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## To assess the sensory appraisal of alcoholic whey beverage

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#### Abstract

In India, the major source of whey is from production of *Channa*, *paneer* and *Chakka*. During the process about 10-20 percent portion of milk is recovered as the desired product and remaining 80-90 per cent liquid portion is the whey. The samples of alcoholic whey beverage of all the six treatments (W<sub>1</sub>S<sub>1</sub>, W<sub>1</sub>S<sub>2</sub>, W<sub>2</sub>S<sub>1</sub>, W<sub>2</sub>S<sub>2</sub>, W<sub>3</sub>S<sub>1</sub>, W<sub>3</sub>S<sub>2</sub>) were acceptable with varying degree as evidenced by the sensory scores. Exceptionally, non-significant effect due to whey system and form of culture and interaction thereof was noticed. It is to note that, the *channa* whey with mixed culture (W<sub>3</sub>S<sub>2</sub>) produced organoleptically superior product. This was followed by W<sub>1</sub>S<sub>2</sub>, W<sub>3</sub>S<sub>1</sub>, W<sub>2</sub>S<sub>2</sub>, W<sub>1</sub>S<sub>1</sub>, and W<sub>2</sub>S<sub>1</sub> in descending order. In general, samples appeared pleasant, attractive, transparent, whitish yellow in colour with pleasant aroma, mild astringency and slight sweet and sour in taste. In viewing of all the sensory attributes taken together, the sample of alcoholic whey beverage i.e. W<sub>3</sub>S<sub>2</sub>- (*channa* whey + mixed culture) was found to be best and most acceptable as evidenced with highest scores based on 9 point Hedonic scale, this sample ranked at the top and rated “liked moderately” to “liked very much”.

**Keywords:** Milk, *channa*, sensory, whey, alcohol, beverage, etc.

#### Introduction

Whey is the most important by-product of milk industry in the process of milk manufacturing products like *Channa*, *paneer*, *Chakka*, casein, cheese etc. During the process about 10-20 percent portion of milk is recovered as the desired product and remaining 80-90 per cent liquid portion is the whey. It has been considered as an important food medium for thousands year. It is rich source of carbohydrates (Lactose 4-5%), minerals 0.60% (Ca, P, Na, Mg etc.), and whey proteins  $\alpha$ -lactalbumin (22% of whey protein),  $\beta$ -lactoglobulin (59% of whey protein), serum albumin-6% of whey protein) and water soluble vitamin i.e. B complex (Ghosh and Singh, 1997 and Parekh, 1997) <sup>[2, 7]</sup>. In India, the major source of whey is from production of *Channa*, *paneer* and *Chakka*. In that *Channa* and *paneer* whey contribute around 80 per cent of total whey (Gupta, 2008) <sup>[3]</sup>, and majority of it is disposed off as a waste. To overcome with this disposal problem and to harness the benefits of nutritious solids of the whey, we standardized the technology of alcoholic whey beverage and assess the accessibility of sensory appraisal.

#### Methodology

##### Sensory evaluation

A panel of six semi-trained judges carried out the sensory evaluation of alcoholic whey beverage. ‘9’ point Hedonic scale described as per IS: 6273 (Part-II) (1971) was used to assess the product. In this attempt, the sample of the treatments was prepared as per procedure (Choudhari, D.M. 2011) <sup>[1]</sup> and offered to the sensory evaluation panel. About 50 ml volume of alcoholic whey beverage served and asked to indicate their judgments liking about the product in Proforma i.e. 9 point Hedonic scale. The combined effect of the treatments was analyzed by factorial Completely Randomized Block Design (FCRD) in final experimental trials with six treatments and three replications (Panse and Sukhatme, 1985) <sup>[6]</sup>

#### Treatment details as below

##### 1. Total No. of factors: 2

- Whey systems
- Form of culture

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## 2. Levels of factors

- Whey systems: 3 ( $W_1$ - *paneer*,  $W_2$ - *chakka* and  $W_3$ - *channa*)
- Form of culture: 2 ( $S_1$ - Simultaneously and  $S_2$ - Mixed culture)

## Result and Discussion

### Colour and appearance

Though the non-significant variation was observed in the mean values of the score allotted to the colour and appearance of the alcoholic whey beverage prepared under different treatments (Table 1), the whey system-  $W_3$  (*Channa* whey), culture-  $S_2$  (mixed) and interaction thereof –  $W_3S_2$  scored on higher side than rest of the treatments. The score values were 7.43, 7.61 for factor  $W_3$ ,  $S_2$ , and that of 8.05 for  $W_3S_2$  as interaction effect. Further, it was observed that the samples prepared under all the treatments were acceptable and rated as “like moderately”. The colour and appearance of all the samples prepared under different treatments had uniform, attractive, pleasant and transparent appearance with whitish yellow colour and brilliant feel without dullness. This indicated that either of the whey system (*Paneer*, *Chakka* and *Channa*) could be used suitably by inoculating the culture in the form of mixed or simultaneous without affecting much the colour and appearance of the product.

### Flavour

It revealed from the values Table 2 that, the different whey systems and form of the culture had no significant effect on flavor quality of the alcoholic whey beverage. It means, the different whey systems and culture (mixed and simultaneous) did not affect the quality of alcoholic whey beverage. However, whey system ( $W_3$ ), form of culture ( $S_2$ ) and interaction ( $W_3S_2$ ) secured maximum scores i.e.  $W_3$  – 7.55,  $S_2$  – 7.57,  $W_3S_2$  – 8.10 over rest of the treatments. The combined effect of the treatment  $W_3S_2$ , resulted into development of pleasant aroma with highly acceptable flavor. In general, all treatments were sensorially acceptable from the point of view of flavor. The observation recorded in this study were in close agreement as that of Kosikowski and Wzorek (1986), who noticed that the flavor of dry cheese whey wine was pleasant, tart, clean without whey taint.

### Taste

Tasting involves perception of its array of taste and mouth feel, which involve the combination of flavour and overall structure. While tasting alcoholic beverage the acidity and sweetness are judged. On the same line the samples of the alcoholic whey beverages of this study, were tasted organoleptically. Non-significant variation observed in the mean values of the score allotted to the taste as sensory attribute Table 3. The whey system and form of culture as an individual factor and interaction between them observed non-significant. However, the whey system  $W_3$  (*Channa*), form of culture  $S_2$  (mixed) and interaction thereof  $W_3S_2$  recorded highest score as compared with their counterpart. The liking of the product was rated in between “liked moderately” to “liked very much” ( $7.66 \pm 0.36$ ). Moreover, all the samples of alcoholic whey beverage of this investigation were scored in between 6 and 7 and hence acceptable. However, the product tasted mild sweet and slightly sour to the satisfaction of the judges.

## Body

It is noted that, very similar trend in sensory score was observed in this attribute also, as seen earlier. To explain, non-significant variation was observed in the values (mean) of the scores obtained for body as one of the sensory attribute Table 4. This means that neither whey system nor form of culture had any significant effect with respect to the body of the product. But, the alcoholic whey beverage prepared under treatment  $W_3S_2$ , secured maximum score i.e. 8.22. All other samples scored in between 6.86 and 7.55 and were acceptable with varying degree. Not too much variation has found in all the treatments.

### Astringency

Astringency plays major role in the evaluation of alcoholic beverages. It refers to developed puckering sensation in the mouth after drinking the alcoholic beverage. From the results Table 5, it is revealed that the whey system and form of the culture had shown significant ( $P < 0.05$ ) effect on the astringency of alcoholic whey beverage. This might be due to the type of whey system used as basic substrate, while preparing the alcoholic whey beverages. Wherein the whey system  $W_3$  (*Channa*) was used, resulted into significantly higher score ( $7.42 \pm 0.22$ ). However, this value was at par with a whey system  $W_2$  (*Chakka*). Though the product prepared with a whey system  $W_2$  were higher ( $6.98 \pm 0.22$ ) but at par with whey system  $W_1$  (*paneer*). In regards to the form of culture also showed significant effect on the astringency score of the product. The form of culture  $S_2$  (mixed) secured significantly ( $P < 0.05$ ) higher score ( $7.28 \pm 0.17$ ) than  $S_1$  ( $6.65 \pm 0.17$ ). Though the interaction of  $W_3$  and  $S_2$  had scored maximum (7.77) however, they are statistically non significant when compared to rest of the treatments. The sensory scores for astringency attributes were near to 6 and above than this. It indicates that the product prepared under various treatments were acceptable with varying degree.

### Overall acceptability

The overall acceptability is the consensus on the overall quality of the product. The samples of the alcoholic whey beverage prepared under this study subjected to the judges to record the score on overall acceptability. From the table values Table 6, it revealed that the whey system did not show any significant effect on overall acceptability but the form of culture had it. The whey system  $W_3$  (*Channa*) scored at maximum (7.55) followed by  $W_1$  (7.03) (*paneer*) and  $W_2$  7.65 (*Chakka*). The form of culture  $S_2$  (mixed) proved to be better than  $S_1$  (simultaneous), wherein, the scores values were  $7.41 \pm 0.21$  and  $6.69 \pm 0.21$ , respectively. The combined effect of whey systems and form of culture, influenced non significantly on the score of overall acceptability, of the alcoholic whey beverage. The sensory score for  $W_3S_2$  treatment was 7.95 followed by  $W_1S_2$  (7.25),  $W_3S_1$  (7.15),  $W_2S_2$  (7.03),  $W_1S_1$  (6.80) and  $W_2S_1$  (6.11) in descending order. On critical review, it revealed that, the form of culture  $S_2$  (mixed) would be responsible for increased scores for overall acceptability, however, no specific trend observed due to the whey systems. However, all the samples scored more than the 6, indicating that they are acceptable at varying degree. None of the samples rejected sensorily by the judges. This observation was in accordance with the observations recorded by Pradyuman kumar *et al.* (1999) for alcoholic whey beverages, prepared by 75 (whey): 25 (banana) substrate with 2 membered culture.

**Table 1:** Score for colour and appearance of alcoholic whey beverages

Treatment	Mean Score
<b>Factor A</b>	
W <sub>1</sub>	7.35
W <sub>2</sub>	7.18
W <sub>3</sub>	7.43
Result	NS
S.E.±	0.22
<b>Factor B</b>	
S <sub>1</sub>	7.25
S <sub>2</sub>	7.61
Result	NS
S.E. ±	0.18
<b>Interaction (A+B)</b>	
W <sub>1</sub> S <sub>1</sub>	7.27
W <sub>1</sub> S <sub>2</sub>	7.44
W <sub>2</sub> S <sub>1</sub>	7.02
W <sub>2</sub> S <sub>2</sub>	7.35
W <sub>3</sub> S <sub>1</sub>	7.48
W <sub>3</sub> S <sub>2</sub>	8.05
Result	NS
S.E. ±	0.31
NS: Non significant	

**Table 2:** Score for flavour of alcoholic whey beverages

Treatment	Mean Score
<b>Factor A</b>	
W <sub>1</sub>	7.27
W <sub>2</sub>	7.05
W <sub>3</sub>	7.55
Result	NS
S.E.±	0.24
<b>Factor B</b>	
S <sub>1</sub>	7.01
S <sub>2</sub>	7.57
Result	NS
S.E. ±	0.19
<b>Interaction (A+B)</b>	
W <sub>1</sub> S <sub>1</sub>	6.88
W <sub>1</sub> S <sub>2</sub>	7.66
W <sub>2</sub> S <sub>1</sub>	7.14
W <sub>2</sub> S <sub>2</sub>	6.96
W <sub>3</sub> S <sub>1</sub>	7.00
W <sub>3</sub> S <sub>2</sub>	8.10
Result	NS
S.E. ±	0.33
NS: Non significant	

**Table 3:** Score for taste of alcoholic whey beverages

Treatment	Mean Score
<b>Factor A</b>	
W <sub>1</sub>	6.55
W <sub>2</sub>	6.74
W <sub>3</sub>	7.19
Result	NS
S.E.±	0.25
<b>Factor B</b>	
S <sub>1</sub>	6.61
S <sub>2</sub>	7.05
Result	NS
S.E. ±	0.21
<b>Interaction (A+B)</b>	
W <sub>1</sub> S <sub>1</sub>	6.55
W <sub>1</sub> S <sub>2</sub>	6.55
W <sub>2</sub> S <sub>1</sub>	6.55
W <sub>2</sub> S <sub>2</sub>	6.94
W <sub>3</sub> S <sub>1</sub>	6.72
W <sub>3</sub> S <sub>2</sub>	7.66
Result	NS
S.E. ±	0.36
NS: Non significant	

**Table 4:** Score for body of alcoholic whey beverages

Treatment	Mean Score
<b>Factor A</b>	
W <sub>1</sub>	7.44
W <sub>2</sub>	7.04
W <sub>3</sub>	7.45
Result	NS
S.E.±	0.24
<b>Factor B</b>	
S <sub>1</sub>	7.35
S <sub>2</sub>	7.54
Result	NS
S.E. ±	0.20
<b>Interaction (A+B)</b>	
W <sub>1</sub> S <sub>1</sub>	7.33
W <sub>1</sub> S <sub>2</sub>	7.55
W <sub>2</sub> S <sub>1</sub>	7.21

W <sub>2</sub> S <sub>2</sub>	6.86
W <sub>3</sub> S <sub>1</sub>	7.50
W <sub>3</sub> S <sub>2</sub>	8.22
Result	NS
S.E. ±	0.34
NS: Non significant	

**Table 5:** Score for astringency of alcoholic whey beverages

Treatment	Mean Score
<b>Factor A</b>	
W <sub>1</sub>	6.49 <sup>a</sup>
W <sub>2</sub>	6.98 <sup>ab</sup>
W <sub>3</sub>	7.42 <sup>b</sup>
Result	Sig.
S.E. ±	0.22
CD at 5%	0.678
<b>Factor B</b>	
S <sub>1</sub>	6.65 <sup>a</sup>
S <sub>2</sub>	7.28 <sup>b</sup>
Result	Sig.
S.E. ±	0.179
CD at 5%	0.554
<b>Interaction (A+B)</b>	
W <sub>1</sub> S <sub>1</sub>	5.98
W <sub>1</sub> S <sub>2</sub>	6.98
W <sub>2</sub> S <sub>1</sub>	6.88
W <sub>2</sub> S <sub>2</sub>	7.07
W <sub>3</sub> S <sub>1</sub>	7.06
W <sub>3</sub> S <sub>2</sub>	7.77
Result	NS
S.E. ±	0.311
NS: Non significant, Sig.: Significant	

**Table 6:** Overall acceptability score of alcoholic whey beverage

Treatment	Mean Score
<b>Factor A</b>	
W <sub>1</sub>	7.03
W <sub>2</sub>	6.57
W <sub>3</sub>	7.55
Result	NS
S.E. ±	0.265
<b>Factor B</b>	
S <sub>1</sub>	6.69 <sup>a</sup>
S <sub>2</sub>	7.41 <sup>b</sup>
Result	Sig.
S.E. ±	0.216
CD at 5%	0.668
<b>Interaction (A+B)</b>	
W <sub>1</sub> S <sub>1</sub>	6.80
W <sub>1</sub> S <sub>2</sub>	7.25
W <sub>2</sub> S <sub>1</sub>	6.11
W <sub>2</sub> S <sub>2</sub>	7.03
W <sub>3</sub> S <sub>1</sub>	7.15
W <sub>3</sub> S <sub>2</sub>	7.95
Result	NS
S.E. ±	0.375
NS: Non significant, Sig.: Significant	

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