Blending Whey Powder with Haricot Bean Powder for Weaning Food Production

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Abstract

Introduction Whey is the milk component remaining after removal of casein, as by curdling.

Objective The main aim of this study was to produce weaning food by blending whey powder with haricot bean powder.

Method The raw materials used were whey and haricot bean (*Phaseolus vulgaris*), *Roba 1* variety. Whey was filtered through ultra-filtration membrane. Permeate was stored and pre-heated at 55 °C for 40 min. Vacuum pump was used to concentrate the soluble solid to 60%. Finally, it was dried by means of a pressure-nozzle spray dryer. The bean seeds were weighed and soaked for 12 h at 25 °C. The pan was covered and kept in darkness to sprout. Seeds that sprouted within four days were dried, ground and stored. Whey and haricot bean powder were mixed in various mix ratios and analyzed for their physico-chemical and bacteriological quality.
Result The protein, iron and fat content of whey powder was 7.9%, 1.14% and 1.12% respectively and increased to 13.94%, 3.02% and 1.95% respectively through blending with haricot bean powder. The Ca, Mg and K contents of the blended product were within the recommended range. The microbiological results of all fortified products were within the acceptable limits.

Conclusion The nutritional content of a mix of whey: haricot bean powder in the ratio 80:20 was the best composition for fulfilling the nutritional requirements for young children. This study shows that there is a possibility of blending of whey powder with the high protein content of haricot bean powder, providing an option to develop low-cost weaning foods from pulses

Introduction

Whey is the milk component remaining after the removal of casein, as by curdling. Whey contains approximately half of the original nutrients of milk. Enriched foods consist of a mixture of cereals, pulses, fats, vitamins, and minerals intended to provide a balanced intake of essential nutrients for vulnerable groups. The main aim of this study was to produce weaning food by blending whey powder with haricot bean powder.

Methods

The raw materials used were whey and haricot bean (*Phaseolus vulgaris*), *Roba 1* variety. Whey was filtered through ultra-filtration membrane. Permeate was stored and pre-heated at 55 °C for 40 min. Vacuum pump was used to concentrate the soluble solid to 60%. Finally, it was dried by means of a pressure-nozzle spray dryer. The bean seeds were weighed and soaked for 12 h at 25 °C. The pan was covered and kept in darkness to sprout. Seeds that sprouted within four days were dried, ground and stored. The whey and haricot bean powder samples were blended in the proportion of 100:0 (S1), 95:5 (S2), 90:10 (S3), 85:15 (S4), 80:20 (S5), 0:100 (S6) (whey to bean powder ratio) and analyzed for their physico-chemical and bacteriological quality. The protein, iron and fat content of whey powder was 7.9%, 1.14% and 1.12% respectively and increased to 13.94%, 3.02% and 1.95% respectively through blending with haricot bean powder. The Ca, Mg and K contents of the blended product were within the recommended range. The microbiological results of all fortified products were within the acceptable limits.

Result

The protein, iron and fat content of whey powder was 7.9%, 1.14% and 1.12% respectively and increased to 13.94%, 3.02% and 1.95% respectively through blending with haricot bean powder. The Ca, Mg and K contents of the blended product were within the recommended range. The microbiological results of all fortified products were within the acceptable limits

Table 1 proximate composition of whey powder, haricot bean powder, enriched products and raw liquid whey.

Samples	Moisture (%)	Protein (%)	Fat (%)	Crude fiber (%)	Ash (%)	Total Carbohydrates (%)
S1	11.25±0.35	7.99±0.04	1.12±0.06	1.63±0.37	17.23±0.24	60.87
S2	10.90±0.02	9.16±0.07	1.53±0.11	1.41±0.09	15.49±0.23	61.57
S3	10.60±0.54	10.13±0.36	1.83±0.16	1.64±0.16	13.63±0.24	62.17
S4	10.46±0.38	13.19±0.08	1.92±0.05	1.68±0.06	12.69±0.31	60.77
S5	10.22±0.21	13.94±0.05	1.95±0.08	1.72±0.01	6.73±0.21	65.48
S6	9.70 ±0.18	23.29±0.09	2.04±0.04	2.75±0.04	6.12±0.13	56.09
S7	93.020.13	0.75±00.24	0.1±0.21	0.32±0.02	0.55±0.12	5.26

Table 2 Mineral contents of whey, haricot bean powder and blended product

Samples	Mineral contents(mg/100gm) on dry basis					
	Mn	Zn	Fe	Ca	Mg	K
S_1	0.08±0.02	1.31±0.01	1.41±0.01	33.93±0.01	3.64±0.02	15.13±0.06
S_2	0.10±0.02	1.22±0.01	2.12±0.01	30.35±0.02	3.62±0.01	18.05±0.01
S_3	0.13±0.01	1.10±0.02	2.36±0.01	33.46±0.13	3.60±0.01	18.31±0.06
S_4	0.22±0.01	1.12±0.02	2.75±0.01	32.36±0.01	3.43±0.01	19.15±0.02
S_5	0.21±0.01	1.93±0.02	3.02±0.01	24.34±0.02	3.45±0.04	19.33±0.04
S_6	0.30±0.01	3.23±0.08	7.58±0.02	15.83±0.01	3.51±0.01	20.21±0.08

Fig 1 The protein and fat contents of whey powder and enriched products

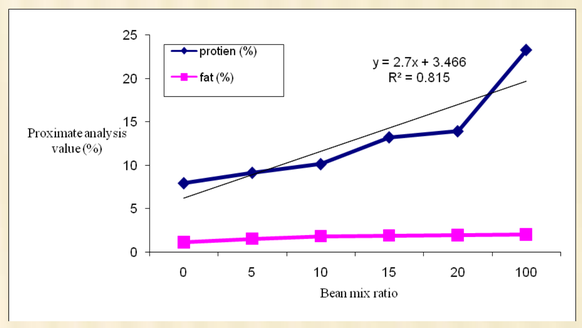

Table 3 Microbial analysis of whey powder enriched products and liquid whey

Parameters	**Result**							Acceptable limit (cfu/ml)
	$S_{1(cfu/ml}$	$S_{2(cfu/ml)}$	$S_{3(cfu/ml)}$	$S_{4(cfu/ml)}$	$S_{5(cfu/ml)}$	$S_{6(cfu/ml)}$	$S_{7(cfu/ml)}$	
Mold and yeas	$<1*10^1$	$<1*10^1$	$<1*10^1$	$<1*10^1$	$<1*10^1$	$<1*10^1$	$<1*10^1$	< 50
APC*	$1.2*10^3$	$1.4*10^2$	$2.4*10^4$	$1.5*10^6$	$2.3*10^7$	$4.8*10^7$	$1.48*10^4$	$< 2*10^4$
Fecal coliform	Nil	Nil	Nil	Nil	Nil	Nil	Nil	< 10
E.coli type 1	Nil	Nil	Nil	Nil	Nil	Nil	Nil	< 40
S.aureus	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Shall not detected
B.cereus	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Shall not detected
S.coccus spp	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Shall not detected
Salmonella sp	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Shall not detected
Shigella spp	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Shall not detected

*APC Aerobic bacteria plate count at 37^0C for 48hr

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