

Studies on effect of value addition in whey potato fermented products

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The three different types of whey viz., *Paneer*, *Chakka* and *channa* were utilized as base material for preparation of whey-potato fermented product. This product was prepared by adjustment of pH of whey at 6.4, addition of potato (nearly 30%) to the level of milk solids (12.69%), fermentation with LF-40 starter culture (2%), by incubating at $30 \pm 1^\circ\text{C}$ for 12 hr, sweetening with 5 per cent sugar, packaging in cups and store at $5-7^\circ\text{C}$, be adopted. *Channa* whey system (T_2) produced organoleptically superior product but samples T_4 (Equal quantity of three whey) and T_0 (Plain lassi) were also comparable to them. The addition of vanilla (essence) @ 0.06 ml and pista (colour) @ 0.03 ml per 100 ml of whey potato fermented product had more acceptability as compared to without addition of them. Considerable increase in the sensory score (8.30 ± 0.12) was observed due to preparation of *Kadhi* prepared from whey potato fermented product. Consumers appreciated the plain whey potato fermented product with remark of “very good to excellent”.

Key Words : Whey, Value addition, Consumer appraisals

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INTRODUCTION

Whey is the watery part of milk that remains after separation of curd / coagulated products that result from acid or proteolytic enzyme mediated coagulation of milk. It is major by-product of dairy industry, during manufacture of products like *paneer*, *channa*, *chakka*, cheese, casein, etc. Whey is considered as an important food medium. It is rich source of carbohydrates (lactose 4-5%), minerals (0.60% Ca, P, Na, Mg etc.) and whey protein (0.3-1%). (Nair and Thompkinson, 2007). In India nearly 5 million tones whey is produced of which *channa*

and *paneer* whey contribute around 80 per cent of total whey (Gupta, 2008) and majority of it is disposed off as a waste. Most of whey drained off causing pollution to environment and increased urination if fed to animal. Processing of whey is one of the means to tackle these problems, but it is cost effective. Therefore systematic efforts are needed for best utilization of whey. Nowadays whey could be processed and used in various types of beverages i.e. fermented or non fermented with or without addition of fruit Juice / pulp / flavours. Plain whey carbonation and soups by using vegetables has been successfully developed and marketed all over the world. Also whey can be utilized in production of ethanol, acetic acid, wine and in the production of crackers, filled dairy gels, lactose, beer, chewing gum and caramel (Mann, 1986). Potato (*Solanum tuberosum*) is the rich source of carbohydrates and fibre. Manufacture of beverages through lactic or alcoholic fermentation that can provide

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desirable sensory properties have been considered an option to add value to whey. Considering the nutritional qualities of whey, LAB and potato, the present study was conducted in department of Animal Husbandry and Dairy Science, M.P.K.V., Rahuri.

METHODOLOGY

The composite whole milk of cow was procured from RCDP on cattle M.P.K.V., Rahuri. The whey was obtained by manufacturing of *panner*, *channa* and *chakka*. The pH of whey systems was adjusted at par of fresh whole milk pH (6.4) by using (2%, aqueous solution of sodium bicarbonate (NaHCO_3)). Simultaneously, boiled potato paste was prepared. The total solids of whey potato systems were adjusted at par with milk solids (12.69%) by adding nearly 30g boiled potato paste per 100 ml of whey and blended properly. The blended mixture was heated at 85°C for 5 min. and cooled to room temperature (30±1°C). Active starter culture (LF-40) was inoculated under aseptic condition, @ 2 per cent, mixed properly and incubated at 30±1°C temperature for 12 hrs. for fermentation to have approximately 0.75 per cent acidity. On fermentation, sugar at the rate of 5 per cent was incorporated and mixed thoroughly. A food grade polyethylene cups (100 ml) were used for packaging the finished product. The filled cups were preserved at refrigerator temperature *i.e.* 5-7°C till evaluation. The experimental trials were conducting with five treatments *viz.*, T₀ (plain *lassi*) T₁ (*Paneer* whey + Potato + Sugar), T₂ (*Channa* whey + Potato + Sugar), T₃ (*Chakka* whey + Potato + Sugar) and T₄ (Equal quantity of *Paneer* + *Channa* + *Chakka* whey + Potato + Sugar) with four replications. The sensory evaluation of whey potato fermented products and plain *lassi* was carried out by

the panel of six semi trained judges by adopting 9 point Hedonic scale, given in IS:1971 and referred by Gupta (1976). The value addition were done in *chaana* whey potato fermented product by addition of essence (vanilla) and colour (pista) and preparation of *kadhi* (indigenous cuisine). The essence of vanilla (0.06 and 0.1 ml/100 ml) and colour pista (0.03 ml/100 ml) were added by mixing in whey potato fermented product.. The *kadhi* was prepared with ginger @ 0.2 per cent, garlic @ 0.3 per cent, green chilli @ 0.2 per cent, *Jeera*, *mohari curry leaves* etc. Refined groundnut oil @ 2 per cent was used as medium for frying of above ingredients. The fried mixture was salted @ 1 per cent and further cooked about five minutes on low fire till first boiling. The *kadhi* was evaluated sensorily while hot in condition. The consumer acceptance test was carried out by offering the *channa* whey potato fermented product to 46 respondents and collected the information from questionary. The optimization of single ingredients and processes were assessed statistically with help of basic statistics. Whereas, combined effect of treatments were assessed by Complete Randomized Design (CRD) and in consumer acceptance test data regarding the class of age, social status and gender was analyzed statistically by adopting X² test.

OBSERVATIONS AND ASSESSMENT

From the Table 1, it is observed that The overall acceptability is the consensus on the overall quality of the product. Overall acceptability of the product influenced significantly (p<0.05) by whey system. The overall acceptability score of sample T₀ was at higher side (7.54±0.17) of all treatments, whereas the Treatment T₃ scored the least (6.75). Further, it is revealed that

Table 1 : Sensory evaluation of whey potato fermented products and plain *lassi* (Mean of 4 replications)

Treatments	Sensory attributes				
	Colour and appearance	Body and texture	Flavour	Acidity	Overall acceptability
Score					
T ₀	7.71 ^b	7.50	7.21 ^{bc}	7.42 ^{bc}	7.54 ^b
T ₁	7.42 ^{ab}	7.29	6.92 ^{ab}	7.00 ^{ab}	6.96 ^a
T ₂	7.79 ^b	7.54	7.63 ^c	7.71 ^c	7.50 ^b
T ₃	6.96 ^a	6.79	6.46 ^a	6.79 ^a	6.75 ^a
T ₄	7.46 ^b	7.21	7.21 ^{bc}	7.25 ^{abc}	7.25 ^{ab}
Result	*	NS	*	*	*
S.E. ±	0.16	0.23	0.17	0.19	0.17
C.D. (P=0.05)	0.47	-	0.51	0.57	0.52

Note: Means with different superscript differed significantly from each other

* indicates significance of value at P < 0.05

scores of samples T₀, T₂ and T₄ were at par indicating that samples were comparable from sensory point of view and rated as “liked moderately”. The good quality whey potato fermented product has the characteristic light lemon yellow colour and pleasant flavour.

As evidenced from the results (Table 2), The essence

added at the rate of 0.06 ml per 100 ml of product was found more acceptable as compared to 0.1 ml. It was experienced that, as the concentration of flavour increased, the bitterness of product increased.

The *kadhi* was accepted highly by the panel of Judges. The overall acceptability score was recorded as

Table 2 : Value addition by essence and colour on sensory qualities of whey potato fermented product

Treatments	Sensory attributes				
	Colour and appearance	Body and texture	Flavour	Acidity	Overall acceptability
	(Scores out of 9)				
Without essence	7.17 ^a	7.67	7.44 ^b	7.50	7.33 ^a
With 0.06 ml vanilla and 0.03ml pista colour / 100 ml product	7.83 ^b	7.67	7.83 ^c	7.72	7.89 ^b
With 0.1ml vanilla and 0.03 ml pista colour / 100 ml product	7.72 ^b	7.61	7.11 ^a	7.39	7.17 ^a
Result	*	NS	*	NS	*
S.E. ±	0.09	0.11	0.09	0.11	0.09
C.D. (P=0.05)	0.27	--	0.27	--	0.27

Note: Means with different superscript differed significantly from each other
*indicates significance of value at P < 0.05

Table 3 : Sensory evaluation of Kadhi

Treatments	Sensory attributes				
	Colour and appearance	Body and texture	Flavour	Acidity	Overall acceptability
Mean(score)	8.00	7.97	8.25	8.24	8.30
S.E. ±	0.00	0.03	0.13	0.24	0.12
SD	0.00	0.05	0.22	0.42	0.21

Table 4 : Comparative performance of value addition on sensory quality of channa whey potato fermented product

Product	Sensory attributes				
	Colour and appearance	Body and texture	Flavour	Acidity	Overall acceptability
	Score				
Whey potato fermented product	7.79	7.54	7.63	7.71	7.50
With essence and colour	7.83	7.67	7.83	7.72	7.89
<i>Kadhi</i>	8.00	7.97	8.25	8.24	8.30

Table 5 : Consumer's appraisal for channa whey potato fermented product

Group	Degree of liking								Result
	Respondents		Excellent		Very good		Good		
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	
Overall	46	100	7	15.22	25	54.35	14	30.43	
Age									
18-30 Years	34	73.91	6	17.67	17	50.00	11	32.35	x ² cal -1.109
30 onwards	12	26.09	1	8.33	8	66.69	3	25.00	x ² tab - 5.99 NS
Social status									
Students	29	63.04	6	20.69	12	41.38	11	37.93	x ² cal 2.930
Employee	17	36.96	1	5.88	11	64.71	5	29.41	x ² tab - 5.99 NS
Gender									
Male	28	60.87	1	3.571	14	50.00	13	46.43	x ² cal 9.161
Female	18	39.13	6	33.33	9	50.00	3	16.67	x ² tab - 5.99 Sig.

NS=Non-significant

8.30 ± 0.12 and ranked as “liked extremely to very much”.

It is learnt from the Table 4, data on sensory scores of value added products that value addition due to addition of essence and colour and cooking in the form of *kadhi*, would be the another avenue to utilize whey potato fermented product. There was significant improvement in liking, which might have reflected on increased values of scores. The *Kadhi* (cuisine) obtained highest score *i.e.* 8.30 and ranked in between in “liked extremely to very much”.

Consumer's acceptance of whey potato fermented product :

The frequency distribution of consumers acceptability in totality and category wise given in Table 5 and graphically presented in Fig.1.

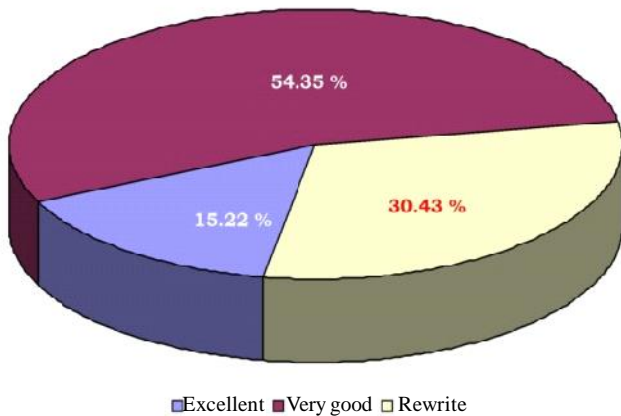


Fig. 1 : Consumer's appraisal

The effect within the class of age, social status and gender was analyzed statistically by adopting X^2 test.

It was noticed that 15.22 per cent of the consumers reported the product as excellent and 54.35 per cent as “very good” about the quality of whey potato fermented product. Further 30.43 per cent expressed as good. None of the subjects gave remark as fair. It evident that, the perceptiveness of consumers liking influenced statistically significant due to gender but social status and age did not play any role in case of whey potato fermented product. In short, about 69.57 per cent of consumers recorded the product as “very good to excellent”. Hence, there is scope to say that the whey potato fermented product can be popularized extensively on large scale.

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