



Paneer: Eat It with Caution Except One, All Brands Fail Crucial Tests

While cooking the occasional meal—for a break from regular veggies, for entertaining guests, for alternatives to non-vegetarian yet equally tasty food—paneer is probably the first and only food item that comes to the mind of most vegetarians. In view of its popularity, the findings of this report will not amuse the serious paneer eaters. The facts that will unravel point by point in the following report may discourage them from consuming their favourite food item on a regular basis, and in any case from consuming it in raw form.

It will surprise many of you that all brands of paneer except Mother Dairy have failed the *Consumer Voice* microbiological tests and are rated 'poor' for not complying with standards and allowing microbiological activity. We will not say that one must stop eating paneer completely – but we seriously recommend stopping its consumption in raw form.

We tested paneer on physical, chemical, microbiological and sensory parameters, and generally the test results are shared in that order. Here, we are beginning the report with results of microbiological tests

as the results of these tests nullify all other results and we have had to rate all brands, except Mother Dairy, as 'poor'. Although, most brands perform fine in various other tests, failing the microbiological test means that they are 'not suitable for consumption'. Hence, better performance in other tests on all other parameters including packaging information, appearance, or organoleptic properties becomes useless.

Here are the results of the microbiological tests.

Most edible products are normally contaminated with microbes (or microorganisms). They are so small

Brands Tested
Mother Dairy
Verka
Amul
Ananda
Easy Day (Great Value)
Gopaljee
Hatsun
Heritage
Nandini
Nilgiri's
Paras
Vijay
Vita
Fresh paneer (non-branded loose paneer bought from a popular dairy [Haryana Dairy, Fatehpuri, Delhi])

Key Findings

- Only Mother Dairy fully complies with the microbiological test requirements – that is, total plate count (TPC), coliform and yeast and mould. None of the other tested brands fully comply with the microbiological requirements.
- Vijay, Nandini and Amul do not meet the minimum requirement of having 50 per cent fat. Vijay has the lowest with a mere 20 per cent fat – only 20gm/100gm fat is found on dry basis.
- All the brands exceed the maximum permissible limit for acidity (0.5gm/100gm).
- Vijay surpasses the permissible limit (60 per cent) for moisture by nearly eight per cent.
- Loosely sold paneer (applies only to sample as preparations of all dairies vary) scores highest in sensory attributes but do not comply with the microbiological test.

Our Recommendation

Mother Dairy* is the only brand (among the ones tested by us) that we recommend for consumption in raw as well as cooked form.

**(Disclaimer: Refers to sample purchased by Consumer Voice. The quality, safety and hygiene of paneer will depend on the conditions of storage [specifically, how effectively the cold chain is maintained throughout the supply chain] and may vary from retailer to retailer.)*

that we need a microscope to see them. Microbes include bacteria, yeast, mould, algae and protozoan. However, the organisms that normally contaminate and spoil foods are the bacterium with yeast and moulds of secondary importance. Under normal conditions, microbes feed on the food in which they live and reproduce and cause a variety of changes in the food, most of which result in a loss of the food's quality.

Hence, there's an acceptable standard limit of microbes prescribed for each food item. Given here are acceptable and non-acceptable limits of total plate count (TPC), coliform and yeast and mould for paneer.

- i) Total plate count [TPC, colony-forming unit (cfu)/ gm] m: 300,000 per gram, M: 500,000 per gram
- ii) Coliform [cfu/gram] m: 50 per gram, M: 90 per gram

iii) Yeast and mould [cfu/gram]

m: 150 per gram, M: 250 per gram

Here 'm' represents an acceptable level and values that are only marginally above it are acceptable. The 'M' here shows a microbiological criterion that separates 'marginally acceptable quality' from 'unsatisfactory/potentially hazardous quality'. Values above M are unacceptable.

Except Mother Dairy, all the tested brands crossed the maximum permissible limit for microbiological parameters (TPC, coliform and yeast and mould) by a huge margin, making the paneer unsuitable for human consumption, at least in its raw form. Only Mother Dairy paneer could pass all microbiological tests. Verka and Amul performed fine in two tests (TPC and yeast and mould) but had a slightly higher count of coliform; hence, they too are not recommended.

COMPARATIVE TEST

Results of Microbiological Tests			
Brand	Results		
	TPC (per gram)	Coliform (cfu/gram)	Yeast and Mould (cfu/gram)
Mother Dairy	3,227	20	Not detected
Verka	259,091	6,636	25
Amul	486,364	291	Not detected
Ananda	41,818,182	12,364	509,091
Easy Day (Great Value)	8,909,091	3,045	3,045
Gopaljee	34,545,455	30,000	64,091
Hatsun	2,468,182	31,364	568,182
Heritage	46,363,636	42,273	211,364
Nandini	26,318,182	30,455	115,909
Nilgiri's	2,390,909	600	127
Paras	472,727	1,259	20,000
Vijay	114,545,455	30	7,273
Vita	9,000,000	32,727	86,363
Fresh paneer	3,136,364	291	236,364

Production Process of Paneer
Milk standardization (should have minimum fat of 5.8% and SNF 9.5%)
↓ Heat treatment (milk is heated at 85 °C–90 °C)
↓ Curd formation (1%–2% of citric acid is added per litre of milk)
↓ Whey drainage (excess water is removed)
↓ Hooping (curd is transferred to muslin cloth)
↓ Pressing (hoops are pressed at 8–13 kPa pressure for 10–15 minutes)
↓ Cooling (pressed hoops are cooled at 4 °C for 10–15 minutes)
↓ Cutting, weighing and packing





Other Test Results

Packaging

Paneer should be packed in clean and suitable food-grade packet/wrapper that can protect its flavour and smell and not let it get contaminated. Only food-grade packaging conforming to the relevant Indian Standard should be used.

Except Ananda, all the brands of paneer that we bought are packed in printed PVC material (poly pack). Ananda is packed in blister transparent packet, which is a bit better than PVC packs.

The loose paneer was wrapped in recyclable paper covered in biodegradable PVC material. However, this packing cannot be generalized for loose paneer as you may see it being sold even in low-grade polythene bags and at some places wrapped in used newspapers, both of which are unhygienic and not recommended.

Labelling

As per the national standards requirement, the following details should be clearly and indelibly marked on the labels (not applicable to loosely sold paneer):

- Name and trade name of product
- Name and address of manufacturer/marketer
- Batch or code number

- Net mass in grams
- Month and year of manufacture
- Best before (the date given by the manufacturer)
- Green dot
- Instructions for storage
- Nutritional information
- Maximum retail price

Vita did not reveal nutritional information on its pack. This is a mandatory requirement as per Food Safety and Standards (FSS) Rules, 2011, and Bureau of Indian Standards (BIS). All brands except Vita contained the required information and scored equal points.









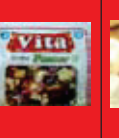


COMPARATIVE TEST

Comparative Performance Rating

Brand→ Test Parameters↓	Weightage %	Mother Dairy 	Amul 	Verka 	Paras 	Easy Day 
MRP (Rs)/weight (gm)		55/200	50/200	42/200	50/200	50/200
1. General						
1.1 Packaging	3	2.8	2.8	2.8	2.8	2.8
1.2 Marking	5	5	5	5	5	5
1.3 Net weight	2	2.0	2.0	2.0	1.81	2.0
2. Sensory Panel Tests*	25	20.40	17.57	19.92	18.26	20.37
3. Physico-Chemical Tests						
3.1 Fat	14	8.54	6.39	8.46	9.30	10.55
3.2 Protein	9	6.92	9.00	6.42	6.78	6.40
3.3 Moisture	7	5.30	6.19	5.11	4.44	4.84
3.4 Energy value	6	5.47	5.83	5.34	5.00	5.37
3.5 Acidity	5	1.42	2.17	1.29	1.33	1.26
3.6 Cholesterol	5	4.49	2.9	2.52	5.00	4.65
3.7 Calcium	4	3.76	3.97	2.44	3.11	3.01
4. Microbiological Tests**	15	15	Poor			
Overall Score (Rounded off)	100	81				

Rating: >90: very good*****, 71– 90: good*****, 51– 70: fair****, 31– 50: average**, up to 30: poor*
 *Sensory panel tests include package, body and texture, colour and appearance, flavour/odour, taste and after-taste.

of Packaged Paneer

Gopaljee (G+)	Ananda	Heritage	Hatsun	Nilgiri's	Nandini	Vita	Loose paneer#	Vijay
								
52/200	50/200	60/200	58/200	50/200	50/200	42/200	32/200	53/200
2.8	3	2.8	2.8	2.8	2.8	2.8	N.A	2.8
5	5	5	5	5	5	1.5	N.A	5
2.0	1.9	1.97	2.0	1.99	1.97	1.81	1.97	2.0
18.01	19.94	19.07	17.71	15.76	16.64	15.16	22.36	14.36
12.10	10.29	9.67	8.54	8.59	7.21	10.90	10.40	2.8
6.62	5.96	6.90	6.30	7.50	7.77	6.21	4.55	7.29
5.42	5.12	4.59	4.65	4.61	5.51	4.83	3.90	2.47
5.99	5.53	5.07	5.01	4.98	5.46	5.40	4.60	2.51
1.20	1.25	1.45	2.11	1.25	1.44	1.16	1.68	1.48
3.48	2.55	2.87	5.00	3.11	1.88	5.00	1.75	5.00
3.38	3.05	3.03	2.72	2.53	3.42	2.68	3.59	3.33
Poor								
Downgraded to poor as not fully complying with microbiological requirement								

**Microbiological tests include total plate count, coliform and yeast and mould count.

#Loose paneer purchased from Haryana Dairy, Fatehpuri (Delhi), a major retailer and distributor

COMPARATIVE TEST

Test Findings						
Brand ↓	Net weight (in grams)		Moisture	Fat	Acidity	
	Result	Declared#	(in gram per 100 grams)			
Requirements	As declared		Max.-60%	Min.- 50gm/100gm	Max.- 0.50gm/100gm	
Mother Dairy	200.02	200	47.14	50.34	1.05	
Verka	200.03	200	48.43	50.14	1.16	
Amul	200.05	200	40.78	44.57	0.69	
Ananda	199.95	200	48.4	55.05	1.2	
Easy Day	200.10	200	50.37	55.75	1.19	
Gopaljee	200.04	200	46.28	59.92	1.24	
Hatsun	200.03	200	51.72	50.34	0.71	
Heritage	199.89	200	52.21	53.38	1.03	
Nandini	199.88	200	45.61	46.78	1.04	
Nilgiri's	199.98	200	52.05	50.49	1.20	
Paras	199.06	200	53.27	52.39	1.12	
Vijay	200.01	200	67.32	20.45	1.01	
Vita	199.08	200	50.50	56.70	1.29	
Loose paneer	199.89	200	57.09	55.35	0.89	

#Declared here means the claims that brands make on their respective packets

*Detection limit of the method used by the test laboratory is 15mg/100gm

on Parameters excluding Microbiological Tests								
Calcium (milligram per 100 grams)		Protein (gram per 100 grams)		Energy Value (KCal)		Cholesterol		
Results	Declared#	Results	Declared#	Results	Declared#	Results	Declared#	
As Declared		As Declared		As Declared		As Declared		
611.39	485	20.00	18.5	337.73	309	22.08	Not declared (ND)	
396.62	Not declared	18.57	18	329.57	300	49.25	ND	
645.96	480	26.2	14	359.85	289	42.77	66	
497.1	485	17.24	18.5	341.19	284	48.81	ND	
490.00	485	18.51	18.5	331.43	320	19.82	ND	
550.45	485	19.13	18.5	369.59	284	35.96	ND	
443.16	470	18.20	15.0	309.18	279	<15*	ND	
493.44	480	19.94	14.0	312.83	290	44.36	ND	
556.56	Not declared	22.45	18.6	337.06	297	58.16	ND	
412.26	Not declared	21.68	21	307.26	307	40.99	0.00	
506.47	Not declared	19.61	21	308.88	317	<15	69	
542.54	9%	20.90	10	155.10	180	<15*	25	
436.23	Not declared	17.95	18	333.41	125	<15*	ND	
583.44	Not applicable	13.17	Not applicable	284.27	Not applicable	58.90	ND	

COMPARATIVE TEST

Physical and Chemical Characteristics

- **Net Weight**

Paneer packets were unpacked and the weight was measured and compared with their declared values.

All the brands were within the maximum permissible limit of net weight as per Legal Metrology Rules.

- **Moisture**

Paneer is a highly perishable milk product that deteriorates rapidly because of high moisture content. Moisture up to a certain limit is an inherent part of fresh paneer in judging the quality of paneer. As per the national standards, it should not be more than 60 per cent.

Vijay contained 7.32 per cent more moisture than allowed, hence failed the test. Moisture in all other brands was found within the standard limit.

- **Fat (on dry basis)**

Paneer derived from split milk contains mainly milk fat, which is highly essential for better health. Fat helps in gaining of weight as well as for digestion of certain fat-soluble vitamins. The percentage of fat in paneer varies due to variation in milk composition as well as source – generally buffalo's milk has more fat than that of cow. As per the national standards, paneer should contain at least 50gm/100gm of fat when measured on dry basis.

Nandini and Amul had slightly low amount of fat and Vijay (20.45gm/100gm) contained the lowest fat – way below the recommended weight.

- **Acidity**

The maximum acidity allowed is 0.50 grams per 100 grams. Presence of acidity as lactic acid was measured in paneer as its presence in high quantity could cause paneer to become bitter and also allow microbiological activity to begin.

All the brands surpassed the maximum limit of 0.5gm/100gm as per the standards.

- **Calcium**

Paneer is a good source of calcium and its consumption helps in preventing osteoporosis. As per recommended dietary allowances (RDA), daily calcium intake is 1,000 milligrams for those who are 19 years to 50 years old. Paneer contributes around 40 per cent to 50 per cent of daily value of calcium.

Amul contains the highest amount of calcium, followed by Mother Dairy.

- **Protein (on dry basis)**

Paneer is also a rich source of protein and is a substitute for non-vegetarian foods.

Amul (26.2gm/100gm) had highest amount of protein, followed by Nandini and Nilgiri's.

- **Energy Value (Kcal)**

Energy value for all the brands was quantified and also compared with the declared value.

Gopaljee was found to provide the maximum energy among all, followed by Amul and Ananda. Brand Vijay contained the lowest energy value.

- **Cholesterol**

Cholesterol is a lipid (fat) that is produced by the liver. Cholesterol is vital for normal body function. Every cell in our body has cholesterol in its outer layer.

Loose paneer (58.90) was found with highest amount of cholesterol, followed by Nandini and Verka.

Paras, Vita, Hatsun and Vijay had cholesterol levels below the detection limit.



Reaction of Manufacturers

As a matter of policy, before publication the test results of the brands tested are shared with their respective manufacturers/marketers inviting their views/comments. We reproduce here the reactions:

Manufacturer	Manufacturer's Comments	VOICE Society' Reply
Amul	i) The result reported for 'fat' is quite low as per their standards and records. ii) TPC and coliform reported are higher than their standards and records.	i) We retested for fat and the results are nearly the same as reported earlier. ii) Our test lab repeated the microbial tests and reconfirmed the high value as reported.
Verka	Commented on test results of coliform, which was above the permissible limit, and questioned the sampling plan, cold chain maintenance and testing errors.	Utmost care was taken to maintain the cold chain during the handling and transportation of product from retailer to the laboratory. Testing was carried out in a hygienic, air conditioned and controlled environment by qualified and experienced lab experts.
Vita	Commented on the microbiological test results and questioned the cold chain maintenance.	Same as above.
Easy Day (Great Value)	Tested the product through an independent lab and found points of difference between their report and the one shared by us.	We had picked up the product from retail market and got it tested in a NABL-accredited independent test lab, who had double-checked for microbial results before reporting.

Sensory/Organoleptic Tests

Based on the guidelines of IS: 15346-2003 (Method for sensory evaluation of paneer/channa), the following attributes were considered for judging the sensory attributes of paneer. The tests were conducted by expert panellists. Scores were given on a 100 scale by each panel members and average mean scores were taken.

Appearance

Paneer shall be clear and free from dirt, surface discolouration, insects and rodent contamination, foreign matter/particles and adulterants. It shall not have any free moisture/water.

Flavour/Odour

Paneer shall have a pleasant odour and characteristic mild acidic flavour. It should be free from off-flavour and odour.

Texture and Colour

Paneer shall have a closely knit smooth and homogeneous texture, and firm, cohesive and spongy body. It should have milky white colour and no extraneous colouring matter shall be added to it.

Taste and After-Taste Feeling

Paneer shall have a good pleasant taste and not be bitter or have a smoky taste.

Loose paneer turned out to be the best in all the sensory attributes, followed by Mother Dairy and Ananda.

Brand→ Parameter↓	Loose paneer	Mother Dairy	Ananda	Gopaljee	Easy Day	Paras	Verka	Vita	Hatsun	Nandini	Nilgiri's	Heritage	Vijay	Amul
Package	NA	85.5	87.0	86.7	89.5	86.0	83.0	76.5	82.8	85.0	79.4	85.6	77.5	82.1
Body and texture	90.0	76.5	82.5	72.2	84.0	67.8	78.5	61.7	73.9	63.6	56.9	80.0	67.8	55.0
Colour and appearance	91.1	77.0	76.0	63.3	80.0	65.0	80.0	64.0	47.5	41.9	46.4	81.7	68.1	75.7
Flavour/Odour	86.7	86.1	77.8	65.5	76.0	72.5	80.5	47.0	75.7	72.9	63.1	71.7	38.9	70.0
Taste and after-taste	90.0	83.0	75.6	72.5	78.0	74.0	76.5	54.0	74.4	69.4	69.4	62.5	35.0	68.6