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Process optimization and sensory quality of dragon fruit milkshake

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Abstract

The study aimed to “Process optimization and sensory quality of dragon fruit milkshake”. Dragon fruit pulp was incorporated at different levels (3%, 6%, and 9%) with varying sugar concentrations (6% and 8%). The sensory evaluation was conducted using a trained panel using a 9-point hedonic scale. The T₄ treatment (6% dragon fruit pulp, 8% sugar) received the highest acceptability score (8.76), demonstrating a desirable colour, body and texture, flavour, and overall acceptability. The findings suggest that moderate levels of dragon fruit pulp enhance sensory properties, making it a nutritious and appealing dairy-based beverage.

Keywords: Dragon fruit, milkshake, sensory evaluation, consumer acceptability

Introduction

A milkshake is a sweet and refreshing beverage typically crafted from milk, ice cream, chilled milk, flavourings, or sweeteners such as fruit syrup or chocolate sauce. Milkshakes, classified as soft frozen products, are commonly prepared for immediate consumption at retail outlets directly from milkshake mixes processed at a dairy processing facility. These mixes are then packaged and transported in bulk containers (Karki, *et al.*, 2015)^[4]. Dragon fruit, also known as Pitaya, has recently gained prominence in the Indian market. Its popularity among cultivators is attributed to its attractive fruit colour, delightful white or red pulp, and edible tiny black seeds embedded within the pulp along with its nutraceutical value. Belonging to the Cactaceae family and *Hylocereus* genus, Dragon fruit, or pitaya, is a round, succulent fruit with significant nutritional benefits. Often red-hued with a scale-like texture, it is native to Mexico, Central and South America. Southeast Asian countries, where the fruit thrives, have also embraced its cultivation and marketing. Dragon fruit is increasingly cultivated as a new crop in countries such as Australia, Nicaragua, Vietnam, China, Malaysia, Taiwan, and Israel. Commercially, Israel, Malaysia, and Taiwan exhibit a production range of approximately 16,000 to 27,000 kg/ha. The overall foliage of the Dragon fruit plant contributes to its structural makeup. While the foliage is abundant, it serves no particular purpose. In the commercial production of fruits, proper foliage reduction is crucial to achieving optimal fruit size and yield (Idris *et al.*, 2012)^[2].

Materials and Methods

The fresh clean composite milk samples of crossbreed cows were procured from the Research cum Development Project on cattle, MPKV, Rahuri, District- Ahilyanagar. Milk was standardized to four per cent fat using Pearson's square formula. The milkshake mix was kept in a freezer at -2 to -6^o C for 7 min for freezing. Sodium alginate was used as a stabilizer. For the preparation of dragon fruit milkshake, the following blends of dragon fruit pulp and cow milk were prepared.

T₀: Control

T₁: (P₁S₁) Cow milk + 3% dragon fruit pulp + 6% sugar level

T₂: (P₁S₂) Cow milk + 3% dragon fruit pulp + 8% sugar level

T₃: (P₂S₁) Cow milk + 6% dragon fruit pulp + 6% sugar level

T₄: (P₂S₂) Cow milk + 6% dragon fruit pulp + 8% sugar level

T₅: (P₃S₁) Cow milk + 9% dragon fruit pulp + 6% sugar level

T₆: (P₃S₂) Cow milk + 9% dragon fruit pulp + 8% sugar level

SMP was constant throughout the trials @ 4 % of milk. For the preparation of dragon fruit pulp, the first dragon fruit was washed with clean water. The skin was peeled. Slices were made with the help of a knife and finally, it was converted into a homogenous mass of pulp by putting it into the mixer.

Preparation of dragon fruit added Milkshake

The dragon fruit pulp samples were prepared by using procedure prescribed by (Shinde *et al.* 2018) [6] with slight modification. The fully ripe healthy and fresh red dragon fruit was taken, along with milk, skimmed milk powder and sugar as per treatments. Mix the ingredients thoroughly.

Heat the mixture to around 35 °C. Subsequently, cool it down to room temperature. Pasteurization by heating the mixture to 63 °C for 30 minutes.

The dragon fruit milkshake was subjected to sensory evaluation by a panel of five trained judges from Dept. Animal Husbandry and Dairy Science, MPKV., Rahuri, using 9-point Hedonic scale

It was judged for colour and appearance, flavour, consistency, mouthfeel and overall acceptability. The results obtained during the course of investigation were subjected to statistical analysis by using Completely Randomized Design (CRD).

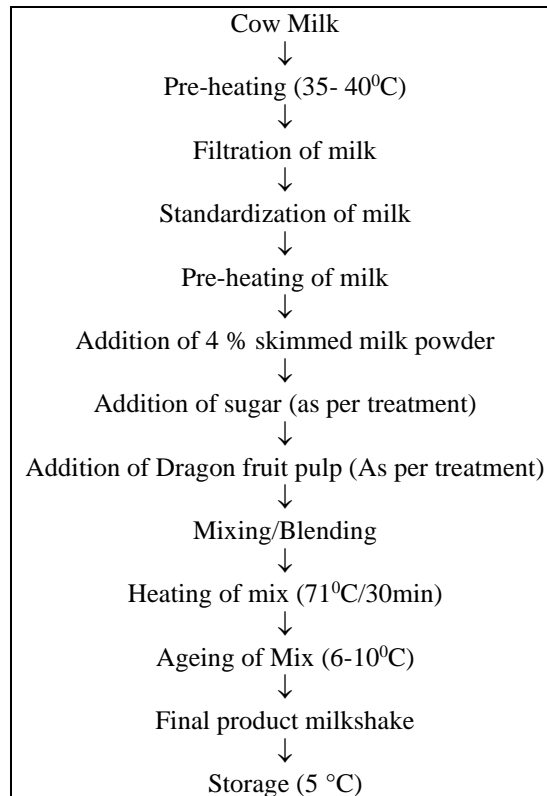


Fig 1: Flow diagram for dragon fruit milkshake (Shinde *et.al* 2018) [6]

Results and Discussion

Sensory evaluation of Dragon fruit milkshake

The Dragon fruit milkshake prepared from different

Conclusion blends of Dragon fruit pulp and cow milk were subjected to sensory evaluation and scores recorded for different parameters are presented in Table 1.

Table 1: Sensory Evaluation of Dragon Fruit Milkshake Prepared from Different Blends of Dragon Fruit Pulp and Cow Milk

Treatments	Colour and Appearance	Flavour	Consistency	Taste	Overall Acceptability
T ₀	7.82 ^c	7.12 ^c	7.76 ^b	7.12 ^d	7.46 ^{bc}
T ₁	7.64 ^d	6.67 ^d	7.20 ^e	6.24 ^g	6.94 ^{bcd}
T ₂	7.32 ^e	6.35 ^e	7.02 ^f	6.37 ^f	6.77 ^{bcd}
T ₃	8.10 ^b	7.25 ^b	7.33 ^d	7.67 ^b	7.59 ^{ab}
T ₄	8.61 ^a	8.82 ^a	8.71 ^a	8.88 ^a	8.76 ^a
T ₅	4.70 ^f	5.66 ^f	7.40 ^c	7.50 ^c	6.32 ^{cd}
T ₆	4.3 ^g	5.35 ^g	7.44 ^c	7.01 ^e	6.07 ^d
S.E.±	0.0137	0.0096	0.0158	0.0108	0.4181
CD at 5 %	0.0403	0.0285	0.0465	0.0317	1.2296

Colour and Appearance

The colour and appearance of the milkshake significantly (P<0.05) were influenced by the addition of different levels of dragon fruit pulp milkshake. The mean maximum score for colour and appearance was obtained to treatment T₄ i.e. (8.61) and the lowest colour and appearance for treatment

T₆ i.e. (4.3).

Flavour

The mean flavour scores of milkshakes were as 7.12, 6.67, 6.35, 7.25, 8.82, 5.66 and 5.35 for treatments T₀, T₁, T₂, T₃, T₄, T₅ and T₆, respectively. The flavour of milkshake

significantly ($p < 0.05$) affected by addition of different levels of dragon fruit pulp milkshake. The treatment T₄ with 6 per cent dragon fruit pulp and 8 per cent sugar was superior over other treatment combinations.

Consistency

The average scores for the consistency attribute of dragon fruit pulp milkshake prepared under each treatment ranged between 7.02 to 8.71 which were significantly ($p < 0.05$) changed by the addition of different levels of dragon fruit pulp in milkshake. Treatment T₄ had the highest score of 8.71 ("Like very much"), whereas treatment T₂ had the lowest score of 7.02 ("Like moderately").

Taste

The taste scores for dragon fruit pulp blended milkshake varied significantly (< 0.05) among treatments T₀ (7.12), T₁ (6.24), T₂ (6.37), T₃ (7.67), T₄ (8.88), T₅ (7.50) and T₆ (7.01). Treatment T₁ received the lowest score of 6.24, whereas treatment T₄ obtained the highest score of 8.88 from the panel.

Overall Acceptability

Overall scores for treatments T₀ (7.46), T₁ (6.94), T₂ (6.77), T₃ (7.59), T₄ (8.76) and T₅ (6.32) were comparable, while treatment T₆ (6.07) differed significantly (< 0.05) from the others. The overall acceptability scores of dragon fruit pulp blended milkshake ranged from 6.07 to 8.76 as rated by the panel.

Conclusion

The better-quality milkshake blended with dragon fruit pulp can be prepared by using 6 per cent red-fleshed dragon fruit pulp and 8 per cent sugar of milk.

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