Pie
Apple Cake Brownies
Chocolate Chip Cookies
Dutch Apple Pie

14 January 1988 (Day 4)

Lunch

Chicken Noodle Soup
Chicken Monterey
Baked Fish Portions
Meat Loaf
Pepper Steak
Chicken Gravy
Baked Macaroni & Cheese
Seasoned Potato
Steamed Rice
Broccoli
Succotash
Chocolate Cookies
Yellow Cake w/ Choc Icing
Apple Pie

Dinner

Vegetable Noodle Soup
Steak Smothered w/ Onion
BBQ Pork Loin
Brown Gravy
Roast Fresh Ham
Lasagna
Savory Baked Chicken
Savory Bread Dressing
Spanish Rice
Mashed Potato
Seasoned Carrots
Seasoned Spinach
Seasoned Lima Beans
Seasoned Peas
Brownies
Apple Pie
Yellow Cake w/ Vanilla Frosting
Peach Pie

FT DEVENS II

15 January 1988 (Day 5)

Lunch	Dinner
Beef Barley Soup	Beef Barley Soup
Braised Pork Chops	Baked Turkey & Noodles
Breaded Pork Chops	Hungarian Goulash
Swiss Steak	Braised Pork Chops
Brown Gravy	Breaded Veal Steaks
Mashed Potato	Brown Gravy
Franconia Potato	Mashed Potato
Cottage Fried Potato	Steamed Rice
Lima Beans	Seasoned Succotash
Stewed Tomato	Lima Beans
Strawberry Shortcake	Seasoned Squash
Vanilla Cream Pie	Stewed Tomato
Cherry Pie	Strawberry Shortcake
Coconut Drop Cookies	Vanilla Cream Pie
Chocolate Pie	Cherry Pie
	Coconut Drop Cookies
	Chocolate Pie

19 January 1988 (Day 6)

Lunch	Dinner
Beef Noodle Soup	Beef Noodle Soup
Glazed Cornish Hen	Creole Shrimp
Jaegerschnitzel	Pot Roast
Chicken Gravy	Brown Gravy
Bread Dressing	Mashed Potato
Noodles	Oven Browned Potato
Oven Browned Potato	Steamed Rice
Mixed Vegetables	Seasoned Beets
Corn	Seasoned Greens
Boston Cream Pie	Mixed Vegetables
Chocolate Drop Cookies	Boston Cream Pie
Blueberry Pie	Chocolate Drop Cookies
Vanilla Pudding	Blueberry Pie
Yellow Cake w/ Butter Cr Icing	Vanilla Pudding
	Yellow Cake w/ Butter Cr Icing

FT DEVENS II

20 January 1988 (Day 7)

Lunch

Chicken Rice Soup
Newport Fried Chicken
Baked Chicken
Brown Gravy
Lasagna
Shrimp Creole
Noodles
Steamed Rice
Rissole Potato
Corn
Cheese Cake w/ Fruit Topping
Chocolate Cream Pie
Apple Cake Brownie

Dinner

Chicken Rice Soup
Roast Fresh Ham
Braised Beef & Noodles
Brown Gravy
Newport Fried Chicken
Lyonnaise Potato
Rice Pilaf
Seasoned Green Beans
Cauliflower
Okra & Tomato Gumbo
Cheese Cake w/ Fruit Topping
Chocolate Cream Pie
Apple Cake Brownies
Oatmeal Cookies
Yellow Cake w/ Butter Cream Icing

21 January 1988 (Day 8)

Lunch

Beef Rice Soup
Baked Fish
Steak Smothered w/ Onions
Brown Gravy
Macaroni & Cheese
Mashed Potato
Broccoli
Stewed Tomato
French Apple Pie
Yellow Cake w/ Choc Icing
Chocolate Drop Cookies
Lemon Pie

Dinner

Beef Rice Soup
Meat Loaf
Breaded Veal Steaks
Brown Gravy
Oven Brown Potato
Lyonnaise Potato
Peas w/ Celery
Cauliflower
French Apple Pie
Yellow Cake w/ Choc Icing
Chocolate Drop Cookies
Lemon Pie

DEPARTMENT OF THE ARMY
HEADQUARTERS FORT DEVENS
Fort Devens, Massachusetts 01433-5000
20 February 1987

APPENDIX B

Food Program
GARRISON DINING FACILITIES NUTRITION PROGRAM

SUMMARY. This pamphlet establishes nutritional guidelines to be utilized in the Installation Food Service Program. It is designed to educate the soldiers and food service personnel on nutritional standards.

APPLICABILITY. This pamphlet applies to all Fort Devens Active Army units and activities.

IMPACT ON THE NEW MANNING SYSTEM. This pamphlet does not contain information that affects the New Manning System.

SUPPLEMENTATION. Local supplementation of this pamphlet is prohibited, except upon approval of the Director of Logistics. Requests for exception, with justification, will be sent to Commander, Headquarters Fort Devens, ATTN: AFZD-DLS, Fort Devens, MA 01433-5330.

SUGGESTED IMPROVEMENTS. The proponent of this pamphlet is the Director of Logistics. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to Commander, Headquarters Fort Devens, ATTN: AFZD-DLS, Fort Devens, MA 01433-5330.

CONTENTS

*Supersedes para 7-3, FD Pam 30-1, 1 Jul 86

a. Ensure that a diet of sufficient variety, nutritional value, and attractiveness is provided at each meal. Helpful hints are provided throughout this publication.

b. Ensure new arrivals and permanent party receive a nutrition orientation. A commander's briefing is at appendix A.

c. Ensure that unit dining facility evaluations include a check on nutrition and include comments on nutritional performance as outlined in appendix J, AR 30-1.

d. Ensure that policies outlined in this pamphlet are followed in all dining facilities operated on Fort Devens.

2-2 Commander, MEDDAC. The Commander, MEDDAC, will:

a. Provide advice and assistance, on request, to commanders, directors, and other interested parties on menus, diets, and medically related nutritional questions.

b. Provide formal nutritional training upon request.

c. Provide samples of nutritional education materials to be used in dining facilities.

d. Provide representation on the Dining Facility Nutrition Committee. The membership is outlined in chapter 4-3.

2-3 Director of Logistics (DOL). The DOL will:

a. Act as the primary staff agency responsible for the Fort Devens Nutrition Program.

b. Form an Installation Nutrition Committee and appoint a chairperson. The committee will formulate guidance, oversee program implementation, evaluate suggestions from the Fort Devens community, and interact with the Installation Menu Board.

c. Ensure that the monthly menu board addresses nutritional topics to provide a balanced, healthy menu to all dining facilities.

d. Conduct scheduled food service evaluations and assistance visits to ensure compliance with, and assistance in, the Fort Devens Nutrition Program.

e. Ensure that standard nutrition educational materials are available to each dining facility.

f. Ensure that the Installation Food Adviser conducts and monitors a nutritional program for all food service personnel.

g. Support and promote nutritional initiatives applicable to the resale commissary system.

2-4 Director of Personnel and Community Activities (DPCA). Support and promote nutritional initiatives applicable to the nonappropriated fund system (clubs, Post Exchange food operations, etc.)

2-5 Public Affairs Officer (PAO). The PAO will provide assistance through publicity for the Nutrition Program.

CHAPTER 3

DINING FACILITY NUTRITION COMMITTEE

3-1 General. The Dining Facility Nutrition Program is based on the elements of awareness, variety, and choice. It is not the intent of the program to force personnel to eat food items that others feel are healthy. It is the intent of the program to provide each dining facility patron the facts needed to make item choices and to make those choices available on serving lines in a desirable state of preparation. The ultimate objective is to make each individual desire healthy foods as a normal way of life.

3-2 Policies and Guidelines. The program establishes guidelines and policies that standardize implementation of the Nutrition Program. Specific policies and guidelines are stated in this chapter and in the chapters dealing with specific food groups.

4-6. Minerals occur in small but vital amounts. They aid in blood coagulation and serve as a catalyst for vitamins. A well balanced diet also eliminates the need for mineral supplements.

4-7. Water is also a nutrient. It is essential to good health and aids in maintaining the body temperature, in eliminating waste material, and in maintaining the proper metabolism.

CHAPTER 5

BASIC FOOD GROUPS

5-1 General. When planning dining facility menus, a variety of foods must be offered to meet nutritional requirements. The basis for selecting the proper choices to offer is the four basic food groups. Servings of each of these foods daily provides diners with the required daily nutrients.

5-2 Basic four food groups are:

a. Fruit and Vegetable Group. This group provides Vitamins A and C, other nutrients and fibers. Dark green and yellow vegetables provide Vitamins A and C. Citrus fruits, melons, berries, and tomatoes provide Vitamin C. Unpeeled fruits and vegetables provide fiber.

b. Grain Group. The grain group is a source of thiamine, protein, iron, niacin, carbohydrate and fiber. Enrichment of breads and cereals substantially contribute additional amounts of these nutrients to the diet. Whole grain cereals, breads and starches are important sources of fiber.

c. Milk Group. These foods are major sources of calcium and certain vitamins. This food group includes all milks, ice milk, buttermilk, yogurts, cheese, and cottage cheese.

d. Meat Group. These foods supply iron, protein, certain vitamins, and phosphorus. Foods in this group include: Beef, veal, pork, lamb, poultry, fish, shellfish, eggs, dried beans, and peas, soybeans, lentils, seeds, nuts, peanuts, and peanut butter.

5-3 Other Foods. Foods which do not fit into the basic four groups include: fats, sweets, and alcohol. They are low in nutrients and high in calories. They add very little to the nutrient value of a meal. Foods in this other group include: sweet desserts, candy, sugar, jams, syrups, soft drinks, gravies, sauces, butter, wine, beer, and other alcoholic beverages.

5-4 Policies.

a. Fruit and Vegetable Group:

(1) Each dining facility will have a fresh fruit and salad bar at the lunch and dinner meals. Fresh fruit should also be available at the breakfast meal.

(2) Each patron will be offered a minimum daily serving of four fruit/vegetable servings. One serving of citrus fruits (oranges, grapefruits, etc.) and one serving of dark, leafy green or deep yellow vegetables should be included daily. Serving sizes are contained in the standard Army recipes.

(3) Vegetables should be prepared using the standard Army recipes minus butter or margarine. Melted margarine for seasoning should be available to patrons upon request. Cooking times will be followed.

b. Grain Group:

(1) Patrons will be offered a minimum of four servings daily from this food group.

(2) Presweetened cereals will be kept to an absolute minimum. Procurement of presweetened cereals by TISA will be limited.

(3) Dining facilities will vendor order whole grain breads (wheat, rye, and rolls, etc.) to be offered with white bread products.

(4) Pancakes, waffles, and other baked goods should be prepared using an unsaturated fat rather than solid shortening. Fruit toppings should be offered as well as syrups.

7-2 Policies.

a. The standard Army recipes will be followed and all salt will be reduced by 1/4 unless the quality of the finished product is affected.

b. An herbal seasoning mixture will be offered in addition to regular salt. Recommended and approved recipes are at appendix B.

CHAPTER 8.

NUTRIENT RETENTION IN FOOD PREPARATION AND SERVICE

8-1 General. Food items, on their way to the dining facility, can lose nutrients due to improper handling or storage practices. Once these food items arrive at the dining facility, it is the food preparation and service practices that could contribute to even more nutrient losses. As dining facility personnel, you cannot do much to influence the nutrient retention of food items before they arrive in your facility, except to refuse those food items that are obviously poor in quality. You can, however, have direct influence over nutrient losses occurring during food processing in your dining facility. The nutrients most frequently lost due to improper preparation and service are the B complex Vitamins and Vitamin C. Exposure to air (oxygen) and contact with hot water during heating or steaming are conditions which promote nutrient losses from food items. While it is true that no food item can be cooked or held under heat or refrigeration without some sacrifice in vitamin content, there are methods of preparation, cooking, and holding food items that can lessen nutrient losses. The following suggestions should help to prevent any significant nutrient losses in food items served in your dining facility.

8-2 Storage:

a. Store at recommended temperatures.

b. Allow necessary air circulation to maintain recommended storage temperatures.

c. Provide cool, dry, ventilated conditions.

d. Except for bread, practice the "first-in, first-out" method of food storage.

8-3 Preparation:

a. Avoid early preparation of cooked foods.

b. Utilize the progressive cooking method whenever possible.

c. Avoid using high cooking temperatures when lower temperatures are adequate.

d. Avoid too much cooking water -- STEAM WITHOUT WATER WHEN POSSIBLE.

e. Do not thaw frozen vegetables before cooking (with the exception of corn on the cob).

f. Avoid excessive cutting/chopping of fruits and vegetables.

g. Do not add baking soda to vegetables during the cooking process.

h. Utilize vegetable stocks for the preparation of other foods.

i. Cook for as short a time as possible.

8-4 Services:

a. Minimize the amount of time a food item is on the serving line.

b. Regulate the temperatures of the steam table for proper holding temperatures of the food items -- DO NOT BOIL THE FOOD ITEMS.

c. Avoid excessive stirring or handling of the food items on the serving line to minimize exposure of the food items to the air.

d. Cover food items prior to serving of the meal and during slow meal periods.

APPENDIX A

COMMANDERS BRIEFING ON NUTRITION

What is nutrition? Nutrition is what you eat and how your body uses it. It is your total daily food intake transformed into physical appearance, energy, growth, and countless other body functions.

Let's discuss some of the outward signs of good nutrition:

a. Body: Well developed.

b. Weight: Correct for height and age.

c. Muscles: Well developed and firm.

d. Skin: Smooth and clear and slightly moist.

e. Hair: Smooth and glossy.

f. Eyes: Clear and without dark circles around them.

g. Facial Expression: Alert without strain.

h. Posture: Good, i.e., head erect, chest up, shoulders flat, abdomen in.

i. Attitude: Good natured, full of life, buoyant.

j. Sleep: Sound.

k. Appetite: Good.

l. Digestion and Elimination: Good.

m. Appearance: Of general well being.

These will vary from individual to individual, but nutrition plays an important role in each of these areas.

Why should you worry about nutrition? People are not aware of the inter-relationship between dietary factors and chronic diseases. There are seven items that can be used to improve your nutritional intake.

1. Eat a variety of foods. No single food item supplies all the essential nutrients; the greater the variety the less likely you are of developing either a deficiency or excess of any single nutrient. To ensure an adequate diet, a variety of foods, including whole grains, enriched cereals and breads, fruits and vegetables, meat, poultry, eggs and fish, dry peas, beans, and dairy products are needed.

Application: Use the basic four food group guidelines to select your meals as shown by posters that you will routinely see displayed in your dining facility.

2. Moderate intake of calories. To maintain your ideal body weight, you should only consume as much energy as you expend. If overweight, calories should be reduced by decreasing the total food intake, especially fats, oils, sugars, and alcohol. In addition, you should increase your physical activity.

Application: Check the calorie posting of foods offered for each meal when you enter the dining facility.

3. Avoid excessive dietary fat intake. Because of their high calorie content, consumption of fats and oils should be limited during weight reduction and weight maintenance. Personnel can reduce their risk for heart disease by reducing saturated fats and dietary cholesterol. Reduce the number of eggs each week, avoid gravies and the addition of butter and animal fats to vegetables.

Application: Sauces, gravies, and butter/margarine will be served separately from meat food items and must be requested.

APPENDIX B

HERBAL REPLACEMENTS FOR SALT

1. The following herbal recipes are suggested seasonings that may be used instead of salt. Suggested uses for each recipe are given.

2. There are two amounts listed for each ingredient. The amount on the left is for a single shaker; the amount on the right is for bulk preparation.

3. Recipe abbreviations are as follows:

Tsp = Teaspoon	C = Cup
Tbs = Tablespoon	QT = Quart

4. Recipe Conversion Chart:

Tsp	Tbs	Cups	Quarts
3	1		
	2	1/8	
	4	1/4	
	5	1/3	
	8	1/2	
48	16		1/4
	64	4	1

5. All-purpose table seasonings (can also be used for a variety of food items during preparation; listed in order of acceptability):

PER SHAKER	INGREDIENT	BULK
Recipe #1		
5 Tbs	Instant Minced Onion	8 QT
1 Tsp	Sweet Basil	2 C
1 Tsp	Black Pepper	2 C
1 Tsp	Ground Cumin	2 C
2 Tsp	Garlic Powder	4 C
3 Tsp	Sesame Seed	6-1/4 C
Recipe #2		
1 Tsp	Chili Powder	2 C
1 Tsp	Garlic Powder	2 C
2 Tbs	Dry Mustard	12-1/2 C
6 Tbs	Onion Powder	9-1/3 Qt
2 Tsp	Oregano	4 C
3 Tsp	Paprika	6-1/4 C
2 Tsp	Pepper (red or black)	4 C
Recipe #3		
2-1/4 Tbs	White Pepper	3-1/2 Qt
1-1/2 Tsp	Grated Nutmeg	3 C and 2 Tbs
1-1/2 Tsp	Ground Ginger	2-1/3 C
1/2 Tsp	Ground Cloves	1 C and 3 Tbs
Recipe #4 (very spicy/hot)		
1 Tsp	Onion Powder	2 C
1 Tsp	Paprika	2 C
1 Tsp	Dry Mustard	2 C
1 Tsp	Garlic Powder	2 C
1/4 Tsp 1/2	Cayenne Pepper	1/2 C

FOR THE COMMANDER:

OFFICIAL:

ROBERT R. MACMASTER
Director of Information Management

THOMAS A. DE BLOIS
Colonel, Infantry
Chief of Staff

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CF: FORSCOM, ATTN: AFLG-TRS

APPENDIX C

DEMOGRAPHIC QUESTIONNAIRE

Name _____ Subject Number _____

Sex M F Age _____

Race 1-White 2-Black 3-Hispanic 4-Asian 5-Other _____

Rank _____ Length of Time in Military _____years _____months

MOS Marital Status

Primary _____ 1-Single 2-Married

Secondary _____ 3-Separated 4-Divorced

Duty _____ 5-Widow/Widower

Highest Level of Civilian Education Completed

1-Grade school (K-8)

2-Some high school

3-High school graduate or GED

4-Some college or Associate Degree

5-Bachelors degree (4 year college)

6-Beyond Bachelors degree

7-Other, please specify _____

Do you smoke tobacco? Yes No

Do you chew tobacco? Yes No

Number of cigarettes smoked per day _____

Number of cigars smoked per day _____

Number of pipes smoked per day _____

Number of tobacco chews per day _____

How long have you been smoking tobacco (yrs/mos)? _____

How long have you been chewing tobacco (yrs/mos)? _____

During a typical week, which meals do you usually eat, regardless of where you eat them? (Please check meals you eat).

	MON	TUE	WED	THU	FRI	SAT	SUN
Breakfast							
Lunch							
Dinner							

During a typical week, which meals do you usually eat at a military dining facility? (Please check those eaten in a military dining facility).

	MON	TUE	WED	THU	FRI	SAT	SUN
Breakfast							
Lunch							
Dinner							

How often during the day do you eat snacks? _____

Between breakfast & lunch? _____

Between lunch & dinner? _____

After dinner? _____

Please indicate any dietary supplements (vitamins, minerals, or protein powders etc.) you take regularly. Specify brand and amount.

	Brand	Amount Per Day
Protein		
Vitamins		
Minerals		
Other		

Are you satisfied with your current weight? Yes No

Are you trying to lose weight? Yes No

If yes, how much? _____

Are you trying to gain weight? Yes No

If yes, how much? _____

Do you follow any special diet? Yes No

If yes, please specify type _____

Do you add salt to your food? Yes No

Do you use a herb shaker? Yes No

How many meal periods are you allowed by your duty section during a typical duty day? (Do not include field exercises). (Please circle).

-Ø meal periods -1 meal period -2 meal periods

How many minutes are you allowed for each individual meal period? (Please circle).

-more than 6Ø minutes -6Ø minutes

-45 minutes -3Ø minutes

-less than 3Ø minutes

Please estimate the average time you spend during your meal period in the dining facility. (This includes from the time you enter to the time you exit the dining facility).

_____ minutes

Please estimate the time it takes you to travel from your duty section to the dining facility.

_____ minutes

APPENDIX D

RATION RECORD

BREAKFAST/LUNCH/DINNER

NAME: _____ DATE: _____

SUBJECT #: _____ DATA COLLECTOR #: _____

MEAL: (CIRCLE ONE)

BREAKFAST -- B LUNCH -- L DINNER -- D

DESCRIPTION	CODE #	PORTION SERVED	PORTION RETURNED	ADDED SALT	REASON NOT EATEN/NOT FINISHED	RATING CODE

DISTRIBUTION

	COPIES
HQDA DCSLOG ATTN: DALO-TST Washington, DC 20310-2300	6
HQDA ATTN: DASG-RDZ Washington, DC 20310-2300	1
HQDA OTSG ATTN: DASG-DB Rm 617, Bldg. 5 Skyline Place 5111 Leesburg Pike Falls Church, VA 22041-3258	3
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Fort Detrick
Frederick, MD 21701-5012

Commandant
Academy of Health Sciences, U.S. Army
ATTN: AHS-CDM 1
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Fort Sam Houston, TX 78234

Dir of Biol & Med Sciences Division 1
Office of Naval Research
800 N. Quincy Street
Arlington, VA 22217

CO, Naval Medical R&D Command 1
National Naval Medical Center
Bethesda, MD 20014

HQ AFMSC/SGPA 1
Brooks AFB, TX 78235

Under Secretary of Defense Research and Engineering 1
ATTN: OUSDRE(RAT)E&LS
Washington, DC 20310

Dean 1
School of Medicine
Uniformed Services University of Health Sciences
4301 Jones Bridge Road
Bethesda, MD 20014

Commander 1
U.S. Army War College
Carlisle Barracks, PA 17013

Commander 1
U.S. Army Soldier Support Center
Ft. Benjamin Harrison, IN 46216

Assistant Secretary of Defense (Health Affairs) 1
ATTN: ASD(HA) PA&QA
Washington, DC 20310

Assistant Secretary of Defense (Acquisition & Logistics) 1
ATTN: OASD(A&L)SD
Washington, DC 20310

Commander
U.S. Army Troop Support Command
ATTN: AMSTR-E
4300 Goodfellow Boulevard
St. Louis, MO 63120-1798 1

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U.S. Army Test and Evaluation Command
ATTN: AMSTE-EV-S
Aberdeen Proving Ground, MD 21005-5055 1

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U.S. Army Operational Test Evaluation Agency
ATTN: CSTE-ZX
5600 Columbia Pike
Falls Church, VA 22041 1

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U.S. Army TRADOC Combined Arms Test Activity
ATTN: ATCT-PO
Ft. Hood, TX 76544 1

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U.S. Army Materiel Command
ATTN: AMCDE-S
Alexandria, VA 22333 1

HQ U.S. Marine Corps
Code LFS-4
Washington, DC 20380-0001 1

Department of Clinical Investigation
Chief, Army Medical Specialist Corp-CIS
WRAMC
Washington, DC 20307-5001 2

MAJ Robert Stretch
DCIEM
1133 Sheppard Ave. West
P.O. Box 2000
Downsview, Ontario, Canada M3M 3B9 2

Commander
U.S. Army Health Care Systems Support Activity
Fort Sam Houston, TX 78234 1

Commander
U.S. Army Combined Arms Center
ATTN: ATZL-TIE
Fort Leavenworth, KS 66027-5130 1

Commander
U.S. Army Training and Doctrine Command
ATTN: ATCD-S
Fort Monroe, VA 23651 1

MAJ Judith Turcotte 1
SGPS-FP
Room 606
5109 Leesburg Pike
Falls Church, VA 22041-3258

Commandant 1
U.S.A. First Infantry Division
Non-Commissioned Officer Academy
Fort Riley, KS 66442-5360

Commander 1
39th Engineer Battalion Combat
Fort Devens, MA 01433-5300

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10th Special Forces Group (Airborne)
Fort Devens, MA 01433-5300

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Cutler Army Community Hospital
Fort Devens, MA 01433-5300