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FACTORS AFFECTING THE STABILITY OF PROTEIN ENRICHED SOFT DRINK

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Protein dispersibility of the heat processed samples was found to be maximum at pH 6.8, fat fortification also helped in stabilization of the protein enriched beverage. Addition of 0.6% carboxymethyl-cellulose was observed to be the appropriate amount for achieving maximum protein dispersibility in the beverage.

INTRODUCTION

The Asian population is faced with a perpetual short supply of milk. Therefore, it is imperative that a suitable milk substitute must be found to offset this shortfall. A possibility to achieve this objective exists through the formulation of milk like products based on proteins of vegetable origin. (Miller, 1975; Elahi *et al.* 1971; Cluskey *et al.* 1976. A nutritious vegetable milk, in the absence of cow's mitk, is essential first for infants, then to supplement the diet of the school-age children, followed by the requirements of teenagers, and finally through-out the life span of an individual (Miller, 1975).

Beverages, indigenous or imported, are relished very much by people living in this region. Preference for different beverages, however, is based on social background and traditional customs of the people. Since it is known that there is a protein shortage in the vulnerable groups of developing countries, therefore, a project was initiated with a view to study the factors affecting the stability of protein enriched soft drink.

MATERIALS AND METHODS

Protein was isolated from detoxified mustard seed meal by the method of Shah *et al.* (1985). W st protein isolate was used in the beverage formulations. A beverage, containing mustard seed protain isolate at the rate of 1.5, 2.0, 2.5 and 3.0% and 4.0% sucrose, was prepared. Thus prepared beverage was fortified with 3.5 % vegetable oil, 0.6 % mineral mix (Mustakas *et al.* 1971), vitamins (vitamin A 180 IU, vitamin B 50 ug, riboflavin 200 ug) and CMC (carboxy-me-

thylcellulose) at the rate of 0.2, 0.4, 0.6, 0.8 and 1.0%. The prepared samples were filled in (210 ml capacity) glass bottles, crown corked and processed in a vertical retort under 16 lb. pressure for 10 minutes. The beverage was analysed for its protein content by following the A. O. A. C. (1980) method.

RESULTS AND DISCUSSION

a) *Effect of pH on theStability of the Beverage*

Protein solubility increased from 65 to 90% when the pH was raised from 6.5 to 7.0. However, tncrease in pH resulted in a decrease in the protein retension on heat processing of the bevrrage. Protein dispersibility was observed to be 88.62 and 67.54% at pH 6.5 and 7,0 respectively (Table 1). However, dispersion of the protein in the processed beverage was optimum at pH 6.8. Thus both stability of the suspension as well as availability of protein was found to be maximum at pH 6.8. These results do not agree with the findings of Priepki *et al* (1980) and Elahi *et al* (1971) who reported higher pH values for these type of beverages. However, these workers used the protein from vegetable sources other than mustard seeds.

Table 1. *Effect of change in pH on the protein dispersibility and protein retension on heat processing of the beaerage*

Parameter Tested	pH					
	6.5	6.6	6.7	6.8	6.9	7.0
Dispersibiliry (%)	75.43	68.48	73.10	78.61	84.12	90.06
Retension After Processing (%)	88.62	84.78	82.30	78.02	72.51	67.54
Total Available Protein (%)	57.98	58.06	58.70	61.33	60.89	60.83

b) *Effect of Heat Pracessing af the Beverage*

Heat processing of the beverage resulted in a decrease in the dispersibility of protein (Fig. 1). This may be attrtbuted to coagulation of proteins on processing. The decrease in the dispersibility was greater in samples containing higher percentage of protein (3.0%). Similar loss in the stability of pea-nut based beverage had been reported by Elahi *et al* (1971).

c) *Effect of Fat Fortification*

Fat fortification effect, in respect of protein stability, was found to be

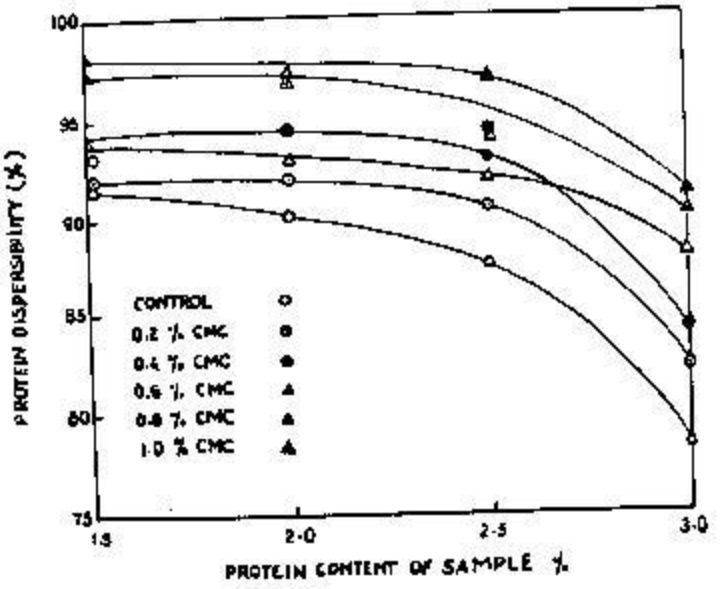

Fig. 1. COMBINE EFFECT OF EMULSIFIER (CMC) AND PROCESSING ON STABILITY OF PROTEIN SUSPENSION IN THE BEVERAGE.

more pronounced in the samples with higher protein contents (3.0%) than the beverage containing lower amount of protein (1.5%) (Fig. 2). Protein dispersibility in the fat-free and fat fortified samples, with 1.5% protein, was almost equal, while the fat-fortified beverage containing 3.0% protein showed almost 5% more dispersibe protein than the fat-free sample with the same level of protein. These results are in agreement with the observations of Mustakas (1974), Priepke *et al* (1980), and Tornberg and Hermansson (1977), who reported that lipid protein beverage had a good suspension stability.

d) *Effect of Emulsification* :

Addition of emulsifier beyond 0.6% did not show significant emulsifying effects both in fat-free and fat-fortified samples as far as 1.5% and 2.0% protein containing samples were concerned. However, fat-free samples showed improved dispersibility with the addition of CMC even beyond 0.6% in the case of 2.5% and 3.0% protein beverage (Fig. 3).

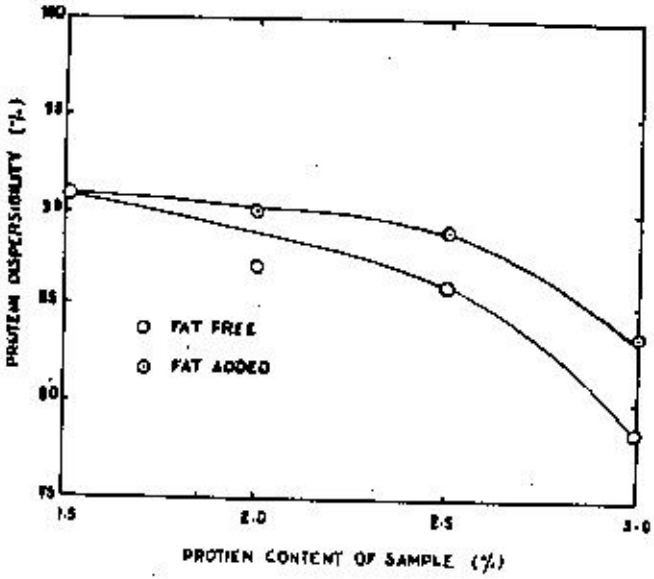

Fig X EFFECT OF FAT ON STABILITY OF THE BEVERAGE

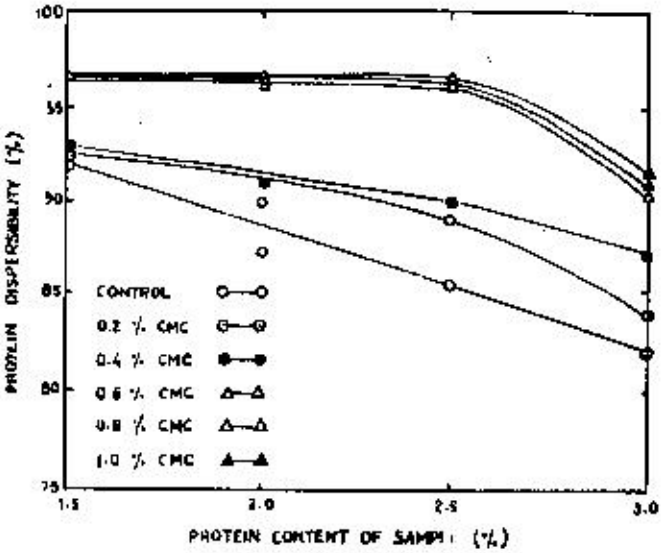

Fig. XI COMBINE EFFECT OF FAT AND EMULSIFIER (CMC) ON PROTEIN STABILITY OF THE BEVERAGE

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