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Quality evaluation and shelf- life study of milk dessert with different levels avocado (*Persea americana*) and whey protein concentrate

Nongmaithem Mangalleima[1], Dr. John David[2], Vishal Singh[1], Maske Sachin V[1]
[1] PhD Scholar, Food Science and Technology, Sam Higginbottom University of Agriculture, Technology and Sciences, Pryagraj, Uttar Pradesh, India
[2] Professor and Dean, Warner College of Dairy Technology, Sam Higginbottom University of Agriculture, Technology and Sciences, Pryagraj, Uttar Pradesh, India

Abstract
The experimental avocado milk dessert was developed using whole milk, avocado and whey protein concentrate in different combinations. Sixteen treatments with 5 times replications each were conducted for this study. Sensory evaluation of the milk dessert with different levels of avocado pulp and whey protein concentrate was conducted using 9-point hedonic scale. Treatment T7 had the highest score for flavour and taste (8.25) and also found to be the most palatable in respect to body and texture. In terms of colour and appearance treatment T7 (8.05) had come up with the most acceptability. The careful and hygienic conduction of the experiment lead to the absence of yeast and mold in the product during the microbiological analysis. Largest proportion of SPC was indicated in treatment T2 (2.69). The shelf life of the experimental milk desserts were investigated on 7th and 14th day after manufacturing.

Keywords: avocado, whole milk, whey protein concentrate, milk dessert

Introduction

Milk desserts are one of the most important industrial food products. Milk desserts typically include between 84 and 89% liquid milk, 6.5 to 10% sugar, 2% to 3.5% starch, 0.15 to 0.25 % carrageenan, and 0.2 % chocolate powder, among other ingredients. To enhance flavour and alter colour, vanillin, carotenoids, or xanthophylls are sometimes added in trace amounts (less than 0.25) to the final product. Thickeners such as starches and their derivatives can be used to get gel like texture of the milk desserts. Thickeners can sometimes form gels while gelling agents are sometimes used as thickeners. In-mouth perceived thickness is one of the important quality factor of milk desserts (Garawany *et al*., 2005) [3].

Milk desserts production involves a step in which texturizing agent are added. Dairy desserts are being prepared by addition of polysaccharides for stabilizing, thickening and gelling. To obtain the desired textural properties of the final product different gums, starch, gelatin and pectin are used (Mleko, 2002) [7].

The avocado, commonly referred to as the "Alligator pear," is a tropical fruit with American roots. The Aztec word "ahucatl" is the source of the term "avocado." Other names for it include "butter fruit" and "alligator pear." Due to its rich nutritional content and therapeutic characteristics, it has historically been grown for food and medicine. Since avocados are mostly water (72%) and fiber (6.8%), their calorie density is moderate. Contrary to popular belief, avocados are really rather low in sugar, with just around 0.2 g sugar per half fruit. Eating avocados may enhance lipid profiles in the blood, which is beneficial for heart health, according to eight minor clinical research. The monounsaturated and polyunsaturated fatty acids (MUFA and PUFA) found in avocados, as well as the fruit's natural phytosterols and dietary fibre, may contribute to the fruit's capacity to lower cholesterol levels. Avocados include a wide variety of minerals and phytochemicals, some of which may contribute to cardiovascular health beyond lowering cholesterol. The Hass avocado cultivar took over. An average Hass avocado weighs in about 136 grams, despite its thick, dark green, purplish black and bumpy shell." Both the seed and the peel contribute around a third of the avocado's total weight (USDA, 2011) [11]. The fruit is abundant in different fatty acids, vitamins, carotenoids, and other phytochemicals, according to an examination of its constituent parts. As a result, it is a highly nourishing meal. Whey proteins are a common functional element in a wide variety of foods. The most noticeable proteins in whey protein isolates are immunoglobulins, although bovine serum albumin, alpha-lactalbumin, beta-lactoglobulin, and other smaller proteins are also present. One of whey protein's greatest assets as a food component is its gel forming abilities. When salt is added to a whey protein dispersion before or after heating, gels may develop. (Barbut and Foegeding 1993; Mleko Achremowicz 1996; Mleko 2000) [7].

In many cases, the skin is the first organ to reveal the effects of aging. It has been hypothesized that ingesting or topically applying avocado oil, among other fruit and vegetable extracts, might boost skin health. (Roberts *et al*., 2009; Morganti *et al*.,2002; 2004) [8, 10].

Avocados contain several bioactive phytochemicals with anti-carcinogenic properties, including carotenoids,

terpenoids, D-mannoheptulose, persenone A and B, phenols, and glutathione (Ding *et al*., 2009; Jones *et al*., 1992) [6]

The macula, the area of the eye responsible for central vision, absorbs lutein and zeaxanthin more avidly than other parts of the eye (Caepentier *et al*., 2009) [1]. Low luteinand zeaxanthin intake is more common in women than males, and it decreases with age (Johnson *et al*., 2010) [5].

Whey is often regarded as a healthy food option these days. These days, people all around the globe use whey largely as an energy base drink for sports and in a broad variety of medicinal applications. Milk is primarily composed of two different types of protein, caseins and whey.

Materials and methods

The study was carried out at Warner College of Dairy Technology, Sam Higginbottom University of Agriculture, Technology, and Sciences, Prayagraj (Allahabad), Uttar Pradesh, Department of Dairy Technology (India). International Journal of Food Science and Nutrition

T1 =dessert prepared from buffalo milk with addition of 5% Avocado & 5% WPC

T2= dessert prepared from buffalo milk with addition of 5% Avocado & 10% WPC

T3= dessert prepared from buffalo milk with addition of 5% Avocado & 15% WPC

T4 =dessert prepared from buffalo milk with addition of 5% Avocado & 20% WPC

T5= dessert prepared from buffalo milk with addition of 10% Avocado & 5% WPC

T6= dessert prepared from buffalo milk with addition of 10% Avocado & 10% WPC

T7 =dessert prepared from buffalo milk with addition of 10% Avocado & 15% WPC

T8 =dessert prepared from buffalo milk with addition of 10% Avocado & 20% WPC

T9= dessert prepared from buffalo milk with addition of 15% Avocado & 5% WPC

T10= dessert prepared from buffalo milk with addition of 15% Avocado & 10% WPC

T11= dessert prepared from buffalo milk with addition of 15% Avocado & 15% WPC

T12= dessert prepared from buffalo milk with addition of 15% Avocado & 20% WPC

T13= dessert prepared from buffalo milk with addition of 20% Avocado & 5% WPC

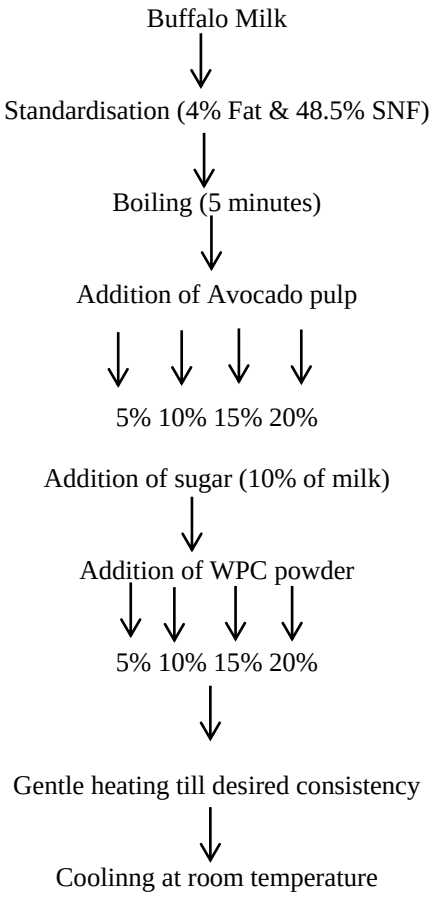
T14 =dessert prepared from buffalo milk with addition of 20% Avocado & 10% WPC

T15 =dessert prepared from buffalo milk with addition of 20% Avocado & 15% WPC

T16 =dessert prepared from buffalo milk with addition of 20% Avocado & 20% WPC

Number of treatments = 16
Number of replications = 5
Total trails = 80

Manufacturing of Avocado Milk Dessert



Results and discussions

The experimental work was done in the laboratories of Warner College of Dairy Technology, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, U.P, India.

Table 1: showing Colour and Appearance, Body and Texture, Flavour and Taste & overall acceptability.

Treatment	Colour and Appearance	Taste and Flavour	Body and Texture	Overall Acceptability
T1	6.76	6.84	6.70	6.75
T2	6.47	6.90	7.00	7.00
T3	7.20	7.35	7.25	7.30
T4	6.86	6.64	6.44	6.38
T5	6.74	6.54	6.95	6.95
T6	7.35	7.86	7.25	7.65
T7	8.05	8.46	8.25	8.55
T8	7.20	7.65	7.35	7.57
T9	6.76	6.65	6.85	6.64
T10	6.84	6.95	7.10	7.00
T11	7.10	6.85	7.25	7.20
T12	6.74	6.55	6.84	6.65

T13	6.46	6.15	6.10	6.35
T14	7.10	6.69	6.87	7.10
T15	7.25	6.86	7.00	7.00
T16	6.95	6.67	6.95	6.85
F	S	S	S	S
S. Ed (±)	0.112	0.134	0.113	0.122
C.D. (P=0.05)	0.223	0.267	0.225	0.234

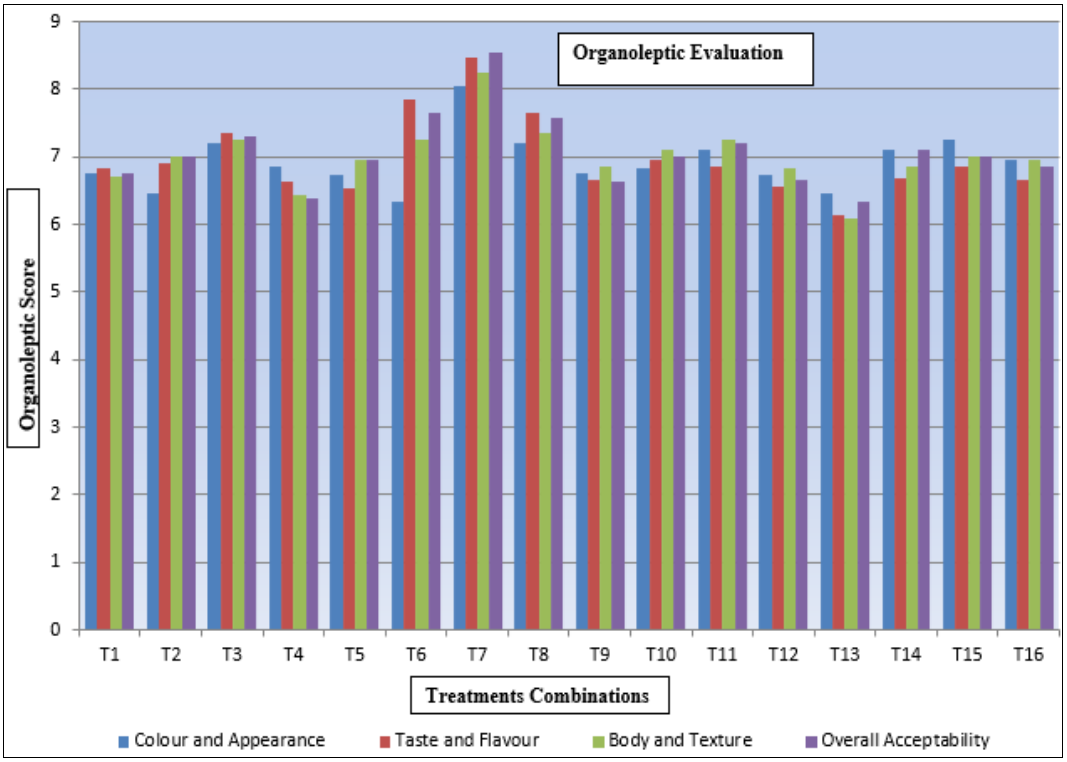


Fig 1: Graphical representation of Organoleptic Evaluation of milk dessert

The treatment combinations (T7) and (T13) have the highest and lowest Colour & Appearance levels compared to the other treatments, respectively. Treatment combinations (T7) and (T13) have the highest and lowest taste and flavour levels compared to other treatments, respectively. The treatment combinations (T7) and (T13) include the highest and lowest levels of body and texture compared to the other treatments, respectively. The treatment combination (T7) & (T13) has the highest and lowest overall acceptability level, respectively.

Table 2: showing the shelf-life study of experimental avocado milk dessert.

Treatments	**Standard Plate Count (10^5 cfu/g)**			**Yeast and Mold Count (10^2 cfu/g)**			**Coliform Count (Per gm)**		
	0 Days	7 Days	14 Days	0 Days	7 Days	14 Days	0 Days	7 Days	14 Days
T1	2.64	3.43	4.53	Nil	2.32	4.12	Nil	Nil	Nil
T2	2.69	3.43	4.54	Nil	2.32	4.11	Nil	Nil	Nil
T3	2.64	3.44	4.53	Nil	2.33	4.11	Nil	Nil	Nil
T4	2.62	3.43	4.53	Nil	2.34	4.12	Nil	Nil	Nil
T5	2.62	3.42	4.53	Nil	2.33	4.12	Nil	Nil	Nil
T6	2.60	3.43	4.54	Nil	2.34	4.11	Nil	Nil	Nil
T7	2.64	3.42	4.53	Nil	2.34	4.12	Nil	Nil	Nil
T8	2.62	3.41	4.53	Nil	2.32	4.11	Nil	Nil	Nil
T9	2.69	3.43	4.54	Nil	2.33	4.11	Nil	Nil	Nil
T10	2.66	3.42	4.54	Nil	2.33	4.12	Nil	Nil	Nil
T11	2.64	3.43	4.55	Nil	2.34	4.14	Nil	Nil	Nil
T12	2.62	3.42	4.54	Nil	2.33	4.14	Nil	Nil	Nil
T13	2.61	3.42	4.55	Nil	2.32	4.13	Nil	Nil	Nil
T14	2.62	3.42	4.55	Nil	2.33	4.15	Nil	Nil	Nil
T15	2.61	3.43	4.55	Nil	2.32	4.14	Nil	Nil	Nil
T16	2.63	3.42	4.55	Nil	2.34	4.14	Nil	Nil	Nil

The Table No.2 was showing the shelf-life study of final developed product dessert examined on 7 days of time interval for 14 days at room temperature. In this period product were complete analyzed of microbial study of standard plate count (105 cfu/gm), yeast and mold count (Per/gm) as well as coliform count (Per/gm). Standard plate

count of dessert was showed that the day by day increases the number of colonies from 0 days to 14 days. On O days the highest SPC measure of sample T2 and T9 it was 2.69 (105 cfu/gm) and the lowest measure of SPC measure in treatment T13 and T15 it was 2.61 (105 cfu/gm).

On 14th day the highest measure of SPC in the treatment of T3 was 3.44 (105 cfu/gm) and the

lowest measure of SPC in the treatment of T8 was 3.41 (105 cfu/gm). In the yeast and mould count of dessert was showed that the day by day increases the number of colonies from 0 days to 14 days. On 0 days the yeast and mould count were showed nil and the on-7th days the highest yeast and mould count on 7th days in treatment T4, T6, T7, T11 and T16 was 2.34 (Per/gm). On 14th the highest yeast and mould count in treatment T14 it was 4.15 (Per/gm)

In the study of coliform count (cfu/gm) showed that not any growth of coliform in any treatments from 0 days to 21 days the result was showed that the nil.

Conclusion

The whey protein concentrate (WPC) which is considered as a complete protein owing to its content of many essential amino acids such as leucine, isoleucine etc, is another main ingredient for this experimental dessert. WPC helps to improve muscle protein synthesis and promote the growth of lean muscle mass. Therefore the dessert prepared using these nutritious ingredients have high nutrients such as protein which is around 20% in some treatments which is good for consumers health. Having around 20% protein and containing less fat percentage makes it a product of high quality. The experimental dessert contains excellent antioxidant property which makes it a product of great health choice.

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