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PRODUCTION, CHARACTERIZATION AND UTILIZATION OF CHEESE WHEY POWDER

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Cheese whey is a valuable "waste" of dairy industry. It contains 0.5 percent ash, 0.30 percent fat, 5.1 percent lactose, 0.90 percent protein, 0.19 percent acidity and 93.1 percent water. Whey samples were concentrated to about 52 percent total solids by a vacuum concentrator at 60°C and 29 inches vacuum and the spray dried with an inlet temperature of 200°C and an outlet temperature of 90°C. Each sample of 60 litres cheese whey on spray drying gave 6 to 7 kg whey powder. It contained 2.25 percent acidity, 8.05 percent ash, 1.10 percent fat, 71.2 percent lactose, 12.9 percent protein (N x 6.38) and 4.5 percent moisture. Whey solids made a positive nutritional contribution when used in bread at the rates of 1, 3 and 5 percent, in ice cream at 10, 15, 20 percent and in orange juice at 2, 3 and 6 percent of the total weight of the product without altering their original characteristics.

INTRODUCTION

Cheese why is the fluid portion of milk, drained from curd during cheese manufacturing. Besides about 90 percent of milk sugar, it contains a portion of fat, minerals and high percentage of water soluble vitamins with almost all of the riboflavin of the milk.

Growing concern over pollution and environmental control has renewed the pressure on cheese manufacturers to stop dumping the whey into streams. This dairy waste can play an important role when used for fortification of foods for enhancing their nutritional value. The presence of high percentage of lactose makes the why a perishable commodity. It is generally therefore dried.

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Dried whey has been used for the fortification of bread, orange juice and ice cream (Vanchenko, 1977; Dalum, 1976; Holsinger, 1982). Quality utilization of whey has been reported by Brabec (1976). Thompson *et al.* (1983) observed that addition of 10% whey protein concentrate in ice cream increased the viscosity and reduced the freezing time even in the absence of stabilizers and emulsifiers.

In view of the abundance and nutritional quality of whey, present studies were carried out for its utilization and characterization.

MATERIALS AND METHODS

Cheese whey samples preserved with hydrogen peroxide (at the rate of 350 ppm) were procured from Green Dairies, Sahiwal. The samples were analysed for acidity, ash, fat, lactose, protein and total solids. Then samples were concentrated to about 52 per cent total solids by a vacuum concentrator at 60°C and 29 inches vacuum and dried by a spray drier having inlet temperature 200°C and outlet temperature of 90°C. Ash, lactose, protein, total solids of whey samples were determined by the methods described in AOAC (1975) and acidity by the method of Vanstone and Dougall (1960). Fat and moisture of dried whey were determined as described by Pearson (1976).

Bread sample (control) was prepared by addning patent flour = 200g, sugar = 9g, salt = 4g, dry yeast = 6g and ghee = 15g. In the other samples, dried whey at the rates of 1, 3 and 5 per cent of the total weight of flour were added. Organs juice was blended at the rates of 2, 3 and 6 per cent with dried whey. Control sample of ice cream was prepared by adding milk 1000g, cream 225g, ice cream powder 50g, sugar 190g, salt 1g and flavour 3 drops. Milk S.N.F. of other three samples were replaced by 10, 15 and 20 percent of whey powder.

The panel testing for colour, taste, flavour and texture was carried out using the method of Krum (1955). Data were statistically analysed by the analysis of variance technique as described by Steel and Torrie (1960).

RESULTS AND DISCUSSION

Eight samples of cheese whey were analysed for proximate composition and the mean values for different constituents revealed 0.19 per cent acidity, 0.50 per cent ash, 0.30 per cent fat, 5.10 per cent lactose, 0.90 per cent protein and 93.10 per cent water. The mean values for different constituents of dried

whey indicated 2.25 per cent acidity, 8.05 per cent ash, 1.10 per cent fat, 71.20 per cent protein and 4.50 per cent moisture.

Organoleptic evaluation of orange juce, ice cream and bread fortified with dried whey was carried out. Addition of dried whey (2%) enhanced the acceptibility of blended juice but 6 per cent lowered the appeal. Statistical treatment of the data (Table I) showed that blending had non-significant effect on the colour, taste and flavour of the juice. Anonymous (1969) blended orange juice with dried whey and reported similar results. In ice cream 10, 15 and 20 per cent milk S.N.F. were replaced by whey solids. All these levels improved the quality of ice cream. When data were analysed statistically (Table I), no significant different existed in colour, texture, taste and flavour among the samples. Similar observations have also been recorded by other research workers (Rothwell, 1974; Khalafalla 1975).

Table 1. *Effect of fortifica ion of dried whey at different levels on the sensory quality of orange juce, ice cream and bread.*

Parameters	Orange juice				Ice cream				Bread			
	0	2	3	6	0	10	15	20	0	1	3	5
Colour	7.0	7.6	7.2	7.0	7.8	8.0	8.0	7.8	6.4	8.2	8.8	9.0
Taste	7.0	7.2	7.0	6.6	7.2	7 4	7.4	7.2	6.2	8.2	8.5	9.0
Flavour	6.8	7.2	7.0	6.2	6.4	6.6	6.6	6.8	5.6	7.6	8.2	8.8
Texture	—	—	—	—	7.0	7.2	7.2	7.4	6.4	7.8	8.2	8.6

1. Scores are means of seven to Jugements

Organoleptic evaluation of bread showed that the addition of dried whey had significant effect on different quality attributes of bread. With an increase in dried whey level, the quality of gradually enhanced. Statistical analysis of the data (Table I) showed highly significant positive effect of dry whey on the colour, texture, taste and flavour of the bread. Similar resuls have also been reported by Chumachenko *et al.*, (1977) and Demchuk *et al.*, (1975).

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