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FROZEN EGG PRODUCTS FOR AIR FORCE MISSILE SITES

H. H. Palmer, et al

Western Regional Research Center
Albany, California

1974

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DEVELOPMENT EGGS SOLUBLE EGG ANTIGEN FROZEN FOODS PRECOOKED FROZEN FOODS	FOODS FREEZING STORAGE STABILIZERS STABILIZATION SYSTEM	MICROWAVE EQUIPMENT MICROWAVE OVENS ACCEPTABILITY CONVECTION (HEAT TRANSFER) CONVECTIVE HEAT
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)		
This study conducted in response to US Air Force requirement 3-10, was designed to develop precooked frozen breakfast egg products suitable for use at the US Air Force Missile base sites. Seven products which meet the specifications have been developed and tested. The instability of cooked egg white to frozen storage has been overcome by formulation changes which involve the use of stabilizers and the substitution of ingredients for those known to be unstable to freezing and storage. All of the products contain at least one		

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20. Abstract (Cont.)

egg per serving. They can be prepared by commercially feasible operations and standard equipment. They are suitable for reheating in a microwave or air convection oven and retain their acceptability after 6 months' storage at -18°C .

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FOREWORD

From the standpoints of acceptability and nutrition eggs are of major importance in military feeding systems, particularly in breakfast menus. The natural properties of eggs, however, impose a number of restraints on their use under non-garrison situations. In addition to their sensitivity to breakage, shell eggs have a poor packing efficiency and require refrigeration during storage. Refrigeration, however, must not be carried to the point of freezing because intact egg yolks do not regain fluidity on thawing. Commercially frozen eggs as well as dehydrated egg solids or egg mix are limited to the preparation of scrambled eggs and formulated egg products. This investigation sought to develop the methodology for the preparation of precooked frozen egg products which, after a realistic storage period, can be quickly reconstituted for consumption with a microwave oven, a convection oven, or other standard equipment.

This investigation was conducted at the USDA Western Regional Research Center, Berkeley, California, with funds provided from Task or of Project No. 1J762713A034, titled: Military Food Service and Subsistence Technology. Dr. Helen H. Palmer served as Principal Investigator with the collaboration of Dr. Lee-Shin Tsai and the technical assistance of Mr. K. Ijichi and Ms. C. A. Hudson. Dr. Maxwell C. Brockmann and Dr. George C. Walker performed as Project Officer and Alternate Project Officer, respectively, for the US Army Natick Development Center.

Table of Contents

	Page No.
Foreword	1
Table of Contents	2
List of Tables	3
List of Figures	4
Summary	5
Introduction	6
Objective	6
Procedure	8
Results and Discussion	9
Conclusion and Recommendations	15
Literature Cited	16
Appendix	18

List of Tables

<u>Table</u>	<u>Title</u>	<u>Page No.</u>
<u>Formulas and Preparation Methods</u>		
I.	French Toast	15
II.	Western or Denver Egg	16
III.	Egg and Potato Patty	18
IV.	Puffy Omelet	19
V.	Scrambled Eggs	24
VI.	Creamed Egg and Beef, Turkey, or Chicken	26
VII.	Potato Pancake	28
<u>Panel Ratings and Statistical Analyses</u>		
VIII.	Panel Ratings of Products for All Test Periods	29
IX.	Test Period I	32
X.	Test Period II	33
XI.	Test Period III	34
XII.	Test Period IV	35
<u>Judges' Ratings of Commercial Products</u>		
XIII.	French Toast (Aunt Jemima)	36
XIV.	Scrambled Eggs (Swanson)	37
XV.	Creamed Chicken (Stouffer)	38
XVI.	Creamed Chipped Beef (Stouffer)	39
<u>Judges' Ratings of Laboratory Products</u>		
XVII.	French Toast (served with syrup)	40
XVIII.	Western or Denver Egg	41
XIX.	Egg and Potato Patty (served with catsup)	42
XX.	Puffy Omelet (with optional sauce)	43
XXI.	Scrambled Eggs	44
XXII.	Creamed Egg and Beef, Chicken, or Turkey (served on toast)	45
XXIII.	Potato or Rice Pancake (served with syrup)	46

List of Figures

<u>Figure</u>	<u>Title</u>	<u>Page No.</u>
I.	Questionnaire: Judges' ages and their use of eggs	12
II.	Rating Scale for Frozen Egg Products	13
III.	Photographs of Laboratory Egg Products	14
	Top: A. Western or Denver Egg	
	B. Puffy Omelet (with chipped beef sauce)	
	Center: C. Scrambled Eggs (with bacon bits)	
	D. French Toast (served with syrup)	
	Bottom: E. Egg and Potato Patty (served with catsup)	
	F. Creamed Hard Cooked Egg and Meat (served on toast)	

SUMMARY

This program sought the development of a variety of commercially producible, precooked, breakfast egg items which, after six months frozen storage, retain a normal level of acceptability when prepared for consumption in either a microwave or air convection oven. The following products were prepared and statistically evaluated against the preceding requirements:

- French toast (4 types)
- Western (Denver) egg (3 types)
- Egg and Potato patty (3 types)
- Creamed egg with meat (5 types)
- Puffy omelet (6 types)
- Potato pancakes (3 types)
- Scrambled eggs (2 types)

Acceptance tests were also performed on four commercial egg items.

Production guides identifying source of major ingredients, the weight of all ingredients for 8-30 servings (each serving is equal to a minimum of one egg), details of preparation and cooking, packaging, freezing, storage, and heating for serving are provided for all products. These guides are deemed feasible for production at F. E. Warren AFB. One or more types of the first four products listed above rated above 7.0 on a 9 point scale after six months storage. The remaining three products rated 6.5, 6.0 and 5.9 respectively.

Attempt to produce a frozen, reconstitutable soft fried egg, or poached egg failed due to insurmountable difficulties in cooking, freezing, thawing and reheating intact egg yolks or in simulating normal soft cooked yolks.

INTRODUCTION

This investigation was undertaken in response to US Air Force Requirement 3-10 to determine the feasibility of developing a variety of frozen egg products suitable for serving at Air Force missile sites. The need for such products arises from the isolated location of the missile sites, their limited cooking facilities, and the impracticability of providing cooks for the few people at each site. A large assortment of precooked frozen items has been developed for these sites, and facilities for reheating them are available. However, precooked frozen egg products are unavailable for this type of service. The well-known problems associated with freezing and reheating of cooked eggs have not been overcome sufficiently to provide acceptable products.

Objective

The objective of this investigation was to develop four or more frozen cooked egg products which are commonly included on breakfast menus. The products should be suitable for reheating in a microwave oven or in an air convection oven. They should be adaptable to packaging as individual servings in flexible pouches or as modules of 8-16 servings in flexible or semi-rigid containers. Production and freezing of all products should be based on commercial, feasible operations and standard equipment or minor modifications thereof. The acceptability of the products should be equal to that of their normal counterparts, and there should not be a significant reduction in acceptability following 6 months' storage at -18°C .

A collateral objective sought by the Air Force was the development of fried or poached eggs which retain a normal fluid yolk after frozen storage and reconstitution for consumption in a microwave oven. Based on exploratory observations this objective was deemed beyond the limits

of current technology with respect to the behavior of intact egg yolks. Development of an acceptable product requires simulated or profoundly modified egg yolk contained in a membrane-like structure to have sensory properties closely resembling the yolk of normal fried or poached eggs.

Procedure

The methods used for preparation, freezing and reheating of each product, the ingredients, and the equipment used are reported in detail in the Appendix, Tables I to VII, listed with page numbers in the List of Tables, page

The panel of judges was selected to be as representative as possible of the ultimate consumers of these products, the men at the Air Force missile sites. They were the youngest men available on the laboratory staff. In addition, those selected were accustomed to eating eggs for breakfast, and were unfamiliar with the source of the products (laboratory or commercial). Their responses to a questionnaire (Appendix, Figure I) showed that four of the eight were in the 20- to 30- year age range and four were in the 31- to 40- age range. Three reported that they ate eggs several times a week, three ate them once a week and the other two, less frequently.

The products were presented to the judges at four test periods, approximately 6 months apart. At each of the first three test periods, 13 products were compared in a balanced incomplete block design. Three products were presented three at a time, once a day for 26 days. During these periods each product was presented six times, once with each of the other twelve products. At the fourth test period 10 products were compared in two balanced incomplete block designs: once a day for 14 days. Six products were compared 3 at a time on 10 days in one design; in the other, 4 products were compared 3 at a time on 4 days. The two designs were randomized over the 14-day period. Within each of these designs each product was compared twice with each of the others. Initial evaluations were performed on unfrozen items within a few days of preparation. Stored samples were evaluated within 6 to 6½ months after preparation.

Included in the first test period were four commercially-prepared products, two typical breakfast items (Swanson's scrambled eggs and Aunt Jemima French Toast) and two luncheon items (Stouffer's creamed chicken and creamed chipped beef). The second and third tests included the commercially-prepared scrambled eggs and French toast; the fourth test included the scrambled eggs. The commercial products were obtained from a large supermarket which has a rapid turnover; therefore, they presumably had only a relatively short frozen storage period before the tests.

The frozen products before and after storage at -18°C for 6 months were reheated and served on warm plates. Each judge received one-fourth of a "serving" of each of the three products. Each judge was served in a separate booth. Lighting approximated that of daylight since appearance of the product influences acceptability. Each product was rated on a 9-point scale ranging from "like extremely" to "dislike extremely". (Figure II, Appendix) Comments were requested.

The descriptive terms were converted to numbers for statistical analysis ("like extremely" = 9; "dislike extremely" = 1).

RESULTS AND DISCUSSION

Maintenance of texture or structural stability has long been recognized as the main problem in the successful freezing and storage of cooked egg products. The requirement that these

products be reheated from the frozen state presented the additional problem of assuring a uniformly reheated product.

When hard-cooked eggs are frozen and thawed, the yolks retain their normal consistency, but cooked whites have a spongy consistency characterized by liquid separation and a granular or rubbery texture (1, 2, 3, 4). The damage is related to the mechanical effects of ice crystal formation and is reduced by conditions which promote supercooling. Ultrafast freezing has been shown to produce a product approaching the quality of unfrozen, cooked white, but this is not a solution under commercial conditions since freezing in a blast freezer at -35°C . does not produce an acceptable product (3).

The most successful approaches to freezing of egg-containing products have been the use of blends of yolk and white, the addition of stabilizers, and the substitution of more stable ingredients for certain ingredients which are unstable to freezing (5, 6, 7, 8, 9). These methods have been used in the development of these pre-cooked frozen egg products designed for the U. S. Air Force missile sites. All products were formulated to include at least one egg per serving. All products are acceptable after storage for 6 months at -18°C . The seven developed in this study are French toast, Western or Denver eggs, potato patty, puffy omelet, scrambled eggs, potato pancake, and creamed egg and meat on toast. All were acceptable except the potato pancake served with syrup.

Mean scores for panel ratings of each product at the four test periods are reported in Table VIII. The statistical significance of differences between laboratory-prepared and commercial products are reported in Tables IX to XII. Tables XIII to XXIII show the individual judges' ratings of each product and illustrate the variation in preference of individuals on this panel.

Commercially-prepared products were included in each test period for comparison with the laboratory-prepared products. Four commercial products were tested in the first period, and all except the scrambled eggs received relatively high ratings (Table VIII). The scrambled eggs were the only commercial egg product, since the French toast appeared to contain little egg and the other two contained none. However, since the creamed chicken and creamed chipped beef received relatively high ratings, similar egg-containing laboratory products were prepared for subsequent tests (Puffy Omelet with creamed chipped beef sauce for Test Period II and Creamed Hard Cooked Egg and Chicken for Test Period IV).

The following discussion includes pertinent comments about each laboratory product, including variations in formulation, comparisons with commercial controls, and reaction of judges. The relatively higher ratings of commercial products than of laboratory products in Test I and the apparent decrease in those ratings in subsequent tests (Table VIII) can probably be attributed to the well-known "contrast effect" that is encountered in all

sensory evaluations. When a product is compared with others of lower acceptability it usually receives a relatively high rating, and when it is compared with others of higher acceptability, its rating is usually relatively low. We feel that the lower ratings of commercial products compared to laboratory products in tests other than the first one are probably due to the improvements made in the laboratory products rather than to deterioration in the commercial products.

French Toast (Figure III D): Use of a firm bread is desirable so that the product will retain its shape during freezing, storage, and reheating. The ratings given to the laboratory products during the first test period were significantly lower than the rating of the commercial French toast (Table IX). We attributed this primarily to our use of whole wheat bread and the judges' preferences for white bread. The results of Test Periods II and III lend credence to this opinion, since the laboratory products were prepared with two types of white bread, and the ratings were significantly higher than the ratings of both commercial products. In addition, since the laboratory products had been stored 6 months at -18°C for Tests II and III, there was evidently no deterioration during storage. The laboratory products did not contain cinnamon, but it might be worthwhile to add a small quantity of the spice for some future test. The commercial product used in this test had a slight flavor of cinnamon and the spice seemed to contribute to its acceptability.

Western or Denver Egg (Figure III A): The products prepared for the first test period rated lower than the commercial French toast and not significantly different from the commercial scrambled eggs (Table IX). The use of chopped fresh green onion gave a slightly greenish cast to the eggs and was objectionable to some judges (JWF and TTL, Table XVIII). Also, the use of imitation bacon bits did not give a desirable bacon flavor. Substitution of diced ham for the imitation bacon bits resulted in a rating significantly higher than that of the commercial scrambled eggs (Table X). Use of diced ham and substitution of dry minced onion for the green onion resulted in a rating significantly higher than either commercial product. No deterioration was apparent during storage for 6 months at -18°C . It is probable that use of the real bacon bits would also produce an acceptable product.

Egg and Potato Patty (Figure III E): This product was equal to or higher than commercial products at all test periods (Tables X and XI). There was no deterioration during storage for 6 months at -18°C . The formula containing bacon bits was preferred to the one without the bacon, and the former rated higher than both commercial products (Table XI).

Puffy Omelet (Figure III B): This product, and its several variations, never received panel ratings higher than the commercial products (Tables IX, X, XI), although some members of the panel gave them high ratings (Table XX). One judge (JWF) disliked the spicy onion

flavor in the tomato sauce, and another judge (TJL) gave relatively low ratings to all variations. In general, the variations with cheese sauce and with chipped beef sauce were preferred to the ones with no sauce or with tomato sauce. It is probable that most of the panel members were unfamiliar with puffy omelets and favored the more familiar products, since the members of the research group would have rated these products higher than the panel did.

Scrambled Eggs(Figure III C): The laboratory prepared scrambled eggs received significantly higher ratings than the commercially prepared scrambled eggs (Table XI). The judges gave higher ratings to the products with bacon bits on top than to the plain scrambled eggs.

Creamed Hard Cooked Egg and Meat on Toast (Figure III F): The ratings given to these products during the first two test periods were strongly influenced by the type of toast on which they were served. At the first test period both the turkey and beef products were served on whole wheat toast. The ratings for both were significantly lower than that of the commercial French toast and not different from that of commercial scrambled eggs. At the second test period the products stored for 6 months were served on white toast. The ratings were significantly higher than either control and received the highest ratings of any product served at that test period. The variations tested in the fourth period were included to evaluate the acceptability of the diced egg cooked by a readily controlled method, to test a product containing chicken, and to test the feasibility of using commercially-available cooked, diced chicken and turkey.

Conclusion and Recommendations

It is feasible to provide frozen egg products for the Air Force Missile sites. Six suitable products have been developed: French toast, Western or Denver egg, egg and potato patty, puffy omelet with sauces, scrambled egg with bacon bits, and creamed egg and meat. These products can be prepared commercially with standard equipment, and they can be reheated in either a microwave oven or an air convection oven. They remain acceptable during 6 months' storage at -18°C .

These products should be prepared at F. E. Warren Air Force Base to determine whether any problems are encountered with the existing facilities. They should be submitted to large-scale testing by the enlisted personnel to determine whether the acceptance ratings of the small panel are confirmed or whether product modifications would be desirable.

Literature Cited

1. Tressler, D. K. 1968. Special problems encountered in preparing, freezing, transporting, and marketing frozen precooked and prepared foods. Chapt. 2 in the Freezing Preservation of Foods, Volume 4 Freezing of Precooked Foods, editors, Tressler, D. K., W. B. Van Arsdel, M. J. Copley, Avi Publ. Co.
2. Davis, J. G., Hanson, H. L., and Lineweaver, H. 1952. Characterization of the effect of freezing on cooked egg white. Food Res. 17, 393-401.
3. Bengtsson, N. 1967. Ultrafast freezing of cooked egg white. Food Technol. 21:1259.
4. Palmer, H. H. Prepared and Precooked Frozen Foods. Chapt. 13 in Food Theory and Applications, editors, Paul, P. C. and Palmer, H. H. John Wiley and Co., 1972.
5. Hanson, H. L., Nishita, K. D., and Lineweaver, H. 1953. Preparation of stable frozen puddings. Food Technol. 7, 462-465.
6. Hanson, H. L., Fletcher, L. R., and Campbell, A. A. 1957. The time-temperature tolerance of frozen foods. V. Texture Stability of thickened precooked frozen foods as influenced by composition and storage changes. Food Technol. 11, 339-343.
7. Cimino, S. L., Elliott, L. F., and Palmer, H. H. 1967. The stability of souffles and meringues subjected to frozen storage. Food Technol. 21:1149-1152.
8. Hanson, H. L., Campbell, A., and Lineweaver, H. 1951. Preparation of stable frozen sauces and gravies. Food Technol. 5, 432-440.

9. Palmer, H. H. 1968. Sauces and gravies; thickened desserts and fillings; whipped toppings; salad dressings and souffles. In, Freezing Preservation of Foods, Vol. IV, 4th Ed., Eds. Tressler, D. K., VanArsdel, W. B., and Copley, M. J., Chapter 14, 314-328.

Appendix

Figure 1. Questionnaire: Panel ages and use of eggs

Please answer the following questions:

1. Age: 20 to 30 _____ 31 to 40 _____ Over 40 _____

2. How often do you eat eggs for breakfast?

Once a week _____

Several times a week _____

Several times a month _____

Several times a year _____

Never _____

Figure 2. Rating Scale for Frozen Egg Products

Please check the term which expresses your opinion of each sample. Comments about the reasons for your responses will be welcomed.

Sample No. _____	Sample No. _____	Sample No. _____
Like extremely _____	Like extremely _____	Like extremely _____
Like very much _____	Like very much _____	Like very much _____
Like moderately _____	Like moderately _____	Like moderately _____
Like slightly _____	Like slightly _____	Like slightly _____
Neither like nor dislike _____	Neither like nor dislike _____	Neither like nor dislike _____
Dislike slightly _____	Dislike slightly _____	Dislike slightly _____
Dislike moderately _____	Dislike moderately _____	Dislike moderately _____
Dislike very much _____	Dislike very much _____	Dislike very much _____
Dislike extremely _____	Dislike extremely _____	Dislike extremely _____
Comments:	Comments:	Comments:

Table I. French Toast

8 portions
 each portion - 2 slices
 40-50 grams egg/portion

<u>Ingredients</u>	<u>Weights</u>	<u>Measures</u>	<u>Method</u>
Bread		16 slices ¹	
<u>Batter:</u>			Dip bread slices in batter for 30-45 seconds (enough that at least 80% of batter is used).
Whole egg	450 grams		
Milk, whole	434 grams		
Salt	10 grams		
Butter	74 grams		Fry slices in butter on grill or in electric skillet set at 188°C (370°F), for approx. 2-1/4 min. on each side.

Packaging and Freezing: Cut cooked toast slices in half diagonally. Pack 4 halves in each aluminum pan (Ecko #7036) and cover with matching foil/paper lids. Freeze at -29°C (-20°F) and store at -18°C (0°F).

Reheating:

Air convection oven: Place frozen slices on cooky sheet and heat in oven (204°C, 400°F) 11 min. Serve with syrup.

Microwave oven: (in presence of beaker of water) place 2 frozen slices on pyrex pan. Set flexopulse for 30 sec. on - 30 sec. off. Heat for 4 on cycles.

Acceptable Ingredients

- ¹Bread - Columbo: Sour French
- Oroweat: English muffin toasting bread
- Oroweat: Gluten bread
- Oroweat: Whole wheat
- Or any other firm bread

Table II. Western or Denver Egg

12 portions
68 grams egg/portion

<u>Ingredients</u>	<u>Weights</u>	<u>Method</u>
Onion, dry minced ¹	10.0 grams	Rehydrate onions in 90 grams water.
Pepper, green, chopped fine	90.0 grams	Saute onions and peppers in oil and butter.
Oil, vegetable	39.0 grams	
Butter	39.0 grams	
Flour, waxy rice ²	72.0 grams	Add flour and water and cook briefly.
Water	300.0 grams	
Water chestnuts, canned	135.0 grams	Chop water chestnuts (or purchase chopped).
Soy sauce ³	72.0 grams	Heat 70 grams water to 90°C (194°F). Gradually add 14.5 grams Methocel and stir on mechanical mixer with flat beater or propeller blade. Add 280 grams cold, blended egg white and chill to 10°C (50°F). Use 312 g. of mixture.
Pepper, black ¹	1.5 grams	
Smoke salt ⁴	1.8 grams	
Milk, nonfat ⁵ dry	30.0 grams	
Egg yolk, blended	570.0 grams	Blend all ingredients except ham.
Egg white/Methocel ⁶	312.0 grams	
Ham chopped ⁷	300.0 grams	Dice ham approximately 0.6-0.9 cm. (1/4" - 3/8"). Weigh 35 grams ham into each aluminum pan ⁸ - add 130-135 grams egg mixture. Stir to blend. Cover with lid and aluminum foil (to prevent dilution with steam). Steam 13 min.

Table II. cont.

Method

These eggs can be easily over-cooked, so time of steaming must be carefully controlled. The inclusion of methocel and cooling of the mix before cooking increase the viscosity of the mix so that the diced ham and other heavier ingredients remain distributed through the mix. Other methods of increasing viscosity such as use of viscous frozen egg yolk might be used for the same purpose.

Packaging and freezing: Freeze at -29°C (-20°F), store at -18°C (0°F).
Reheating: Heat with lid on in air convection oven at 149°C (300°F) for 35-40 min.

Acceptable Ingredients

- 1 Schillings, Crown Colony (Safeway)
- 2 Nu-formula flour, Rice Products Co., 26 O'Farrell St., San Francisco.
- 3 Kikkoman.
- 4 Sea Island.
- 5 Carnation or Lucerne.
- 6 Methocel MC, Dow-Chemical Co., premium grade (food use), 15cps.
- 7 Royal Buffet canned ham.

Acceptable Equipment

- 8 Aluminum pans, Ecko #7036 with foil/paper lids.
Hobart mixer, Model 200, with 12 qt. (11.4 liters) and 20qt. (18.9 liters) bowl and flat beater.
or
Lightnin Mixer with propeller blade.

Table III. Egg and Potato Patty with Bacon

30 portions
approx. 50 g. egg/portion

<u>Ingredients</u>	<u>Weights</u>	<u>Method</u>
Egg Mixture		Mix until milk, salt, and MSG are dissolved.
Whole egg, blended	1500.0 grams	
Milk, nonfat dry ¹	150.0 grams	
Onion flakes, dry	60.0 grams	
Salt	30.0 grams	
MSG	6.0 grams	
Black pepper	1.0 grams	
Potatoes ²	1800.0 grams	Mix portions of 30 grams potatoes and 25 grams egg mixture.
Shredded hash browns, thawed.		
Bacon bits ³	150.0 grams	Add 2-1/2 grams bacon bits to each portion.
		Drop onto buttered skillet or griddle at 171°C (340°F). Form into 9 cm. (3-1/2 inch) patties as they cook. Fry for 2 min. on each side.

Packaging and Freezing: Pack two patties in each aluminum pan and cover with matching foil/paper covers. Freeze at -29°C (-20°F) and store at -18°C (0°F).

Reheating:

Air convection oven: Heat 30 min. at 204°C (400°F), covered with aluminum foil.

Microwave oven: Remove patties from foil pans to glass dish. Heat for 3 on cycles of 30 sec. on/30 sec. off.

Serve with catsup.

Acceptable Ingredients

¹Carnation or Lucerne.

²Bel-Air Frozen Shredded Hash Browns (Safeway).

³Preco, Real Pre-cooked Bacon Bits. - Westland Foods Corp., Concord, CA 94520. Cut particles not greater than 0.6 cm. (1/4") in any dimension. Protein content 35-45%, Salt 4-6%.

Acceptable Equipment

Aluminum Pans: Ecko #7036, with foil/paper covers.

Table IV. Puffy Omelet

8 portions
60 grams egg/portion

<u>Ingredients</u>	<u>Weight</u>	<u>Method</u>
<u>White Sauce:</u>		
Butter	140 grams	In top of double boiler, melt butter. Add dry ingredients mixed together, and stir to blend. Gradually add water and continue stirring and heating until mixture thickens and reaches a temperature of about 80°C (176°F).
Milk, nonfat ¹ dry	60 grams	
Methocel ²	14 grams	
Flour, mixture ³ wheat & waxy rice	100 grams	
Salt (omit if using salt yolk)	10 grams	
Water	572 grams	
<u>Egg Yolk⁴</u>		
Blended, or 5% salt yolk	196 grams 206 grams	Beat yolk at high speed (speed 10 on Kitchen Aid K4B) for 200 sec., scraping bowl after 160 sec. Add hot white sauce and beat at medium speed (speed 4) for 100 sec. (scrape bowl after 50 sec.).
<u>Egg White</u>		
Blended at 25°C	316 grams	Beat egg white at high speed until stiff but not dry. (Speed 3 of Hobart 5 qt. mixer N-50). Fold about 1 cup beaten egg white into yolk mixture with 10 strokes of a wire whip, then fold in remaining whites with 10 more strokes. Fold mixture with 20 strokes of a large rubber spatula (scraping bowl at 10 strokes). Place 150 grams in each aluminum pan ⁵ and cover with smaller aluminum pan ⁶ with 1" hole in center. Bake at 107°C (225°F) for 1 hour.

Packaging and Freezing: Cover omelets with foil/paper lids and freeze in a single layer at -23°C (-10°F) (room with blast freezer). Store at -18°C (0°F).

Reheating:

Remove foil/paper lid and cover omelet loosely with aluminum foil.
Heat at 149°C (300°F) for 50-60 min.

Variations: with sauce: Remove frozen sauce from package and place on top of omelet. Reheat 60 min. at 149°C (300°F).

Table IV. cont.

Acceptable Ingredients & Equipment

- ¹ Carnation or Lucerne
- ² Dow Chemical Co., Methocel MC, Premium-grade (food use) 15 cps.
- ³ Mixture 1/2 waxy rice flour: Nu-Formula flour from Rice Products Co.,
26 O'Farrell St., San Francisco, CA.
1/2 all purpose flour: Gold Medal.
- ⁴ 5% salt yolk may be used - obtain as frozen product - thaw containers in
cold water or refrigerator before using.
- ⁵ Ecko #7036
- ⁶ Ecko #705
Mixers: Kitchen Aid Model K4B & Hobart Model N-50, 5 qt. bowl.

Table IV. cont.

Spanish Sauce

approx. 25 portions

<u>Ingredients</u>	<u>Weights</u>	<u>Method</u>
Dry onion flakes	8.0 grams	Soak dry vegetables in water for 10 minutes.
Dry sweet pepper flakes	8.0 grams	
Dry parsley flakes	0.8 grams	
Water	120.0 grams	
Butter	120.0 grams	Melt butter and cook vegetables lightly 5 minutes.
Tomatoes, canned, peeled, chopped	2240.0 grams	Add tomatoes and spices ¹ and simmer until reduced to 2/3 volume.
Salt	12.0 grams	
Black pepper, ground	0.4 grams	
Oregano, ground	0.4 grams	
Garlic powder	0.4 grams	

Packaging and Freezing: Fill 4x6 Scotchpak² pouches with 60 grams sauce. Seal. Freeze in single layer on trays, at -29°C (-20°F). Store at -18°C (0°F).

Reheating:

Remove frozen sauce from pouch. Follow directions for desired basic product.

Acceptable Ingredients & Equipment

¹ Spices: Schilling Spice Co.

² Packaging Kit Number SK-33, 3M Co., Minnesota.

Table IV. cont.

Cheese Sauce

approx. 25 portions

<u>Ingredients</u>	<u>Weights</u>	<u>Method</u>
Cheese, Processed American ¹	1135.0 grams	Cut cheese into 1/2 inch cubes. Combine ingredients in double boiler. Heat and stir until cheese is melted and sauce is smooth.
Milk, whole ²	568.0 grams	
Pepper, black ²	0.2 grams	

Packaging and Freezing: Fill 4x6 Scotchpak pouches³ with 60 grams sauce. Seal. Freeze in single layer on trays at -29°C (-20°F). Store at -18°C (0°F).

Reheating:

Remove frozen sauce from pouch. Follow directions for desired basic product.

Acceptable Ingredients & Equipment

¹Kraft "Velveeta" Brand.

²Schilling Spice Co.

³Packaging Kit Number SK-33, 3M Co., Minnesota.

Table IV. cont. Creamed Chipped Beef Sauce

approx. 25 portions

<u>Ingredients</u>	<u>Weights</u>	<u>Method</u>
Milk, ¹ nonfat, dry	200 grams	Reconstitute milk.
Water	1920 grams	
Butter	240 grams	Melt butter.
Flour, all purpose ²	60 grams	Add flours and pepper, stir until smooth.
Flour, waxy rice ³	60 grams	
Pepper, black ⁴	2 grams	
		Add milk gradually and stir over medium heat until mixture comes to a boil and thickens.
Beef, ⁵ chipped, dried	480 grams	Shred beef. Add to white sauce and heat slowly for 5 minutes.

Packaging and Freezing: Fill 4 x 6 Scotchpak pouches⁶ with 60 grams sauce. Seal. Freeze in single layer on trays at -29°C (-20°F). Store at -18°C (0°F).

Reheating:

Remove frozen sauce from pouch. Follow directions for desired basic product.

Acceptable Ingredients & Equipment

¹Carnation or Lucerne.

²Gold Medal.

³Nu-Formula Flour from Rice Products Co., 26 O'Farrell St., San Francisco, CA.

⁴Schilling Spice Co.

⁵Beef, dried (wafer sliced) Swift's Premium, packed for Swift & Co., Chicago, Illinois.

⁶Packaging Kit Number SK-33, 3M Co., Minnesota.

Table V. Scrambled Eggs

12 portions
77 grams egg/portion

<u>Ingredients</u>	<u>Weights</u>	<u>Method</u>
<u>Egg Blend</u>		
Whole eggs ¹	960 grams	Mix egg and milk in a blender.
Milk, whole homogenized	240 grams	
Starch, Purity W ²	20 grams	Blend dry ingredients well; add to egg with continuous mixing.
Monosodium phosphate, monohydrate	6 grams	
Salt	5 grams	
Butter	15 grams	Melt butter. Add to egg and continue mixing until dry ingredients are dissolved.
Bacon Bits ³	144 grams	
Polyethylene ⁴	4 tubes, 38 cm (15") long	Cut high density polyethylene tubings, 7.6 cm. (3") wide into 38 cm. (15") lengths and seal one end of each with metal clip. ⁵

Cooking: Fill polyethylene tubings with egg blend and clip the open end (clip should be about 1 inch above liquid level). Eliminate as much air as possible from the tubing. Excess air trapped inside the tube could cause buoyancy and bursting during cooking. Cook the tubes in 75°C (167°F) water for 80 min. To prevent floating, tubes may be packed in a covered basket or fastened on a frame and then submerged.

Cool cooked egg to room temperature. Egg may be kept at 2 to 3°C (36°F) for up to 30 days before further processing.

Scrambling: Open polyethylene tubing with a sanitized knife and pour the egg content into a mixer bowl equipped with a wire whip. Break the cooked egg into desired chunk size by using adequate speed and time of whipping.

Packaging and Freezing: Weigh 100 grams of the scrambled egg blend into each aluminum pan and sprinkle 12 grams bacon bits on each portion. Cover pans with foil/paper lids and blast freeze. Store at -18°C (0°F).

Reheating: In order to preference of methods:

- 1) Air convection oven: Heat (with cover) at 204°C (400°F) for 30-35 min.
- 2) Cold convection oven: Put package in cold oven. Set oven at 232°C (450°) and heat 35-40 min.
- 3) Microwave oven: Remove eggs from pans to nonmetal container with cover. Heat for 30 sec. turn off for 2-1/2 min. and heat 30 sec. additional.

Table V. cont.

Acceptable Ingredients and Equipment

¹ Fresh or frozen whole eggs.

² Purity W, National Starch and Chemical Corp., 750 Third Ave., New York, New York 10017.

³ Fully cooked Bacon Bits - Westland Food Corp., 138 Franquette Ave., Concord, CA 94520.

Bacon bits specifications:

a) Chemical composition: Protein 35-45%
Moisture 10-15%
Salt 4-6%

b) Physical:

- 1) Free of cartilage, bone fragments and extraneous material.
- 2) Particle size no greater than 0.6 cm. ($\frac{1}{4}$ ") in any dimension.
- 3) Moderately firm, with no soft or oil cuts.

c) Microbiological:

- 1) Standard plate counts: 5,000/g. max.
- 2) Coagulase positive Staphylococci - negative.
- 3) Salmonella - negative.

⁴ Polyethylene materials comply with FDA regulations for general food use, including holding and packaging food during boiling - for example: Plaskon 2201 and 2204, Allied Chem., P.O. Box 365, Morristown, N.J. 07960. Recommended film thickness is 0.0035 inch (0.089 mm).

⁵ Manual clips and applicator obtainable from Cryovac Division, W.R. Grace & Co., 91 Jackson Street, Hayward, CA - Emperor Clip Applicator and clips. Automatic clipping machine obtainable from Tipper Tie Division, Rheem Manufacturing Co., San Leandro, CA 94577.

Kitchen Aid model K4-B, or any mixer with wire whip attachment.

Ecko number 7036 pans, with matching foil/paper lids.

Table VI. Creamed Egg and Beef, Turkey, or Chicken (on Toast)

approx. 18 servings

Ingredients for Meat Loaf

Weights

Methods

Ground beef (10-12% fat), turkey, or chicken meat	900.0 grams
Whole egg (blended)	100.0 grams
Salt	7.0 grams
Onion flakes (dried)	3.0 grams
MSG.	1.0 grams
Black pepper	1.0 grams
Thyme (with turkey)	0.5 grams

Mix for a loaf covering the bottom of a 9"x9" baking pan. Cook by steaming for 45 min. in a steam cooker at atmospheric pressure. Cool and refrigerate overnight. Dice to 3/8" in Urschel Model F slicing machine.

Ingredients for Egg portion

Egg yolk (blended)	550.0 grams
Egg whites	240.0 grams
Water	200.0 grams
Salt	7.0 grams
MSG.	1.0 grams

Stir until dry ingredients are dissolved. Pour into two 23 x 23 cm. (9"x9") baking pans. Cook by steaming in a steam cooker at atmospheric pressure for 15 min. Cool, refrigerate and dice as for the meat loaf.

Ingredients for White Sauce

Milk, whole	830.0 grams
Beef broth (or chicken broth for use with turkey loaf)	800.0 grams
Flour, waxy rice	90.0 grams

Table VI. cont.

Ingredients for White Sauce cont.

	<u>Weights</u>	<u>Method</u>
Butter	65.0 grams	
Flour, all purpose wheat	45.0 grams	
Salt	12.6 grams	
Onion flakes, dry	3.0 grams	
MSG.	1.8 grams	
Black pepper	1.3 grams	
Thyme (for use with turkey)	0.8 grams	

Blend dry ingredients with butter by stirring in steam jacketed kettle or double boiler until uniform. Add liquids, continue stirring and scraping sides until thickened and smooth.

Packaging and Freezing: Hot white sauce, diced meat and diced egg are mixed together in the preparations by weight of 2:1:1. Two hundred (200) gram portions are sealed in 16 x 20 cm. (6-1/2" x 8") Scotchpak #3320 (3M) pouches. Freeze at -29°C, store at -18°C.

Reheating and Serving:

Microwave oven: Punch 10 - 12 holes on one surface of pouch, place in Pyrex glass baking dish with punched side up. Set Flexopulse for 1 min. on, 1 min. off. Heat for 3 on cycles.

Air Convection oven: Punch holes in pouch as above and place in pan. Heat in 204°C (400°F) oven for 35 min.

Serve on two slices of toast.

Table VII. Potato Pancakes

30 portions (2 patties per portion)
approx. 50 g. egg/portion

<u>Ingredients</u>	<u>Weights</u>	<u>Method</u>
Egg Mixture		Mix until milk, salt, and MSG are dissolved.
Whole egg, blended	1500 grams	
Milk, nonfat dry ¹	100 grams	
Water	100 mls.	
Salt	15 grams	
MSG	6 grams	
Potatoes²	1800 grams	Mix portion of 30 grams potatoes and 25 grams egg mixture.
Shredded hash, browns thawed		Drop onto buttered skillet or griddle at 340°F. Form into 3-1/2 inch patties as they cook. Fry for 2 min. on each side.

Packaging and Freezing: Pack two patties in each aluminum pan and cover with matching foil/paper covers. Freeze at -29°C (-20°F) and store at -18°C (0°F).

Reheating:

Air convection oven: Heat 30 min. at 205°C (400°F), covered with aluminum foil.

Microwave oven: Remove patties from foil pans to glass dish. Heat for 3 on cycles of 30 sec. on/30 sec. off.

• Serve with syrup.

Acceptable Ingredients

¹ Carnation or Lucerne.

² Bel-Air Frozen Shredded Hash Browns (Safeway).

Acceptable Equipment

Aluminum Pans: Ecko #7036, with foil/paper covers.

Table VIII. Panel Ratings of Frozen Products^{1/}

<u>Products</u>	I	<u>Test Periods</u>		IV
		II	III	
<u>Commercial Products</u>				
French toast (Aunt Jemima)	7.39	6.26	6.73	--
Scrambled eggs (Swanson)	6.61	5.92	6.02	6.20, 6.07
Creamed chicken (Stouffer)	7.80	--	--	--
Creamed chipped beef (Stouffer)	7.26	--	--	--
<u>Laboratory Products</u>				
<u>French Toast</u>				
Whole wheat bread ^{2/}	6.88	--	--	--
Whole wheat bread ^{2/} , high yolk batter	6.60	--	--	--
White bread ^{3/}	--	<u>7.06</u>	--	--
Sourdough French bread ^{4/}	--	--	<u>7.11</u>	--
<u>Western or Denver Egg</u>				
With ham, green onion	6.71	<u>6.57</u>	--	--
With ham, dry minced onion	--	7.04	<u>7.05</u>	--
With imitation bacon bits ^{5/} , green onion	6.27	--	--	--
<u>Egg and Potato Patty (with catsup)</u>				
With dry minced onion	--	6.44	<u>6.91</u>	--
With dry minced onion, bacon bits ^{6/}	--	--	7.26	<u>7.14</u>
With dry minced onion, imitation bacon bits ^{5/}	--	6.64	--	--

Table VIII. cont.

Puffy Omelet

Formula 1.

Plain	5.19	--	--	--
With cheese sauce	6.02	<u>6.41</u>	--	--
With Spanish Sauce 1	5.87	--	--	--
With Spanish Sauce 2	--	<u>6.27</u>	--	--
With chipped beef sauce	--	<u>6.47</u>	--	--

Formula 2

With Spanish Sauce 2	--	5.65	<u>5.63</u>	6.60
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Scrambled eggs

Plain	--	--	6.44	<u>5.68</u>
With bacon bits ^{6/}	--	--	7.06	<u>5.92</u>

Creamed Hard-Cooked Egg and Meat (on toast)

Turkey (on whole wheat toast)				
Lab. cook & dice; steamed egg	6.85	--	--	--
Turkey (on white toast)				
Lab. cook & dice; steamed egg	--	<u>7.42</u>	--	--
Commercial cook & dice; tube cook egg	--	--	--	<u>7.40</u>
Beef (on whole wheat toast)				
Lab. cook & dice; steamed egg	6.88	--	--	--
Beef (on white toast)				
Lab. cook & dice; steamed egg	--	<u>7.32</u>	--	--
Chicken (on white toast)				
Commercial cook, lab dice; tube-cook egg	--	--	--	<u>7.06</u>
Commercial cook & dice; tube-cook egg	--	--	--	<u>7.23</u>

Table VIII. cont.

Pancakes (with syrup)

With shredded potatoes	--	--	6.22	<u>6.02</u>
With white rice	--	--	6.00, <u>5.11</u>	--
With brown rice	--	--	<u>5.56</u>	--

1/ Underlined ratings were made on products after storage of
6 months at -18°C.

2/ Oroweat whole wheat bread.

3/ Oroweat English Muffin toasting bread.

4/ Columbo sour French bread.

5/ Schilling imitation bacon bits.

6/ Westland Foods Corp., Preco, pre-cooked bacon bits.

Table IX. Statistical Analysis, Test Period I.

Analysis of Variance (based on averages over judges).

<u>Source</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>F_{.05}</u>
Product	12	2.0538	12.157	2.00
Block	25	0.2557	1.513	1.78
Residual	40	0.1689		

Least Squares Means

<u>Product</u>	<u>Mean^{1/}</u>
French Toast (comm.)	7.39
Scrambled eggs (comm.)	6.61
Creamed chicken (comm.)	7.80
Creamed chipped beef (comm.)	7.26
French toast	6.88
French toast, high yolk	6.60
Puffy omelet	5.19
Puffy omelet, tomato sauce I	5.87
Puffy omelet, cheese sauce	6.02
Creamed egg & turkey, whole wheat toast	6.85
Creamed egg & beef, whole wheat toast	6.88
Western egg with ham	6.71
Western egg with imitation bacon bits	6.27

^{1/}All products unstored at this test period; to compare a lab product with either commercial use $l. s. d. (.05) = 2.021\sqrt{2(.1689)/6} = 0.48$.

Table X. Statistical Analysis, Test Period II.

Analysis of Variance (based on averages over judges).

<u>Source</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>F_{.05}</u>
Product	12	1.1713	4.266	2.00
Block	25	0.3183	1.159	1.78
Residual	40	0.2746		

Least Squares Means

<u>Product</u>	<u>Storage time</u>	<u>Mean^{1/}</u>
French toast (comm.)		6.26
Scrambled eggs (comm.)		5.92
French toast, white bread	6 mo.	7.06
Puffy omelet I, tomato sauce II	6 mo.	6.27
Puffy omelet I, chipped beef sauce	6 mo.	6.47
Creamed egg & turkey, white toast	6 mo.	7.42
Creamed egg & beef, white toast	6 mo.	7.32
Western egg & ham, dry minced onion	unstored	7.04
Western egg & ham, green onion	6 mo.	6.57
Egg & potato patty, plain	unstored	6.44
Egg & potato patty, imitation bacon bits	unstored	6.64
Puffy omelet I, cheese sauce	6 mo.	6.41
Puffy omelet II, tomato sauce II	unstored	5.65

^{1/}To compare a lab product with either commercial use l. s. d.
 $(.05) = 2.021 \sqrt{2(.2746)/6} = 0.61.$

Table XI. Statistical Analysis, Test Period III.

Analysis of Variance (based on averages over judges).

<u>Source</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>F_{.05}</u>
Product	12	2.0797	20.235	2.00
Block	25	.1442	1.403	1.78
Residual	40	.1028		

Least Squares Means

<u>Product</u>	<u>Storage time</u>	<u>Mean^{1/}</u>
French toast (comm.)		6.73
Scrambled eggs (comm.)		6.02
French toast (sour dough)	6 mo.	7.11
Western egg & ham, dry minced onion	6 mo.	7.05
Puffy omelet II, tomato sauce II	6 mo.	5.63
Egg & potato patty, plain	6 mo.	6.91
Egg & potato patty, with bacon bits	unstored	7.26
Potato pancake	unstored	6.22
White rice pancake	unstored	6.00
White rice pancake	6 mo.	5.11
Brown rice pancake	6 mo.	5.56
Scrambled eggs	unstored	6.44
Scrambled eggs with bacon bits	unstored	7.06

^{1/}To compare a lab product with either control use l. s. d.
 $(.05) = 2.021 \sqrt{2(.1028)/6} = 0.37.$

Table XII. Statistical Analysis, Test Period IV Design I.

Analysis of Variance (based on averages over judges).

<u>Source</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>F_{.05}</u>
Product	5	1.7559	11.9%	2.90
Block	9	0.0825	0.56	2.59
Residual	15	0.1473		

Least Square Means

<u>No.</u>	<u>Product</u>	<u>Storage time</u>	<u>Mean</u>
1	Scrambled eggs (comm.)		6.20
2	Scrambled eggs	6 mo.	5.68
3	Puffy omelet - Spanish sauce	unstored	6.60
4	Creamed egg & turkey	6 mo.	7.40
5	" " chicken I	6 mo.	7.06
6	" " " II	6 mo.	7.23

To compare a lab product with the commercial use l. s. d.
 $(.05) = 2.131 \sqrt{2(.1473)/5} = 0.52.$

Design II.

Analysis of Variance (based on averages over judges).

<u>Source</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>F_{.05}</u>
Product	3	0.8631	14.71	5.41
Block	3	0.1958	3.34	"
Residual	5	0.0587		

Least Square Means

<u>No.</u>	<u>Product</u>	<u>Storage time</u>	<u>Mean</u>
1	Scrambled eggs (comm.)		6.07
7	Egg & potato patty w/bacon	6 mo.	7.14
8	Potato pancake	6 mo.	6.02
9	Scrambled eggs w/bacon	6 mo.	5.92

To compare a lab product with the commercial use l. s. d.
 $(0.5) = 2.571 \sqrt{2(.0587)/3} = 0.51.$

Table XIII. Judges' Ratings, French Toast (Aunt Jemima)

<u>JUDGE</u>	Ratings for Test Periods		
	I	II	III
KB	8.0	8.0	8.0
JWF	7.0	7.8	7.0
JGF	8.0	7.8	7.6
TJL	7.0	4.2	2.2
RM	5.8	5.3	7.5
AM	8.2	7.6	8.0
JZ	7.3	6.8	6.8
CF	7.0	--	--
TGL	--	--	7.0
Range	5.8- 8.2	4.2- 8.0	2.2- 8.0

Table XIV. Judges' Ratings, Scrambled Eggs (Swanson)

<u>JUDGE</u>	Ratings for Test Periods				
	I	II	III	IV ^{1/}	IV ^{2/}
KB	7.8	7.0	6.8	6.5	7.0
JWF	6.6	5.6	6.3	6.6	6.0
JGF	7.7	6.5	6.2	7.2	7.5
TJL	6.0	4.7	5.8	6.5	6.3
RM	6.8	6.8	6.3	6.0	6.0
AM	5.7	3.3	4.3	4.3	4.5
JZ	7.0	6.8	6.3	7.0	7.0
CF	4.8	--	--	--	
TGL	--	--	5.7	4.7	4.7
Range	4.8- 7.8	3.3- 7.0	4.3- 6.8	4.3- 7.2	4.5- 7.5

^{1/} Design I, 6 products.

^{2/} Design II, 4 products.

Table XV. Judges' Ratings, Creamed Chicken (Stouffer)

<u>JUDGE</u>	Ratings for Test Period I
KB	8.6
JWF	6.6
JGF	8.0
TJL	7.3
RM	8.0
AM	8.5
JZ	8.0
CF	7.8
Range	6.6-8.6

Table XVI. Judges' Ratings, Creamed Chipped Beef (Stouffer)

<u>JUDGE</u>	Ratings for Test Period I
KB	8.0
JWF	7.5
JGF	6.8
TJL	6.6
RM	7.5
AM	7.3
JZ	7.0
CF	7.5
Range	6.6-8.0

Table XVII. Judges' Ratings, French Toast

<u>JUDGE</u>	Ratings for Test Periods			
	I ^{1/}	I ^{2/}	II ^{3/} stored	III ^{4/} stored
KB	7.6	8.0	7.0	7.2
JWF	5.8	7.2	7.0	7.8
JGF	6.3	6.8	7.3	7.2
TJL	6.6	6.8	6.7	7.0
RM.	6.8	5.8	5.8	7.5
AM.	8.0	4.4	6.5	8.0
JZ	7.7	7.5	7.5	6.8
CF	6.7	7.2	--	--
TGL	--	--	--	6.2
Range	5.8- 8.0	4.4- 8.0	5.8- 7.5	6.2- 8.0

^{1/}Oroweat whole wheat bread.

^{2/}Oroweat whole wheat bread, high-yolk batter.

^{3/}Oroweat English Muffin toasting bread (white).

^{4/}Columbo Sour French Bread.

Table XVIII. Judges' Ratings, Western or Denver Egg

<u>JUDGE</u>	Ratings for Test Periods				
	<u>1/</u> I	<u>3/</u> I	<u>1/</u> II stored	<u>2/</u> II	<u>2/</u> III stored
KB	7.3	7.2	7.2	7.2	6.8
JWF	3.5	5.5	5.8	5.4	5.3
JGF	8.0	8.0	7.6	7.4	6.8
TJL	2.6	1.5	4.3	7.3	5.0
RM	8.0	7.2	8.0	7.8	7.8
AM	7.0	6.5	6.0	6.2	8.0
JZ	8.2	8.2	8.3	8.5	8.0
CF	7.0	6.3	--	--	--
TGL	--	--	--	--	7.0
Range	2.6- 3.2	1.5- 8.2	4.3- 8.3	5.4- 8.5	5.0- 8.0

1/ With ham, green onions.

2/ With ham, dry minced onion.

3/ With imitation bacon bits (Schilling), green onions.

Table XIX. Judges' Ratings, Egg and Potato Patty

<u>JUDGE</u>	Ratings for Test Periods				
	II <u>1</u> / ₁	II <u>2</u> / ₂	III <u>1</u> / ₁ stored	III <u>3</u> / ₃	IV <u>3</u> / ₃ stored
KB	7.0	7.7	6.7	7.0	7.0
JWF	6.6	6.0	7.5	7.2	7.0
JGF	7.3	7.7	7.8	7.8	7.5
TJL	4.5	5.2	7.0	7.0	7.0
RM.	6.8	6.5	6.6	7.3	7.0
AM.	7.3	6.2	8.4	7.4	7.3
JZ	7.0	7.3	7.0	7.7	8.0
TGL	--	--	6.2	6.3	5.7
Range	4.5- 7.3	5.2- 7.7	6.6- 8.4	6.3- 7.8	5.7- 8.0

1/ Plain patty.

2/ With imitation bacon bits (Schilling).

3/ With bacon bits (Preco).

Table XX. Judges' Ratings, Puffy Omelet

JUDGE	Ratings for Test Periods								
	I ^{1/}	I ^{2/}	I ^{3/}	II ^{2/} stored	II ^{4/} stored	II ^{5/} stored	II ^{6/} stored	IV ^{7/}	
KB	7.0	7.7	7.8	7.4	7.4	7.8	8.0	8.0	8.7
JWF	4.8	5.2	2.0	4.8	4.8	3.2	2.4	2.3	--
JGF	8.0	8.5	8.7	8.2	7.5	7.4	6.2	7.3	7.5
TJL	3.6	5.0	5.2	5.8	5.7	5.5	5.6	3.2	5.0
RM	3.5	5.0	5.3	5.0	6.3	5.0	4.4	5.7	7.2
AM	6.0	6.3	6.3	7.3	5.7	7.2	5.5	7.5	7.8
JZ	6.6	7.2	7.2	7.3	6.8	6.8	6.7	6.5	7.2
CF	4.8	5.3	6.2	--	--	--	--	--	
TGL	--	--	--	--	--	--	--	5.0	3.5
Range	3.5- 8.0	5.0- 8.5	2.0- 8.7	4.8- 8.2	4.8- 7.5	3.2- 7.8	2.4- 8.0	2.3- 8.0	3.5- 8.7

^{1/}Omelet formula I.

^{2/}Omelet formula I, cheese sauce.

^{3/}Omelet formula I, tomato sauce formula I (spicy).

^{4/}Omelet formula I, chipped beef sauce.

^{5/}Omelet formula I, tomato sauce formula II (bland).

^{6/}Omelet formula II, tomato sauce formula II (bland).

^{7/}Omelet formula II, tomato sauce formula II, reheating method II.

Table XXI. Judges' Ratings, Scrambled Eggs

<u>JUDGE</u>	Ratings for Test Periods			
	III ^{1/}	III ^{2/}	IV ^{1/} stored	IV ^{2/} stored
KB	7.0	7.8	5.5	7.5
JWF	6.3	6.4	6.7	6.0
JGF	6.8	7.8	6.8	7.5
TJL	6.6	6.2	2.5	3.0
RM	6.6	8.0	7.2	7.5
AM	4.4	5.3	3.0	4.5
JZ	6.0	6.8	5.6	7.0
CF	--	--		
TGL	7.0	7.2	5.6	5.3
Range	4.4- 7.0	5.3- 8.0	2.5- 7.2	3.0- 7.5

^{1/} Plain.

^{2/} With bacon bits (Preco).

Table XXII. Judges' Ratings, Creamed Egg and Beef, Turkey or Chicken

JUDGE	Ratings for Test Periods						
	<u>1/</u> I	<u>2/</u> I	<u>3/</u> II stored	<u>4/</u> II stored	<u>5/</u> IV stored	<u>6/</u> IV stored	<u>7/</u> IV stored
KB	8.0	7.8	7.0	6.6	7.0	7.0	7.0
JWF	7.5	6.3	6.8	6.6	7.5	7.5	7.0
JGF	4.7	7.0	7.4	7.0	7.6	6.8	6.8
TJL	6.3	5.5	7.4	7.5	6.3	5.8	5.7
RM	6.8	8.0	7.4	7.8	7.8	7.4	7.6
AM	6.3	4.5	7.8	6.8	7.3	8.0	8.0
JZ	7.5	7.5	7.7	8.0	8.2	8.0	8.2
CF	6.8	7.0	--	--	--	--	--
TGL	--	--	--	--	6.5	6.8	7.0
Range	4.7- 8.0	4.5- 8.0	6.8- 7.8	6.6- 8.0	6.3- 8.2	5.8- 8.0	5.7- 8.2

Turkey

- 1/ Whole wheat toast
- 3/ White toast steamed egg, laboratory cooked and diced turkey.
- 5/ White toast, egg cooked in tube, commercially cooked diced turkey.

Beef

- 2/ Whole wheat toast
- 4/ White toast steamed egg, laboratory cooked and diced turkey.

Chicken

- 6/ White toast--egg cooked in tube, commercially cooked chicken, laboratory diced.
- 7/ White toast--egg cooked in tube, commercially cooked diced chicken.

Table XXIII. Judges' Ratings, Potato or Rice Pancake (served with syrup)

<u>JUDGE</u>	Ratings for Test Periods				
	<u>1/</u> III	<u>2/</u> III	<u>2/</u> II stored	<u>3/</u> III stored	<u>1/</u> IV stored
KB	6.3	6.7	6.5	6.7	6.5
JWF	7.3	6.0	4.7	5.8	--
JGF	5.2	5.7	6.0	5.3	3.7
TJL	5.8	4.3	3.7	4.2	6.3
RM	5.4	5.8	4.8	4.8	6.0
AM	6.6	6.2	3.7	3.6	7.5
JZ	7.2	7.0	6.8	7.8	7.0
TCL	6.2	6.0	5.2	6.3	6.7
Range	5.2- 7.3	4.3- 7.0	3.7- 6.8	3.6- 7.8	3.7- 7.5

- 1/ Potato.
- 2/ White rice.
- 3/ Brown rice.

