Use of Foam-Spray-Dried Cottage Cheese Whey in Water Ices

The development of foam-spray-dried Cottage cheese whey (4) has led to investigation of uses for this new by-product.

We report the formulation and some properties of a frozen novelty consisting of water ice on a stick and containing foam-spray-dried Cottage cheese whey.

This product is of interest when considering recent British work (6) showing that the low pH and lack of calcium and phosphate in now-available products of this type lead to accelerated erosion of the front teeth of consumers.

Experimental Procedure

The Cottage cheese whey used was a by-product of pilot-plant Cottage cheese manufacture, using both lactic starter and rennet as in commerce.

The whey was heated to 91 C, held 30 min, condensed to 60.5% total solids in a falling-film evaporator, then foam-spray-dried using equipment and techniques described by Hanrahan et al. (4).

The moisture content of the product was determined, using a toluene distillation technique (1). Protein nitrogen was determined by a micro-Kjeldahl procedure. Calcium was determined with the method of Yalman et al. (7), and phosphorus according to Fiske and Subbarrow (2). pH of the reconstituted product was measured with a glass electrode.

A control iced novelty formula (3) consisting of 84% water, 15.3% sucrose, 0.2% citric acid, 0.2% gelatin, and 0.3% flavoring and coloring (Virginia Dare Extract Co. Inc., Brooklyn, N. Y.)[1] was used. When foam-spray-dried Cottage cheese whey was added to the experimental product, 12.7% sucrose was used with 2.6% Cottage cheese whey.

Lemon-, lime-, orange-, and strawberry-flavored ices were made up. The solutions were frozen around wooden sticks in a commercial-type metal mold cooled by a dry ice–methanol mixture. The pH of the solutions was measured prior to freezing.

After release from the molds consumer acceptance of the products was determined, using an

[1] Reference to certain products or companies does not imply an endorsement by the Department over others not mentioned.

TABLE 1
Preference ratings of water ices

Flavor of ice	No. panel members	Cottage cheese whey water ice		Control water ice	
		No. preferred	Average score	No. preferred	Average score
Lemon	16	10	7.7	6	7.5
Lime	14	10	7.4	4	7.1
Strawberry	16	8	6.2	8	6.4
Orange	14	10	7.4	4	6.8

informal panel of adults. Many of the panel members were experienced milk judges. The judges were asked to rate acceptance on the basis of a nine-point hedonic scale (5) and to express a preference among the like-flavored pairs.

Results and Discussion

The foam-spray-dried Cottage cheese whey used in this study contained 3.2% water, 13.2% protein, 1.44% calcium, and 1.17% phosphorus. On reconstitution to its original solids content, it had a pH of 4.6.

Inclusion of dried Cottage cheese whey in the iced novelty formulas resulted in raising the pH of the solutions from 3.0 to 4.0.

Results of consumer acceptance investigations are shown in Table 1. Whereas the observed differences in numerical scores are not statistically significant, the number of judges expressing preference for the whey-containing product is worth noting. Certainly, the inclusion of foam-spray-dried Cottage cheese whey in the ices did not adversely affect flavor.

It should be noted that the pH of the whey ices is also at the level which Wagg et al. (6) have shown to be effective in reducing tooth erosion caused by consumption of water ices. Therefore, the inclusion of dried Cottage cheese whey in ice formulas should not only make them more nutritious, due to the protein and calcium present, but also alleviate the tooth erosion associated with their consumption.

The high-heat treatment (91 C for 30 min) given the whey described in this paper is not required for improved product manufacture. Our most recent work has shown that ices of lower opacity are produced when foam-spray-dried powders were made from Cottage cheese whey pasteurized (74 C for 15 sec) just prior to concentrating and drying.

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