AMXFC REPORT 41-62

METHODS OF SHAPING SOLDIERS' ATTITUDES TOWARD QUICK-SERVE MEALS

Interim Report

December 1962

ARMED FORCES FOOD AND CONTAINER INSTITUTE
U.S. ARMY QUARTERMASTER RESEARCH AND ENGINEERING CENTER
CHICAGO 9, ILLINOIS

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QM Food & Container Institute for the Armed Forces, QM Research & Engineering Command, U. S. Army, Chicago 9, QMFCIAF Rpt. No. 41-62

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Primary Field: Attitude change

Secondary Field(s): Acceptance of material

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2. Attitudes
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PROJECT: Human Factors in QM Corps Operations

TASK: Attitude toward and acceptance of QM Materiel

PHASE: Attitude Changes

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Interim Report

by

Joseph M. Kamen

Food Acceptance Branch, Food Division

December 1962

Armed Forces Food and Container Institute

METHODS OF SHAPING SOLDIERS' ATTITUDES TOWARD QUICK-SERVE MEALS

When new items or concepts of materiel are poorly received by the users, the disappointment of the engineers and technologists is understandable. It would appear that unfavorable evaluation by the users is usually based upon undesirable functional characteristics. For example, the new clothing may chafe, the new food may be unpalatable, or the new mess gear may be difficult to clean. In these cases redesign or further development work is ordinarily required.

But even apart from the functional characteristics, the user's attitude is frequently an important determiner of acceptability. In our own culture, for example, many foods and food classes are not even considered by most people as a source of nourishment. Horsemeat, insects, and reptiles illustrate this point. Many other foods are disdained by specific subcultures, although not by the population at large. Negative attitude is an intervening cause of rejecting these foods since people don't even allow themselves to be exposed to the flavor or other bases for their functional evaluation.

There is tacit recognition of attitudes in the development of components of military rations. The decision to develop foods having a counterpart in the user's normal dietary implies the designer's belief that foods which are too novel would bring about attitudinally-based resistances. The best course of action, it is felt, would be to develop foods compatible with the soldiers' favorable predispositions toward existing food.

As new foods are developed for special purposes, this guideline often becomes unfeasible. In some cases, it may be impossible to meet the military and nutritional requirements by attempting to simulate familiar foods. In other cases, the prepared form of the food may be familiar, but its unprepared state may be so unusual that an adverse attitude may develop and appreciably reduce acceptability. This may be true in the case of the Quick-Serve Meal, a new dehydrated operational ration which the soldier himself rehydrates and prepares (Anonymous, 1960).

Observations at a field test of a prototype of this ration indicated that attitude might be a crucial variable affecting acceptability (Weeks, 1959). The soldiers' lack of information on the purposes of Quick-Serve Meals and on the nature of the individual foods appeared to contribute to adverse evaluations of the foods and the concept. A more systematic indoctrination program might have offset these negative effects.

Purposes

The primary purpose of the present study was to estimate the effectiveness of a communication designed for mass audiences in order to improve attitude toward Quick-Serve Meals. Another purpose was to determine whether this communication should be presented before or after soldiers have had first-hand experience with some foods from this ration.

It can be argued that the communication should be presented prior to experiencing the foods because such experience might induce an attitude difficult to overcome through a mass communication. Another point of view is that experiencing the foods should precede the communication so that the soldier would better be able to understand the content of the communication. (See Hovland, et al., 1957, for a comprehensive discussion of orders of presentation within mass communications.)

The study was of the laboratory type in order to better control or eliminate extraneous variables. The degree of realism -- and generalizability to the field -- may not be a drawback since the communication was presented under conditions typical of Army indoctrination programs.

Method

Communications

Experimental communication. Communication was by 25 film slides with accompanying tape-recorded narrative. The script (see Appendix A) incorporated principles derived from other attitude-change studies (e.g., Thistelthwaite and Kamenetzky, 1955). One of these principles was to acknowledge the soldiers' salient objections or counterarguments and to answer the questions most likely to be asked. For example, a previous field test (Weeks, 1959) suggested that soldiers were unaware of the limitations of a canned operational ration in those situations for which Quick-Serve Meals are intended; biases toward dehydrated foods in general were found to exist. Also, pilot studies among Army Reservists indicated the advisability of imparting information with minimal exhortation and the avoidance of "talking down" to the men. These guidelines,

and those provided by other research and observations, were useful. However, there are no assurances that present communication is among the best that could be written because script-writing is largely an art. Running-time of the communication was approximately 13 minutes.

Control communication. The control communication was an Army Sound Film Strip (Number 55-15) entitled, "Army Motor March Columns." This topic was unrelated to foods and ran for slightly less than 10 minutes.

Subjects

The subjects were 400 enlisted men at Fort Lee, Virginia. One hundred participated in each of four daily sessions. During each session 25 participants were randomly assigned to each of the four experimental conditions.

Experimental conditions

1. The experimental communication was immediately followed by a taste-test of three foods included in the Quick-Serve Meals -- chicken, ground beef slices, and peas. All were rated on a nine-point hedonic scale.

2. The control communication was immediately followed by the taste-test.

3. The taste-test preceded the experimental communication.

4. The taste-test preceded the control communication.

Procedure and Questionnaire

Pretest. Prior to any manipulation of the experimental variables, the subjects were asked to complete a pretest questionnaire which first gave a minimal amount of information on Quick-Serve Meals and then asked two opinion questions: (a) "How good or how poor is the idea of a field ration consisting mainly of dehydrated foods?"; (b) "How favorable or unfavorable are you to the idea of including Quick-Serve Meals as a regular field ration?"

The experimental conditions were then carried out. Immediately afterwards subjects completed a first posttest questionnaire which covered the following areas:

(a) Attitude toward Quick-Serve Meals

(b) Curiosity to try entire Quick-Serve Meals

(c) Background information: age, education, length of active duty, morale, and attitude toward the Army.

(d) All subjects who listened to the experimental communications also evaluated the communication in terms of level of difficulty, worthwhileness, interest value, and credibility. Each participant was also afforded the opportunity to comment on Quick-Serve Meals and on the talk.

Two-week posttest. Two weeks later the subjects completed a second posttest questionnaire which asked how much they had thought about and talked about Quick-Serve Meals during the two preceding weeks and their attitudes toward this ration.

Because a few subjects at each phase of the experiment neglected properly to complete the questionnaire -- or were absent for the second posttest -- the number used in the statistical analyses was reduced to 382 for the first post-test, 389 for the preference questionnaire, and 290 for the second posttest..

Results

Pretest attitudes

The two pretest attitude questions asked essentially the same thing in two different ways. This was done to reduce the effect of random error inherent in any one question. The correlation, based upon all subjects regardless of experimental condition, between the two questions was .805. Hence, the two ratings were summed to yield a single pretest score. The reliability (internal consistency) of this score was .89 (Thorndike, 1949, p. 84).

The experimental groups differed somewhat on pretest attitudes which were in turn positively correlated with posttest attitudes. Thus, the correlation of the pretest with the immediate posttest was .51; with two-week post-test, it was .42; and with the taste-test ratings averaged over three foods it was .38.

Hence, an analysis of co-variance (Brownlee, 1961; Lindquist, 1953) appeared to be the appropriate method of statistical analysis since it takes advantage of these correlations in reducing error variance. Just as important, it allows statistical adjustment of the posttest attitudes and taste-test ratings on the basis of differences in pretest scores; the groups are thereby statistically equated on pretest.

Posttest and taste-test scores

The adjusted mean posttest and taste-test ratings appear in Table 1, and the corresponding analyses of co-variance are shown in Table 2.

Table 1

Adjusted Mean Ratings on Attitudes toward Quick-Serve Meals
(9 = most favorable: 1 = most unfavorable)

A. Immediate posttest attitudes

	Communication		
	Experimental	Control	Average
Sequence:			
Taste-test after communication	6.18 (93)	5.70 (98)	5.93
Taste-test before communication	5.91 (97)	5.13 (94)	5.53
Average	6.04	5.42	

B. Two-week posttest attitudes

	Communication		
	Experimental	Control	Average
Sequence:			
Taste-test after communication	5.79 (76)	4.85 (68)	5.35
Taste-test before communication	5.95 (75)	4.94 (71)	5.46
Average	5.87	4.90	

C. Average of three taste-test ratings

	Communication		
	Experimental	Control	Average
Sequence:			
Taste-test after Communication	5.87 (95)	5.59 (97)	5.73
Taste-test before communication	5.58 (100)	5.33 (97)	5.46
Average	5.72	5.46	

NOTE: Numbers in parentheses are N's.

Table 2

Analyses of Co-variance of Posttest Attitude and Taste-Test Ratings

Source of variation	First Posttest				Two-week Posttest				Taste-test			
	df	Mean square	F	p	df	Mean square	F	p	df	Mean square	F	p
Communications (Control vs. experimental)	1	36.74	12.18	.001	1	68.59	23.12	.001	1	47.49	2.69	n.s.
Taste-test (Before vs. after communications)	1	16.34	5.42	.05	1	.92	<1	n.s.	1	63.81	2.98	n.s.
Communications x taste-tests	1	4.24	1.41	n.s.	1	1.69	<1	n.s.	1	1.24	<1	n.s.
Within treatments	377	3.02			288	2.97			384	21.39		

First posttest attitudes. The experimental communications had a highly significant effect ($p < .001$) in increasing the favorableness of attitudes toward Quick-Serve Meals. To a lesser extent ($p < .05$), communications presented after taste-tests were more effective than those presented before. This effect appeared to hold for both the experimental and control communications, although the magnitudes of superiority were not large, .27 and .57 scale points, respectively. Practically speaking, order of presentation does not seem to be very important; but if a choice had to be made, it would be that foods should be experienced before the communication is presented. Since this effect occurred for the control groups as well as for the experimental groups, it is unlikely that experience per se with the foods facilitates understanding of the following communication.

Two-week posttest attitudes. Attitudes of subjects who listened to the experimental communication became a little less favorable (by .17 scale points) over the course of two weeks than they were immediately after the communication. But the control subjects showed even a more marked deterioration of .52 scale points. The difference between the two groups was significant at the .001 level. Thus, it is clear that the indoctrination program not only had immediate positive effects upon attitude, but also that these effects generally carried over for two weeks without intervening experiences with the actual ration.

Neither of the other two sources of variation -- sequence of presentation and interaction of sequence with communication -- was statistically significant.

Thus, one of the major benefits of the experimental communication was to prevent a sharp decline in favorableness over time, as well as to increase favorableness.

Taste-test ratings. No source of variation significantly affected ratings. In another statistical comparison, only two of the four experimental conditions were considered. Those two were the "taste-after-communication" conditions; and the average taste-test ratings between the experimental and control groups were not significantly different.

Subsidiary Attitude Questions

Four questions reflecting general attitude toward the Quick-Serve Meals were answered by subjects in all groups. Two of these questions were administered in the first posttest questionnaire, and two in the second posttest questionnaire. Table 3 presents, by experimental treatment, the percentage checking each alternative in each question. To question No. 1, "What do you think is the longest time one should expect a soldier to live on Quick-Serve Meals, and nothing else?", the median response was approximately one week. About 66 percent of the men were curious to try the entire Quick-Serve Meals (Question No. 2). Almost 80 percent of the men had thought about the ration during the two weeks intervening between the first and second posttests (Question No. 3) and 77 percent had talked about this ration with their buddies (Question No. 4).

Table 3

Percentage Distributions of Subsidiary Attitude Questions
(From Burt, 1962)

	Condition 1 (Experimental communication before taste-test)	Condition 2 (Control communication before taste-test)	Condition 3 (Experimental communication after taste-test)	Condition 4 (Control communication after taste-test)
1. Longest time soldier should live on Quick-Serve Meals?				
Less than 2 days	17	19	17	31
3 days to one week	34	27	38	27
1 to 2 weeks	20	14	14	10
2 weeks to one month	13	17	20	11
1 to 3 months	7	9	4	7
3 months or more	9	14	7	14
2. Curious to try Quick-Serve Meals?				
Yes	75	62	70	57
No	25	38	30	43
3. Think about this ration during past two weeks?				
Yes	84	68	84	80
No	16	32	16	20
4. Talk about this ration with buddies?				
Yes	82	69	79	79
No	18	31	21	21

NOTE: First two questions were asked immediately after communications and taste-tests. Second two questions were asked on two-week posttest.

These percentages appear unusually high, particularly for the groups receiving only the control communication. However, since after the first posttest, all subjects were in practically daily contact with each other, intercommunication probably led to an increase in thinking about and discussion of this ration.

The first two questions correlated .41 and .57, respectively, with posttest attitudes indicating that there is a common factor between the general attitude and the factors measured by these subsidiary questions.

Subjects' Evaluation of Experimental Communication

Five main questions were designed to secure the subjects' evaluations of the experimental communication, regardless of their agreement or disagreement with the content.

The first question dealt with the perceived fairness or unfairness of the speaker. Only five percent of the respondents felt that the speaker was unfair to some degree, while 82 percent said that the speaker was either very fair or extremely fair.

Eighty-one percent said that none of the talk was hard to understand, and another 10 percent said that a little was hard to understand. The belief that the talk was worthwhile for all soldiers in the Army to hear was expressed by 87 percent compared to eight percent who felt it was not worth while and five percent who felt it was a waste of time. Similarly, nine percent said they were bored, whereas 33 percent indicated they were somewhat interested, 35 percent very interested, and 23 percent extremely interested.

When asked whether anything in the communication was hard to believe, 13 percent said yes. However, over two-thirds of these failed to specify what was hard to believe. Of the remainder, two questioned the good flavor of freeze-dried products and two doubted the process of freeze-drying. Five other reasons were given by one person each.

Generally, the subjects enjoyed the communication and felt it was worthwhile, clear, and fair. Although no alternative communications are available for comparative purposes, the high absolute percentages of favorable evaluations of the communications leave little doubt that it was satisfactory. In fact, a greater degree of negative evaluations had been expected if for no other reason than as a means of expression of general cynicism toward the Army. Also this favorable evaluation of the communication cannot be attributed to the subjects' fear of intimidation for unfavorable evaluations, since 33 percent expressed a general negative attitude toward the Army and 41 percent low general morale, parameters which one might suppose would be associated with hostility toward Army-sponsored communications.

Relationship between food attitudes and personal characteristics

Correlations were calculated between attitudes toward the Quick-Serve Meals (including degree of attitude change) and such personal characteristics as morale, attitude toward the Army, length of service, and age. It is planned that a future Interim Report will summarize these relationships together with ones derived from other studies among Reservists and National Guardsmen.

Discussion

This study demonstrated the feasibility and effectiveness of a mass communication in increasing favorableness of attitude toward a new ration system. Also suggested -- though not unambiguously so -- was the desirability of having soldiers sample foods from this system before exposure to the communication. However, this conclusion applies only to immediate changes, since over a two-week period, this variable does not appear to have any effect.

Perhaps a more important conclusion is suggested by the fact that those who were not exposed to the experimental communication had an appreciably more unfavorable attitude two weeks after they tasted freeze-dried foods than immediately after testing. This deterioration of attitude over time suggests the possibility that during actual field use of these rations, initially good reception might decline over time unless an indoctrination program were instituted. If this is true, then a fall-off in ratings which otherwise might be attributed to monotony characteristics of the foods might actually be due in large part to an attitudinal component (cf. Weeks, 1959). It would be unwarranted, of course, to assert that an attitude-change program alone can stem this decline. The importance of the intrinsic characteristics of the ration must not be understated. If it does not meet minimal subjective and objective standards of the users, the effects of such a program would be ephemeral at best. But assuming a basically satisfactory product, one can help insure its success through a "properly" planned and executed program of indoctrination.

"Properly" is in quotation marks since it indicates that the guidelines for such a program are still on an intuitive level. The experimental communication used here was, as mentioned earlier, based on these intuitive guidelines (e.g., no exhortation, acknowledgement of salient counterarguments, etc.). But, how these facets of the communication affect members of the audience -- as individuals -- is not known. Such knowledge could lead to sounder and more effective approaches in introducing new products by increasing our understanding of the relationship between the soldier and his materiel.

Thus, an indoctrination program may have the following intermediary psychological effects conducive toward creating favorable attitudes:

a. The program may, if nothing else, provide a frame of reference for evaluating the ration. As Seaton and Gardner (1959) and Kamen and Eindhoven (1962) have shown, when consumers evaluate novel products without knowledge of its purpose, they tend to downgrade them, particularly those which are least preferred. Preference discrimination among alternative formulations is also reduced when consumers are told too much about the purpose of the food; therefore, instructions to the subjects usually are kept to a minimum. A similar phenomenon might occur in the case of a mass communication: soldiers become more favorable because they know more precisely what is being evaluated. Without this knowledge, they are prone to be antagonistic.

b. New products often arouse objections to certain of their features. For example, an objection may be that dehydrated foods are not natural foods, or there may be some suspicion about the processing methods, or the user may forsee human engineering problems. To the

extent that these objections are acknowledged and refuted, or the men are prepared to encounter and overcome certain difficulties, greater shifts in attitude can be expected.

c. Only rarely are soldiers given any background information on their supplies or equipment. Typically, these items are "thrown" at them. As Gottlieb and Rossi (1959) have pointed out, soldiers perceive some impersonal entity as being responsible for designing much of the Army's materiel, and this entity does not take cognizance of the soldiers' needs or wants. Rations, the soldiers believe, are developed from the hardware point of view and not from the standpoint of the human user. A mass communication which does emphasize the importance of the consumer can be hypothesized to lead to more favorable attitudes, possibly as a subtle expression of gratitude for humanism symbolized by the communication.

Indirectly related to this point is the general principle that soldiers' satisfaction with a dietary will largely be determined by whether he perceives that the foods issued him are the best that can reasonably be expected under existing conditions. He may not like specific foods, but his general satisfaction is enhanced if he believes that no better ones could be provided. This principle, for example, helps explain the discrepancy in attitudes toward identical rations, depending upon the field conditions, and why soldiers are often satisfied with foods which would ordinarily not have high acceptability (e.g. Peryam, 1962). The experimental communication used here attempted to convince the audience of the Army's concern for providing the best under the specified conditions of use.

These three intermediary psychological mechanisms may or may not have been operating in the present study, and perhaps more important ones have been overlooked, but it is apparent that a better knowledge of them could have greater practical generality for psychological control of attitudes.

Summary

A mass communication intended to increase favorableness of attitudes toward Quick-Serve Meals was presented to 200 enlisted personnel. Half were exposed to the communication before sampling components from this ration, and half were exposed after sampling. In addition two control groups of 100 men each were treated the same way except that the communication presented to them dealt with a topic unrelated to Quick-Serve Meals.

The experimental communication had favorable effects upon attitudes immediately after the presentation. A slight decline occurred two weeks later. The attitudes of the control group appreciably deteriorated after the two-weeks' interval. Thus, the experimental communication had both the immediate effect of improving attitudes and the longer-range effect of preventing the development of unfavorable attitudes.

Having men sample the foods before exposure to communications appeared superior to the reverse order; however, the difference between orders was slight, though statistically significant, and disappeared after a two-week interval.

The practical and theoretical implications of the findings are discussed.

Acknowledgement

All field work and some of the data tabulations was supervised by Mr. Thomas Burt, Military Subsistence Specialist, Quartermaster Research and Engineering Field Evaluation.

References

1. Anonymous. Feeding systems to meet new tactical needs. QM Food and Container Institute for the Armed Forces. Feb. 1960.

2. Brownlee, K. A. Statistical theory and methodology in science and and engineering. New York,Wiley, 1960.

3. Burt, T. B. A Study of Factors Affecting Receptivity of Soldiers towards Precooked Dehydrated Foods. Tech. Rpt. T-220. FEA 61070, QMR&E Field Evaluation Agency, Ft. Lee, Va., Mar. 1962.

4. Gottlieb, D. and P. H. Rossi. The Problem of Food Acceptance in the Military Establishment: A Social Psychological Approach. Rpt. No. 2, Contract DA19-129-qm-1117, Univ. of Chicago, Mar. 1959.

5. Hovland, C. I., et al. The order of presentation in persuasion. New Haven, Conn., Yale Univ. Press, 1957.

6. Kamen, J. M. and J. Eindhoven. Instructional Sets Affecting Preference Differences among Familiar and Unfamiliar Foods. Paper presented at Annual Meeting of the American Psychological Ass'n., St. Louis, Mo., Sept., 1962.

7. Kamen, J. M. Prospects for shaping soldiers' attitudes toward materiel. Proceedings of 7th Annual Army Human Factors Engineering Conference, Ann Arbor, Mich., pp. 197-201, Oct. 1961.

8. Lindquist, E. F. Design and analysis of experiments in psychology and education. Boston, Houghton Mifflin, 1953.

9. Peryam, D. R. Food attitudes in an unusual environment. (interim report, QMFCIAF 2-62), Mar. 1962.

10. Seaton, R. W. and B. W. Gardner. Acceptance measurement of unusual foods. Food Res., 24: 271-78, 1959.

11. Thistlethwaite, D. L. and J. Kamenetzky. Attitude change through refutation and elaboration of audience counterarguments. J. Abnorm. Soc. Psychol., 51: 107-113, 1955.

12. Thorndike, R. L. Personnel selection. New York, Wiley, pp. 84, 1949.

13. Weeks, E. An engineering test of 6-man and 25-man modules of the experimental Quick-Serve Meal. Tech. Rpt. T-127, FEA 58037 QMR&E Field Evaluation Agency, Ft. Lee, Va., Sept. 1959.

APPENDIX

Script—Attitudes Toward Quick-Serve Meals

Conditions of warfare and conditions of battle are always changing, and the next ten years may well be the years of greatest change. From long before the days of the Revolutionary War to the Korean Police action, scientific and technical advances have brought about a continuous increase in the fire-power of armies and in their ability to deliver it.

Modern warfare may be just as brutal as earlier warfare, but it will certainly be different. In the eighteenth century, wars were won or lost in what we would now consider to be major skirmishes. A battle often lasted for a few hours or a few days. Opposing forces were tightly grouped, and every man had pretty much the same job—load, aim, fire; or attack with his bayonet, lance or sword. Tactics couldn't be much improved because the lack of rapid communications and transportation meant that everyone had to stay close together.

In modern warfare, troop concentrations are to be avoided to prevent offering the enemy a profitable target for nuclear weapons. Otherwise an entire Battle Group or Task Force could be decimated all at once. But for attack, concentration of force is necessary; the troops must be mobile enough so they can come together quickly and then disperse when the mission is accomplished.

Mobility, speed, and dispersion become prime factors in military operations. You have seen, heard, and trained with these new weapons, new vehicles, and new tactics for small groups. But what you possibly haven't heard about are new foods and new feeding systems which are designed to match the new field requirements.

Let us first discuss more exactly these military requirements. The Army of the United States will be divided into field armies. A field Army

will be considerably smaller than in past wars and will consist of highly mobile combat divisions. In addition, there will be necessary combat support units providing services such as supply and transportation.

This type of Army may bear any number of names as time progresses, but the keynotes of this type of army are: ease of controlling small units and of simplifying tactical and logistic planning. Machines will be substituted for man-power whenever practical. The number and types of weapons and equipment will be substantially reduced in order to: first, simplify training; second, reduce the tonnage of supplies; third, reduce the number of different items in the supply system; and, fourth, simplify maintenance. Combat commands will be ready to carry out independent operations. The combat effectiveness of the basic fighting unit, the company, will be increased by improvement in firepower, mobility, communications, and surveillance. The new tactics mean that the soldier can no longer depend upon cooks to provide him with all of his meals in the field. The small units will be too spread out for hot meals from the kitchen to be brought to them or for them to eat at a central location. Field ranges, cook sets, insulated food containers, immersion heaters, refrigerators, kitchen trucks, and so on, are items that are not compatible with dispersion and mobility.

Now troops have to eat, and if cooks are not going to prepare all the meals, who will? Obviously, it will have to be the troops themselves. But not all of us can prepare a regular hot meal because we may not have the training, the skill, the equipment, or even the time to prepare our own hot meals. So, what is left? The answer is prepackaged rations, which the men themselves can prepare quickly and easily. One such possibility is some kind of canned ration such as the 5-in-1, which provides three meals for each of five men, or some version of the old C-ration, such as the Meal, Combat, Individual. Certainly, these rations are fast to prepare—within

minutes if necessary—and they do provide adequate nutrition. But no one expects men to live on canned rations for more than a few days at a time—except under unusual emergency conditions.

Why aren't canned foods the whole answer? For one thing, canned rations are too heavy and too bulky to transport or to carry on the back; and if they are air dropped, they can be damaged too easily. Just as important is that so far food scientists have not been able to can certain foods so that they will taste freshly prepared.

Why don't canned meats, for example, taste fresh? Well, the fresh ingredients are good. But after a can of meat is sealed, all bacteria have to be destroyed. This is done by heating the can and the meat in it. As the heat is applied, the bacteria in the meat closest to the outside are destroyed first, and then the bacteria at the next level are destroyed, and so on until the bacteria at the very center of the can are killed. But by the time the meat at the center is sterilized, the meat at the outside is overcooked. So the taste of canned meats is not the same as the taste of fresh meats because heating the cans at high temperatures and for long periods of time changes the flavor.

Therefore, many canned foods are not sufficiently acceptable to people. And that's one of the main reasons why we don't expect soldiers to eat only canned rations, day in and day out for extended periods of time. Canned rations are intended for use when fresh hot meals are not available, when there is not enough time to prepare the meals or when the meals cannot be brought forward. Hot meals, we know, are important for morale and extended combat efficiency.

To summarize, what is needed is this:

A. A nutritious ration, one which provides all the necessary protein, carbohydrates, fats, minerals, vitamins.

B. An acceptable ration, one which men will like and eat, especially for long periods of time.

C. A simple ration, one which is easy to prepare by the men themselves without special training.

D. A compact ration, one which is lightweight and takes up little space.

E. A self-contained ration, one which requires no refrigeration or elaborate equipment.

Now, this is a tall order, so tall that no existing ration meets all of these requirements. We already mentioned some disadvantages of canned products, and obviously, fresh or frozen foods cannot be provided, What is left?

During the past several years, food scientists have made a concentrated attack on this problem and have come up with foods that meet these military requirements. These foods are dehydrated foods. When you consider that for some foods three-quarters of the total is water, taking out the water will mean significant reductions in weight; and once a food is dehydrated, you can preserve it in flexible packages without a refrigerator or freezer, and you save the weight of the can desides.

In the past years, dehydrated foods were not completely satisfactory. They may have been too hard to chew or for some other reason did not have the right taste. The reasons for the low quality is that the methods for dehydrating foods were not well developed. Meats, especially, were a

problem. Heat cannot be used to rid a meat of water, because heat is an enemy of quality. But now a better method of getting the water out has been developed. This method is called freeze-drying. High quality meat is cooked and quick-frozen. Then the meat is placed into a vacuum chamber. In a vacuum, the frozen water turns directly into a vapor without first unfreezing. Finally, the water vapor is removed from the chamber and the food is packaged. You may know that the lower the air pressure, the sooner water starts to boil; for example, water in Denver, Colorado--which is 5,000 feet above sea level--boils at lower temperatures than say, in New York City. If you lower the air pressure to zero, even a frozen product will boil; that is, it will lose its moisture without first turning into water and without damaging the product. This is the secret of producing these new dehydrated foods: freeze them fast and put them into a vacuum.

The idea of dehydrated or instant foods is not new. For example, we have used frozen orange juice in the Army for many years; this is orange juice with some of the water taken out, and then frozen. Now we have orange juice with <u>all</u> the water taken out. We've had raisins for centuries; and raisins of course are dehydrated grapes. We've had instant coffee since the Civil War. And we've had instant potatoes for a long time, first in the Army, then on the civilian market.

What is new is the improved method of taking out the water so that the food still tastes good. It took a long time to develop this method, and further research is still going on, and will go on until the best possible products can be made. And you can expect that within the next few years, more dehydrated foods will be placed on the civilian market, just as instant puddings, instant cake mixes, and other instant foods already have.

It is true that many instant foods do not taste exactly like freshly prepared foods. But even apart from taste, many people have a prejudice against instant foods. They may feel that these foods are not "natural." But let us look more closely at the evidence. Dehydrated foods are foods that have lost their water, and nothing more. The protein, vitamins, and other nutritional components are still there.

Dehydrated foods are natural foods. The manufacturer takes the water out; the consumer puts it back in when he's ready to eat it. As long as the food is dry, and in some cases as long as the food is in a sealed package, bacteria cannot spoil it.

Twenty-one meals, consisting largely of dehydrated components, have been developed into a ration and named "Quick-Serve Meals." They are called Quick-Serve because they are much more simple to prepare than meals made from perishable foods. Some rations are packed in six-man units, others in 25-man units.

It takes more than just a minute or two to prepare a meal. It can take up to twenty minutes, or perhaps even a little longer, but while one man prepares the meal, the others can remain on duty. These meals are to be used when small groups can get together. If they cannot, then they will have to depend upon an individual ration. Usually, it takes only one man to prepare a meal for his six-man team, so that the preparation time averages out to about 5 minutes per man per meal, a small time considering the benefits of a hot meal. And there is no K.P.

Quick-Serve meals do not mean that a soldier merely has to dump water on the foods and serve. Some skill is still necessary, but it is a skill that can be picked up by almost anyone, and picked up rapidly. After preparing one or two Quick-Serve meals, most men are qualified to prepare any

other Quick-Serve meal.

Quick-Serve Meals, at least at the present time, are not suitable for all conditions. If the foods are prepared outdoors without a shelter, then very severe weather may make preparation impractical. Under these conditions, using a canned ration becomes necessary, until a newer type of ration can be developed.

We have described this new ration--why it was developed, the conditions for which it is intended and not intended, and its major features. But the final evaluation is up to <u>you</u>. It's what you think about it that will determine whether this ration will be introduced into the supply system.

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