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Study on effect of sugar levels on physical quality of litchi essence drink prepared from whey

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Abstract
In the investigation entitled "study on effect of sugar levels on physical quality of litchi essence drink prepared from whey" was conduct in the laboratory department of Animal Husbandry and Dairying, Chandra Shekhar Azad University of Agriculture and Technology Kanpur. In this experiment three levels of sugar combination ratio (8%, 10%, 12%) and three levels of litchi essence (0.1%, 0.2%, 0.3%). The effect of various attributes on quality of drink was analyzed and determine for physical quality flavour, sweetness, colour and appearance, and overall acceptability were determined.
The study revealed that the physical quality of drink, 10% sugar level and 0.2% essence was found better as compared to the other treatment combination.

Keywords: Milk whey, sugar, litchi essence, color

Introduction

Whey is obtained as by-product during manufacturing of chhana and paneer and to a lesser extent in cheese manufacturing. In the production of cheese, paneer and chhana only 10-20% of milk is recovered as the desired and remaining 80-90% is whey.

Whey is not only a good source of protein, but is also significantly rich in minerals and lactose. Whey and casein are the two proteins present in milk. During manufacture of cheese, the casein coagulates to form the cheese curd. The milk fats get entrapped within the casein complex, allowing the rest of the milk components to float to the surface. This includes the whey proteins, minerals, and lactose, which are essentially the by-product of cheese manufacture. Although the whey that is sloughed out is 90% water and only 0.6% of it is actually protein, processes such as Ultra filtration and ultracentrifugation convert whole liquid whey to whey concentrate, which is about 90% protein.

Whey contains 93.94 percent water hence it is too bulky and creates problem during storage and handling. Also, the high lactose content cause rapid increase in acidity of raw whey, which completes for its utilization immediately after it is generated. All constituents of milk are presented in whey except protein due to this reason whey takes a long period for its decomposition. There is an inversed awareness all over the world and the potential utilization of whey, primarily because of pollution prevention regulation, economic condition and future needs to ease world food shortage (Horton, 1995) [15]. In recent past, the isolation of individual whey constituents and there have also assumed special significance. However, the best possible use cooled be to direct it back to the human food chain by employing different processes. Herman *et al.* (1998) reported that conversion of whey by different processes to yield products like condensed whey, sweetened condensed whey, whey protein concentrate, alcohol, vit. B12, Ammonium lactate etc.

The utilization of whey provides several advantages

- It provides additional sales outlets for typical whey products such as whey protein, lactose and milk minerals.
- Open up avenues for development of new whey products.

Table 1: Whey Composition

Amount (%w/w) in:		
Constituent	**Sweet Whey**	**Acid Whey**
Water	93-94	94-95
Dry Matter	6-6.5	5-6
Lactose	4-5.5	3.8-4.3
Lactic Acid	Traces	≤ 0.8
Total Protein	0.8-1	0.8-1
Whey Protein	0.6-0.65	0.6-0.65
Citric Acid	0.1	0.1
Minerals	0.5-0.7	0.5-0.7

Nutritional Benefits of Whey Proteins: The benefits of whey protein have been demonstrated in a number of studies, including a study published in the Advanced Food Nutrition Research, which looked at the effects of whey protein supplementation on muscle growth in men undertaking a 6-weeks resistance training program. In this study, subjects combining resistance training with whey protein supplementation increased their lean muscle mass and strength significantly more than subjects who completed the same exercise program without supplementation.

Materials and Methods

Materials: Materials mainly included the ingredients required for optimization of compositional and processing parameters of litchi essence drink, these were:-

Whey: Fresh whey was collected after preparation of paneer in the department of Animal Husbandry & Dairying, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur. The whey was collected in a clean and sterilized stainless-steel bucket, taking in to account all hygienic precaution.

Sugar: Commercial grade white crystalline cane sugar was used as a sweetening agent which was obtained from the open market of Kanpur city it was ensured that the sugar was free from dust, dirt and other foreign impurities.

Milk vessels: All the vessels used for the processing and preparation of whey drink thoroughly cleaned manually before using in the laboratory.

Litchi essence: A good quality litchi essence was obtained from the market after ensuring their market quality.

Glass wares: The beaker and measuring cylinder with a capacity of 500 ml. and 250 ml, respectively were used for standardization of whey. Vessels, butyrometer, pipettes, automatic tilt measures lock stopper etc were properly cleaned before use.

Glass wares: The beaker and measuring cylinder with a capacity of 500 ml. and 250 ml, respectively were used for standardization of whey. Vessels, butyrometer, pipettes, automatic tilt measures lock stopper etc were properly cleaned before use.

Muslin cloth: To remove visible dirt, dust and foreign matter from the milk was strained through a fresh muslin cloth.

Packaging material: 200 ml. sterilized glass bottles and crown corks (for sealing of the bottles) were used for filling of the finished product. The bottles after filling were properly corked.

Methods

Preparation of Litchi essence drink

Receiving whey
↓
Preheating (35° to 40 °C)
↓
Filtration and Clarification
↓
Mixing of sugar (60 °C)
↓
Adding colour (80 °C)
↓
Heating (95° to 100 °C)
↓
Cooling (25 °C)
↓
Mixing of litchi essence (25 °C)
↓
Bottling and sealing (25 °C)
↓
Cooling and storage (5 °C)

Flow Diagram of Preparation to Whey Based Beverage Using Litchi Essence

Examination of Whey drink

Sensory Evaluation-The sensory evaluation of whey-based litchi essence beverage sample was carried out by a panel of 5 judges. Scoring of Samples were done by 9-point hedonic scale. The samples were evaluated for various sensory parameter like flavour, colour and appearance, sweetness and over all acceptability as per schedule.

Attributes	Perfect score	Score allowed		
		A	B	C
Colour and appearance	9			
Flavour	9			
Sweetness	9			
Overall acceptability	9			
Total	36			

Hedonic Score

Hedonic Rating	Score
Excellent	9
Very Good	8
Good	7
Fair	6
Neither good nor bad	5
Slightly undesirable	4
Poor	3
Very Poor	2
Unacceptable	1

Results and Discussion

In the present investigation "study on effect of sugar levels on physical quality of litchi essence drink prepared from whey" prepared from different level of sugar (8%, 10%, 12%), and essence were considered. The observation of sensory evaluation (flavor, sweetness, color and overall acceptability). The data thus obtained were analyzed by using factorial complete randomized design.

Sensory Evaluation

1) Flavour: As regarding the score of essence and sugar level treatment combination. It was observed that the highest score (8.0) of flavors was in case of litchi whey drink prepared from 0.2 ml essence, while lowest flavor score (7.689) in sample 0.3 ml essence.

So as far the effect of different levels of sugar on flavor score of whey drink, it was observed the maximum mean score in (A2) case of fresh litchi whey drink made from 10 percent sugar and lowest score was found in(A3) samples 12 percent sugar.

Table 2: Effect of various essence level (A) and sugar levels (B) on flavor score of whey-based drink.

Treatment	B1	B2	B3	Mean
A1	7.800	8.000	7.700	7.833
A2	8.000	8.100	7.867	8.022
A3	7.600	7.800	7.500	7.633
mean	7.800	8.000	7.689	

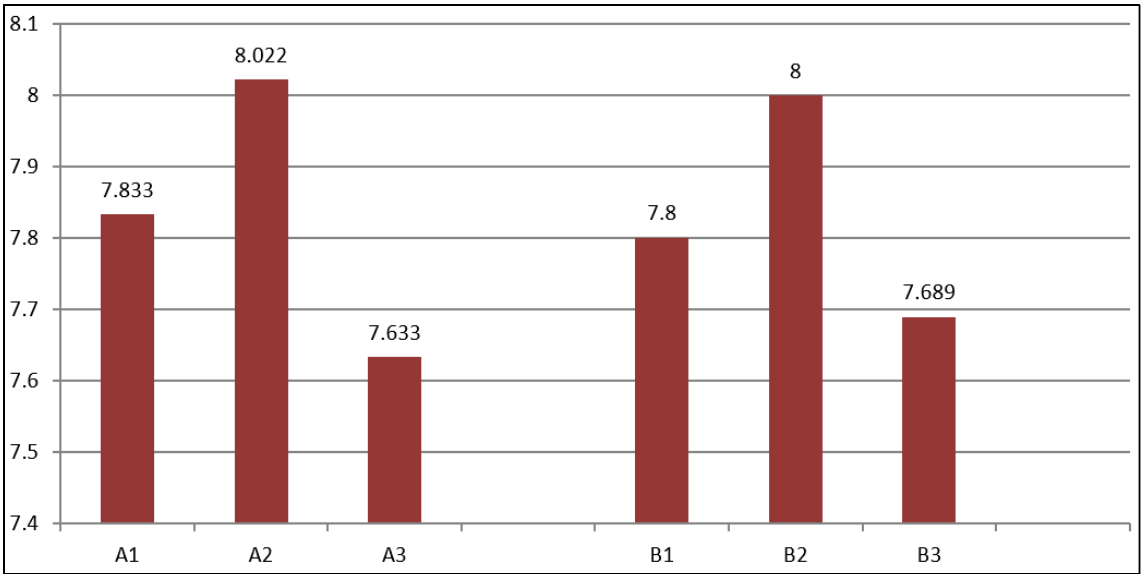

Fig 1: Mean effect of A and B on flavor of whey drink

2) Sweetness: The sweetness of litchi essence drink prepared from whey is the sensory attribute. The effect of sugar (A) and essence (B) with respect to sweetness score of litchi-based whey drink have been present in table 3.

As regarding the mean score of products, it was observed that the highest sweetness score (6.978) was in case of B2, while lowest sweetness score (6.600) in sample B3.

So as far the effect of different levels of sugar on sweetness score of whey drink, it was observed the maximum mean sweetness score (6.978) found in A2 and lowest score (6.600) was found in A3 sample.

Table 3: Effect of various essence level and sugar levels on sweetness score of whey-based litchi drink.

Treatment	B1	B2	B3	Mean
A1	6.800	7.000	6.600	6.800
A2	7.000	7.133	6.800	6.978
A3	6.600	6.800	6.400	6.600
Mean	6.800	6.978	6.600	

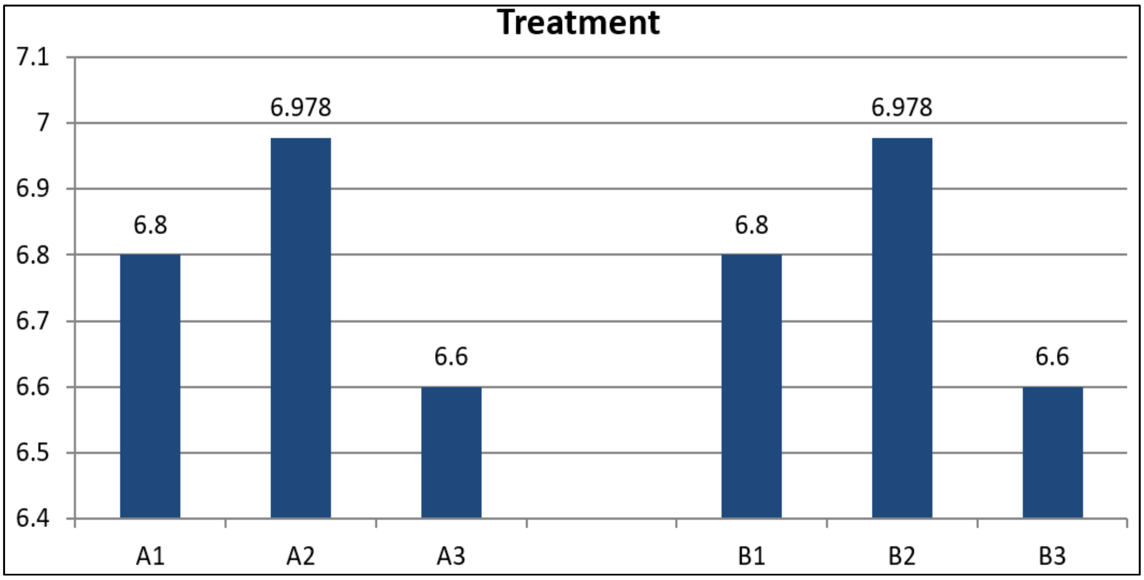

Fig 2: Mean effect of various essence and sugar levels on sweetness score of whey drink.

3) Color and appearance: The colour and appearance of litchi essence drink prepared from whey was the sensory attribute. The effect of sugar (A) and essence (B) with respect to colour and appearance score of litchi-based whey drink has been present in table 4. As regarding the mean score of products, it was observed that the highest colour and appearance score (6.800) was in case of B2, while lowest colour and appearance score (6.400) in sample B3.

So as far the effect of different levels of sugar on colour and appearance score of whey drink, it was observed the maximum mean colour and appearance score (6.800) found in A2 and lowest score (6.400) was found in A3 sample.

Table 4: Effect of various essence level and sugar levels on colour and appearance score of whey-based litchi drink.

Treatment	B1	B2	B3	MEAN
A1	6.600	6.800	6.400	6.600
A2	6.800	7.000	6.600	6.800
A3	6.400	6.600	6.100	6.400
MEAN	6.600	6.800	6.400	

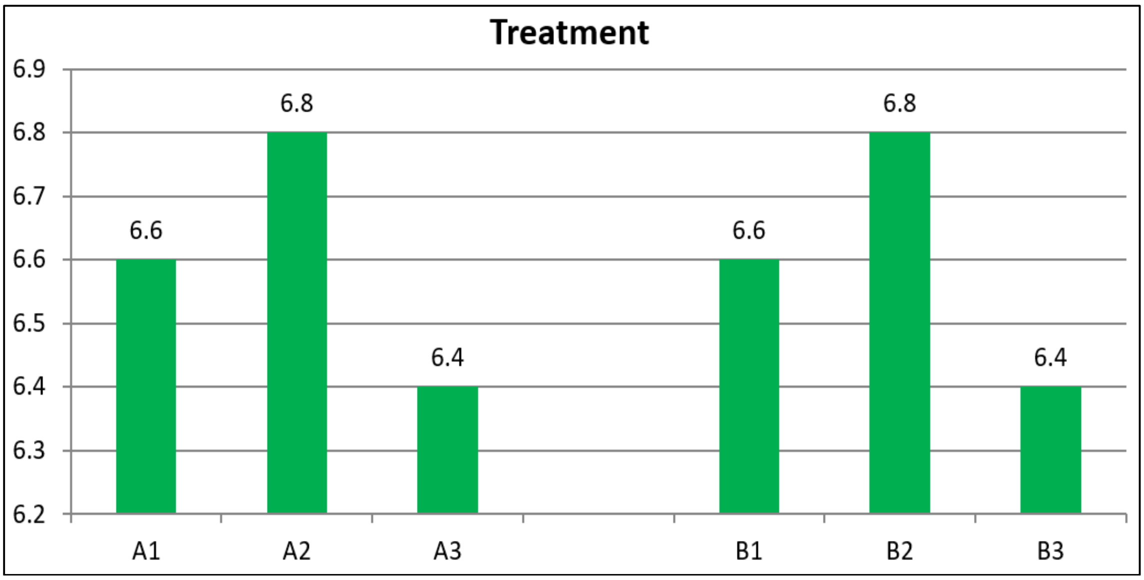

Fig 3: Mean effect of various essence and sugar levels on colour and appearance of whey drink.

4) Overall acceptability-The overall acceptability of litchi essence drink prepared from whey was the sensory attribute. The effect of sugar (A) and essence (B) with respect to overall acceptability score of litchi-based whey drink have been present in table 5. As regarding the mean score of products, it was observed that the highest overall acceptability score (7.00) was in case of B2, while lowest overall acceptability score (6.378) in sample B3.

So as far the effect of different levels of sugar on overall acceptability score of whey drink, it was observed the maximum mean overall acceptability score (6.867) found in A2 and lowest score (6.511) was found in A3 sample.

Table 5: Effect of various essence level and sugar levels on overall acceptability score of whey-based litchi drink.

Treatment	B1	B3	B3	MEAN
A1	6.800	7.00	6.600	6.800
A2	7.000	7.100	6.400	6.867
A3	6.600	6.800	6.133	6.511
MEAN	6.800	7.000	6.378	

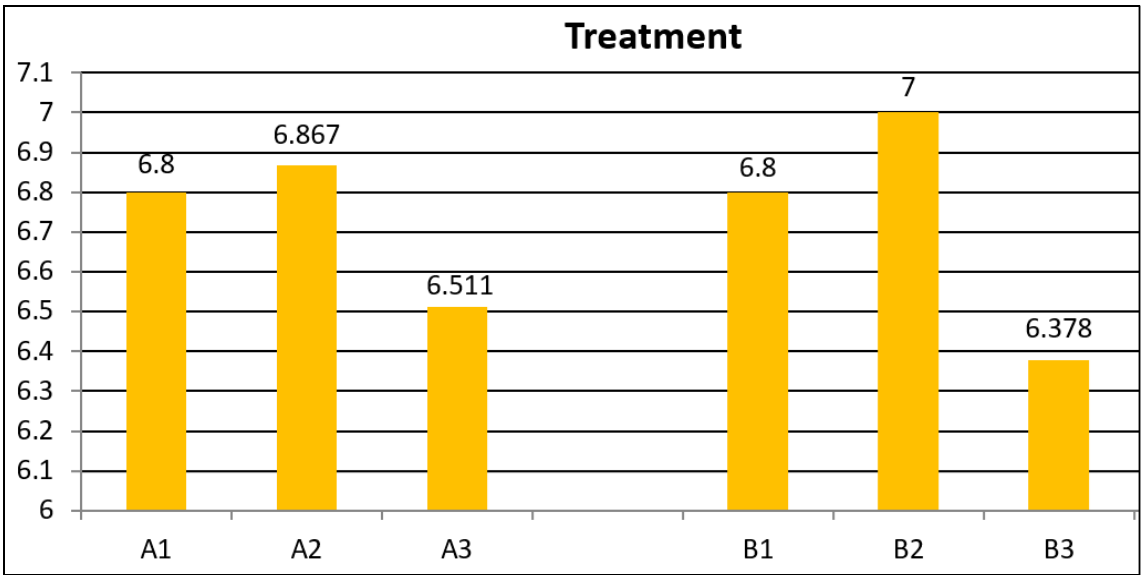

Fig 4: Mean effect of various essence and sugar levels on overall acceptability of whey drink.

Conclusion

The data obtained on the basis of sensory and chemical whey drink prepared from paneer whey using different essence and sugar levels with their concentrations have been concluded as the overall suitability of litchi essence-based whey drink was found better in sample prepared from whey with addition of 0.2 ml essence, 10% sugar in 100 ml litchi essence whey drink.

References

1. Anonymous. Rivella, a new form of whey utilization. Dairy Industries. 1960;25:113-117.
2. Ashutosh P, Atul AM, Shukla RN, Praveen KD, Rahul KV. Development of process for whey-based pineapple beverage. Int J Curr Microbiol Appl Sci. 2019;8(6):3212-3228.
3. Astha KW. Preparation and quality evaluation of beverage from a blend of apple pulp and WPC. Pharma Innov J. 2018;7(11):151-155.
4. Beukema C, Jalen P. High potency sweetness in formulation of whey beverage. Milchwissenschaft. 1990;45:576-579.
5. Bhlekar R, *et al.* Development of whey beverage by using jackfruit pulp. J Dairying Foods Home Sci. 2022;:1-5. doi:10.18805/ajdfr.DR-1824.
6. Chamboucry SA. Gas-pressurized milk drink. French Patent 1538716; Dairy Sci Abstr. 1969;31:2420.
7. Chatterjee G, De Neve J, Dutta S. Formulation and statistical evaluation of a ready-to-drink whey-based orange beverage and its storage stability. Rev Mex Ing Quim. 2015;14(2):253-264.
8. Desnilasari D, Kumalasari R. Characteristic of fermented drink from whey cheese with addition of mango (*Mangifera* × *odorata*) juice. IOP Conf Ser Earth Environ Sci. 2017;101(1):01202.
9. Durham RJ, Harian JA, Sleigh RW, Johsen RL. Whey fractionation-wheying up consequences. Food Aust. 1997;49(10):460-465.
10. Esmat A, Aliaa AD, Meranda T. Quality characteristics of sweet whey-based fruit beverages fermented with *Lactobacillus plantarum*. Egypt J Food Sci. 2019;47(2):141-154.
11. Gangarani. Preparation of fruit-flavoured beverage from whey. J Food Sci Technol. 1987;24(2):99-102.
12. Gandhi DN, *et al.* Whey utilization for beverage production. Indian Dairyman. 1989;41:35-37.
13. Galen P. Whey cheese and beverage. In: Zadow J, editor. Lactose and Whey Processing. London: Elsevier Applied Science; 1992. p. 157-194.
14. Gimhani. Development and quality evaluation of ready-to-drink fruit flavoured whey beverage. Int J Sci Res Publ. 2019;9(8):92107. doi:10.29322/IJSRP.9.08.2019.p92107.
15. Horton BS. Whey processing and utilization. Int Dairy Fed Bull. 1995;303:1-12.
16. Kuzmina S. Carbonated beverages from whey. Moloch Prom. 1966;27(4):28-30.
17. Kustovskaya NV. Beverage “Detskii”. Moloch Prom. 1969;30(1):33-35.
18. Ladkhani R, *et al.* Development of whey-based beverage. Indian J Dairy Sci. 1994;47(7):586-589.
19. Lifran EV, Hourigan JA, Sleigh RW, Johnson RL. New whey for lactose. Food Aust. 2000;52(4):120-125.
20. Mustafa A. Developing of grape flavoured whey probiotic beverage. Ann Rom Soc Cell Biol. 2021;25(1):4732-4741.
21. Parema P. Chemical, sensory and functional properties of whey-based beverage with watermelon juice. Food Chem. 2018;255:58-66.
22. Patel MT, Kilara A. Studies on WPC: Compositional and thermal properties. J Dairy Sci. 1990;73(6):1439-1449.
23. Punoo HA, *et al.* Comparison of cheese and paneer whey for production of a functional pineapple beverage: nutraceutical properties and shelf-life. J Food Sci Technol. 2016;53(6):2558-2568.
24. Singh S, Mathur BN. Development of whey-based beverage. Indian J Dairy Sci. 1994;47(7):586-590.
25. Singh R. Standardization of technology for the manufacture of guava whey beverage. Indian J Dairy Sci. 1999;52(5):268-271.
26. Tuohy HY, Fitzgerald A, Nash P. Utilization of whey as a beverage. Farm Food Res. 1988;19(4):8-10.
27. Vilma S. Development of a functional whey beverage containing calcium, vitamin D, and prebiotic dietary fiber, and its influence on human health. CyTA J Food. 2016;14(2):309-316.