

the elderly have low incomes and/or diseases which limit their diets. These things result in a large percentage of our senior citizens being malnourished—particularly in terms of protein. Many of the symptoms, often attributed to age, (fatigue, irritability, anxiety, memory loss, etc.) are in fact subclinical symptoms of malnutrition.

The purpose of this research was to develop foods which the elderly enjoyed, could eat and were nutritionally balanced. A survey of a local group of elderly people showed that they liked baked custard and would buy this product if it were available in a powdered form. Thus, the first objective of this research was to develop a product which tasted like the baked custards made in the home 40-80 years ago. Several recipes have been developed which accomplish this, and are nutritionally balanced in terms of the percentage of calories coming from protein, fat and carbohydrate. At present these products are being prepared as "powdered" mixes to which the customer will need only to add water and bake. The custards presently are being evaluated by a taste panel of senior citizens.

## Introduction

With birth rates in the United States declining, the average age of our population is continually shifting upwards. Thus, an increasing percentage of the United State's population will be classified as elderly (over 55) and subject to the particular problems of that age group. The federal government is becoming more concerned about this increasingly large segment of our population, and attention was focused on their problems by a recent White House conference (9). The elderly have particular problems all their own. In the first place, their sense of taste and smell tends to become less acute as they age (3, 6, 8). These people tend to eat less as they grow older and get smaller amounts of all essential food substances. This usually results in a diet which is not balanced. In particular, their diets are often low in protein, calcium, vitamin C, and iron (1,2).

There are several factors which cause this undernourishment in the aged population. One is the fact that many of them have low incomes (2, 8). There also is a psychological satisfaction from eating with friends, which is not achieved when eating by yourself. Thus, the isolation in which many of these people live results in an atmosphere which is not conducive to eating adequate amounts of food. One author stated that people like to eat foods with which they are familiar and many of the new foods on the market are of little interest to them. Milk for these people still represents a feeling of security, and frozen desserts represent a reward or a celebration (3, 7, 10).

Many of these people won't cook for themselves and cannot go to

with this study and 36 of them agreed to fill out a survey on food preferences. From these data (Tables 1, 2 and Figure 1) several things are apparent. A number of the answers did not agree with each other. Therefore, there was some misunderstanding of the questions or the respondents did not wish to write about many aspects of their food habits. After personal conversation with some of the respondents, the authors were of the opinion that the latter reason was the main one. Several respondents made comments to the effect that their food habits were "private" and not something to discuss (or write about) in public. It appears that more of these people eat "restricted diets" than admitted it. Consider

Table 1. Summary of Questionnaire Answers By "Aging Americans".

1. Age: 50-60, 1; 60-70, 14; 70-80, 18; over 80, 3 (median age: 70-80).
2. Marital status: married: yes 22, no 14.
3. Where living: with mate 19, alone 10, with relative 3.
4. On restricted diet:<sup>1</sup> yes 12, no 23. If so, what type: salt 6, sugar 9, fat 7.
5. Use "prepared" mixes when making: cakes 25, pudding and pie filling 15.
6. Use milk powder: in cooking 11, as a drink 2.
7. If a nutritionally fortified and good flavored pudding were available at a reasonable price, would you buy it:<sup>2</sup> yes 22, no 12.

<sup>1</sup> These answers do not give the same totals. Either the respondents misunderstood the question, or several were not willing to admit their diets were restricted.

<sup>2</sup> This is a "biased" question which could have been misleading. When comparing the answers for "food preferences" shown in Table 2, to these, it appeared that some misunderstanding occurred.

Table 2. Food Preferences of "Aging Americans". 36 Respondents

Product	Do You Eat or Use This Food		Rank of Food Preferences		Food Purchased Most Often <sup>3</sup>	
	Number "yes"	%	Number responding	Weighted average <sup>1</sup>	Number	%
Baked Custard	20	56	17	66	0	0
Pudding	14	39	18	54	1	4
Pie Filling	16	44	15	41	0	0
Cottage Cheese	27	75	27	71	12	43
Other Cheese	22	61	23	57	3	11
Ice Milk	26	72	26	72	10	36
Ice Cream	14	39	14	70	2	7
Milk <sup>4</sup>	31	86	29	69	19	68
Butter <sup>4</sup>	23	64	21	54	9	32

<sup>1</sup> The weighted average equals 10 times the total points divided by the number of respondents. Points obtained as: choice 1 = 9 points, choice 2 = 8 points, etc.

<sup>2</sup> Most respondents ranked only a few foods in the "food purchased" column, and only 28 people answered this question. Therefore, only the first and second choices, of those who responded, were tabulated.

<sup>3</sup> This includes some who use reconstituted milk powder.

<sup>4</sup> This includes a few who considered margarine equal to butter.

making a prepared mix which could be converted into a baked custard simply by adding water, then baking the custard. A second product to work on would be ice milk. If one could fabricate these into nutritionally balanced products by adding protein, reducing the carbohydrates, and maintaining a low fat content; such foods might be attractive to the senior citizens.

To accomplish the first objective, baked-custard recipes were obtained and custards were baked which were similar to those used in the home 40-80 years ago. The method of assembling all the recipes in this study was to heat the liquid ingredients to "scalding" (158°F or 70°C). The dry ingredients, if any, were mixed together and added slowly with stirring to the scalding liquid. Lumps of material, i.e. the white spot in eggs (chalazae), were removed by straining. The liquid was then put through a "hand-homogenizer" to thoroughly mix the ingredients. The same mixing could have been accomplished with a spoon or a mechanical "blender."

The proteins in the basic recipe (Table 3, recipe 1) were changed, in order to increase the amount of protein in the food and reduce the

Table 3. Ingredients of several experimental custards together with the calories in each.

Ingredient <sup>1</sup>	Custard recipe							
	1 <sup>2</sup>		2 <sup>3</sup>		3 <sup>4</sup>		4 <sup>5</sup>	
	Weight (g.)	calories	Weight (g.)	calories	Weight (g.)	calories	Weight (g.)	calories
ilk - whole	76.5	52	34.0	22	34	22	18	11
ilk - skim	---	---	33.2	12	33	12	---	---
ilk fat (dry)	---	---	1.2	11	---	---	9	---
gg - whole	15.7	25	---	---	---	---	---	---
gg - white	---	---	23.0	35	23	35	---	---
gg - dried whole	---	---	---	---	---	---	4	---
elatin	---	---	0.6	2	0.6	2	0.6	---
ucrose	7.8	31	8.0	32	9	36	9	---
water	---	---	---	---	---	---	59	---
total	100	108	100	114	100	107	100	100

ingredients calculated from *Composition of Foods*, 1963 by B. K. Watt and A. L. Merrill, Agricultural Handbook No. 8, USDA, Washington D. C.

Control recipe: whole milk and whole egg. Calories from: Fat 38%, Protein - 18%, Carbohydrate - 44%.

Modified recipe: whole milk plus egg whites and dry milk fat. Calories from: Fat - 19%, Protein - 39%, Carbohydrate - 42%.

Modified recipe: whole milk, skim. Calories from: Fat - 10%, Protein - 41%, Carbohydrate - 49%.

Modified recipe: whole and dry skim milk plus dry whole egg. Calories from: Fat - 20%, Protein - 24%, Carbohydrate - 50%.

**Table 4. Taste Preferences for Baked Custards By Aging Americans**

Panel Date	Recipe & Number <sup>1</sup>				Totals
	(1)	(2)	(3)	(4)	
	Whole Milk & Whole Egg	Whole, Skim Egg White & Milk Fat	Whole, Skim, +Egg White	Whole, Skim Dry White Egg	
		Fresh	Dried		
11-29-73	11	1			
11-29-73	8	3			19 vs 4
12-13-73	6		9		6 vs 9
12-06-73	6		10		
12-13-73	9		6		
01-17-74	1		2		34 vs 32
12-06-73	6		10		
01-24-74	12		4		
01-24-74	6			8	
01-17-74	3			3	9 vs 11
01-17-74	3		0	4	0 vs 4

<sup>1</sup> Recipe numbers correspond to those listed in Table 3.

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