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A. Ü. Vet. Fak. Derg.
40 (2): 256-260 1993

NUTRITIONAL VALUE OF CHHANA WHEY

Suzan Yalçın[1] **V. Nigel Wade**[2] **Md. Nozmul Hassan**[3]

Chhana peyniraltı suyunun besin değeri

Özet: *Bu araştırma, chhana peyniraltı suyunun besin değerini incelemek ve kullanımına ışık tutacak bilgileri elde etmek amacıyla yapıldı.*

Chhana peyniraltı suyu kimyasal bileşim ve diğer analitik veriler yönünden incelendi.

Araştırma sonucunda, chhana peyniraltı suyunun besin değerinin yüksek olduğu ve böylece gıda endüstrisinde çeşitli ürünlerin hazırlanmasında kullanılabileceği kanısına varılmıştır.

Summary: *This study was carried out to investigate the nutritional value of chhana whey and to obtain some basic information for its utilization.*

Chhana whey was analyzed for chemical composition and other analytical data.

Based on this study, it is concluded that chhana whey has a highly nutritive value, thus indicating that chhana whey could be used for the preparation of various products in food industry.

Introduction

Cheese is manufactured throughout the world and an inevitable consequence of this process is the formation of whey after the coagulation, cutting and heat treatment of the curd, or equivalent operation. Cheese whey can be a highly polluting waste product with a biological oxygen demand reaching 60 000 mg/l in some cases. Fortunately many cheese wheys can be used for feeding livestock or con-

1 Department of Food Hygiene and Technology, Veterinary Faculty, Selçuk University, Çimenlik, 42020, Konya, Turkey.

2 Department of Food Science and Technology, The Scottish Agricultural College, Auchincruive, Near Ayr, KA 6 5 HW, Scotland-UK.

3 Department of Dairy Science, Bangladesh Agricultural University, Mymensingh, Bangladesh.

verted into concentrated or dried whey for use as a food ingredient in products. Demineralized cheese wheys are an excellent base for "humanized' infant formulations used as a supplement to or substitute for human breast milk (4,5,6).

Unfortunately, acid cheese wheys derived from some soft cheese and acid curd manufacturing process are not so readily processed into useful by-product. Chhana is a milk curd product which is very popular in the Far East. Chhana obtained from cow's milk by a combination of heat and acid coagulation is used in the manufacture of sweetmeat deliacies such as "rasogolla".

Chhana whey is considered as a waste product and it is carelessly thrown out causing the pollution. The major problem with whey utilization is that there is not enough research. Very little information on the nutritional value of chhana whey is available (10, 11). When considering the nutritional aspects of whey and its utilization, it is necessary to have sound information on composition. Therefore, this research was carried out to determine nutrient composition of chhana whey and to obtain some basic information to investigate the feasibility of utilization of chhana whey.

Material and Methods

Raw materials: Cow milk was obtained from the farm of The Scottish Agricultural College, Auchincruive. Citric acid was obtained from BDH Ltd. and solutions of this compound were made up freshly prior to use.

Preparation of chhana whey: Advice was received from Punjrath (9) of the National Dairy Development Board of India on the manufacture of chhana. This procedure was adopted to obtain chhana whey, except that a higher citric acid concentration of 5 % (w/w) was used to reduce the pH value to obtain protein coagulation. Fresh raw whole milk was heated to 85°C and held at that temperature for 5 minutes. Milk proteins were coagulated at 70°C and a pH of 4 .8 to 5 .0 using a 5 % (w/w) aqueous citric acid solution. The whey was separated from the curd using a cylindirical chesese mould and muslin cloth. The whey samples from all the six trials were analysed immediately.

Analysis: Total solids and ash were determined by the gravimetric method (2). Total protein (nitrogen x 6 .38) was determined using

the micro-kjeldahl method (2). Fat content was obtained according to the Rose-Gottlieb method (3). Lactose content was determined by difference. Vitamin C was determined titrimetrically (8). The pH measurement was carried out using a Pye Unicam pH meter (model 290 MK II) fitted with a standard combined glasss electrode. Energy value was calculated using by the Atwater system (12). For the mineral analysis, an adapted inductively coupled plasma atomic emission spectra method (1) was used. All analysis were carried out in duplicate.

Results and Discussion

Results of chemical analysis of chhana whey are given in Table 1 and 2.

Table 1 shows that the mean value of total solids in chhana whey was 6.80 %. Singh and Mathur (10) and Singh and Ray (11) reported the total solids content in whey as 6.91 % and 6.58 %, respectively. The mean protein content of 0.36 % observed in this study was al-

Table 1. Chemical composition of chhana whey

Constituent	Mean value	Standard deviation
Total solids (%)	6.80	± 0.05
Total protein (%)	0.36	± 0.01
Fat (%)	0.69	± 0.08
Lactose (%)	5.08	± 0.04
Ash (%)	0.66	± 0.01
Vitamin C (mg/100 ml)	0.34	± 0.06
pH	4.98	± 0.03

Average of six replicates.

Table 2. Micronutrient content of chhana whey, mg/100 ml

Constituent	Mean value	Standard deviation
Sodium	45.00	± 0.52
Calcium	85.00	± 1.46
Phosphorus	59.67	± 0.47
Magnesium	10.00	± 0.03
Potassium	150.33	± 2.49

Average of six replicates.

most similar value of 0.37 % reported by Singh and Mathur (10). But Singh and Ray (11) observed a higher value of 0.61 % in chhana whey. The mean fat content in chhana whey was found to be 0.69 % which was higher than the values reported by some investigators (10, 11). The mean lactose value of 5.08 % observed in this study was the same average value reported by Singh and Mathur (10). A value of 5.18 % lactose content of chhana whey was reported by Singh and Ray (11). The mean ash content in chhana whey was observed to be 0.66 % which was higher than the value of 0.53 % reported for whey by Singh and Mathur (10). As shown in Table 1, mean vitamin C value was 0.34 mg/100 ml and mean value of pH of chhana whey was 4.98.

It can be said that 1 kg chhana whey supplies about 272.86 ± 5.82 kcal of energy.

Table 2 shows that mean sodium, calcium, phosphorus, magnesium and potassium values as mg/100 ml in chhana whey were found to be 45.00, 85.00, 59.67, 10.00 and 150.33, respectively. In comparison with micronutrient content of milk (7), chhana whey appears to be equally valuable sources of sodium, magnesium and potassium.

Conclusion

This survey has provided sound compositional data for chhana whey. Consequently, it is evident from this study that chhana whey is a highly nutritious product. Obviously, development of any process for its utilization would be of great benefit to the dairy industry.

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