



Ghee

What's in it for me? And is it adulteration-free?

What do we need to test ghee for, you may wonder. Isn't it a pure form of fat, with some essential properties for health? And it has a special place in India's traditions, being used for cooking as well as religious rituals. Ghee did fall out of favour in recent times, what with the proliferation and popularity of refined oils in the majority of urban homes, but slowly and surely it is now starting to claim its place back thanks mainly to various studies endorsing its beneficial properties. It may even be termed as the emerging superfood of our times, becoming a hot thing not just in India but globally as well. With a bevy of brands leaving us consumers quite spoilt for choice, it may be useful to know the parameters with which to assess their quality and acceptability. A couple of findings from our test results may leave us somewhat surprised. For example, though ghee is expected to be rich in vitamin E, the same was below detection limit (0.50 mg/100 gm) in all the brands we tested. What about vitamin A then? And the other nutrients that ghee is so eulogised for? Read on to get the report on 14 leading ghee brands.

A Consumer Voice Report

As per our standard procedure, we undertook market research to identify the regular-selling brands of ghee across the country. We tested 14 brands (6 desi ghee brands and 8 cow ghee brands) on various quality, safety and acceptability parameters. One brand, Navdanya, claims to be desi cow ghee and

also happens to be the costliest (Rs 660 for 330 gm).

The key parameters for which the ghee brands were tested included milk fat, vitamins A and E, energy

The samples were tested as per specification laid out by FSS Regulations 2011, Agmark and Indian Standard IS: 16326:2015.

value and various fats. We also carried out a series of tests to check for adulteration (with vegetable fats, animal body fats, etc.). The testing was conducted at an NABL-accredited laboratory.

Ghee means the pure clarified fat derived solely from milk or curd or from desi (cooking) butter or from cream to which no colouring matter or preservative has been added. To clarify means removal of unwanted solid matter or impurities. Due to variation in its composition from region to region and season to season, depending on the type of animal and the feed given, the establishment of its purity often involves elaborate analysis, as well as tests for its keeping quality.

Ghee is a carrier of the fat-soluble vitamins A, D, E and K, which our body needs in very small quantities but cannot make for itself. These vitamins perform many essential functions. Similarly, the essential fatty acids, which cannot be synthesised in our body, are also supplied by ghee.

CV RECOMMENDATIONS | TOP PERFORMERS

COW GHEE

Patanjali | Gowardhan | Ksheer

DESI GHEE

Mother Dairy



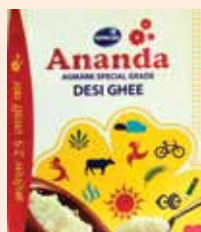
VALUE FOR MONEY

COW GHEE

Ksheer

DESI GHEE

Ananda



Comparative Test

BRANDS

Rank	Total Score out of 100 (rounded off)	Brand	MRP (Rs)	Net Weight
Cow Ghee				
1	86	Patanjali	290	500 ml (452.5 gm)
1	86	Gowardhan	255	500 ml (452.5 gm)
1	86	Ksheer	470	1 litre (900 gm)
2	85	Anik	238	500 ml (449 gm)
2	85	Mother Dairy	260 (Rs 15 off)	500 ml (451gm)
3	84	Amul	450	1 litre (905 gm)
3	84	Paras	250	500 ml (450 gm)
Desi Ghee				
1	88	Mother Dairy	230	500 ml (451 gm)
2	87	Nestle Milkmaid	250	500 ml (449.5 gm)
2	87	Milkfood	228	500 ml (449 gm)
3	85	Ananda	440	1 litre (900 gm)
4	83	Madhusudan	230	500 ml (449 gm)
4	83	Amul	230	500 ml (452 gm)
Desi Cow Ghee				
	88	Navdanya	660	330 gm

Score Rating: >90: very good*****, 71-90: good****, 51-70: fair***, 31-50: average**, up to 30: poor*



TESTED

	Cost per 100 gm, Rs	Agmark	Best before (Months)	Manufactured/Marketed by
	58	-	9 months	Patanjali Ayurved Ltd
	51	-	12 months	Parag Milk Foods Ltd
	47	-	12 months	Dharampal Satyapal Ltd
	47.6	-	12 months	Anik Milk Products Pvt. Ltd
	52	-	8 months	Mother Dairy Fruits & Vegetable Pvt. Ltd
	45	Agmark special grade	9 months	Gujarat Co-operative Milk Marketing Federation Ltd
	50	-	9 months	VRS Foods Ltd
	46	-	9 months	Modern Dairies Ltd
	50	Agmark special grade	9 months	Nestle Milkmaid India Ltd
	45.6	Agmark special grade	12 months	Milk Food Ltd
	44	Agmark special grade	9 months	Gopaljee Dairy Foods Pvt. Ltd
	46	Agmark special grade	9 months	Creamy Foods Ltd
	46	Agmark special grade	9 months	Gujarat Co-operative Milk Marketing Federation Ltd
	200	-	12 months	Navdanya

Key Findings

- Based on the overall test findings, the top performers are Patanjali, Gowardhan and Ksheer in cow ghee category, and Mother Dairy in desi ghee category.
- The value-for-money brands are desi ghee Ananda and cow ghee Ksheer.
- All brands are safe for consumption.
- There was no adulteration with vegetable fat and animal fat.
- Most of the brands met the minimum requirements specified in the national standards.
- Vitamin A was highest in Gowardhan among cow ghee brands and in Nestle among desi ghee brands.
- Milk fat was found highest in Patanjali among cow ghee brands and in Nestle Milkmaid among desi ghee brands.
- BR reading of Anik and Amul was found to be lower than the specified value.
- Polenske value of Paras and Mother Dairy was found to be slightly lower than the specified limit.
- Beta-carotene was higher in cow ghee than in desi ghee.
- FSSAI number was not marked on Madhusudan pack.



TEST RESULTS FOR PHYSICOCHEMICAL PARAMETERS

Milk Fat | Vitamin A | Peroxide Value | Moisture | Free Fatty Acid as Oleic Acid | Phytosterol Acetate Test | Presence of Animal Fats | RM Value | BR Reading | Energy Value | Baudouin Test | Phenol phthalein Test | Polenske Value | Coliform | Vitamin E | Cholesterol | Saturated Fat | Trans Fatty Acids | PUFA | MUFA

◆ Milk Fat

Fat is an essential part of any balanced diet, providing essential fatty acids, fat-soluble vitamins and a concentrated source of energy. The minimum requirement for milk fat in ghee is 99.5 per cent.

- All the brands fulfilled the minimum requirement for milk fat content.
- Among cow ghee brands, Patanjali (99.94 per cent) had the highest amount of milk fat; among desi ghee brands, it was Nestle Milkmaid (99.94 per cent).

◆ Vitamin A

For vitamin A, the recommended dietary allowance (RDA) for adults is 600 milligrams daily. As for our tests, we checked the samples for total of vitamin A, which included vitamin A detected and vitamin A converted from beta carotene.

- Vitamin A was highest in Gowardhan cow ghee and lowest in Madhusudan desi ghee.
- Vitamin A from beta carotene was found to be higher in cow ghee than in desi ghee.

◆ Peroxide Value

This parameter is an indicator of rancidity in the product. Peroxide value in ghee shall be a maximum 0.6.

- Peroxide value was below the specified limit in all the brands. Thus they all passed the test.

◆ Moisture

Moisture generally refers to the presence of water in a product. Less amount of moisture is better as it translates into a longer shelf life. As per FSS

Vitamin A and Beta-Carotene

Beta-carotene is a yellow/orange pigment found mostly in fruits and vegetables, especially carrot, mango, papaya, orange, apricot, melon, tomato, pumpkin and spinach. For beta carotene, the recommended dietary allowance (RDA) for an adult is 4,800 milligrams/day.

The human body converts beta-carotene into vitamin A (retinol) – beta-carotene is a precursor of vitamin A.

Here are some of the key health benefits of vitamin A:

- It is critical for good vision.
- It plays an important role in healthy bone growth.
- It is essential for reproduction.
- It plays a role in cell division and cell growth.
- It supports the immune system.
- It supports skin health.



Regulations, moisture content in ghee shall not be more than 0.5 per cent; as per Agmark, it shall not be more than 0.3 per cent.

- *Moisture content in all the brands was less than 0.3 per cent.*
- *Among the cow ghee brands, the lowest moisture content was in Patanjali (0.06 per cent), followed by Mother Dairy (0.07 per cent). Among the desi ghee brands, Nestle Milkmaid (0.06 per cent) had the lowest moisture content.*

◆ Free Fatty Acid (FFA) as Oleic Acid (% by mass)

FFA is the percentage by weight of free acid groups in the oil or fat. Free fatty acids are an indication of



hydrolytic rancidity, though other lipid oxidation processes can also produce acids.

Free fatty acids shall be a maximum three per cent.

- *All brands were within the specified limit.*

◆ Energy Value

Energy value is the amount of calories which our body obtains from food. Energy value is expected to be higher in ghee.

- *Among the tested brands, energy value was highest in Patanjali and Nestle (both 899.46 kcal/100 gm).*

The Adulteration and Purity Tests

◆ Baudouin Test

This test is to distinguish between desi ghee and vanaspati ghee. It may be noted that ghee adulteration with vanaspati, vegetable oils/fats and animal body fats is a key concern.

Results of the Baudouin test shall be negative.

- *All 14 brands passed the test.*

◆ Phenolphthalein Test

The results are required to be negative. Phenolphthalein is used as indicator to detect possible adulteration in the ghee.

- *All brands showed negative and thereby cleared the test.*



◆ Phytosterol Acetate Test

This test detects the adulteration of ghee with vegetable oils. Ghee is an animal fat and contains cholesterol, while all vegetable oils contain sterols of other types which are together termed phytosterols. Note that this test will not detect the presence of animal body fat, such as tallow and lard, in ghee, since these also contain cholesterol.

- All the brands turned in negative results for adulteration and thus passed the test.

◆ Presence of Animal Fats

The ghee brands were tested for possible adulteration with animal fat materials like tallow.

- Animal fat was not detected in any of the brands.

◆ Reichert-Meissl (RM) Value

The RM value is determined when examining fat. It is an indicator of how much volatile fatty acid can be extracted from fat through saponification.

- All tested brands met the requirements set by the national standards.

◆ Butyro Refractometer (BR) Reading (at 40 degrees Celsius)

BR reading is the index of purity of ghee. An increase in BR reading indicates adulteration of ghee with vegetable oil/animal body fat.

- BR reading for Anik and Amul was found to be slightly lower than the specified limit.

◆ Polenske Value

Like the RM value, the Polenske value is also determined when examining fat. It is an indicator of how much volatile fatty acid can be extracted from fat through saponification.

- Polenske values of Paras and Mother Dairy (cow ghee) were found to be lower than the specified range.

Coliform bacteria, the presence of which is an indicator of poor sanitation practices and/or water quality employed in the handling and processing stages, were not detected in any of the ghee brands.

◆ Vitamin E

Vitamin E is a fat-soluble nutrient found in many foods. In the body it acts as an antioxidant, helping to protect cells from the damage caused by free radicals.

- *In the test results, vitamin E was found below detection limit (0.50 mg/100 gm). Paras claimed to contain 2.8 mg/100 gm, but this was not detected in our tests.*

The Fat of the Land

◆ Cholesterol

Ghee is not recommended for individuals already suffering from high cholesterol.

- *Nestle was found to have the highest amount of cholesterol (267.8 mg/100 gm); it was lowest in Anik (251.0 mg/100 gm).*

◆ Saturated Fat

Saturated fats are derived from animal fat as well as vegetable fat. Saturated fats directly raise total and LDL (bad) cholesterol levels. It is expected to be less in ghee.

- *Saturated fat was found highest in Patanjali (72.93 gm/100 gm) and lowest in Milkfood (65.68 gm/100 gm).*

◆ Trans Fatty Acids

Trans fatty acids also raise the level of 'bad' cholesterol in our blood.

- *Highest amount of trans fat was found in Madhusudan (3.37 gm/100 gm); it was lowest in Ananda (0.50 gm/100 gm).*

◆ PUFA

Polyunsaturated fatty acids, or PUFAs, are found in plant and animal foods such as salmon, vegetable oils and some nuts and seeds. Eating moderate amounts of polyunsaturated (and monounsaturated) fat in place of saturated and trans fats can benefit your health. Polyunsaturated fats can help lower your LDL (bad) cholesterol.

- *PUFA was found highest in Navdanya (4.95 gm/100 gm) and lowest in Mother Dairy cow ghee (2.07 gm/100 gm).*

◆ MUFA

Both monounsaturated fatty acids, or MUFAs, and PUFAs are referred to as the healthy fats. MUFAs are associated with lowering the level of bad cholesterol (LDL) and total cholesterol while also increasing the production of the good cholesterol (HDL). These fats can be found in vegetable oils like canola, peanut and olive oil, as well as in nuts.

- *MUFA was found highest in Gowardhan (28.08 gm/100 gm) and Mother Dairy cow ghee (27.28 gm/100 gm), and lowest in Patanjali (22.3 gm/100 gm).*



PHYSICOCHEMICAL

Parameters ↓	Weightage (%)	Cow Ghee							
		Patanjali	Gowardhan	Ksheer	Anik	Mother Dairy	Amul	Paras	
Milk fat	10	9.9	9.6	9.3	9.8	9.8	9.4	9.6	
Vitamin A	7	6.79	7.0	5.09	6.86	6.07	5.07	6.46	
Peroxide value	6	6	4.8	6	6	6	6	6	
Moisture	5	4.93	4.7	4.48	4.85	4.85	4.63	4.7	
Free fatty acid as oleic acid	5	3.92	4.20	4.18	4.23	4.33	4.9	3.38	
Phytosterol acetate test	5	5	5	5	5	5	5	5	
Presence of animal fats	5	5	5	5	5	5	5	5	
RM value	5	3.32	3.49	3.76	2.82	3.70	3.26	3.48	
BR reading	5	3	3	4.5	1.5	3	3	3.0	
Energy value	5	4.23	4.10	3.96	4.19	4.19	4.05	4.10	
Baudouin test	5	5	5	5	5	5	5	5	
Phenolphthalein test	4	4	4	4	4	4	4	4	
Polenske value	4	2.44	3.28	2.88	2.88	1.64	2.04	1.84	
Coliform	3	3	3	3	3	3	3	3	
Vitamin E	3	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
Cholesterol	3	1.86	1.86	1.62	2.07	1.62	1.76	1.94	
Saturated fat	2.5	1.55	1.66	1.64	1.64	1.64	1.63	1.63	
Trans fatty acids	2.5	2.16	2.08	1.94	1.86	2.05	1.73	1.99	
PUFA	2	1.62	1.54	1.57	1.72	1.41	1.57	1.64	
MUFA	2	1.38	1.85	1.70	1.58	1.78	1.66	1.70	

FOR GENERAL QUALITIES

◆ Marking/Labelling

The following details shall be marked on the product label:

- Name of product
- Net quantity (declared)
- Name and address of manufacturer
- Date of packing

- Place of packing
- The words 'Best before'
- Batch or code or melt number
- MRP
- FSSAI license number
- Customer-care details

Tins and plastic containers shall be marked with this instruction: 'This container shall not be reused for packaging oils and fats.'

Parameters ↓	Weightage (%)	Cow Ghee						
		Patanjali	Gowardhan	Ksheer	Anik	Mother Dairy	Amul	Paras
Physical observations	6	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Marking	3	3	3	3	3	3	3	3
Packing	2	1.7	1.5	1.7	1.5	1.2	1.7	1.7

SCORES

	Desi Cow		Desi Ghee				
	Navdanya	Mother Dairy	Nestle	Milkfood	Ananda	Madhusudan	Amul
	9.5	9.4	9.9	9.2	9.7	9.2	9.1
	6.42	5.00	5.47	4.72	4.18	3.91	4.63
	5.34	6	6	4.92	6	6	5.76
	4.63	4.55	4.93	4.4	4.78	4.4	4.33
	4.58	4.63	4.93	4.53	4.93	4.58	4.7
	5	5	5	5	5	5	5
	5	5	5	5	5	5	5
	3.97	4.17	4.14	4.2	4.15	3.86	3.53
	3	4.5	3	4.5	3	3	2.5
	4.05	4.01	4.23	3.92	4.14	3.92	3.87
	5	5	5	5	5	5	5
	4	4	4	4	4	4	4
	3.96	3.56	2.84	3.64	2.24	3.68	2.04
	3	3	3	3	3	3	3
	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	1.89	1.99	1.57	1.99	1.82	1.59	1.76
	1.61	1.63	1.56	1.71	1.59	1.64	1.70
	2.26	2.02	2.26	2.18	2.38	1.66	2.05
	1.99	1.55	1.44	1.88	1.42	1.67	1.92
	1.53	1.70	1.60	1.73	1.72	1.65	1.70

- The FSSAI mark was missing in the Madhusudan packet

◆ Packaging

Packaging plays an important role in maintaining consistent quality of the product and in preventing its deterioration.

- Anik and Gowardhan were packed in plastic boxes; Mother Dairy cow ghee was in a plastic pouch; and Navdanya was packed in a glass bottle. All other brands were in Tetra packs.



	Desi Cow		Desi Ghee				
	Navdanya	Mother Dairy	Nestle	Milkfood	Ananda	Madhusudan	Amul
	6.0	5.7	5.7	5.7	5.7	5.7	5.7
	3	3	3	3	3	2.5	3
	2	1.7	1.7	1.7	1.7	1.7	1.7



Physical Observations

- a) Ghee shall be free from excess moisture.
- b) On melting, the ghee shall be clear, transparent and free from sediment or foreign colouring matter.
- c) A good ghee sample should have well-developed granules dispersed fairly, thickly and uniformly over the entire mass. A bright yellow colour, caused by the presence of carotenoid pigments (beta carotene), is associated with cow ghee and constitutes a desirable criterion in areas where it is preferred. Buffalo ghee is white in colour. Sometimes, it may also have a greenish tinge depending on the region and feeding schedule. Ghee from mixed milk has a straw-yellow colour. The colour of fats always appears deeper to the eyes when melted than when in solid form.

Physical observations on the 14 samples were made by laboratory scientists, checking for colour and texture and whether they were free from sediment and objectionable flavour. Navdanya was given the highest score. The other brands followed close behind and were given equal scores.

Why Cow Ghee Is More Yellow

It is because of the pigment (the natural colouring matter of animal or plant tissue) beta-carotene. Beta-carotene comes from the cows' diet, which consists mostly of dried grass, grass, grains and cereals.

The amount of beta-carotene in cow ghee depends on a few factors including cow's breed; cow feed (grass-fed dairy produce contain more beta-carotene than cows that are fed grains); the season of the year; and the biological makeup of milk throughout the lactation period.

Dear readers: We are open to hearing your suggestions on products and services that you believe should be reviewed/ tested by Team Consumer Voice. You may write to editorial@consumer-voice.org