

RS9-52

CURRENT STATUS OF THE DEHYDRATED FOODS PROGRAM

Virgil O. Wodicka
Director, Food Division
Quartermaster Food & Container Institute for the Armed Forces

A review of the dehydrated foods program may properly begin by having a look at just what the program is. Even before this, it may be in order to review briefly the present feeding system and the reasons for having a dehydrated foods program at all.

The basic problem to be addressed is that of feeding soldiers in a Theater of Operations. There are a few special problems in feeding sailors and airmen, but these are special cases and may be considered later.

The basic ration of troops in an overseas Theater is the Operational Ration B, consisting of as normal a diet as can be devised from entirely non-perishable foods. It is supplied in the form of somewhat over 100 different components shipped in bulk lots and broken down in forward supply points to balanced menus in a 15-day rotation cycle. In practice, it has usually been necessary to supplement this ration with perishables, notably meats, to the extent permitted by shipping and overland transport facilities. This ration, supplemented or not, is used whenever field kitchens can be operated.

When troops are dispersed in small groups, the current ration is the Ration, Small Detachment, 5 Persons. This is also a non-perishable ration unitized for 5 men for one day (3 meals). There are 5 menus. It must be prepared for consumption by the using unit with no formal kitchen facilities.

The present dehydrated foods program enters heavily into the

TECHNICAL LIBRARY
U. S. ARMY
NATICK LABORATORIES
NATICK, MASS.

development of rations to replace the B Ration in part and the Small Detachment Ration entirely. In the new system there may still be some use of bulk lots of ration components in rearward areas, but more forward areas fed from a field kitchen will receive a Unitized Uncooked Meal. In this system all the ration components except bakery items will be unitized so that one case contains all the food for 25 men for one meal. Thirty such meals are scheduled for development. Present plans are to supply a family of prepared bakery mixes packaged in bulk to a small, highly portable bakery capable of baking all the bread and cake for a battle group with a crew of three or four men.

Within the case, the components of the Unitized Uncooked Meal will be chosen to maximize acceptability and simultaneously minimize preparation labor. In order to do this, heavy use will be made of dehydrated components, irradiated components, and prepared mixes of one sort or another. The components will be uncooked wherever there is a quality advantage to be achieved thereby; otherwise, precooked. (Slides showing menus for a typical day)

In future combat it is expected that opportunities to assemble in company-size units for meals will be far fewer than in the past. There will be much more emphasis, therefore, on the ration for small groups. There is need, then, for a ration to replace the Small Detachment Ration which will be easier to prepare, more acceptable when consumed over extended periods, and more effective in use of weight and space. To meet this need, a family of 21 Quick-Serve Meals is under development. Most major components of these meals are dehydrated precooked foods which require only the addition of water (hot for hot foods, cold for cold foods)

to the dry food and holding for 20 minutes to prepare a meal for serving. Use of paper trays and expandable plastic eating utensils eliminates dishwashing and thereby conserves water, offsetting the extra water needed for the use of dehydrated food. Provision of this extra material results in a ration which occupies essentially the same space as the Small Detachment Ration it replaces, but the use of dehydrated foods and flexible packages reduces the weight by 26 percent. (Slides on weight comparison)

Because of the more frequent use of Quick-Serve Meals in the Combat zone, its development has been given priority over that of the Unitized Uncooked Meal. In order to test out the concepts embodied in its design, nine different meals have been manufactured and packaged and are now in the process of assembly into 25-man and 6-man units for an extensive field test in late May and early June under conditions as closely simulating atomic warfare as can be currently managed. Results of the test will then be used to guide an intensive effort to complete the development of the 21 meals to the stage of quantity production in the next two years. (Slides of typical menus, pictures of meals)

From the start of the project in the fall of 1955 to the completion of laboratory development in 1961, the 21 menus are expected to require the development of 28 new basic food components and their combination into 17 new combination dishes, not including seasoning mixtures. Experience to date has shown that the Brunauer-Emmett-Teller analysis of water-vapor relationships on the components is very helpful in predicting the boundary values of moisture content necessary for stability of individual items. Water vapor equilibrium curves also make possible

the prediction of the stability of mixtures of materials of different moisture levels. Use of this approach greatly reduces the need for empirical testing of stability on both components and mixtures.

Development of the Unitized Uncooked Meal is scheduled roughly one year behind the Quick-Serve Meal. It was originally planned to conduct a field test on the first nine meals next year, but the procurements for this test, originally scheduled for this year, have now been cancelled to permit accelerated development of the full 30 meals. The nine meals on which menus have been developed required 15 new basic ingredients. In this ration, formulated dishes are not required, their place being taken by recipes for use by field cooks. Completion of the development will emphasize the need for a family of mixes for sauces, gravies, icings, etc., suitable for use under military conditions of storage and preparation. These will save time and labor in the field kitchens.

The achievement of laboratory prototypes, however, is only the first step in developing the new rations. In each instance, a satisfactory process must be engineered for use on a production scale. In some instances, this transition is relatively straightforward; in other cases, it requires as much effort and investment as the development of the prototype. In at least one instance, a product (it happened to be a fruit) was quite satisfactory in laboratory prototype form, but it proved completely impractical to produce on full-scale equipment because of difficult handling problems. Obviously, the process needs a second look.

During the next year, several different phases of the total program will have to proceed concurrently. First, development work will have to continue on products and processes to complete the components and finished dishes as scheduled. Second, engineering studies will have to be conducted on items that are already through the laboratory development

stage but are sufficiently outside the bounds of experience with similar products or processes to make translation of experience unduly risky. Third, plant production runs on a small scale will have to be arranged to provide product for field testing. Fourth, performance tests and other quality criteria will have to be defined for specification purposes on items ready for procurement. Fifth, procurement will be started on individual items in order to provide needed experience for all concerned. It is obvious to all that the background knowledge of even the finished items is skimpy, and many problems may be expected at all levels. The most effective way of finding these problems, however, and of bringing them under control is to move ahead into regular production and use of the items on a scale which is representative but not too grandiose. This will also give all concerned a better basis for estimating costs than now exists.

Items procured under this program will go directly into troop feeding in spite of the fact that they may be ultimately intended for use in combat rations rather than in garrison. This will provide use experience as well as production experience and will keep stocks from being held until they begin to deteriorate before they are issued. If the cost experience is favorable, some of these items may move into regular overseas supply to support our peacetime overseas forces. In any event, an attempt will be made over the next few years to reach and maintain a steady procurement volume which will assure the availability of needed items in the event of mobilization. In these days of serious fiscal problems, there is no guarantee that this intention can be carried into effect, but at least the wheels have been started into motion in that direction. Items tentatively scheduled for procurement within the

next year are shown in Table _____. Drafts of purchase instruments to be developed within the next year for subsequent procurement use are listed in Table _____.

The dehydrated foods program is of wider defense interest than just Army. The Navy is interested in dehydrated foods of good acceptability because of their logistic advantages on nuclear-powered submarines and also because of their ease of preparation for use on small ships. The Air Force finds the Quick-Serve Meals promising for feeding in flight

From the highlights presented above, it is clear that the next year will be a critical one for the dehydrated food program in the Armed Forces. By next year at this time results of the first large-scale field exercise using Quick-Serve Meals will be known and evaluated. Similarly, quantity procurements of some of the first new items will have been accomplished, and the effects of processing, storage, transportation, and preparation will be known as well as the reactions of the consumers. On other items, first production scale runs will have been made to develop processes and to gather foods for later field tests. By the next time the Associates meet, we fervently hope that we may all join in taking pride in the results of our joint endeavors for the year and for all the years which have led up to it.

MASTER MENU ITEMS

BACON (Prefried)
PRUNES (Dehydrated)
APPLESAUCE (Instant)
CABBAGE (Raw - Dehydrated)
PEPPERS (Green - Dehydrated)
CHICKEN PIECES (Precooked - Dehydrated)
BEEF (Ground - Precooked - Dehydrated)
SHRIMP (Precooked - Dehydrated)
MACARONI (Instant)
PEAS (Dehydrated)
BEANS (Green - Dehydrated)
POTATOES (Sweet - Dehydrated)
SOUP (French Onion)

1203-1 Master Menu Items

3/59

NEW PURCHASE INSTRUMENTS

BEEF STRAKS (Raw, Dehydrated)
FISH STICKS (Raw, Dehydrated)
PORK CHOPS (Raw, Dehydrated)
BEVERAGE POWDER (High Protein, High Calorie)
CHEESE (Cheddar, Processed, Dehydrated)
APPLES (Dehydrated (Low-Moisture))
CRANBERRIES (Dehydrated)
FRUIT COCKTAIL (Dehydrated)
JUICE (Orange, Dehydrated)
CHICKEN (Sliced, With Gravy, Precooked, Dehy.)
MEAT BALLS (With Gravy, Precooked, Dehydrated)
MEAT BALLS (With Beans, Precooked, Dehydrated)
CHICKEN AND RICE (Precooked, Dehydrated)
BEEF STEAK (Swiss, Precooked, Dehydrated)
CHILI AND BEANS (Precooked, Dehydrated)

4203-3 New Purchase Instruments
3/59 (Continued)

NEW PURCHASE INSTRUMENTS (Cont'd)

BEEF (Ground, W/Onion Gravy, Precooked, Dehy.)
SLICED GROUND BEEF (W/Tomato Gravy, Precooked, Dehy.)
BEEF (Ground, W/Mushroom Gravy, Precooked, Dehy.)
BEEF (Ground, W/Spaghetti & Sauce, Precooked, Dehy.)
POTATOES (White, Precooked, Dehydrated)
BEANS (Red, Precooked, Dehydrated)
APPLE JUICE (Dehydrated)
CARROTS (Precooked, Dehydrated)
TOMATO JUICE (Dehydrated)
LIMA BEANS (Precooked, Dehydrated)
CORN (Cream Style, Dehydrated)
GREEN BEANS (Precooked, Dehydrated)
MACARONI & SPAGHETTI (Instant)
RICE (Instant)
OATMEAL (Instant)
BEEF BROTH WITH NOODLES (Dehydrated)

4203-2 New Purchase Instruments

3/59

QUICK SERVE MEAL

BREAKFAST

FRUIT COMPOTE
CEREAL BAR
POTATO STICKS
FRIED BACON
EGG
COFFEE CREAM SUGAR

3962-1 Quick Serve Meal
Breakfast

QUICK SERVE MEAL

DINNER

CHICKEN RICE SOUP
MEAT & SPAGHETTI w/TOMATO SAUCE
BUTTERSCOTCH PUDDING
BREAD
JAM OR JELLY
COCONUT BAR
COFFEE CREAM SUGAR

3962-5 Quick Serve Meal
Dinner

UNITIZED UNCOOKED MEAL

BREAKFAST

GRAPEFRUIT JUICE
OATMEAL CREAM
PANCAKES W/SYRUP
BACON
BREAD
MARGARINE JAM
COFFEE CREAM
SUGAR MILK

3962-1

UNITIZED UNCOOKED MEAL

LURICH

CREAM OF ONION SOUP W/CRACKERS
FRASIED BEEF W/TOMATO GRAVY
MASHED POTATOES
LIMA BEANS
VEGETABLE RELISH
BREAD
MARGARINE JELLY
SPICE CAKE
COFFEE CREAM SUGAR

5/58 3962-2

UNITIZED UNCOOKED MEAL

DINNER

CHICKEN POT PIE WITH CORNMEAL TOP
DICED POTATOES
CARROTS PEAS
PEACHES
BREAD
MARGARINE JELLY
CHOCOLATE PUDDING
COFFEE CREAM
SUGAR MILK

5/58 3962-3

QUICK SERVE MEAL

SUPPER

NON-FAT MILK
SLICED BEEF W/GRAVY
MACARONI, SEASONED
BUTTERED CABBAGE
BREAD
FAT SPREAD
CHOCOLATE FUDGE CAKE
COFFEE CREAM SUGAR

3962-6 Quick Serve Meal
Supper