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## Factors Affecting Peanut Butter Preference

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### ABSTRACT

A sensory evaluation test with 320 subjects provided information pertinent to the preference of peanut butters. Results of paired preference test indicated that more than half the subjects (59%) preferred the "old fashioned" sample; flavor (aroma and taste) would have to be the primary reason since particle size was nearly the same in the prepared test samples. Chi-square tests of independence showed that the preference for the "old fashioned" sample was dependent on age ( $P < .05$ ) and sensory attributes of flavor and textural perception ( $P < .05$ ). Results of the survey showed that 47% of the total responding subjects listed "crunchy" peanut butter as their favorite type. Selection of one's favorite brand of commercial peanut butter was found to be based primarily on its particle size.

### INTRODUCTION

Peanut butter is by far the most important product made from peanuts in the United States (1) with the per capita consumption increasing from 1.1 kg in 1950 (2) to 3.8 kg in 1976 (3). Peanut butter, a good protein supplement (25-28% protein), is popular in the U.S. because it has a unique, pleasing and well accepted flavor. It is particularly popular among children.

The product standard of identity requires a minimum of 90% shelled, ground, roasted peanuts, with the remainder consisting of optional ingredients such as salt, sweeteners and emulsifiers (4). "Old fashioned" peanut butters consist solely of ground peanuts, while the "commercial type" peanut butters use salt, sweeteners (such as dextrose and sucrose) and emulsifiers or stabilizers to improve taste and counteract bitterness, as well as to retard oil separation to enhance spreadability. Chemical preservatives, artificial sweeteners and flavors, vitamins, and colorants are not permissible. Peanut butter is classified into three texture types based upon the particle size of the ground peanuts. Smooth peanut butter lacks perceptible peanut particles, while the chunky or crunchy types contain particles greater than 1.59 mm. Medium or creamy peanut butters have intermediate particle size.

Using laboratory profile panel data, Syarief (5) found

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flavor-by-mouth character notes such as roasted peanut, over-roast, under-roast, sweetness and saltiness were important in sensory perception. Texture notes found significant included adhesiveness, smoothness, perception of particles and initial oiliness.

Although peanut butter is a major item of commerce with more than 97 firms engaged in its production and sale (6), surveys which determined characteristics that affect consumers' product selection and preference have been of a proprietary nature and consequently have not been published. It is apparent that age, sex and race affect the selection and preference for commercial food products (7, 8). Other factors such as rural/urban lifestyles and product formulation also may be important. It is the objective of this study to learn more about these factors with regard to consumers' preference and selection of peanut butters in North Carolina.

### MATERIALS AND METHODS

#### Peanut Butter Preparation

Both "old fashioned" and "commercial" peanut butters were prepared from vacuum packed dry-roasted runner peanuts (Seabrook Blanching Corp.) as outlined by Woodroof (2), who also presented a review on processing parameters and early industrial processes. "Old fashioned" peanut butter was prepared by grinding whole peanut kernels using a fine mill in a Model "B" Olde Tyme peanut butter grinder (East Longmeadow, Massachusetts). The peanut butter corresponded to a medium or creamy texture type in particle size (ca. 1.59 mm) and was presented on the same day to the subjects for evaluation. A "commercial" peanut butter was prepared by grinding whole peanut kernels in a Morehouse Industries 504X stone mill (Fullerton, California). Additives (1% salt, 1.5% dextrose, 1.5% sucrose and 1.5% emulsifier) were added and mixed. The mixture was then reground to the same particle size (ca. 1.59 mm) as the "old fashioned" peanut butter, cooled and de-aerated using a Groen jacketed kettle (Model TDC/2). As with the "old fashioned" peanut butter, the "commercial" product was freshly prepared. Uncoded samples were presented to the subjects for sensory evaluation.

## PEANUT BUTTER PREFERENCE

**Composition of Consumer Survey**

Three hundred and twenty participants in the North Carolina State University Open House during the fall of 1982 served as subjects in this survey. They were comprised of high school students, younger children, university students and parents. There were nearly equal numbers of males and females with the age composition as follows: preteens and teenagers, 43%; university students, 15%, and adults, 40%. The majority of the subjects came from urban areas (61%), with most being residents of North Carolina (84%). Ninety-two percent of the subjects surveyed were whites and the remainder were blacks. Smokers comprised 13% of the total persons surveyed.

**Survey Questionnaire**

An 18-point question sheet was presented to each subject in which the respondent first was asked to indicate age, sex, race, hometown or county of residence and smoking status (Fig. 1). The subject then was asked to give his/her preference for various commercial peanut butter types and select the reasons for the preference. The reasons included product color, sweetness or saltiness, degree of oil separation, presence or absence of additives and preservatives. The second portion of the questionnaire was a paired preference test (9) between the freshly prepared samples of "old fashioned" and "commercial" peanut butters. The subject also was asked to describe the reason(s) for his/her preference of the test sample.

**Statistical Analysis**

Arbitrary numbers were assigned to denote specific response answers within that category, such as preference: "old fashioned" = 1, "commercial" = 2, and "no preference" = 3. The resulting two sets of response variables were categorized into two-way contingency tables (10) for testing independence/no interaction using the Chi-square method (11). Missing data was not estimated.

**RESULTS AND DISCUSSION**

A total of 320 persons participated and served as subjects for the sensory taste test. Based on age, 59% of the total responses preferred the "old fashioned," 37% preferred the "commercial" sample and 3% indicated "no preference." Table I shows the preference results from the various par-

**DO YOU REALLY KNOW YOUR PEANUT BUTTERS?**

Department of Food Science

Please answer the following questions of our survey.

Thank you for your assistance.

**SURVEY**

1. Age . . . . .
2. Male or Female . . . . .
3. Race . . . . .
4. Give the name of your home town or county . . . . .
5. Smoker or Nonsmoker . . . . .
6. Do you like peanut butter??? . . . . .
7. Do you like a light or dark peanut butter??? . . . . .
8. Do you like a sweet peanut butter??? . . . . .
9. Do you like a peanut butter with a salty taste??? . . . . .
10. Do you like it smooth, creamy, or crunchy??? . . . . .
11. Do you like a sticky peanut butter??? . . . . .
12. Do you like peanut butter with oil on top??? . . . . .
13. What is your favorite brand??? . . . . .
14. Why??? . . . . .
15. What % peanuts are in peanut butter??? . . . . .
16. Can preservatives be added??? . . . . .
17. What is your favorite candy bar??? . . . . .
18. Does it contain peanuts??? . . . . .

**SENSORY EVALUATION**

1. Please taste the two samples:  
"commercial" versus "old fashioned"
2. Which one do you like the best??? Why???

FIG. 1. Questionnaire and response sheet for peanut butter survey and evaluation.

icipant categories. More than half of each age category indicated preference for the "old fashioned" sample, with 68% of the adults selecting it. Flavor was cited as the main reason for the preference of both the "old fashioned" (80%), and "commercial" (60%) samples; another reason cited was the absence of additives. Preference for the "old fashioned" sample may be attributed to the growing trend toward "natural" food consciousness (12). However, the implication of "natural" foods being free from additives and preservatives did not seem to be the criteria for preference in this case. It also was noted that none of the responses cited nutritive value as one of the reasons.

TABLE I

Preference of Test Sample Based on Sensory Evaluation Test

Subjects' characteristics (% total responses)	Sample preference (% responses)		
	Commercial	Old fashioned	N.P. <sup>a</sup>
Age			
43 Preteen and teen	42	56	2
15 University student	40	53	7
40 Adult	30	68	2
Sex			
51 Male	37	59	4
48 Female	38	58	4
Race			
92 White	37	59	4
8 Black	38	50	12
Smoke			
13 Yes	38	54	8
86 No	37	59	4
County			
61 Urban	36	61	3
39 Rural	44	54	2

<sup>a</sup>"N.P.": No Preference.

**TABLE II**  
**Selection of Favorite Type of Peanut Butters on Survey**

	Subjects' characteristics (% total responses)	Peanut butter (% total responses)		
		Smooth	Creamy	Crunchy
Age	44 Preteen and teen	23	18	43
	16 University student	31	6	56
	40 Adult	28	18	43
Sex	52 Male	29	13	44
	48 Female	21	19	48
Race	91 White	23	15	48
	9 Black	44	22	22
Smoke	11 Yes	36	9	45
	88 No	1	17	48
County	58 Urban	24	14	48
	41 Rural	29	20	41

a" N.P.": No Preference.

Results of the chi-square tests showed that preference of the test sample was independent of sex, race, smoking status and location. The chi-square test was adjusted for continuity with the low "No Preference" response dropped to give only 1 d.f. for the sample preference. Age ( $P < .05$ ) was significant in influencing the selection of the peanut butter samples. Preference for the test sample was dependent ( $P < .05$ ) on the reasons cited which included flavor, texture and product formulation; this result was based on Chi-square test.

The number of responses obtained on each of the 18 survey questions ranged from 197 to 311. Table II shows the survey results for the selection of their favorite types of peanut butters (based on particle size). The subjects would prefer having: "crunchy" (47%), "smooth" (27%), "creamy" (14%), and "no preference" (13%). It was apparent that "crunchy" peanut butter was the most popular type. Preference for peanut butter types was independent ( $P > .05$ ) of age, sex, smoking status and location.

Reasons cited for individual selection of the favorite brand of commercial peanut butter included "particle size" (33%); "availability," i.e., what the mothers purchased (23%); "flavor" (19%); and "other" (25%). "Other" denoted minor reasons such as cost, absence of additives and preservatives. Particle size (i.e., texture type) seemed to be more important than flavor in the selection of one's favorite brand of commercial peanut butters. Chi-square results showed favorite brand selection to be dependent ( $P < .01$ ) on the above reasons. The "availability" response indicated by some of the younger subjects may be related to brand loyalty.

Of the 320 subjects who responded to the survey, only 3% indicated their dislike for peanut butters. Seventy percent liked light colored peanut butter, 9% liked dark color and 21% had no preference. Fifty-six percent liked sweet peanut butter, 36% did not like sweet and 8% had no preference. Forty-seven percent liked salty peanut butter, 46% did not like the salty taste, and 7% had no preference.

The majority of the responses (71%) indicated dislike for sticky peanut butter, 24% liked sticky and 5% showed no preference. The majority of the subjects did not like oil on top of their peanut butters (85%), 11% liked the oil and 4% had no preference. Only 11% of the responses indicated correctly that peanut butter contains at least 90% peanuts, while the remaining respondents either indicated incorrectly (46%) or did not respond (43%). Sixty-six percent of

the responses indicated that preservatives can be added to peanut butter. Of the some 20 brands of the subjects' favorite candy bars mentioned, 58% of the responses indicated that the candy bars contained peanuts. A liking for salty, sticky or oily peanut butters was found to be dependent ( $P < .05$ ) on the subject's age.

#### SUMMARY

Based on demographics of this sensory evaluation and survey, [1] only age was a factor in pattern response to prepared (test) samples of similar texture type with a higher percentage of the adult group than of other age groups preferring the test sample designated "old fashioned" (i.e., without additives); [2] crunchy types were preferred over smooth and creamy types when texture type alone was considered, and [3] particle size was the most often cited reason for commercial brand selection.

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