



Cornflakes

The lesser-known ones are no less

For pretty much all of us, cornflakes are an ideal on-the-go breakfast option. Ideal because they are healthy. So we think. So, are they not? Agreed, they are relatively low in fat, but there is the sugar to think of. There is the added salt (sodium) to consider, too. The national standards in India have spelled out various requirements for cornflakes covering quality, safety and hygiene aspects. At *Consumer Voice*, we selected 11 widely-consumed brands of cornflakes and held them up against these non-negotiable parameters. We also checked them on the validity of their own nutritional claims. As you will read in the report produced below, some less-hyped brands have taken the top slots on various parameters, proving once again that quality is the real game changer.

A Consumer Voice Report

We tested 11 leading brands of cornflakes on various quality, safety and acceptability parameters that are crucial in determining whether the cornflake is safe for consumption at all. As per our standard procedure, we undertook market research to identify the popular and regular-selling brands of

cornflakes across the country. While there are many variants of cornflakes in the market (mixed fruit, strawberry, almond, organic honey and almond, etc.), we selected plain cornflakes for the study. Except Kellogg's, Saviour and Mum's, all other brands claim to be proprietary food – *this means* Food Safety & Standards (FSS) Regulations for cornflakes are not applicable.

The key parameters for which these cornflakes were tested included carbohydrate, protein, vitamins, minerals and organoleptic properties. Since cornflakes are more commonly used as breakfast cereal and are expected to give instant energy to the body, we tested

the brands for their energy output as well. A major health-related parameter was microbiological safety. We conducted tests for total plate count (TPC) and yeast and mould. The testing was conducted at an NABL-accredited laboratory.

Cornflakes are the product obtained from dehulled, degermed and cooked corn (*Zea mays L.*) by flaking partially drying and toasting. It shall be in the form of crisp flakes of reasonably uniform size and golden brown in colour.

The milling process removes the corn kernels from the cobs and turns them into flake-sized 'grits'. The grits are cooked in steam pressure cookers, at temperatures exceeding 100°C. This cooking process lasts for an hour and softens the hard grits. During cooking, additional water is incorporated in the form of steam which condenses and the water content in the batch rises to 30 per cent to 35 per cent.

The hot grits are transported from the cookers to large driers via a network of pipes. The grits spend several hours in the hot-air driers in order to reduce their moisture content. These grits are milled using rollers, which squeeze them flat.

Next, the flakes are tumble-toasted in huge cylindrical ovens. The air in the ovens is heated and the flakes are tossed around in a rotating drum. The drum is angled so that the flakes whirl around and pass through it quite quickly, and stops them spending too long in the fierce heat. Here the flakes are sprayed with flavors and minerals. Finally, they are bagged up with the help of a bagging machine, which uses rolls of polythene.



Comparative Test

BRANDS

Rank	Total Score out of 100 (Rounded off)	Brand	MRP (Rs)	Net Weight (gm)
1	83	Diet n Lite*	89	250
1	83	Murginns*	145	475
2	80	Kellogg's	96	250
3	79	Bagrry's*	75	200
3	79	Trusted Value*	99	500
3	79	Mum's	180 (buy 1, get 1 free + 200 gm pack worth Rs 50 free)	500
3	79	Savour	95	500
3	79	Reliance*	99	250+250 free = 500
3	79	Patanjali*	85	250
4	78	Mohun's*	94	500
5	76	Tops*	94	500

*Claimed as proprietary food, which means that FSS Regulations for cornflakes are not applicable to these brands.

CV RECOMMENDATIONS | TOP PERFORMERS

Diet n Lite | Murginns

VALUE FOR MONEY

Murginns



TESTED

	Cost per 100 gm, in Rs	Best before (Months)	Manufactured/Marketed by
	35.60	9	Swadeshi Pharmacy (P) Ltd
	30.50	9	KCL Ltd
	38.40	9	Kellogg's India Pvt. Ltd
	37.50	9	Bagrry's India Ltd
	19.80	9	Spencer's Retail Ltd
	36 (w/o scheme); 15 (with scheme)	12	Amarpali Biotech India Pvt. Ltd
	19.00	9	Savour India Pvt. Ltd
	39.6 (w/o scheme); 19.8 (with scheme)	9	Reliance Retail Ltd
	34.00	9	Patanjali Ayurved Ltd
	18.80	9	Mohan Meakin Ltd
	18.80	9	GD Foods Manufacturing India Pvt. Ltd

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

Key Findings

- All the brands meet the minimum requirements specified in the national standards, making them safe for consumption.
- Based on the overall test findings, Diet n Lite and Murginns are the top performers.
- The value-for-money brand is Murginns.
- Savour is the top performer in the sensory panel tests, followed by Diet n Lite and Murginns. The least preferred brand is Trusted Value.
- Dietary fibre was highest in Diet n Lite, followed by Patanjali and Reliance; it was lowest in Bagrry's.
- The highest amount of protein was found in Mum's and the lowest in Tops.
- Salt content was lowest in Tops and highest in Diet n Lite.
- Energy value was highest in Kellogg's, followed by Murginns, Diet n Lite and Patanjali. Tops scored lowest on this parameter.
- Iron content was found highest in Murginns, followed by Kellogg's. It was relatively low in some brands – namely Diet n Lite, Patanjali, Reliance, Mohun's and Mum's – even though they claimed to have iron content. It may be noted that most of the cornflakes brands make claims of being iron-fortified.
- All the tested brands were found to be within the acceptable limits for yeast and mould. Two brands, Tops and Reliance, were found with slightly higher total plate count (TPC).
- In some of the brands, their claim values with regard to nutritional components like sodium, carbohydrate, protein, iron and fat did not match the actual test results.



TEST RESULTS FOR PHYSICOCHEMICAL PARAMETERS

**Total Dietary Fibre | Protein | Salt as Sodium |
Total Ash | Acid-Insoluble Ash | Alcoholic Acidity |
Moisture | Energy Value | Crude Fibre | Sieves Test |
Carbohydrates | Iron | Fat**

◆ Total Dietary Fibre

Dietary fibre has many health benefits. It can reduce one's risk for heart disease, diabetes and some cancers, and also help in weight control. Fibre is important for digestive health too.

- *Dietary fibre was highest in Diet n Lite (5.34 per cent) and lowest in Bagrry's (2.16 per cent).*

◆ Protein

Protein is an essential nutrient. It plays an important role in cellular maintenance, growth and functioning of the human body. Protein in cornflakes is considered to be better.

- *The highest amount of protein was found in Mum's (10.8 per cent) and the lowest in Tops (5.80 per cent).*

◆ Salt as Sodium

It is used for seasoning as well as food preservation. Salt also inhibits the growth of bacteria in a food item. In most of the cornflakes brands, sodium chloride and sodium bicarbonate have been added in the end product for better shelf life, uniform texture and acceptability of taste.

The daily requirement for sodium intake in the average diet is a maximum two grams. No requirement has been specified in the national standard for salt content in cornflakes. It should, however, be added in moderate quantity.

- *Salt content was lowest in Tops (419 mg/100 gm) and highest in Diet n Lite (689 mg/100 gm).*

◆ Total Ash

As per the Indian Standard and FSS Regulations, the percentage of total ash, excluding salt, in cornflakes shall not be more than 1.0 per cent (on dry-weight basis).

- *Total ash in all brands was within the maximum permissible limit. It was lowest in Tops (0.54 per cent) and highest in Kellogg's (0.80 per cent).*

What Does Ash in Food Mean?

Ash refers to the inorganic material, such as minerals, present in food. It is the portion of the food or any organic material that remains after it is burned at very high temperatures. Some minerals are essential to a healthy diet (for example, calcium, phosphorus, potassium and sodium), whereas others can be toxic (lead, mercury, cadmium and aluminium). The quality of many foods depends on the concentration and type of minerals they contain, including their taste, appearance, texture and stability.

◆ Acid-Insoluble Ash

Acid-insoluble ash indicates the presence of sand, dirt and dust. As per the Indian Standards, acid-insoluble ash in dilute HCL in cornflakes should not be more than 0.05 per cent; as per FSS Regulations, it should not be more than 0.1 per cent (on dry-weight basis).

- *Acid-insoluble ash was found within the specified limits. It was lowest in Kellogg's and Reliance (0.020 per cent), and highest in Patanjali (0.035 per cent).*

◆ Alcoholic Acidity

As per FSS Regulations, alcoholic acidity (with 90 per cent alcohol) of cornflakes should be equivalent to not more than 2.0 ml.

- *All the brands met the requirement for alcoholic acidity.*

◆ Moisture

Moisture generally refers to the presence of water in a product. It may be noted that cornflakes with less amount of moisture is better as it translates into a longer shelf life. As per Indian Standard and FSS Regulations, moisture content in cornflakes shall not be more than 7.5 per cent by mass.

- *Moisture content in all the brands of cornflakes was within the specified limit.*
- *The lowest moisture content was in Mohun's (2.24*

per cent), followed by Murginns (2.98 per cent). Patanjali was found with higher moisture content (4.94 per cent).

◆ Energy Value

Energy value is the amount of calories which our body obtains from food. While there is no requirement prescribed in the national standards, energy value is expected to be higher in cornflakes.

- *Among the tested brands, energy value was highest in Kellogg's (388 kcal/100 gm), followed by Murginns (387 kcal/100 gm).*

◆ Crude Fibre

Crude fibre is a measure of the quantity of indigestible cellulose, pentosans, lignin and other components of this type present in food. As per Indian Standards, crude fibre should not be more than 0.75 per cent in cornflakes.

- *Crude fibre was found within the specified limit in all the brands of cornflakes.*

◆ Sieves Test

The test is conducted to check the small/breakage pieces/coarse powder of flakes. Not more than eight per cent (by mass) of the material shall pass through a 2 mm sieve.

- *All the brands passed in this test.*



Comparative Test

◆ Carbohydrates

Carbohydrates are a source of energy. Carbohydrates are the sugars, starches and fibres found in fruits, grains and vegetables and milk products. Though often maligned in trendy diets, carbohydrates are one of the basic food groups and are important to a healthy life. No requirement for carbohydrates in cornflakes has been specified in the national standards.

- Carbohydrates percentage was highest in Tops (88.5) and lowest in Mum's (83.61).

◆ Iron

Iron, one of the most abundant metals on earth, is essential to most life forms and to normal human physiology. Iron is an integral part of many proteins and enzymes that maintain good health. It expected to be higher in cornflakes.

This is an important parameter in terms of brands' claim verification – most of the brands of cornflakes make claims of being iron-fortified.

- Iron was found highest in Murginns (22.27 mg/100 grams), followed by Kellogg's (11.73 mg/100 grams). It was lowest in Mohun's (0.75 mg/100 grams).

◆ Fat

The fat component adds richness of flavour and contributes to a smooth texture. In cornflakes the fat content may be due to presence of corn's natural oil. There is no requirement for fat content in the national standards.

- Fat in the tested brands was found between 0.12 per cent (Tops) and 1.22 per cent (Patanjali). Some of the brands made claims of being 'low in fat'.



PHYSICOCHEMICAL

Parameter ↓	Weightage (%)	Dite n Lite	Murginns	Kellogg's	Baggry's	Trusted Value	
Total Dietary Fibre	8	7.14	4.84	4.64	3.96	5.86	
Protein	7	5.59	5.88	5.40	5.98	5.80	
Salt as Sodium	6	3.07	3.21	3.27	3.86	4.40	
Total Ash	6	4.20	4.29	3.90	4.47	3.93	
Acid-Insoluble Ash	6	5.40	5.40	6.00	5.16	5.76	
Alcoholic Acidity	6	5.64	5.24	5.10	5.33	5.59	
Moisture	5	3.61	4.31	4.00	3.38	3.64	
Energy Value	5	4.33	4.37	4.38	4.29	4.31	
Crude Fibre	5	4.25	3.60	3.75	4.10	4.55	
Sieves Test	5	4.94	4.47	4.61	4.74	4.30	
Carbohydrates	3	2.47	2.53	2.55	2.35	2.47	
Iron	3	0.63	3.00	1.86	0.88	0.84	
Fat	3	2.71	2.44	2.87	2.63	2.27	
Subtotal	68	53.98	53.58	52.33	51.13	53.72	



SCORES

	Mum's	Savour	Reliance	Patanjali	Mohun's	Tops
	5.26	4.64	6.49	6.68	4.10	5.22
	6.79	5.81	6.13	5.61	5.71	5.04
	3.10	4.15	4.37	3.26	3.58	4.68
	4.20	4.23	4.23	4.08	4.08	4.68
	5.64	5.64	6.00	5.10	5.52	5.70
	5.69	4.29	5.19	4.97	5.46	4.79
	3.69	3.90	3.46	3.33	4.68	3.82
	4.31	4.31	4.31	4.33	4.36	4.28
	4.25	3.90	3.50	3.30	3.50	3.75
	4.50	4.21	4.34	4.34	4.68	4.45
	2.32	2.42	2.40	2.43	2.54	2.61
	1.23	0.60	0.63	0.63	0.60	0.60
	2.15	2.60	2.27	2.93	2.34	1.94
	53.13	50.7	53.32	50.99	51.15	51.56

Comparative Test



FOR MICROBIOLOGICAL ACTIVITY (TOTAL PLATE COUNT, YEAST AND MOULD)

Microbiological contamination is a very serious issue for food products. For cornflakes, we conducted tests for total plate count (TPC) as well as yeast and mould. These microorganisms are responsible for many food-borne diseases. Due to improper or poor hygienic condition during the manufacturing process, microorganisms may occur in the finished product.

- Two brands, *Tops* (1,820 cfu/100 gm) and *Reliance* (1,050 cfu/100 gm), were found with slightly higher total plate count.
- *Murginns*, *Kellogg's* and *Diet n Lite* had TPC less than 10 cfu/100 gm. The rest of the brands showed TPC ranging from 55 cfu (*Bagrry's*) to 636 cfu (*Mohun's*).
- Yeast and mould was less than 10 cfu/100 gm in all the brands.

FOR SENSORY ATTRIBUTES

Sensory panel tests were conducted in a test lab with volunteers, under the guidance and supervision of technical experts. These five attributes were

judged by the panellists and ratings were then given on a five-point scale: namely colour and appearance, flavour, taste (with milk and without milk), aftertaste feel and overall acceptability.

- *Savour* was the most liked brand among panellists, and was followed by *Diet n Lite* and *Murginns*.
- *Trusted Value* was the least favoured among all tested brands.

Brand	Score out of 20
Savour	17.10
Dite n Lite	16.94
Murginns	16.92
Patanjali	16.48
Bagrry's	16.44
Kellogg's	16.32
Mohun's	16.24
Mum's	14.53
Tops	14.45
Reliance	14.42
Trusted Value	14.28

Parameter ↓	Weightage (%)	Dite n Lite	Murginns	Kellogg's	Bagrry's
Packaging and Marking	5	4.7	5.0	4.7	4.7
Net Weight	2	2	2	2	2

Dear readers: We are open to hearing your suggestions on products and services that you believe should be reviewed/tested by Team

FOR GENERAL QUALITIES

◆ Marking /Labelling

The following details shall be marked on the product label:

- a) Name and type of product
 - b) Name and address of manufacturer
 - c) Batch or code number
 - d) Net weight
 - e) MRP
 - f) Date of manufacturing/packing
 - g) The words 'Best before'
 - h) Nutritional information
 - i) FSSAI license number
 - j) Customer-care details
 - k) Storage instruction
 - l) Vegetarian or non-vegetarian (symbol)
- *Trusted Value did not give storage instruction. All other brands had provided the required information.*

Net Weight

The weight of the cornflakes is measured and compared with the declared values on the packaging. The net weight should be within the tolerance limit permitted in Legal Metrology Rules.

Net weight of all the tested brands was found as claimed and they scored equally well on this parameter.

◆ Packaging

Packaging plays an important role in maintaining consistent quality of the product. As per Indian Standards, cornflakes should be packed in high-density polyethylene bags alone or first packed in high-density polyethylene bags and properly sealed before being placed in cardboard cartons.

- *Packaging of all the brands was quite acceptable – five brands were in stiff thermoplastic material, while the rest six were in thermoplastic and laminated foil and further packed in hard paperboard box for additional protection.*



	Trusted Value	Mum's	Savour	Reliance	Patanjali	Mohun's	Tops
	4.1	4.4	4.4	5.0	4.7	4.4	4.4
	2	2	2	2	2	2	2

Consumer Voice. You may write to editorial@consumer-voice.org