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ICE CREAM

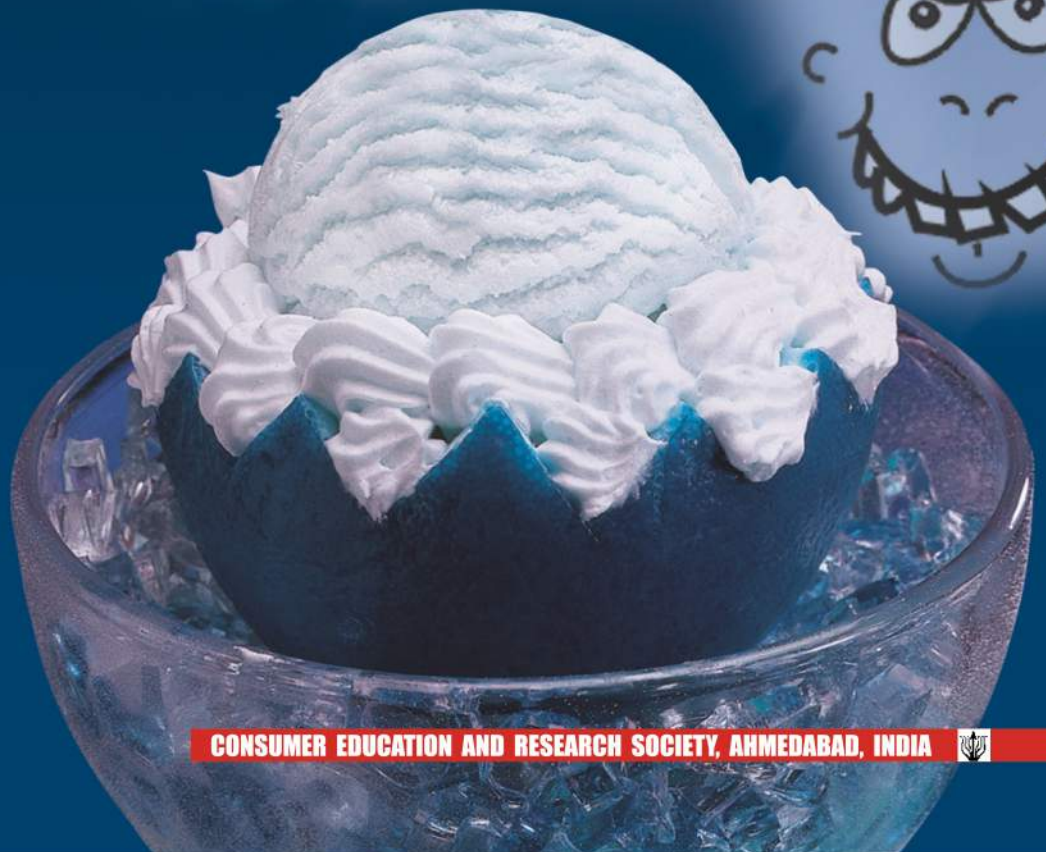
Germs Found In Some!



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CONSUMER EDUCATION AND RESEARCH SOCIETY, AHMEDABAD, INDIA





Germs Found In Some!

On a scorching summer day what could be a better treat than a delicious ice cream? Indeed, we — or most of us — will never outgrow our love for ice cream. With newer brands, tastes, shapes, sizes and packages, choosing a brand may not be an easy task. In fact, it has become more difficult with the local players having joined in, in a big way. So, which brand or brands of ice cream should you go for?

Brands Tested

We tested 4 brands and 4 loose samples of vanilla ice cream to check out on their quality. The brands tested were: *Amul*, *Havmor*, *Kwality Walls Max* and *Vadilal Dairy Premium*.

The loose samples were purchased from *Amiraj Classic*, *Niruben Desai*, *Patel Dairy* and *Shree Janta*, located in different parts of Ahmedabad.

Our primary concern was — and is — to test products marketed all over the country. However, considering the highly perishable nature of ice cream and to ensure a fresh supply for testing, especially for microbial contamination, we opted for brands available locally,

some of which have a national presence.

Standards

We tested the ice cream against specifications laid down under the Prevention of Food Adulteration (PFA) Act and by the Bureau of Indian Standards (BIS). We also referred to Codex, the international standards, to compare the results. 20 samples of each brand were taken for testing.

Germs in Ice Cream

Microbial contamination indicates poor sanitary practices or improper transport and storage. Such contaminants can gain entry with the milk itself or at the production plant. Bad handling or storage under poor refrigeration may also aggravate the contamination. The diseases most commonly carried through ice cream are septic sore throat and gastro-intestinal disturbances, especially among children.

The PFA Act does not cover microbial contamination, a serious issue from the health point of view. We tested this aspect of the brands as per the specifications laid down by the BIS.

• **Total colony count** is the number of

live bacteria in a food item. The higher the number, the higher are the chances of infection which may lead to diseases. The BIS has set a limit of 25×10^4 /gm. All the loose samples had very high numbers of colony count. Except *Vadilal* all the branded ones were within limits.

• **Coliform count** reveals post-pasteurisation contamination. The presence of coliform indicates possible faecal contamination of human or animal origin. The presence of this group of bacteria usually signifies improper processing. The BIS specifies that the coliform count should not be more than 100/gm. *Amul* was the only brand with nil coliform count which indicates good manufacturing practices. *Max* had 20/gm and *Havmor* had 10/gm. The others had problems meeting this standard. *Vadilal* had 260/gm. All the loose samples had a very high level of coliform. *Classic* had the highest coliform count : 322500/gm.

• **E. coli** (*Escherichia coli*), a species of coliform group of bacteria, may cause gastro-enteritis and urinary tract infection. Since *E. coli* is naturally found in the intestinal tract of animals,



its entry into foods most often occurs probably by their direct contamination with faecal material, as per *Encyclopedia of Food Science, Food Technology and Nutrition*. Contamination with human faeces is the principal factor in transmission of these pathogens. Food can get faecally contaminated from food handlers if they do not wash their hands thoroughly after visiting the toilet.

Neither the BIS nor the PFA Act has set any specification for E.coli. Ideally, ice cream should be totally free from E.coli. All the branded ice creams were found without any E.coli. Among the loose ones, only *Shree Janta* was found without E.coli, the rest revealed very high levels. *Classic* again was found with the highest E.coli: 64500/gm!

Fat

Ice cream, to be so called, should have minimum 10 per cent milk fat, as per the BIS and the PFA Act. Among the brands, *Amul* had 14.8 per cent milk fat. Among the loose samples, *Niruben* revealed as low as 3.8 per cent milk fat and could not even qualify to be called an ice cream. *Classic*, with 7 per cent milk fat, met the Codex limit, but not that of the BIS and the PFA Act.

Sugar Content

Sucrose is the sugar content in ice cream which makes it taste sweet. Too much of sucrose will make the ice cream very sweet which may not be liked by many. The BIS has set the limit as 15 per cent. All the samples conformed to this parameter except *Shree Janta* (15.4) and *Patel Dairy* (16.4).

Apart from its sweetness, sugar

provides for a low-cost ingredient to increase the total solids of ice cream. Both the PFA Act and Codex are silent on this parameter.

Total Solids

Ice creams should have minimum 36 per cent solids, as per the BIS and the PFA Act. Codex, however, has set the limit at 28 per cent. Less total solids would mean your ice cream has more ice. This



Key Findings

- We tested 4 brands of vanilla ice cream and 4 samples of ice cream sold loose in Ahmedabad. The brands tested were *Amul*, *Havmor*, *Kwality Walls Max* and *Vadilal Dairy Premium*. The loose samples were purchased from *Amiraj Classic*, *Niruben Desai*, *Patel Dairy* and *Shree Janta*. They all were tested against the specifications of the Bureau of Indian Standards (BIS), the Prevention of Food Adulteration (PFA) Act, and Codex.

- Among the conforming brands *Amul* ranked first followed by *Max*.

- Microbial contamination indicates poor sanitary practices or improper transport and storage. All the samples were found microbially contaminated, except *Amul*, *Kwality Walls Max* and *Havmor*. The PFA Act, which is mandatory, does not cover microbial contamination, a serious health hazard.

Total Colony Count : *Vadilal* had 174×10^4 /gm of total colony count. All

the loose samples also had very high levels. The BIS has set a limit of 25×10^4 /gm.

Coliform : Most of the samples had coliforms and E.coli which may cause gastro-enteritis and urinary tract infections. The BIS specifies that the coliform count should not exceed 100/gm.

Vadilal recorded 260/gm. All the loose

Caution

All the loose samples were found microbially contaminated which may lead to serious health hazard. *Classic* had 322500 /gm Coliform count against the standard of NMT 100/gm. Total colony count was 6865×10^4 /gm in *Niruben* and 3865×10^4 /gm in *Shree Janta*. *Classic* also had 64500 /gm of E-coli which should ideally be nil.

samples also had a very high level of coliform.

E.coli : *Classic*, *Niruben*, and *Patel Dairy* were found with E.coli. There are no Indian standards for E.coli.

- Long exposure to pesticides can affect neural functions. All the samples on fat basis were checked for DDT,

aldrin dieldrin, heptachlor, lindane and phorate. *Havmor* was found with 0.21 ppm heptachlor against the PFA limit of 0.15 ppm. All the rest were found with traces or within the limits, except *Niruben* which had no trace of any pesticide residues.

- In the test for fat content in ice cream, *Niruben* (3.8) and *Classic* (7) could not meet the BIS and PFA limit of minimum 10 per cent fat.

- Minimum 3.5 per cent protein should be there in an ice cream, as per the PFA Act. *Havmor* (3.2), *Classic* (3.0), *Shree Janta* (2.8) and *Niruben* (3.0) could not conform to the PFA Act.

- As per the BIS, the weight of an ice cream should not be less than 525gm/lit while Codex has given the limit as 475gm/lit. Out of the 20 cups tested in the branded section, 12 cups of *Vadilal*, 5 cups of *Max* and 1 cup of *Havmor* were found underweight.

- We tested the samples for their sensory qualities. *Amul* was liked the most by our panellists.



KEY : MSNF — Milk Solid Non-Fat

CALORIES IN YOUR ICE CREAM

Brands	(Fat /100g)	(MSNF/100g)	Cal/100ml
Patel Dairy	128.7	146	268
Classic	63	123.6	177
Niruben	34.2	150	177
Shree Janta	133.2	90.4	174
Amul	133.2	108	136
Havmor	108	91.2	111
Kwality Walls Max	97.2	103.6	106
Vadilal Dairy Premium	101.7	102.8	105

shows how dense or icy the ice cream is. **Havmor** (34.9) could not conform to the limit set by the BIS and the PFA Act. Among the brands, **Amul** recorded 41.8 per cent and, among the loose samples, **Patel Dairy** had 50.8 per cent of total solids. This shows both give more weight of ice cream in their cups/ scoops than the others.

Quality of Milk

The quality of milk used to make ice cream is very important because it affects the overall as well as the keeping quality of the ice cream. This is checked by testing the acidity (lactic acid) which should not be more than 0.25 per cent, as per the BIS. This parameter measures the extent of growth of acid-producing bacteria in dairy products. All the samples conformed to this parameter. The PFA Act, however, is silent on this parameter.

Pesticides

Pesticides enter milk through cattle-feed. Long exposures to pesticides which get stored in the form of tiny fat globules in the body can affect neural functions. All the samples were checked for DDT, aldrin dieldrin, heptachlor, lindane and phorate. Only **Niruben** was found to be free from all pesticide residues. All the rest were found with traces or within the limits, except **Havmor** with 0.21 ppm heptachlor against the PFA Act limit of 0.15 ppm.

Calories

If you are concerned about your weight, you need to watch your calories. We calculated fat per cent and total calories in each ice cream. Among the branded one's, **Amul**, and among the loose samples, **Patel Dairy** was found with maximum calories.

Protein

The PFA Act specifies that an ice cream should have minimum 3.5 per cent protein. The BIS is, however, silent. Among the brands, **Havmor** (3.2) and, among the loose samples, **Classic** (3.0), **Shree Janta** (2.8) and **Niruben** (3.0) could not conform to the PFA Act.

Of Taste and After-Taste

When we choose an ice cream, what matters most to us is the flavour, mouth-feel, taste, after-taste, colour and texture. This in scientific parlance is called sensory testing. It is done by trained panellists who are given coded samples to taste and give their views. We provided weightages to each sensory attribute. Our panellists liked **Amul** the most with a score of 84, followed by **Vadilal** (82). Loose sample **Patel Dairy** (54) was the least liked by our panellists.

Right Weight

As per the BIS, the weight of the ice cream should not be less than 525gms/lt. We weighed 20 cups each of all brands individually. One cup of **Havmor** and 5 cups of **Max** were found underweight.

In the case of **Vadilal**, 12 cups were found underweight. Two cups were even below the Codex limit of 475gms/lt. **Amul** was the only brand

of which all 20 cups were found within the limit of the BIS. All loose samples conformed to the BIS limit.

What the Labels Said

Some of the mandatory labelling requirements for packaged ice cream are as follows :

- Description of food
- Ingredients
- Name and complete address of the manufacturer
- Net weight in grams or volume
- Batch or lot or code number
- Month and year of manufacture
- Best before date

Though all brands complied with the rules, batch number was given on the bulk carton and not on the cups. Hence when we bought the cups we could not know the batch number.

Claims

We checked the claim made by **Max** about the calcium content. We found its calcium content to be 42.8 mg against the label claim of 62.8 mg. The company, however, did not agree with our results and said that the calcium content in their ice cream is actually higher than those declared on the label. *We stand by our results.*

Max also said on the label *Vitameter Score kya hai*. They said, as the product is eaten by kids mostly, they have added vitamin A. The recommended daily requirement (RDR) of vitamin A is 2000 IU whereas they add only 300 IU, i.e. 15 per cent of the total RDR. Therefore, one may get an impression that having one ice cream will take care of our daily requirement of vitamin A.

When brought to the notice of **Max**, they accepted the suggestion and

Do You Get What You Pay For			
Brands	Weight gm./ltr	No. of less weight cup/s	No. of more-weight cup/s
Amul	565*	—	20
Havmor	558*	1	19
Kwality Walls Max	529*	5	15
Vadilal	516*	12	8



* Average weight of 20 samples. Loose samples do not come under this standard



agreed to add '15 per cent of RDR' on their labels.

Rating and Ranking

We rated and ranked only **Amul** and **Max** as they conformed to all the parameters. We assigned a weightage of 60 per cent to chemical score and 40 per cent to sensory scores. **Amul** came on top with a score of 84, followed by 64 of **Max**.

Manufacturers' Response

As a policy, we convey the test results to all the manufacturers, irrespective of whether their brands have passed or failed. The results are posted to their registered offices by Registered A.D/courier. All manufacturers receive the result of their own product only and are given two weeks from the date of receipt to respond.

Batch Number

Gujarat Co-operative Milk Marketing Federation Limited, the manufacturers of **Amul**, and Hindustan Lever Limited, the manufacturers of **Kwality Walls Max**, said that, as per the prevailing rules, since their cups weigh less than 60 gms, they are not supposed to put the batch number on their cups. However, **Amul** added that "in order to improve our service to the consumer, we have started mentioning Batch No. on ice cream lids".

Vadilal Industries Limited, the manufacturers of **Vadilal Dairy Premium**, said that they are printing Batch No. on the secondary package which is

accepted even in the ISO procedures. **Havmor Ice Cream Co**, the manufacturers of **Havmor**, however, said that they would examine the issue of printing the Batch No. on the cups.

The declared net content on the cup is given 100ml (Amul) and 90 ml(Max), which is in volume and not gms. Hence the Batch No. has to be there on the cup.

Total Solids

Havmor did not agree with our test results on total solids, sucrose, protein and acidity. Our results showed **Havmor ice cream** to have 34.9 per cent total solids. According to **Havmor**, the

Melting Quality

Melting quality is important because an ice cream starts to soften as soon as it is taken out of the freezer. If it melts too fast, a messy situation may arise. A slow rate of melting can also be indicative of defective ice cream. We allowed the samples to melt and observed them in the process. **Amul** was the only brand which maintained its homogeneity and melted in an elegant way. Others separated while melting.

total solids of the **mix** was 37.5 per cent. Acidity, according to us, which was analysed by titration (specification for ice cream IS : 2802) was found to be 0.08 per cent. **Havmor** contended that it should be 0.16 per cent or more which they arrived at by theoretical calculation which is as follows:

They calculated the SNF by subtracting fat, sucrose and stabilisers and emulsifiers from total solids [34.9-(12+13.8+0.5)=8.6 per cent]. They said that "the acidity of ice cream having SNF as above (arrived at based on your analysis) will be $8.6 \times 0.018 = 0.1548$ say 0.16 per cent".

We have followed the BIS procedure where the approach and method are totally different. The method followed by Havmor is from the book Ice cream by Robert T. Marshall and W.S. Arbuckle which we as a consumer organisation cannot follow. Secondly, while we tested the final product (ice cream) which the consumer gets, Havmor tested the ice cream mix.

Sucrose was tested by us (specification for ice cream IS : 2802) and found to be 13.8 per cent.

We stand by our results.

Micro-organisms

Vadilal said that any adverse condition in storage and conditions at the retail shop will affect the test results negatively as the coliform count depends on these things. They added that they were setting up a new factory where things would improve.

We will verify and take new samples at that time. We purchased ice cream the way any other consumer would do.

Shree Janta Food Industries, the manufacturers of **Shree Janta**, wanted our advice to improve the quality of their product.

Overrun

Max did not agree to our result on overrun and said that measurement of overrun after the product has gone through distribution and cold chain is difficult and prone to errors. They also said that it is better to look at the average weight of 20 samples rather than individual cups.

We stand by our results.

Vadilal said that as per the standards, 100 ml ice cream cup should be 52.5 gm at 110 per cent overrun. But, taking into account the maximum permissible error by the Standards of Weight and Measures Act 1976, the

net weight of ice cream cup would be 50.13 gm. and hence only 4 cups out of 20 cups fall below the derived standard of 50.13 gm.

Our concern is that every consumer should get the labelled amount.





ICE CREAM : RESULTS

							C H E M I C A L				
							TESTS FOR GERMS				
S T A N D A R D S	Rank	Overall Score	Price 100 ml	Pack size(ml) ^a	Over-run	Wt. in gm/lt	M I C R O B I O L O G Y			Pesticide Residues Heptachlor (ppm)	
							Total Colony count(x10 ⁴)	Coliform count	E.coli/g		
IS2802-1964					NM	NLT 525	NMT 25/g	NMT 100/g	NM	NM	
PFA Act 1954 A.11.02.08					NM	NM	NM	NM	NM	NMT 0.15	
Codex 137					NM	NLT 475	#	##	NM	NM	
CONFORMING											
B E S T	Amul	1	84	9.00	100	97-98	565**	0.63			0.07
	Kwality Walls Max	2	64	11.11	90	93-149	529**	0.65	20		0.01
A	Weightages							60%			
N	NON-CONFORMING										
D	Havmor			10.00	100	80-84	558**	0.53	10		0.21
	Vadilal Dairy Premium			10.00	100	97-138	516**	174	260		0.02
L O S E	Amiraj Classic (formerly Devrani Jethani)			6.80	NA	14-16	946	246	322500	64500	0.04
	Niruben (formerly Devrani Jethani)			8.40*	NA	0.1	962	6865	4275	1710	
	Patel Dairy			10*	NA	0.1	975	155	3650	3650	0.09
	Shree Janta			6.00	NA	24-43	780	3865	1535		0.01

Best Buy

Best Buy is based on chemical and sensory scores. Among the conforming brands, **Amul** is the best buy, followed by **Max**.



* Per 100 gm

** Average of 20 cups

Niruben was not tested for lead and arsenic as it did not conform to milk fat content

The samples were also tested for acidity, starch, non-permitted colour, arsenic, DDT, aldrin, dieldrin, phorate, salmonella, lead, lindane and phosphatase and were found conforming to the standards. Only non-conforming parameters are listed in the table.

^a Pack size not applicable to loose samples.

NMT 25x10⁴/g in all five samples and NMT 5x10⁴/g in 3 or more of five samples

NMT 1000/g in all five samples and NMT 100/g in 3 or more of 5 samples

Sensory

On the melting quality, **Max** said that it is unlikely that the melting quality of the ice cream could be unsatisfactory.

However, it agreed that any thermal shocks could affect the sensory attributes and added that ideally the melt-down

properties should be measured from the products taken directly from the factory.

Vadilal said that they have a regular procedure for testing melting properties based on which their product has slow-melting properties.

We compared the brands for melting quality which indicated the overall ice cream structure as described in a standard book.

Heptachlor

On the presence of heptachlor on their product, **Havmor** said that, "we buy milk and cream from big reputed dairies where they check their products for pesticide residues. We also get the products checked time and again. We have always found them to be within the prescribed limits."

We stand by our results.

The manufacturers of **Classic**, **Patel Dairy** and **Niruben** did not reply.



KEY	NM – Not Mentioned	■ – Failed
	– NIL	□ – Did not conform to BIS
	NMT – Not More Than	NLT – Not Less Than
	NA – Not Applicable	

● <45	⊙ 55-64	⊙ 75-84	● 95+
◐ 45-54	○ 65-74	◑ 85-94	

TESTS				SENSORY TESTS							
Protein	Sucrose (%)	Total Solids (%)	Milk Fat (%)	Sensory Overall Score	Colour	Texture	Flavour	Mouthfeel	Taste	After-taste	Melting Quality defects as judged by our panellists
NM	NMT 15	NLT 36	NLT 10								
NLT 3.5	NM	NLT 36	NLT 10								
NLT 2.2	NM	NLT 28	NLT 7								
4.0	14	41.8	14.8	84	⊙	⊙	◐	◐	⊙	⊙	No defects
3.6	11.4	36.7	10.8	64	○	○	○	⊙	◐	◐	Foamy and did not melt properly
				40%							
3.2	13.8	34.9	12.0	78	⊙	○	⊙	⊙	⊙	⊙	Foamy
3.8	11.6	37.1	11.3	82	⊙	⊙	◐	◐	⊙	⊙	Curdy and wheying off
3.0	14.8	37.9	7.0	65	⊙	⊙	○	⊙	⊙	⊙	Foamy, low viscosity, did not melt properly
3.0	14.2	41.3	3.8	—	—	—	—	—	—	—	Did not melt properly, curdy, wheying off and low viscosity
3.5	16.4	50.8	14.3	54	◐	◐	⊙	◐	◐	⊙	Low viscosity, curdy, and foamy
2.8	15.4	37.4	14.8	71	⊙	⊙	⊙	○	○	○	Foamy

♦ Sensory testing was not done for Niruben as it did not conform to milk fat content.

- Defects :** Curdy —Irregular shaped curd particles seen floating in the melt
 Does not melt—Ice cream retains shape after 15-20 minutes
 Low viscosity — Ice cream is thin in appearance.
 Flaky —Light feathery particles float in the melting product
 Foamy —Large air bubbles retain their shape in the melting product
 Wheying off —Watery fluid appears, and in it are often seen curd particles

Amul

After we had completed our testing and were about to publish our report, we received a complaint from a consumer about Amul ice cream. Being a consumer organisation, we could not close our eyes to the complaint.

We bought another pack of the same Batch No. and tested for acidity. We found the acidity as 0.39 % against the BIS limit of not more than 0.25 %. We also picked up another sample of a different batch and again checked for acidity. This time the acidity was 0.11%, well within the limits. The company was informed and they responded by saying that they checked the control samples and also samples of nearby batches to confirm and found the product normal. They further said, “Our experience on such complaint is that whenever there is power interruption and product is subjected to higher temperatures during storage in supply chain, sourness develops. The recent disturbed situation in Ahmedabad could have contributed to this problem. However, we are checking on this issue.”

Because of lack of time, we checked only acidity so that we can keep our readers informed. Later we may take up a detailed study and report.

Continued on Pg. 37