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Shingare JD

P.G. Student, Department of
Animal Husbandry and Dairy
Science, V.N.M.K.V. College of
Agriculture, Latur, Maharashtra,
India

Padghan PV

Associate Professor, Department
of Animal Husbandry and Dairy
Science, V.N.M.K.V. College of
Agriculture, Latur, Maharashtra,
India

BM Thombre

Associate Dean and Principal,
Department of Animal
Husbandry and Dairy Science,
V.N.M.K.V. College of
Agriculture, Latur, Maharashtra,
India

Studies on physico-chemical properties of *dahi* prepared with buffalo milk blended raw/pasteurized wheat grass extract

Shingare JD, Padghan PV and BM Thombre

Abstract

In this study, the attempt have been made to prepared *dahi* from blends of raw/pasteurized wheat grass extract and buffalo milk in different proportion and study the chemical composition, physical properties of *dahi*. On an average the acidity content of *dahi* prepared from wheat grass extract added with buffalo milk was found to be 0.71, 0.68, 0.72, 0.75, 0.67, 0.70 and 0.73 per cent, pH content of *dahi* 4.20, 4.30, 4.21, 4.16, 4.43, 4.34 and 4.20 per cent, fat content of *dahi* prepared from wheat grass extract added with buffalo milk was found to be 5.95, 5.65, 5.25, 4.95, 5.85, 5.55 and 5.00 per cent, protein content 3.50, 3.30, 3.15, 3.12, 3.45, 3.40 and 3.15 per cent, moisture content of the product i.e. *wheat grass* extract added *dahi* was found to be 86.80, 87.60, 88.40, 89.40, 86.40, 87.70 and 88.50 per cent, total solid content 13.14, 12.34, 11.54, 10.59, 13.50, 12.23 and 11.49 per cent, ash content 0.74, 0.72, 0.71, 0.70, 0.71, 0.73 and 0.70 per cent, whey drainage content 4.70, 5.17, 5.40, 5.70, 5.15, 5.42 and 5.80 ml/100 ml and curd tension 27.83, 25.50, 24.65, 23.26, 25.55, 24.37 and 22.95 gm for pasteurized/raw treatments T₁, T₂, T₃, T₄, T₅, T₆ and T₇, respectively. It was also observed that as the application of wheat grass as the extract increased, there was decreased in acidity, fat, total solids, protein, ash and curd tension while pH, moisture and whey drainage content increased in herbal *dahi*.

Keywords: *Dahi*, raw/pasteurized wheat grass extract, physico-chemical properties

1. Introduction

Fermented milk contains all the milk components modified through the process of fermentation by lactic acid bacteria (LAB). Fermented foods are of great significance since they provide and preserve vast quantities of nutritious foods in a wide diversity of flavor, aroma, and texture which enrich the human diet. In India, *dahi* has been with associated health benefits since time immemorial. *Dahi* is a very good source of calcium, phosphorus, riboflavin vitamin B₂ and iodine. *Dahi* also is a good source of vitamin B₁₂, pantothenic acid- vitamin B₅, zinc, potassium, protein and molybdenum. These ten nutrients alone would make *dahi* a health supportive food (Deb and Seth 2014) [4]. According to FSSAI Rules (2011), "*Dahi* or Curd" means the product obtained from pasteurized or boiled milk by souring, natural are otherwise by a harmless lactic acids or other bacterial culture. *Dahi* may contain additional cane sugar. It should have the same percentage of fat and SNF as the milk from which it is prepared. Where *dahi*, other than skimmed milk *dahi*, is sold are offered for sale without any indication of the class of milk, the standard prescribed for *dahi* prepared from buffalo milk shall apply (Chowdhury and Bhattacharyya 2014) [2]. Different types of *dahi* are available such as sweet *dahi*, sour *dahi* and flavored *dahi*. Its demand is increasing day by day for its multipurpose health benefits such as improves intestinal health, which preventing constipation, diarrhea and dysentery and also prevent gastrointestinal infections (Munzur *et al.* 2004) [11].

Wheatgrass is a food prepared from the cotyledons of the common wheat plant (*Triticum aestivum*) belonging to family Gramineae. Triticum is a genus of annual and biennial grasses, yielding various types of wheat and is cultivated almost all over the world. Shoot of *Triticum aestivum* is called wheat grass. It is also a powerful health food supplement that is packed with highly concentrated vitamins, minerals, chlorophyll and enzymes. Wheat grass is freshly juiced or dried in powder and used for human consumption. Nutritionally, wheatgrass is a complete food that contains 98 of the 102 earth elements. (Mogra and Rathi 2013) [9].

In modern era consumers are very much aware about their health. So, the demand of functional foods is increasing day by day at a global (Singh *et al.*, 2012). Moreover, milk is consumed by people of all age can act as potent carrier for the herb which can add functional attribute to the product and consumer well being. Nowadays, more and more people are adopting herbal way of life for their health benefits. There is also a need to find diverse technologies to add value to milk and its by-products (Pugazhenth and Jothylingam, 2013) [14].

Correspondence**Shingare JD**

P.G. Student, Department of
Animal Husbandry and Dairy
Science, V.N.M.K.V. College of
Agriculture, Latur, Maharashtra,
India

Moreover, these substances are easily available at all seasons, very cheap and utilized by people for different purposes. The present study was aimed to produce *dahi* of good flavor, texture, appearance, palatable and acceptability added with wheatgrass extract.

2. Materials and Methods

The materials used and methods employed during the course of present investigation on preparation of *dahi* from blends of buffalo milk with (raw/pasteurized) wheat grass extract are as under.

2.1 Collection of buffalo milk

Fresh and standardized buffalo milk for fat 6 per cent and SNF 9 per cent was procured from Natural Milk Pvt, Ltd, Latur.

2.2 Growing of wheatgrass

Wheatgrass was produced in laboratories by growing the local variety (HD-2189) of wheat after sorting, cleaning and overnight soaking of wheat seed in tray as per the protocol given by Patel (2012) [13],

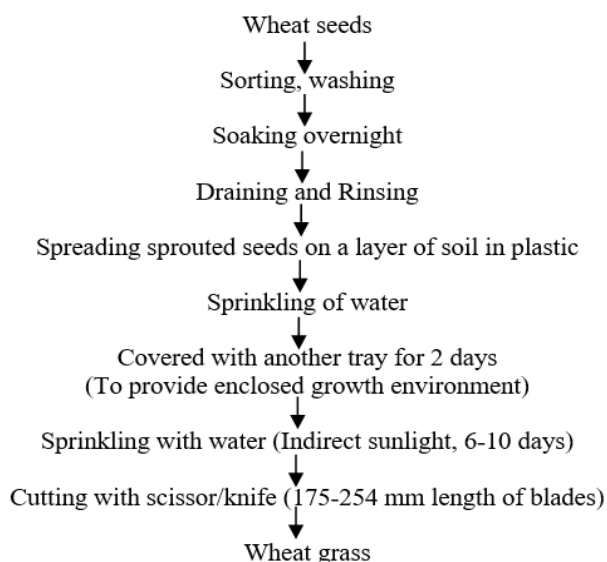


Fig 1: Method of growing wheat grass (*Triticum aestivum*)

2.3 Starter cultures

The standard mixed *dahi* culture i.e. Standard *dahi*, contained *Streptococcus thermophilus* and *Lactococcus lactis* NCDC-167(BD4) in this study was procured from the National collection of Dairy culture (NCDC), NDRI, Karnal.

2.4 Methods

Wheatgrass extract was prepared from the wheat grass cultivated in laboratory as shown in flow chart by two ways i.e. without pasteurization and after pasteurization of wheat grass following the steps sorting wheat grass, washing, pasteurization, grinding and filtration. (Kumar *et al.*, 2017) [8].

2.4.1 Preparation of wheat grass (*Triticum aestivum*) extract

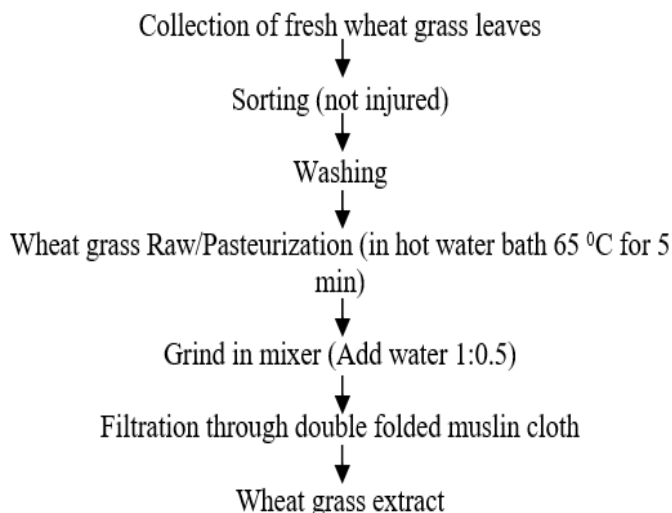


Fig 2: Preparation of wheat grass (*Triticum aestivum*) extract

2.4.2 Optimization of method for *dahi* preparation by using wheatgrass extract

The *dahi* was prepared from buffalo milk as per the method described De, 2009 [13] in his book Outline of Dairy Technology with slight modification for addition of wheat grass extract. The incubation period and culture rate were optimized on the basis of setting *dahi* as shown in Figure 3.

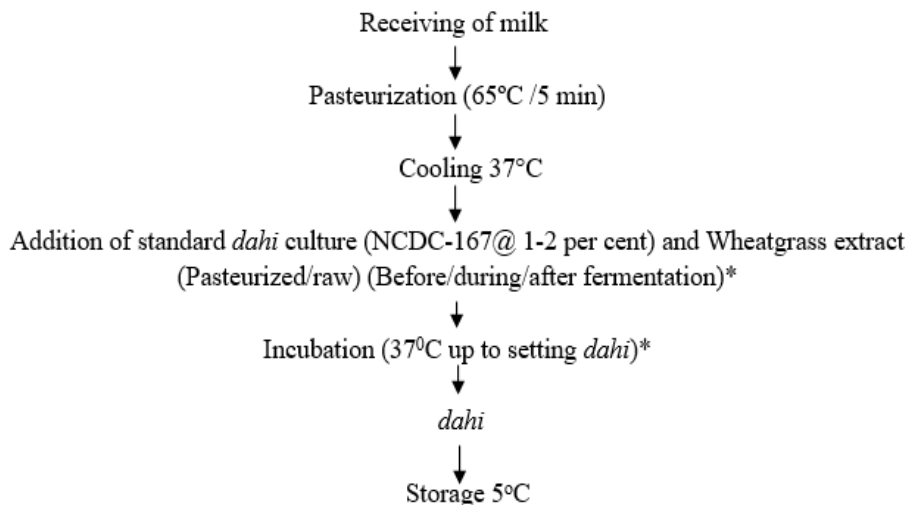


Fig 3: Optimization method for *dahi* preparation by using wheatgrass extract

Analysis: *Dahi* was analyzed for fat by Gerber's method as in IS 1224 (part II) (1977), protein A.O.A.C. (1965) [1], moisture, total solid and ash by standard procedure as described in IS:

SP: 18 (Part XI) 1981. The data obtained in the present study were subjected to statistically by analysis using completely randomized design (CRD) as per Panse and Sukhatme (1985) [4].

3. Result and Discussion

The requisite sample of *dahi* prepared by using wheat grass extract the finished product were subjected for the proximate analysis viz. acidity, pH, fat, protein, moisture, total solids, ash, whey drainage and curd tension along with its control. The results obtained on account of this parameter are presented in table no.1 below.

3.1 Acidity (%)

From above table no.1 acidity content ranges from 0.71, 0.68, 0.72, 0.75, 0.67, 0.70 and 0.73 for T₁, T₂, T₃, T₅, T₆ and T₇ respectively. The acidity content in formulated product was ranged between 0.67 to 0.75 per cent. It was further observed that the highest acidity was observed in treatment T₄ (0.75) followed by the treatment T₇, T₃, T₁, T₆, and lowest in treatment T₅ (0.67) respectively. The acidity content of *dahi* was decreased in first and then increased later. The acidity reduced might be due to the low acidity of wheatgrass extract as compare to control *dahi* and then increased might be due to the contribution of different acidic amino acid more in wheatgrass extract (Mujoriya and Bodla 2011) [4] and

supported by Jothylingam and Pugazhenth (2013) [14] found increased acidity after using wheatgrass extract in flavored milk and Kale *et. al.* (2011) [7] in value added *dahi* by incorporating cereals.

3.2 pH Value

The pH content ranges from 4.20, 4.30, 4.21, 4.16, 4.43, 4.34 and 4.20 per cent for treatment T₁, T₂, T₃, T₄, T₅, T₆ and T₇ respectively. The PH content in formulated product was ranged between 4.16 to 4.43. It was further observed that the highest pH was observed in treatment T₅ (4.43) followed by the other five treatments and lowest pH content was recorded for treatment T₄ (4.16). From observation of pH data, it was found that there was lowering effect of wheatgrass extract on pH of *dahi* and somewhat positively correlate with acidity and pH relation i.e. if acidity increased pH decreased might be due to the higher pH of wheat grass extract as compared to control *dahi*. The results recorded for pH of *dahi* sample obtained by Sarkar (2018) [15], *dahi* preparation from milk with different levels of carrot (*Daccus carrota*) juice. The pH range of *dahi* sample was recorded 3.9 to 4.4.

Table 1: Physico-chemical properties of wheat grass extract added *dahi*

Treatment	Acidity	pH	Fat	Protein	Moisture	Total solid	Ash	Whey drainage	Curd tension
T ₁	0.71	4.20	5.95	3.50	86.80	13.14	0.74	4.70	27.83
T ₂	0.68	4.30	5.65	3.30	87.60	12.34	0.72	5.17	25.50
T ₃	0.72	4.21	5.25	3.15	88.40	11.54	0.71	5.40	24.65
T ₄	0.75	4.16	4.95	3.12	89.40	10.59	0.70	5.70	23.26
T ₅	0.67	4.43	5.85	3.45	86.40	13.50	0.71	5.15	25.55
T ₆	0.70	4.34	5.55	3.40	87.70	12.23	0.73	5.42	24.37
T ₇	0.73	4.20	5.00	3.15	88.50	11.49	0.70	5.80	22.95

3.3 Fat (%)

Fat content in wheat grass extract added *dahi* was found to be 5.95, 5.65, 5.25, 4.95, 5.85, 5.55 and 5.00 per cent for treatment T₁, T₂, T₃, T₄, T₅, T₆ and T₇ respectively. The highest fat content was recorded for treatment T₁ i.e. 5.95 and the lowest fat content was recorded for treatment T₄ i.e. 4.95 per cent. Above observations clearly indicate that, as the adding of wheat grass extract in to the buffalo milk was increased, the fat content in the finished product was decreased due to the negligible fat content in wheat grass extract as compared to buffalo milk (6.0).

3.4 Protein (%)

Protein content of the *dahi* samples were found to be 3.50, 3.30, 3.15, 3.12, 3.45, 3.40 and 3.15 per cent for treatment T₁, T₂, T₃, T₄, T₅, T₆ and T₇, respectively. The protein content in formulated product was ranged between 3.12 to 3.50 per cent. The highest protein content was recorded for control treatment T₁ i.e. 3.50 per cent and the lowest protein content was recorded for treatment T₄ i.e. 3.12 per cent. The protein content in developed product was decreased due to the less amount of protein in wheat grass extract i.e. 1.96 per cent, as compared to buffalo milk.

3.5 Moisture (%)

Moisture content of the product i.e. *wheat grass* extract added *dahi* was found to be 86.80, 87.60, 88.40, 89.40, 86.40, 87.70 and 88.50 per cent for treatments T₁, T₂, T₃, T₄, T₅, T₆ and T₇, respectively. The moisture content in formulated product was ranged between 86.4 to 89.4 per cent. The highest moisture content was recorded for treatment T₄ (89.40 per cent) and lowest moisture content was recorded for treatment T₅ (86.40 per cent). The moisture content in finished product was

increased due to more moisture content in wheat grass extract i.e. 95.6 per cent.

3.6 Total solids

Total solids content of the finished product were found to be 13.14, 12.34, 11.54, 10.59, 13.50, 12.23 and 11.49 per cent for treatment T₁, T₂, T₃, T₄, T₅, T₆ and T₇ respectively. The total solid content in formulated product was ranged between 10.59 to 13.50 per cent. The highest total solids content was recorded for treatment T₅ i.e. 13.50. The lowest total solids contents was recorded for treatment T₄ i.e. 10.59. The total solid content in wheat grass extract added *dahi* sample were decreased due to the less amount of total solid content in wheat grass extract i.e. 3.88 per cent.

3.7 Ash (%)

Ash per cent in *wheat grass* extract added *dahi* were 0.74, 0.72, 0.71, 0.70, 0.71, 0.73 and 0.70 per cent for treatment T₁, T₂, T₃, T₄, T₅, T₆ and T₇ respectively. The ash content in formulated product was ranged between 0.70 to 0.74 per cent. The ash per cent was highest in T₁ samples i.e. 0.74 and lowest in treatment T₄ and T₇ (0.70 per cent) in *wheat grass* extract added *dahi* respectively. Ash content in finished product but slight decreased due to the less amount of ash in wheat grass extract i.e. 0.10 per cent as compared to buffalo milk.

3.8 Whey drainage

Whey drainage in *wheat grass* extract added *dahi* was more than the control *dahi* and were 4.70, 5.17, 5.40, 5.70, 5.15, 5.42 and 5.80 per cent for treatment T₁, T₂, T₃, T₄, T₅, T₆ and T₇, respectively. It was observed that the whey drainage after 24 hr. was ranged between 4.70 to 5.80 per cent /100 ml of

dahi. The higher expulsion rate was seen in T₇ treatment i.e. 5.80 per cent /100 ml of *dahi*. It was seen that with increasing the rate of wheat grass extract whey drainage also increased.

3.9 Curd tension

Curd tension content per cent in *wheat grass* extract added

dahi which was decreased with increased wheat grass extract. The curd tension ranges was 27.83, 25.50, 24.65, 23.26, 25.55, 24.37 and 22.95 gm for treatments T₁, T₂, T₃, T₄, T₅, T₆ and T₇, respectively. The control sample has highest curd tension followed by other treatments. Treatment T₇ observed lowest curd tension (22.95).

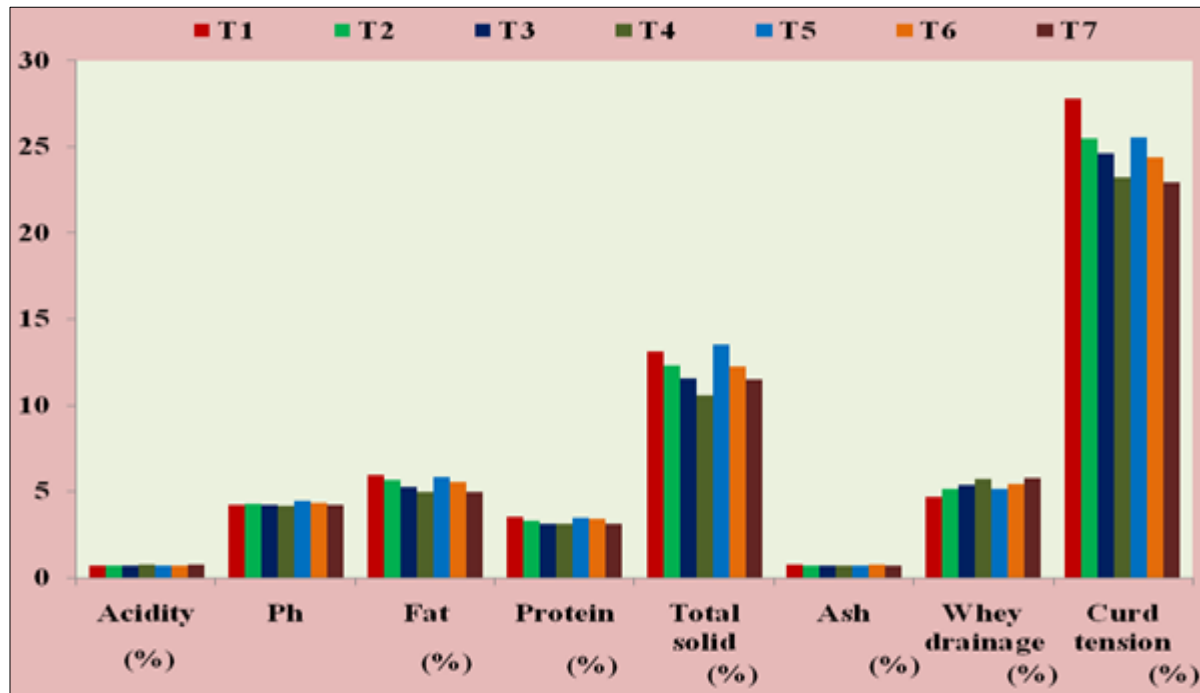


Fig 4: Graphical presentation physico-chemical properties of *wheat grass* extract added *dahi* sample

4. Conclusion

The present study concludes that the *dahi* prepared by using (raw/pasteurized) wheat grass with buffalo milk declined in acidity, fat, total solids, protein, ash and curd tension while pH, moisture and whey drainage content increased as the rate of wheatgrass extract addition increased. Therefore, it can be concluded that the wheat grass extract can be very well utilized for preparation of nutritious, palatable and low cost herbal *dahi* by blending 10 per cent wheat grass extract with 90 per cent buffalo milk on weight basis. The *dahi* prepared by added on 10 per cent pasteurized *wheat grass* extract was found more suitable on physico-chemical attributes.

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