



# Dahi – Food For The Gods!

‘Dahi’ or ‘Dadhi’ has been part of the collective subconscious of Indians – since mythic times. It is part of temple rituals and it’s a food which is a favourite of the gods. Keeping the tradition alive in their daily lives, dahi is still a part of everyday victuals of most Indians – almost a staple – a food for all seasons and for all times and in a hundred variations. Sweet, sour, salty, set or liquefied, it is eaten, drunk, applied, offered to the gods- it is the favourite food of Indians.



**D**ahi (Curd) is a product produced by bacterial fermentation of milk. The bacteria used to make dahi are known as "dahi cultures". Fermentation of lactose by these bacteria produces lactic acid, which acts on milk protein to give dahi its texture and its characteristic tang. Probiotics are live micro-organisms thought to be beneficial to the host organism. According to the currently adopted definition by FAO/WHO, probiotics are: "Live micro-organisms which when administered in adequate amounts confer a health benefit on the host". Lactic acid bacteria (LAB) and bifido bacteria are the most common types of microbes used as probiotics; but certain yeasts and bacilli may also be used. Probiotics are commonly consumed as part of fermented foods with specially added active live cultures, such as in dahi or as dietary supplements.

The organized dairies in our country have started production of fermented milk products specially Dahi. Due to good digestibility, large sections of population in India consume fermented milk products specially dahi after converting it into a refreshing beverage. The quality of dahi depends on

the starter culture used, initial quality of milk and other ingredients added.

Dahi obtained by lactic fermentation through the action of single or mixed strains of lactic acid bacteria or by lactic fermentation accompanied by alcoholic fermentation by yeast from milk.

### Brands Tested

VOICE tested nine (9) regular/most selling brands of plain and probiotic dahi, where 7 brands were of plain dahi and 2 brands were of probiotic dahi. Name and the ranks based on the performance of the brands of the lab tested dahi brands are as follows:

Brand	Rank
<b>Probiotic Dahi</b>	
Mother Dairy b-Activ	1
Nestle ActiPlus	2
<b>Plain Dahi</b>	
Nestle	1
Verka	2
Mother Dairy	3
Vita	4
Reliance Dairy Life	5
Amul Masti	6
Britannia Daily Fresh	7

### Marking

The following information should be marked legibly on each container:

- Name of the material
- Type of the product
- Class of milk used
- Sweetened or Unsweetened
- Net Content
- Permitted flavouring agent
- Batch of code number
- Any other requirements as laid under the standard of Weights and Measures (Packaged Commodities) Rules, 1977.
- Each container may also be marked with the ISI certification mark or similar certification mark
- Expiry date/use by date
- Misleading claim:

Brand Mother Dairy of probiotic category claimed "98% fat free" which could confuse consumers, hence we deducted its weightage and gave it 7 out of 10 points. Amul Masti did not provide any culture information thus it was given 9.5. All other brands had adequate information.

### Acidity as lactic acid

Acidity is due to lactic acid produced by the action of bacteria on lactose in milk. As the acidity increases with the storage time, this parameter is also a means of checking storage conditions. As per the Indian Standards, acidity of dahi should be in the range of 0.6 to 0.8%.

# Comparative Test

We found acidity of dahi in the range of 0.65 to 0.72 which is well within the required range, this shows that the storage condition was adequate for all the dahi brands we tested. Mother Dairy was given full score, getting 4 out of 4.

## Key Findings

- All the tested brands contained the useful bacteria for packaged (regular as well as probiotic) Dahi.
- Brand Mother Dairy had the highest quantity of probiotic bacteria, in the Probiotic category (over trillion in count) and Nestle and Mother Dairy in the plain Dahi.
- All tested brands complied with the National Standards requirement for the laid down parameters.
- Most of the tested packaged Dahi taste proved to be close to home made curds.
- None of the brands had 'separated water', hence all had good texture.
- All brands were found with phosphorus and calcium as micro nutrients in certain quantities.
- All brands were safe from pathogenic bacteria and toxic metals.
- All brands had cholesterol in their dahi but Mother Dairy & Amul Masti plain dahi had more than 9 mg per 100gms.
- Brand Verka & Vita from Punjab & Haryana states cost only Rs. 22 per 400 gms against other brands costing between Rs.35 to 48.

## Milk Protein

Proteins are an extremely important class of naturally occurring compounds that are essential to all life processes. They perform a variety of functions in living organisms ranging from providing structure to reproduction. Milk proteins represent one of the greatest contributions of milk to human nutrition. Indian Standard has not prescribed any requirement for protein content in dahi.

Brands Mother Dairy B-Active, Nestle Actiplus, Amul Masti did not meet their claim for protein content, they were found to be deficient, while they claimed a higher protein content. Probiotic dahi brands were found slightly lower in comparison to plain dahi in protein content. Brand Nestle plain dahi was found with the highest protein content (3.95%)

followed by Reliance (3.93%) & Vita (3.92%). Brand Nestle Acti Plus was found with lower protein content (3.79%) followed by Mother Dairy B-Active (3.83%). The scores were out of 5 points allotted for this parameter.

## Whey as separated water

After the fat and casein have been removed from milk, one is left with whey, which contains the soluble milk salts, milk sugar and the remainder of the milk proteins. All the brands of dahi were found free from any separation.

## Carbohydrate

Brand Nestle Plain dahi was found with a higher carbohydrate content (5.84%) followed by Mother Dairy B-Active (5.81%) and Mother dairy plain dahi (5.76%). Brand Vita was found with lower carbohydrate content

## Total Milk Fat

The fat content of milk is the proportion of milk made up by butterfat. As per the Indian Standards, dahi should have the same minimum percentage of milk fat as the milk from which it is prepared. Where dahi or curd is sold or offered for sale without any indication of class of milk, the standards prescribed for dahi prepared from buffalo milk shall apply.

**All brands have met the minimum requirement for fat content, specified as 4.5 for standardized milk , 3.0 for toned milk and 1.5 for double toned milk.**

Brand	Result, %	Milk used for making dahi as claimed	Min. Requirement of FSSAI for Fat
<b>Probiotic Dahi</b>			
Mother Dairy B-Active	1.58	Double Toned Milk	1.5
Nestle Actiplus	1.54	Double Toned Milk	1.5
<b>Plain Dahi</b>			
Amul Masti	3.12	Toned Milk	3.0
Britannia Daily Fresh	3.15	Toned Milk	3.0
Reliance Dairy Life	3.09	Toned Milk	3.0
Mother Dairy	4.57	Standardized Milk	4.5
Nestle	3.16	Toned Milk	3.0
Vita	3.20	Toned Milk	3.0
Verka	3.13	Toned Milk	3.0



## Solid Not Fat (SNF)

Milk has two inherent major ingredients, one is fat and the other is SNF. Remaining is water in higher percentage. SNF stands for Solid Not Fat i.e. apart from fat all other solids, like vitamins, minerals, protein & lactose put together make SNF. SNF is the most essential part of the milk. As per the Indian Standards, dahi should have the same minimum percentage of 'milk solid not fat' as the milk from which it is prepared. Where dahi is sold or offered for sale without any indication of class of milk, the standards prescribed for dahi prepared from buffalo milk shall apply.

Brand	Result, %	Milk used for making dahi as claimed	Requirement of FSSAI for SNF	Score out of 9
<b>Probiotic Dahi</b>				
Nestle Actiplus	11.44	Double Toned Milk	9.0	8.49
Mother Dairy B-Active	10.87	Double Toned Milk	9.0	7.98
<b>Plain Dahi</b>				
Britannia Daily Fresh	11.68	Toned Milk	8.5	9.0
Mother Dairy	11.03	Standardized Milk	8.5	8.12
Verka	10.71	Toned Milk	8.5	7.83
Reliance Dairy Life	10.57	Toned Milk	8.5	7.71
Amul Masti	10.46	Toned Milk	8.5	7.61
Nestle	10.16	Toned Milk	8.5	7.34
Vita	9.89	Toned Milk	8.5	7.10

All the brands of dahi met the minimum requirement for SNF content and were found with more than the minimum specified requirement, which is good news for consumers. Brand Britannia 'Daily Fresh'- plain dahi had the highest percentage (11.68%) of SNF followed by Nestle Actiplus dahi (11.44%) and Mother Dairy Plain dahi (11.03%).

(5.58%) followed by Nestle Actiplus (5.64%) and Amul Masti (5.68%).

## Cholesterol

Cholesterol is a sterol (a combination of steroid and alcohol) a lipid formed in the cell membrane of all body tissue. Cholesterol plays a central role in many biochemical processes but is best known for its association with cardiovascular diseases. Cholesterol, especially the bad one also increases the risk of nervous system problems, brain synapse connectivity, gall bladder stones and perhaps even cancer. It is expected to be as low as possible. Brand Amul Masti and Reliance Dairy Fresh did not meet their claim

for cholesterol content and had cholesterol content beyond its claimed' value. Brand Mother dairy was found with highest cholesterol content (9.34 mg/100g) followed by Amul Masti (9.02 mg/100g) and Mother Dairy B-Active. Brand Nestle Actiplus was found with the lowest cholesterol content followed by Reliance Dairy Life and Verka .

## Saturated Fat

Is expected to be less in dahi. Brand Britannia Daily Fresh did not meet its claim for saturated fat content which was found to be beyond the claim value. Brand 'Reliance Dairy Life' was found with the lowest saturated fat content

(1.8%). Brand Amul Masti & Verka had highest saturated fat content (2.2%). Their scores were from 2 points.

## Minerals

Brand Amul Masti did not meet its claim for phosphorus content hence got lesser weightage. Brand Nestle Actiplus had a higher phosphorus content however brand Nestle plain dahi had a lower phosphorus content.

## Calcium

Brand Mother Dairy B-Active and Amul Masti did not meet its claim for calcium content hence got lesser weightage. Brand Britannia Daily Fresh had a higher calcium content however brand Mother Dairy B-Active had lower calcium content.

## Heavy Metals

Heavy metals are metallic or chemical elements that have a relatively high density and are toxic or poisonous at high concentrations. We analyzed dahi for Lead & Arsenic. All the brands of dahi were found within the safe limit of heavy metal content.

## Microbiological Tests

Microbiological contamination is a very serious issue for milk products. Microorganisms are responsible for many food borne diseases. We conducted this test for Yeast & Mould & Coliform count.

All the brands of dahi were found free from any microbial contamination hence got full weightage.

## Sensory Panel Tests

This is a very important parameter where subjective Panel tests were conducted based on the critical examination and opinion of panelists. Since most consumers are very critical about the selection of products from retail store, price also plays an important role to make a brand most / least acceptable. During this test,

## Useful (Probiotic) Bacteria

Useful or healthy bacteria are those microorganisms which give good health effects. We tested dahi brands of both probiotic and plain dahi category for Lactobacillus acidophilus, S. thermophilus, Bifidobacterium and L. bulgaricus. We found Lactobacillus acidophilus, S. thermophilus in all plain dahi brands. Probiotic dahi brands claimed that they have more beneficial bacteria that is good for health, however we found in our study that plain dahi also had good bacteria in significant quantity. Bulgaricus was absent from all brands.

Brand	Lactobacillus acidophilus cfu/gm	S. thermophilus	Bifido bacteria	Total useful bacteria	Score out of 10
<b>Probiotic Dahi</b>					
Mother Dairy b-Activ	$24 \times 10^7$	Not claimed-not detected	$5.4 \times 10^7$	294000000	9.0
Nestle Actiplus	$20 \times 10^7$	Not claimed-not detected	Not claimed-Not detected	200000000	8.5
<b>Plain Dahi</b>					
Nestle	$50 \times 10^7$	$95 \times 10^5$	Not claimed	509500000	10.0
Mother Dairy	$25 \times 10^7$	$125 \times 10^5$	Not claimed	262500000	8.75
Verka	$22 \times 10^7$	$17 \times 10^4$	Not claimed	220170000	8.6
Vita	$5 \times 10^6$	$35 \times 10^4$	Not claimed	5350000	6.0
Amul Masti	$36 \times 10^4$	$15 \times 10^3$	Not claimed	375000	4.0
Reliance Dairy Life	$32 \times 10^3$	$10 \times 10^2$	Not claimed	33000	2.1
Britannia Daily Fresh	$30 \times 10^3$	$12 \times 10^2$	Not claimed	31200	2.0

**Note:** L. bulgaricus bacteria was found absent and was not claimed in any brand samples, chosen for testing.

**Probiotic Dahi:** Mother Dairy B-Activ was found to have more Probiotic bacteria than Nestle Actiplus.

**Plain dahi:** Brand Nestle plain dahi had the highest quantity of useful bacteria, followed by Mother dairy plain dahi and Verka. Brand Britannia Daily Fresh had the lowest content of useful bacteria followed by Reliance Dairy Life and Amul Masti.

we determine the overall organoleptic (sensory) quality of the product in terms of consumptions. We conducted the sensory tests for Colour & Appearance, Flavour, Taste, Sweetness, 'after taste feel' & Overall acceptability. These tests were conducted in the lab involving panel members and under the supervision of trained experts.

**Brand** Mother Dairy B-Active was found most acceptable in organoleptic properties followed by Vita and Verka. Brand Britannia Daily Fresh was least acceptable in sensory tests.

## Conclusion of packaged Dahi

One of the major tests conducted on the packaged curd (Dahi) were the useful bacteria namely lactobacillus acidophilus etc. mainly used to make the Dahi. This bacteria was found in quantities varying from tens of thousands to millions/billions. In the ideal/normal case, it should be in billions ( $1 \times 10^7$ ). In probiotics additional friendly bacteria are added to produce the probiotic Dahi to give added advantage to consumers, desiring to consume this variant. In this variant of brands of Mother Dairy

plus (b-Activ) and Nestle's probiotic, we found Bifido bacteria as additional bacteria in the brand Mother Dairy which was in  $5.4 (10^7)$  counts. Both these brands were produced from doubled toned milk. Brands Britannia & Reliance Dairy Life had lesser quantity of useful bacteria as compared to brands Mother dairy & Nestle (regular dahi), that had the useful bacteria in more than billions. In terms of fat, all the brands conform to the requirement of Dahi prepared from double toned/toned & standard (standards as well as the one declared, based on which category of milk it is produced from), falling closer to the minimum specified requirement. In terms of SNF (solid not fat), brands Britannia, Nestle & Mother Dairy had the highest % of SNF. Brand Vita had slightly lesser SNF.

The important test which was conducted, was to determine cholesterol levels, which is inherent, found due to its presence in fresh milk. It was lowest in the brands Nestle Acti Plus, Verka & Reliance Dairy Fresh. The highest was in the brands Mother Dairy (9.34%) Amul Masti (9.02%). There were also various other quality tests, namely protein, calcium, phosphorus, carbohydrates as well as safety tests that were conducted where all the brands met the specified requirements.

**In the overall test performance brand Nestle and Verka are the top performers in Plain Dahi.**



**Best Value for money Verka**



## Difference between Cow and Buffalo Milk

### Description

Cows and buffaloes are both large domesticated cattle animals of the bovine subfamily, but differ in their tribe and genus. A good cow gives around 15 to 20 liters of milk, whereas a good buffalo gives anywhere between 7 to 11 liters milk per day.

### Properties

Buffalo milk contains higher total solids than cow milk, which makes it thicker. Buffalo milk has 100% more fat content than cow's milk, which makes it creamier and thicker. Due to high peroxidase activity (family of enzymes that are a catalyst for reactions), buffalo milk can be preserved naturally for a longer period. Buffalo milk contains more calcium, a better calcium to phosphorous ratio and less sodium and potassium which makes it a better nutritional supplement for infants. Cow's milk is extremely rich in iodine. It has good amounts of minerals like Calcium and Phosphorus.



### Top consumers/producers

India followed by Pakistan is the top producer of buffalo milk. China and Italy follow. India is the top producer and consumer of cow and buffalo milk. Western countries consume mostly cow's milk.

### Health benefits

Higher total solids in buffalo milk also provide for more calories than cow milk (100 calories are derived from 100g of buffalo milk while 70 calories from 100g of cow milk). Buffalo milk contains less cholesterol (total cholesterol 275 mg and free cholesterol

212mg per 100 g of fat) compared to cow milk (total cholesterol 330 mg and free cholesterol 280mg per 100 g of fat) Buffalo's milk is good for healthy bones, dental health, cardiovascular health and weight gain.

Cow's milk is beneficial for healthy bones, dental health, obesity reduction in children, protection from thyroid and protection of heart.

[www.diffen.com/difference/ Buffalo\\_Milk\\_vs\\_Cow\\_Milk](http://www.diffen.com/difference/ Buffalo_Milk_vs_Cow_Milk)

### Comparison chart

	Buffalo Milk	Cow Milk
Uses:	Produces thick and creamy dairy products suitable for the manufacture of traditional (indigenous) milk products like Khoa, Yogurt, Paneer (Cottage cheese), creamy desserts, Malai, Kulfi and Ghee 	Dairy products: curds, sweets, cheese – but less thick and creamy 
Top consumers/producers:	India is top followed by Pakistan. Not consumed in western countries apart from Italy	Consumed all over the world, especially western countries
Health benefits:	More cholesterol, more fat, more calories.	Less cholesterol, less fat, lesser calories.
Properties:	100% more fat content than cow's milk; preserved for longer	Lower in fat than buffalo milk; preserved for less time.
Description:	White, non-transparent liquid from the mammary animal, the buffalo.	White, non-transparent liquid from the mammary animal, the cow.

## COMPARATIVE PERFORMANCE SCORE OF DAHI( Probiotic & Normal Dahi)

Brand Parameter	Probiotic Dahi					Plain Dahi				
	Wt. %	Mother Dairy b-Activ	Nestle Actiplus	Nestle	Verka	Mother Dairy	Vita	Reliance Dairy Life	Amul Masti	Britannia Daily Fresh
Net weight, gms	400	400	400	400	400	400	400	400	400	400
MRP/Retail Price, Rs.	36/36	48/48	42/42	22/22	35/35	22/22	40/40	32/32	40/40	40/40
<b>Physico-Chemical Tests</b>										
Acidity as lactic acid	4	3.80	3.70	3.70	3.80	4.0	3.90	3.90	3.50	3.70
Solid not fat	9	7.98	8.49	7.34	7.83	8.12	7.10	7.71	7.61	9.0
Carbohydrate	4	2.68	2.26	3.25	2.76	2.76	2.67	2.95	3.09	2.44
Cholesterol	3	2.22	2.92	2.26	2.32	2.12	2.25	2.32	2.20	2.28
Saturated fat	2	1.81	1.90	1.81	1.62	1.71	1.71	2.0	1.62	1.90
Phosphorus	2	1.94	1.95	1.76	1.84	1.84	1.82	1.85	1.90	1.87
Calcium	2	1.79	1.82	1.93	1.81	1.81	1.92	1.83	1.89	2.0
Total milk fat	8	6.74	6.44	6.74	6.67	6.49	6.82	6.38	6.44	6.72
Milk protein	5	3.92	3.70	4.64	4.08	4.20	4.48	4.03	3.82	4.18
Heavy metals as lead & arsenic	3	2.93	2.86	3.0	2.85	3.0	2.93	3	2.93	2.93
<b>Microbiological tests</b>										
Useful bacteria as Lactophilus , S.thermophilus , bifido bacteria (A)	10	9.0	8.5	10.0	8.6	8.75	6.0	2.1	4.0	2.0
Harmful Bacteria as Yeast & mould , Coliform (B)	6	6	6	6	6	6	6	6	6	6
Net weight	3	3	3	3	3	3	3	3	3	3
<b>Sensory Tests *</b>	<b>26</b>	<b>21.60</b>	<b>16.63</b>	<b>20.14</b>	<b>20.84</b>	<b>19.22</b>	<b>21.57</b>	<b>20.27</b>	<b>19.46</b>	<b>17.06</b>
Packing	3	2.7	2.7	2.7	2.7	2.7	2.7	3.0	2.7	2.7
Marking	10	7.0	10.0	10.0	10.0	10.0	10.0	10.0	9.5	10.0
<b>Overall Score (rounded off)</b>	<b>100</b>	<b>85.1</b>	<b>82.9</b>	<b>88.3</b>	<b>86.7</b>	<b>85.7</b>	<b>84.9</b>	<b>80.3</b>	<b>79.7</b>	<b>77.8</b>

Rating: >90 – Excellent \*\*\*\*\*, 71-90- Very Good \*\*\*\*\*, 51-70- Good \*\*\*, 31-50- Average \*\*, upto 30 – Poor \*

\* Sensory tests include Colour, Appearance, Flavour & Odour conducted with panel experts.