

Corn Flakes



Breakfast is one of the most important meals of the day as it replenishes our body's energy after an all-night fast. A healthy breakfast significantly improves mental and physical performance of both children & adults. Essentially Breakfast should be low in fat, cholesterol and high in vitamins & minerals. Corn Flakes are made from corn and are in addition fortified with vitamins and iron.

Corn flakes & their variants and other options available as breakfast cereal:

Among the variety of breakfast cereals namely Choco flakes, Wheat flakes, Oat flakes, Muesli, Milk fruit, Chocolates etc are available, Consumer VOICE selected & tested only the large selling variety of plain corn flakes which are consumed across the country.

Corn Flakes Manufacturing Process

Manufacturing of corn flakes starts with milling process that removes the corn kernels from the cobs and turns them into flake sized 'grits'. Malted barley can be added to enhance the flavor of the Corn Flakes. The corn grits are cooked in steam pressure

Key Findings

- Murginns was found with highest energy value (390.75 k cal/100g) followed by Tasty treat (385.64 k cal/100g) & Bagrry's (384.81 k cal/100g), Brand Savour (372.76 k cal/100g) was lowest in energy value.
- Tasty treat was found most acceptable among all brands followed by Bagrry's and Murginns, Mum's was least acceptable followed by Savour and Tops.
- Some of the brands did not meet their claims with actual test results of nutritional facts like Sodium, Calorific value, Carbohydrate, Protein, Vitamin A & C, Iron & Fat.
- Most brands of corn flakes give misleading claims on their packaging and display fruits & other ingredients on packs, Where they are not added or added in small quantity.

cookers, at temperatures exceeding 100C. 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 30-35%. Then the hot grits are transported from the cookers to large driers via the network of pipes. The grits spend several hours in the hot-air driers in order to reduce their moisture content. The corn grits are

milled using rollers, which squeeze the grits flat. The flakes are then tumble toasted in huge cylindrical ovens. The air in the ovens is heated by 600°C gas flames 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 from spending too long in the fierce heat. The flakes are then sprayed with flavors and minerals to make them as nutritious as possible. After that the Corn flakes are bagged up with the help of a bagging machine, which uses rolls of polythene.

Brands Tested

VOICE tested 09 most popular as well as regular selling brands of Corn Flakes. Name and the ranks based on performance of the brands of corn flakes got tested are as follows:

Brands	Rank
Murginns (Value for Money)	1
Tasty Treat	2
Bagrry's	3
Kellogg's	4
Mohun's (Value for Money)	5
Go! Healthy	6
Mum's	7
Tops	8
Savour	9

Comparative Test

Packing

As per the Indian Standards, Corn flakes should be packed in high density polyethylene bags alone or first packed in high density polyethylene bags, properly sealed and then placed in cardboard cartons.

4 brands of corn flakes were packed in stiff thermoplastic material and rest five were in thermoplastic laminated foil and further packed in paper board box for further protection. Packing of all the brands were quite acceptable, hence suitable weightage was given to all brands.

Marking

As per the Indian Standard, final packaging of corn flakes should be suitably marked so as to give the following information.

- Name of the materials;
- If enriched with vitamins (1) the word 'vitaminized' placed in brackets, below (a), and (2) the details of enrichment;
- Name of the manufacturer;
- Batch or code number; and
- Net weight

Only Murginns carried all the required information others had one or the other misleading portrayed in pictures on the cover.



Except brands Mohun's, Tasty Treat & Savour, all the brands we tested were marked with all the necessary information of their label. Mohun's, Tasty Treat & Savour were found deficient in storage instructions. Many brands mislead through pictures of strawberries & other fruits as well as through their claims of being 99% fat free. Corn flakes which are manufactured through the roasting process are not added with any fat. Hence it is not desirable to give picture of 99% fat free.

The misleading pictures/ disclaimers as given in the form of serving suggestions should not be occupying maximum space on the packaging.

Net Weight

All the brands we tested were found with correct net weight.

Moisture

Moisture generally refers to the presence of water, often in trace amounts contained in a material. As per the Indian Standard, moisture content of corn flakes should not be more than 7.5%.

All the brands of corn flakes were found within the required limit of Indian standard for moisture content. Brand Murginns was found with lowest moisture content (1.98%) followed by Tasty treat (2.97%) and Bagrry's (3.5%). Brand Savour was found with higher moisture content (6.57%) followed by Go! Healthy (5.93%) and Mum's (5.65).

Nutrients

We tested the following critical nutrients of corn flakes, which were declared by the manufacturers in their labels. Nutrients were tested against the manufacturer's claims and given weightage accordingly.



Calorific (Energy) Value

Calorific value is the amount of calories which our body obtains from food. There is no requirement prescribed in Indian standard. Calorific value is expected to be higher in corn flakes.

Brands Mums, Go! Healthy & Savour did not meet their claim with actual result in calorific value test. Brand Murginns was found with highest energy value (390.75 k cal/100g), however Savour (372.76 k cal/100g) had lowest energy value.

Carbohydrate

Carbohydrate is the source of energy. Indian standard does not have any requirement for carbohydrate content in corn flakes but carbohydrates are expected to be there and higher the better in corn flakes.

Brand Bagrry's had added honey drops due to which the carbohydrate level is higher. Brands Mum's, Tops, Go! Healthy & Savour did not meet the claim for carbohydrate and got their weightage deducted. Brand Murginns was found with higher carbohydrate content (90.62%) followed by Tops (87.95%) & Tasty treat (87.62%). Brand Go! Healthy had lowest carbohydrate content (62.64%) among the brands we tested.

Protein

Protein is an essential nutrient in diet. They play an important role in the cellular maintenance, growth, and functioning of the human body. Protein is generally found/present in the corns and better if found in higher quantity in corn flakes.

Brand Murginns did not meet their claim of protein content. Brand Go! Healthy was found with higher protein content (9.53%) followed by Bagrry's (8.87%) & Mohun's (8.56%).

Vitamins A

Vitamin A, also called retinol, helps your eyes adjust to light changes when you come in from outside and also helps keep your eyes, skin and mucous membranes moist. Vitamin A mostly comes from animal foods, but some plant-based foods supply beta-carotene, which your body then converts into Vitamin A. It is higher the better in corn flakes.

Brands Tasty Treat and Murginns did not meet their claim for vitamin A content in actual results, hence got lesser weightage. Brand Go! Healthy was found with highest vitamin A content, however Bagrry's had lowest content of vitamin A.

Vitamins C

Vitamin C or Ascorbic acid is a natural antioxidant in fruits and vegetables, helps protect against cancers, heart disease, stress. Vitamin C helps in maintaining a healthy immune system. It is higher the better in corn flakes.

Brand Kellogg's failed to meet its claim value with tested value of vitamin C content in corn flakes. Brand Murginns was found with higher vitamin C content, however Bagrry's was found with lowest vitamin C content.

Iron

A mineral is a naturally occurring solid chemical substance formed

through biogeochemical processes, having characteristic chemical composition, highly ordered atomic structure, and specific physical properties. 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 corn flakes. Brands Kellogg's, Mohun's did not meet their claim with actual results of iron content in corn flakes. Brand Murginns was found with higher iron content among all brands, however Tops had lowest.

Fat

The fat component adds richness of flavour, contributes to a smooth texture. There is no requirement for fat content in Indian standard, but fat contents may be due to presence of corn's natural essential oil not expected to be added in corn flakes.

This is very important parameter from the claim verification point of view since most of the brands of corn flakes we tested made huge claims like "Fat Free". But Five out of nine brands were failed to meet their claim for fat content. Brands Bagrry's, Mohun's, Tops, Go!Healthy & Savour did not meet their claim for fat content, hence deducted their weightage for false claim.

Microbiological Test

Microbiological contamination is a very serious issue for food products. Microorganisms are responsible for many foods borne disease. We conducted this test for Total plate count.

All the brands were found safe in microbial contamination except brands Tops and Savour. These brands were found with total plate count slightly higher.

Sensory Panel Tests

This is very important parameter where subjective Panel tests were conducted based on their critical examination and opinion since consumer is very critical on selection of product from retail stores that makes that brand most acceptable/least acceptable in respect of price. During this test, we determined the overall organoleptic (sensory) quality of the product in term of consumptions. We conducted the sensory tests against colour & appearance, Flavour, Taste without milk, Taste with milk, After taste feel & Overall acceptability. These tests were conducted in the lab involving panel members under the supervision of trained experts.

Brand Tasty Treat was found most acceptable among all the brands followed by Bagrry's and Murginns, however Mum's was least acceptable followed by Savour and Tops.



Comparative Test

Brand	Retail Price per 100 gm	Protein, %	Carbohydrate, %	Vitamin A, mcg/100g	Vitamin C, mg/100g	Iron, mg/100g	Calorific (Energy) Value, Kcal/100g
Bagrry's	36.92	8.87	86.05	261.48	4.51	11.486	384.81
Kellogg's	26.1	8.13	86.17	278.43	7.84	8.303	380.89
Mohun's	17.2	8.56	84.53	277.49	14.04	7.956	376.41
Mum's	39.8	8.14	84.72	280.74	12.43	9.05	374.77
Tasty Treat	30	8.43	87.62	265.17	8.54	12.39	385.64
Tops	15	6.02	87.95	281.52	7.51	5.96	377.59
Go! Healthy	15	9.53	82.64	283.29	7.93	11.782	375.71
Murginns	25.26	6.46	90.62	268.72	31.94	26.99	390.75
Savour	17.5	8.26	83.76	256.17	7.11	8.38	372.76

This chart highlights for consumers what they get at what cost when they buy a brand of breakfast cereal.

Rounding Up

Consumer VOICE tested 9 popular and most selling brands of plain Corn Flakes. Price of this category of cornflakes makes them the most acceptable. It also leaves ample room for individual choice of a variety of additions, whether of nuts or fruits. A large segment of Indian consumers have been known to accept market choices up to a point and they always like to personalize choices by making their own additions of preferred flavours. We went ahead to delve deeper and look at the nutritional value of each brand. The parameters we selected to test were, Calorific Value, Carbohydrates, Proteins, Vitamins, Minerals and Organoleptic properties. We also tested the chosen brands for energy value. The brands which stood out were : 1.Murginns, 2.Tasty Treat, and 3.Bagrrys, which were also overall the best.

The brand which scored the lowest was 'Savour'.

As getting fat or obese is a big issue with the 'on the go' urban consumers, almost all tested brands claimed to be low in fat content and we are happy to report that all were indeed low in the fat content. Next come the Organoleptic properties of corn flake brands. These properties like colour,, appearance, flavour and of course taste are what add to the acceptability factor for the consumer. For this we conducted a sensory test with a select panel. Brand Tasty Treat, followed by Bagrrys and Murginns were found to be the most acceptable and Mum's, Savour and Tops scored low with the panelists.

We are happy to report that all except Kellogg's are Indian brands. Actually Mohun's is among the oldest and the most sold among average consumers with large families, even though it did not score that high in our test. It is the packaging that affects the price and Mohun's is popular because its packaging continues to be low cost, thus reducing the burden on consumer pockets.

Since corn is notorious for being almost completely genetically modified, and because most processed and packaged foods use GM produce, (it is relatively much cheaper), we decided to do the GM test. We are always concerned about a product's impact on consumer and environmental health and GM products still raise doubts and concerns, so we did the test and are happy to report that the corn flakes being sold in India are not genetically modified.

We are also happy to share with our readers the fact that from January 2013, all food labelling will have to declare the GM content, by Government order.

Value for Money : Murginns and Mohun's proved to be good value for money , performing well without costing too much.

Muruguns: Rs 25.26 per 100 gr.

Mohun's : Rs 17.20 per 100 gr.

CLAIMS CHART

This chart highlights for the consumer claims made by various brands about specifics like calorific value, vitamin content, salt etc:

Brand	Calorific (Energy) Value, K cal/100g		Carbohydrates, g/100g		Protein, g/100g		Salt as Sodium, g/100g		Vitamin A, mcg/100g		Vitamin C, mg/100g		Iron, mg/100g	
	Claim	Result	Claim	Result	Claim	Result	Claim	Result	Claim	Result	Claim	Result	Claim	Result
MURGINNS	375	390.75	85	90.62	7.6	6.46	0.70	0.56	310	268.72	68	31.94	24	26.99
KELLOGG'S	373	380.81	85.6	86.17	8.0	8.13	0.95	0.96	100	278.43	33	7.84	17.5	8.30
BAGRRY'S	376	384.81	84.4	86.05	8.5	8.87	NC	0.66	NC	261.48	NC	4.51	NC	11.48
MUM'S	401.5	374.77	91.56	84.72	7.37	8.14	0.55	0.58	84.96	280.74	8.26	12.43	7.50	9.05
TASTY TREAT	375	385.64	85	87.62	7.6	8.43	0.70	0.41	310	265.17	0.06	8.54	0.024	12.39
SAVOUR	380	372.76	84.0	83.76	8.0	8.26	1.0	0.64	NC	256.17	NC	7.11	NC	8.38
TOPS	376.78	377.59	90.50	87.95	3.52	6.02	0.41	0.69	NC	281.52	NC	7.51	1.26	5.96
GO! HEALTHY	435	375.71	85.5	82.64	9.5	9.53	0.56	0.46	75	283.29	7.7	7.93	7.3	11.78
MOHUN'S	372.4	376.41	83.7	84.53	8.5	8.56	0.70	0.49	NC	277.49	13.03	14.04	28.4	7.95

- Failed to meet the claim value, NC – Not Claimed

Therefore while choosing the right breakfast brands Corn: flakes, consumers need to read the ingredients labels carefully, especially if they are diabetics or heart patients.



COMPARATIVE TESTS PERFORMANCE SCORES OF CORN FLAKES

Brand	Parameter	Wt. %	Murginns	Tasty Treat	Bagirry's	Kellogg's	Mohun's	Go! Healthy	Mum's	Tops	Savour
	Pack Size, gm		475	250	325	475	500	500	500	200	200
	MRP in ₹		120	75	120	124	86	75	199	32	35
	Unit Price per 100gm		25.26	30	36.92	26.1	17.2	15	39.8	15	17.5
	Physico-Chemical Tests										
	Moisture	3	2.79	2.57	2.46	2.27	2.04	1.94	2.0	2.18	1.8
	Total Ash	2	1.86	1.5	1.59	1.56	1.82	1.42	1.5	1.72	1.61
	Acid Insoluble Ash	3	1.8	1.87	2.91	2.55	2.31	2.47	2.07	1.8	2.07
	Crude Fibre	4	2.78	3.29	2.46	2.97	3.48	2.78	3.74	3.04	3.48
	Alcoholic acidity	3	2.77	2.32	2.1	2.41	3.0	2.77	2.41	3.0	3.0
	Salt as sodium	3	2.06	1.76	2.31	1.51	1.94	2.35	2.51	2.24	1.52
	Calorific (Energy) Value	8	7.6	7.38	7.34	7.18	6.98	5.99	6.45	7.03	6.7
	Carbohydrate	8	7.9	7.15	6.76	6.79	6.38	5.72	5.95	7.04	6.18
	Protein	6	3.29	5.05	5.32	4.87	5.13	5.71	4.88	3.61	4.95
	Vitamins A	4	3.1	3.02	3.47	3.7	3.69	3.77	3.73	3.74	3.4
	Vitamins C	4	3.75	2.13	1.12	0.47	3.51	1.98	3.1	1.87	1.77
	Iron	5	5.0	4.12	3.82	1.31	0.74	3.92	3.0	1.97	2.78
	Fat	2	1.93	2.0	1.44	1.8	1.55	1.42	1.83	1.6	1.42
	Net Weight	2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Microbiological Test (Total Plate Count)	5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	3.62	3.12
	Sensory Tests	30	22.62	25.17	23.7	21.93	18.96	18.45	15.84	18.66	18.45
	General Parameters										
	Packing & Marking	8	8.0	7.5	7.5	7.5	6.5	7.0	7.5	7.0	7.5
	Overall Score	100	84.3	83.8	81.3	75.8	75.0	74.7	73.5	72.1	71.7

Rating: >90 – Excellent *****, 71-90- Very Good ***, 51-70- Good **, 31-50- Average *, upto 30 – Poor *
Sensory Tests includes Colour & appearance, Flavour, Taste without milk, Taste with milk, After taste feel & Overall acceptability