

SESSION IV.

NUTRITION AND THE ARMED FORCES

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NUTRITIONAL IMPLICATIONS OF MILITARY FEEDING

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First let us define Food and Nutrition because these terms are so often used interchangeably and each has a different meaning.

Nutrition can be defined as the relationship of food to the functioning of the living organism. Nutrition is not food. We eat food and not nutrients per se. Food, on the other hand, is that array of chemicals we call nutrients, color, flavor, texture and a whole host of little known chemicals. Nutrition therefore is concerned with (a) the relationship of nutrients to the functioning of the body, and (b) the relationship of nutrients as affected by the psychological and physiological effects of the non nutrient food chemicals (color, flavor, texture, unknown). In other words, in addition to nutrients and their specified role in metabolism, other chemicals in food can affect the digestion, absorption and metabolism of nutrients.

Military Food Habits Mimic the Civilian Preferences: In 1969, Dr. Emil Mrak in his keynote address at the R&D Associates Symposium "Feeding the Military Man" quoted Dr. Samuel Prescott of MIT who several years earlier had said "that American soldiers reflect the background of the people as a whole" (1). At a recent Food Update program, Lt. Col. Jerry Welbourn elaborated upon this observation as it pertains to food as follows: "Our customers come to us with ready-made food habits and preferences and they are well aware of the changes taking place in society while they are in the service. They have the means and the mobility to eat where they want" (2).

But, just as average American feeding habits are transferred to the military, so too is the resultant quality of the nutrature.

"During World War II, the food consumption of the American public was at an all-time high nutritionally. The controlled meals of the military services, rationing of meat and sugar, enrichment of bread, and victory gardens all contributed to the adequacy of the over-all national diet. A generation later, conditions are very different, but many nutrition educators are still teaching the principles of nutrition as "World War II nutritionists". It is not the chronological age of the nutritionists but their attitude toward food habits and the environmental conditions of today that make the difference" (3).

We should, but probably have not, reached the point of realizing that food is the input to nutrition and it has a relationship to the health and performance of the individual. This must also apply to a collection of individuals, such as in the military, where integrated performance is of utmost importance.

Military Understanding of Implications of Nutrition: The military has accepted the realization that "an army travels on its stomach" but the military has considered this only from the management viewpoint, that is the viewpoint of satisfying a need for the palliation of hunger with food, and if possible, "good" food. What hasn't been considered in this viewpoint is the long term implications of nutrition, the functioning of the living organism, in terms of preventive health and performance. Whereas it has been self evident to both military leader and "soldier" that food is important to life, limb, and happiness, neither one has understood the connection between food and ultimate long term performance. The reason, in my opinion, for this gap is because both the leaders of the military and military personnel have the same relative degree of nutrition awareness, knowledge and misconceptions. They all received little or no nutrition education per se, other than probably some story on basic food group combinations which may or may not have matched their religious and cultural customs at home. Otherwise they read or hear the same advertising and read the same newspapers.

While the implications of lack of food or of poor food are relatively immediate, at least in the attitude and philosophy of the recipients, the implications of nutrition are long term and very related to overall health. The state of nutriture and therefore preventive health is reflected not so much in short term performance but, primarily in consistent long term performance.

Any nutritionist who has labored even if only to write program justifications within the military knows full well we have not been able to make the message clear. We have been funded to relate short term stress, or performance under stress, with short term nutrition in terms of special rations, but we have not been permitted to conduct longer term studies.

Further, we have had a tough time defining optimal nutrition. I submit that optimal nutrition can only be measured in terms of long term consistent performance. Over a lifetime it can be measured in morbidity and mortality data. Such crude data is valuable in public health particularly in developing countries but when a country is highly developed such as the United States, it is a little more difficult to demonstrate relevance. However, even between developed countries one can show that differences exist. The United States is by no means the healthiest, ranking approximately 14th in longevity and 13th in infant mortality (4). Some would argue these statistics are not related to poor nutriture alone and I would have to agree but I believe nutrition is a very significant factor. Let us take for example shorter time periods that do indicate some relationship between nutriture and performance. Since World War II we have learned a few facts. Early studies on the effect of school feeding on child performance indicated beneficial effects (5), and more recent studies by Call et al. of Cornell (6) and Smith of Tulane (7) demonstrate that assuring a balanced dietary improves attendance, decreases tardiness, frequency of visits to the school nurse and to the principal for disciplinary reasons.

We know from bed rest studies that otherwise normal, healthy young males can be physiologically and biochemically decompensated by as few as three weeks of bed rest (8, 9). We know that a similar phenomena occurs with the removal of the stress of gravity during space flight (10, 11). Some of these effects can be ameliorated by exercise but some can be affected by diet. Bone density seems to respond to both (9) and decreased red blood survival time associated with hyperoxia (100% O₂ at 5 PSIA) may be related to vitamin E's role in the integrity of the red blood cell membrane (12). There are many other examples particularly in the animal data which relate performance to diet over time (13).

I should make clear that the research on the effects of diet vis-a-vis short term work, even exhausting work such as Dr. Rodahl (14) reviewed at these meetings a few years ago demonstrate that diet is no where as relevant as prior training. I think there is a big difference between these experiments wherein we searched for relationships between diet and work performance, and the realities of life in the military. My point is as the functions of the military man-machine-operator become more and more sedentary, performance is very much related to nutriture as well as training. Why is it that the incidence of CHD is no different for a West Point cadet five years after graduation or for a professional football player after his retirement? Not only does the quantity and quality of physical exercise diminish but his diet goes to pot as well.

Food is the Input to Nutrition and Consistent Performance: If we can agree there is a need for good nutrition in the military as anywhere else, then we have the problem of reconciling the need to meet the social and cultural demands for food with the objectives of fostering balanced nutrition and consistent performance. It's fine for me to preach about nutrition and its relationship to the health and performance of military individuals but it will be to no avail if I don't get back to food because food is the input to nutrition. There are opportunities in military feeding to meet nutrition needs, and the approaches must complement the new and emerging improvements in food service.

Research and Other Action Needed: Some of these ideas are going to need research but strangely or not so strangely enough they will require a combination of nutrition, food service and marketing techniques. Nutrition surveys alone have some value but they are outdated the day they are completed and like all types of public health nutrition, they do nothing about the problems which they may or may not identify. There is need for fundamental research. For example, the recent work of Blackburn *et al.* (15) would definitely indicate that the entire rationale for survival ration composition should be re-examined. Further, it wouldn't hurt if the military paid for some of the much needed research for improved methodology for the determination of nutrients. The Food Division of Natick Labs, as far back as the days of the Quartermaster Food and Container Institute in Chicago demonstrated the need for such research but not much has been done about it. We remain pretty dependent on some lousy and/or time exhausting methods.

Meanwhile that should not stop us from requiring nutrient analyses as a part of the specifications on all products purchased by the military. The food industry is facing such a requirement for nutritional labeling and the military has a need for even more extensive data. I know a certain amount of this has already been a requirement for particular rations. But, as I look forward to the military for instance serving increasing number of prefrozen, preplated meals or meal components in prefrozen and sometimes precooked or partially cooked, steam table trays, I envision a need for knowledge as to nutrient values as served for all foods.

I've discussed this responsibility of the food industry to assure nutrients elsewhere (16) and recently I have published a few examples of menu planning at the school level based on a nutrient standard, that is a percentage goal of the RDA (17). We must face the simple realization that as we match food habits with nutrition we must have a nutrition way of measuring food combinations without necessarily constraining or severely limiting food choices. As the military shifts to contract feeding, it needs to assure nutrient values. The fact of the matter is that a hamburger, french fries and a milk shake is a good meal in terms of the RDA, and what is best about it is that the food is eaten; whereas a food service system providing one or more warmed over products that are discarded is not good food service, and therefore, not good nutrition. The problems arise in convenient food systems when the individual decides not to have the milk shake and elects coffee or a carbonated beverage, or elects to use one of the ketchups on his hamburger which simply doesn't have the vitamin A or C one would expect. But there are solutions to this dilemma and one is technological and the other is marketing. The technological solution is nutrification (18), the inherent micro-nutrient balancing of food products already contributing the king pin of nutrients: utilizable protein; and the assurance of micro-nutrients in those products one would expect from consumer awareness (image), or USDA Handbook No. 8 to contain such micro-nutrients (e.g. 4 out of 5 major brands of ketchup do not assure the Handbook value of vitamin C (19). One can give a speech about how an array of natural foods will assure the best nutrition but that's simply incompatible with the feeding habits of today, particularly with mass feeding, and the economics of agriculture today. The facts again indicate that if one analyzes processed foods they repeatedly fall short of expectations (20). The only foods that invariably meet nutrient expectations are those for which a label claim has been made. There is an obvious message in that observation and it should explain my recommendation for more nutrient specifications, for menu planning to a nutrient standard rather than by non-specific commodity type-food guidelines, and for selective nutrification of foods.

We have used marketing approaches to determine food preferences and frequency of food uses. Now I would like to reverse the process and market the information back to the customer. That is supposed to be the goal of nutrition labeling but the forthcoming FDA order (much like the proposal) will not do this because it is not compatible with meeting such an objective (21).

We must market back two kinds of information (a) preferred food combinations and (b) the nutrient summation of these combinations. In an admittedly limited

experience in a New Jersey High School we tried such an approach, and these draft age students began to realize that some of their food combinations were lousy and needed very slight modifications to be improved. For example, election of a different beverage or dessert. What happens is that if the individual elects a carbonated beverage he realizes it contributes only calories, and makes up his calcium and related nutrient needs by electing a milk based pudding or a confection containing calcium (this was an experimental product) or ice cream. One has to realize that it is food combinations that are made and so there is a responsibility in labeling for not only listing nutrients but recommending food combinations which assure meal balance in nutrient terms.

Balanced Nutriture Should Have Preference Over Diet Modifications: To those of you who are skeptical of such an approach, I say, don't knock it until it has had a good field test. I firmly believe that the approaches I have suggested apply particularly to identifiable populations such as occurs in school feeding and military feeding. Further, I believe we need to foster eating habits which relate to performance. I think this can be studied as well as marketed.

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