Journal of Food Protection Vol. 43, No. 5, Pages 390-391 (May, 1980)

Flavor and Texture of Cottage Cheese Made by Direct-Acid-Set and Culture Methods[1]

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(Received for publication August 8, 1979)

ABSTRACT

Consumers were asked to indicate a flavor and texture preference for one of two creamed and salted small-curd cottage cheeses made by direct-acid-set or conventional short-set culture methods. When a commercial starter distillate flavor was added to direct-acid-set cheese, its flavor and texture were preferred over cheese made by the culture method. Conversely, when flavor was not added to the direct-acid-set cheese, consumers preferred the flavor and texture of the cultured product. Differences among mean flavor or texture scores of three age groups were not significant (< 20, 20-40, > 40). Preferences for texture appeared to be biased by flavor.

The direct-acid-set (DAS) method of manufacturing cottage cheese, a relatively new process, is gaining rapid acceptance by the industry (*2*). Several advantages for it are claimed over the conventional culture method. White and Ray (*6*) reported reductions of 67% in cutting time and 60% in cooking time compared with the culture method. Sharma et al. (*4*) reported a significantly greater yield ($P < .001$) for direct-acidification. Satterness et al. (*3*) also reported yield increases but not significant ($P < .05$) differences.

Questions have been raised regarding flavor and texture of DAS cottage cheese. Gerson (*2*) reported that cheese made by the DAS process was judged 1st in flavor and texture in Michigan over 14 cultured cheeses. But two others (*1,6*) reported DAS cheese less desirable in flavor than cultured cottage cheese. The opposite reports may stem from differences in dressings used in the products. Starter distillate flavor was added to the Michigan cheese dressing, but apparently not to the cheese judged less desirable (*1,6*). We attempted to determine if consumers preferred cottage cheese made either by the DAS or by the conventional short-set culture method. We used direct-acid-set cheese made both with and without commercial starter distillate flavor added to the dressing.

MATERIALS AND METHODS

We made small-curd cottage cheese by two methods: the conventional short-set culture and the Vitex/American DAS method (*5*) as described by Sharma et al. (*4*). In Experiment 1, we made 14 batches of cottage cheese, seven by each method, using skim milk with 3.1 ± .15% protein and dressed with 44.2 kg of cream and 1.44 kg of salt per 100 kg of curd. The cream contained 13.5 to 14% fat and 0.3% stabilizer. In Experiment 2, we again made 14 batches, seven per method and used skim milk with 3.9 ± .15% protein and with 3.52% protein for one batch by each method. All cheeses were dressed as in Experiment 1, except the recommended 3.2 ml of starter distillate flavor (supplied by Vitex/American) was added per 100 kg of the DAS curd. Distillate flavor was thoroughly mixed with the cream before dressing the curds.

Cartons were packed with 450 g of creamed cottage cheese. One carton each of DAS and cultured cheese were paired. In each trial, one of the two types of cheese in the pair was randomly assigned the code A or B (or 1 or 2); the other type received the other letter or number. Approximately 30 pairs from each trial were sold to consumers through the Kansas State University Dairy Bar at half the prevailing retail price; consumers completed an evaluation form (Fig. 1) and returned it to the researchers. The number of responses varied, depending on family size, from trial to trial. For every trial, all responses in each age group were added and percentages for culture, DAS, and no preference were computed for age groups.

The data were analyzed statistically by comparing the consumer response frequency in each category with the expected frequency using the chi-square test. The expected frequencies were obtained under the null hypothesis of random selection of categories. Tests were conducted: (*a*) by consumer age groups, (*b*) summed over age groups, (*c*) for the three response groups (Culture, DAS, and NP) and (*d*) for the culture and DAS response groups only, i.e. if a person preferred Culture or DAS was he or she equally likely to select Culture or DAS? and (*e*) for texture and flavor responses for each of the two experiments.

Cottage Cheese Evaluation Form

In the circle write the number of persons in each age group in the family preferring that sample.

Flavor

I prefer sample	A	B	No Preference
a. Age group less than 20 years	○	○	○
b. Age group 20 - 40 years.	○	○	○
c. Age group over 40 years.	○	○	○

Texture

I prefer sample	A	B	No Preference
a. Age group less than 20 years.	○	○	○
b. Age group 20 - 40 years	○	○	○
c. Age group over 40 years.	○	○	○

Note: The code will be changed randomly from week to week.

Figure 1. *Form used to evaluate cottage cheese.*

RESULTS AND DISCUSSION

Responses totaled 541 in Experiment 1 and 702 in Experiment 2. Table 1 presents flavor and texture preferences of each of the three age groups.

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TABLE 1. *Consumer responses (%) by age groups to cultured and DAS cottage cheese*[1].

Product	Customer age groups, years				Customer age group, years			
	< 20	20 - 40	> 40	Total	< 20	20 - 40	> 40	Total
				Experiment I				
	Flavor preference, %				Texture preference, %			
Culture	49	43	44	45	40	40	45	42
DAS	32	31	32	32	29	33	32	32
NP[2]	19	26	24	23	31	35	24	27
Total	158	209	174	541	158	209	174	541
				Experiment II[3]				
Culture	27	30	28	29	27	30	28	28
DAS	55	62	61	59	47	53	54	51
NP	18	8	11	12	26	18	18	21
Total	242	238	222	702	242	238	222	702

[1]The totals are frequencies, values in the table are percentages.
[2]NP = no preference
[3]Commercial starter distillate flavor was added to DAS cheese in Experiment II.

A significantly higher proportion of consumers preferred the flavor and texture of cheese made by the culture method when no flavor was added to DAS cottage cheese (Experiment 1). However, when flavor was added to DAS cheese (Experiment 2), a dramatic reversal was observed; a significantly larger proportion of consumers ($P < .001$) preferred DAS cheese. The proportion of consumers choosing the no preference (NP) category decreased significantly, $P < .001$, when flavor was added to direct-acid-set cheese (Experiment 1 = 23%, Experiment 2 = 12%, Table 1). The increased confidence of consumers showed that differences between cultured and direct-acid-set cheese were better defined in Experiment 2.

Consumer trends for texture closely followed those for flavor. As the culture and DAS cheese were manufactured the same in Experiment 1 as in Experiment 2, differences in response to texture must have been influenced by the added flavoring in Experiment 2, so it appears that the average consumer is not a reliable judge of cottage cheese texture.

Consumers preferred DAS cheese over cultured cottage cheese when starter distillate flavor was added to the DAS cheese; when flavor was not added to DAS cheese, consumers preferred cultured cottage cheese. Data for each group gave the same conclusions.

ACKNOWLEDGMENT

This research was supported in part by Diamond Shamrock, Food Division, St. Louis, MO.

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