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**Ashwini Mukhekar**  
Ph.D. (Agri.) Scholar,  
Department of Animal  
Husbandry & Dairy Science,  
MPKV, Rahuri, Maharashtra,  
India

**RJ Desale**  
Associate Professor, Department  
of Animal Husbandry and Dairy  
Science, MPKV, Rahuri,  
Maharashtra, India

**Suchita Bhosale**  
Ph.D. (Agri.) Scholar,  
Department of Animal  
Husbandry & Dairy Science,  
MPKV, Rahuri, Maharashtra,  
India

**Correspondence**  
**Ashwini Mukhekar**  
Ph.D. (Agri.) Scholar,  
Department of Animal  
Husbandry & Dairy Science,  
MPKV, Rahuri, Maharashtra,  
India

## Effect on sensory and microbial properties of yogurt fortified with *Aloe vera*

Ashwini Mukhekar, RJ Desale and Suchita Bhosale

### Abstract

The main objective of present investigation was to study the effect of different levels of *Aloe vera* on sensory and microbial properties of yogurt. During the study cow milk yogurt fortified with *Aloe vera* was analyzed for sensory properties such as colour and appearance, flavour, body and texture, taste and overall acceptability. Microbial properties such as standard plate count, coliform count and yeast and mould. Yogurt was prepared by using different levels of *Aloe vera* (12, 14, 16 and 18 percent). The data were statistically analysed by using Completely Randomized Design (CRD). The yogurt prepared by adding 14% *Aloe vera* showed highest overall acceptability sensory score 8.31. The sensory and microbial quality of yogurt prepared by addition of 14% *Aloe vera* having score for colour and appearance 8.60, flavour 8.40, body and texture 8.00, taste 8.25 and overall acceptability 8.31. Microbial quality of standard plate count  $53.75 \times 10^{-6}$ . While coliform count and yeast and mould count was nil.

**Keywords:** yogurt, *aloe vera*, sensory, microbial properties

### Introduction

“Yogurt is a fermented product made from fresh milk and or reconstituted milk by using bacteria, such as *lactobacillus bulgaricus* and *streptococcus thermophilus* with or without any additional food ingredients and permitted food additives” (Tamime and Robinson, 1999) [11]. Probiotic food products have been consumed by the human being in the form of fermented foods for many years. According to FAO/WHO probiotics are: “Live microorganisms which, when administered in adequate amounts, confers health benefit to the host” (Araya *et al.* 2002) [1]. *Lactobacillus* and *Bifidobacteria* species are the most common probiotics. An important characteristics of probiotic bacteria is that they need to survive through the gastrointestinal tract of the host.

Special types of yogurt manufactured for dietetic and/or therapeutic purposes are known as bio-yogurt (Kaur *et al.* 2015) [4]. Yogurt has smooth texture and a mildy sour and pleasant flavor. It is obtained from pasteurized or boiled milk soured by naturally occurring or lactic acid fermenting bacteria i.e. *Lactobacillus bulgaricus* and *Streptococcus thermophilus*. The sensory characteristics of yogurt are due to its content of carbonyl, mainly acetaldehyde, acetone, diacetyl and ethanol produced by yoghurt bacteria. The highest consumption of yogurt is in Mediterranean, Asian countries and central Europe. Yogurt has been known for its nutraceutical, therapeutic, and probiotic effects such as digestion enhancement, immune system boosting, anticarcinogenic activity and reduction of serum cholesterol (Penna *et al.* 2007; Najafi *et al.* 2008) [9, 6].

Herbs and their extracts have long been used as natural remedies for curing health related complications and metabolic disorders. Imbued with several functional components, they can perform a wide range of biological functionalities. A considerable portion of today's functional food market consists of herbal supplemented functional foods. Traditional Indian dairy products the country, can be used effectively as carrier for herbs to satisfy the needs of health conscious consumers.

*Aloe vera* is one of the oldest known medicinal plants gifted by nature. *Aloe vera*, often called miracle plant, is known by many names. There are over 200 types of *Aloe vera* and of these only 4 or 5 are commonly used in medicine. The most widely used variety of *Aloe vera* is *Barbadensis millar*. It is perennial, succulent plant with stiff fleshy leaves. *Aloe vera* is a clear thin gelatinous material that comes from inside the *Aloe vera* leaves (Neal, 1965) [8].

## Materials and Methods

The yogurt was prepared from composite sample of crossbreed cow milk with *Aloe vera* juice and 3% constant sugar level for all the treatments.

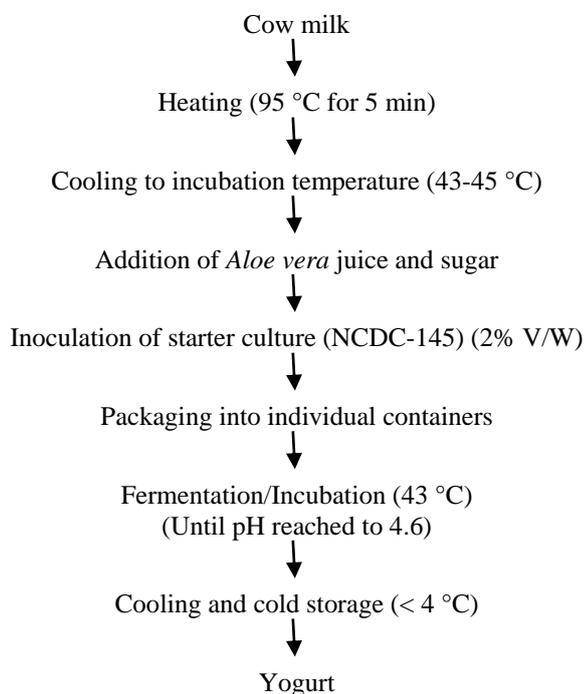
The plain yogurt prepared without addition of *Aloe vera* used as a control (T<sub>0</sub>), yogurt with 12% *Aloe vera* juice (T<sub>1</sub>), 14% *Aloe vera* juice (T<sub>2</sub>), 16% *Aloe vera* juice (T<sub>3</sub>) and 18% *Aloe vera* juice used as a (T<sub>4</sub>).

The samples of yogurt fortified with *Aloe vera* were analyzed for their sensory evaluation such as colour and appearance, flavour, body and texture, taste and overall acceptability. Microbial properties such as Standard plate count, coliform count and yeast and mould count were analyzed.

## Methodology

The yogurt was prepared as per the method given by Lee and Lucey (2010) [5] with slight modifications.

### Flow chart for preparation of yogurt



## Result and Discussion

### Sensory Evaluation

#### Colour and Appearance

Colour and appearance score obtained for different treatment combination was ranged from 7.22 to 8.60. Treatment T<sub>2</sub> (8.60) obtained highest score for colour and appearance while T<sub>4</sub> (7.22) obtained lowest score. This might be due to higher level of *Aloe vera* added into yogurt resulted into greenish/whyeish tinge to the product. The results are in agreement with the results noted by Nazni *et al.* (2014) [7] who reported colour and appearance score of yogurt ranged from 7.60 to 7.70. Gawade *et al.* (2018) [13] studied effect of lemongrass distillate on sensory properties of yoghurt and reported that colour and appearance score ranged between 7.50 to 8.90 and also recorded the decreasing score of yoghurt for colour and appearance attribute due to increase level of lemongrass distillate.

#### Flavour

The score for flavour ranged from 7.50 to 8.40. The highest score obtained by T<sub>2</sub> (8.40) and lowest by the treatment T<sub>4</sub>

(7.50). Lower score for T<sub>4</sub> might be due to the higher concentration of *Aloe vera* which gives harsh flavour to the final product. These results are in agreement with results showed by Nazni *et al.* (2014) [7] who reported flavour score of yogurt as 7.40. Gawade *et al.* (2018) [13] studied effect of lemongrass distillate on sensory properties of yoghurt and reported that flavour score ranged between 7.20 to 8.90. They also reported that as proportion of lemongrass distillate increased, there was decrease in flavour score of yoghurt.

#### Body and texture

The scores for body and texture of yogurt were ranged from 7.50 to 8.00. The treatment T<sub>2</sub> had maximum score for body and texture (8.00) and T<sub>4</sub> showed lowest scores (7.50). The body and texture characteristics are govern by total solids and moisture content of yogurt. Lower score for T<sub>4</sub> as the treatment contains higher concentration of *Aloe vera*. Gawade *et al.* (2018) [13] studied the effect of lemongrass distillate on sensory properties of yoghurt and reported body and texture score as 7.73 to 8.55.

#### Taste

The scores for taste of yogurt were ranged from 7.25 to 8.25. The treatment T<sub>2</sub> had maximum score for taste (8.25) and T<sub>4</sub> showed lowest scores (7.25). The results are in agreement which were noted by Yadav and Shukla (2014) [12] with the addition of cinnamon extract in yoghurt. Gawade *et al.* (2018) [13] studied that effect of lemongrass distillate on sensory properties of yoghurt and reported taste score ranged from 7.20 to 8.90.

#### Overall acceptability

All the treatments had statistically significant effect on overall acceptability score of the yogurt. The highest score was obtained by T<sub>2</sub> (8.31), which was most acceptable treatment combination. While score obtained by T<sub>0</sub>, T<sub>1</sub>, T<sub>3</sub> and T<sub>4</sub> was 7.71, 8.14, 7.59, 7.37 respectively. Treatment T<sub>1</sub> (8.14) and T<sub>2</sub> (8.31) are at par with each other.

#### Microbial properties

##### Standard plate count

The range of standard plate count was between 49.25 to 65.25 c.f.u/ml  $\times 10^{-6}$ . The highest standard plate count recorded for treatment T<sub>0</sub> while lowest for treatment T<sub>4</sub>. It also showed that, standard plate count may be dependent upon environmental conditions and pre-processing factors. The standard plate count goes on decreasing with increasing level of *Aloe vera*. This might be due to the antimicrobial property of *Aloe vera*. The standard plate count obtained was similar with Gawade *et al.* (2018) [13] studied effect of lemongrass distillate on microbiological properties of yoghurt and reported that standard plate count ranged between 51.25 to 65.25.

##### Coliform count

Coliform count was found to be completely absent in all types of treatment combination of yogurt, which signifies that product was prepared in hygienic condition. The similar result was observed by Damunupola *et al.* (2014) [2] they reported that coliform count was nil in plain and beetroot incorporated goat milk yogurt. Gawade *et al.* (2018) [13] studied effect of lemongrass distillate on microbiological properties of yoghurt and reported coliform count was nil in yoghurt.

### Yeast and mould

The yeast and mould in yogurt was completely absent, which was attributed to antimicrobial effect of *Aloe vera*. Shaaban *et al.* (2010) <sup>[10]</sup> showed that EO treatments caused marked reduction in yeast and mold production in yoghurt. Damunupola *et al.* (2014) <sup>[2]</sup> they reported that yeast and mould count was nil in plain and beetroot incorporated goat milk yogurt. Gawade *et al.* (2018) <sup>[13]</sup> studied effect of lemongrass distillate on microbiological properties of yoghurt and reported that yeast and mould count was nil in yoghurt.

### Conclusion

Use of *Aloe vera* as a herb in the probiotic foods can be a promising trend towards functional ingredients in the dairy food. *Aloe vera* fortified yogurt was prepared by using mix culture to study the sensory and microbiological properties of *Aloe vera* yogurt; which is beneficial for the mankind from the health and nutrition point of view.

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