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These New Facts Will Help You Focus

MSG's Power to Perk Up Foods

Panel studies over 18 months tell you "where" and "how much." But—you can't predict benefits merely on the basis of types of foods and flavors

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Respectively, Research Laboratories, Pabst Brewing Co., Milwaukee, and Quartermaster Food & Container Institute, Chicago

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25 CONFIRMED

QM preference probes now bear out that these 25 foods—of 50 tested—are decidedly improved by the addition of glutamate

CANNED PRODUCTS

1. Asparagus, spear
2. Corn, white, cream
3. Corn, golden, cream
4. Corn, golden, kernel
5. Green beans
6. Peas
7. Spinach
8. Tomato juice
9. Hominy, fried
10. Boned chicken
11. Pork & gravy
12. Salmon
13. Beef & gravy

FRESH PRODUCTS

14. Green beans
15. Hamburger
16. Cod fish, creamed
17. Haddock, fried
18. Beef stew
19. Baked beans & bacon
20. Chicken soup
21. Margarine (army type)
22. Cream of celery soup

DEHYDRATED FOODS

23. Potatoes, mashed
24. Cabbage
25. Onion soup

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That monosodium glutamate has a very definite effect on consumer preference for many foods is clearly substantiated by exhaustive studies at the Quartermaster Food & Container Institute, Chicago.

In these investigations, 50 foods or recipes representing various products and flavor types were tested, showing—

1. Twenty-five were definitely improved (at or below 5% level).
2. Three others showed a trend toward improvement (between 5 and 10% level).
3. Eighteen were not changed, and
4. Four were definitely harmed.

It was anticipated that the effectiveness of MSG would depend upon food class or flavor type. This was not consistently true, although there was a tendency for similar foods to give similar results. Meat dishes, fish, and canned vegetables were frequently improved, whereas cereals, milk products, and sweet flavored recipes were not.

These results suggest that, while flavor type may be a useful guide for planning purposes, the final decision as to the use of MSG in a particular food product or recipe intended for general consumption should be made only on the basis of actual tests of that product.

Method Employed

All preference tests involved MSG concentrations at or above threshold of flavor difference as established by the triangle test. Preference testing was by the method of paired comparisons.

The problem that motivated the studies concerned determination of the value of MSG as a flavoring material for use in recipes of the Army's master menu.

Selection of the foods and recipes was based on several considerations. Emphasis was placed on foods considered pertinent to Army feeding and those where available information indicated that improvement might be found.

Different food types—meats, fish, cereals, vegetables, etc.—were included, and attempts were made to choose representatives of broad flavor types, such as bland, sweet, or sour. However, since almost all prepared foods are quite complex in flavor, it was not possible to make clear-cut distinctions on the latter basis.

In most cases, MSG was added as near as possible to the end point in preparation of recipes so that the stated concentrations would represent concentrations in the foods as served.

Primary consideration was to assure a uniform mixture, and in some cases this was best accomplished by adding MSG prior to cooking. With the fried fish items, uniform mixture was not possible, and the product was sprinkled evenly over the fillets before frying. Nine of the canned vegetables, provided through the cooperation of members of the canning industry, had MSG added before final processing. These items were stored at room temperature 4 to 6 months prior to testing.

Two types of testing were employed:

1. Difference testing by a trained panel whose members were selected on the basis of skill in detecting flavor differences caused by MSG, and

2. Consumer preference testing using a group of about 650 employees of the Chicago Quartermaster Depot.

Although random selection within the latter group was attempted, it could not be achieved because the subjects were not equally available.

The study continued over a period of 18 months and involved a total of about 2,150 individual participations in preference tests. It is estimated that only a very few people took part more than ten times. The program was interspersed with preference tests on other foods, and few subjects were ever aware of the variable being checked. Trained panel members, on the other hand, worked with full knowledge.

To assure that only real and controlled flavor differences would be represented in the preference tests, each food was first studied in a series of tests by the trained panel to determine accurately the amount of flavor differences caused by various concentrations of MSG. Employed here was the triangle technique in which the observer received three samples, two alike and one different, and attempted to pick out the odd sample. The two like samples were always untreated controls.

Initially, the concentration of MSG suggested by available information was investigated. If the trained panel was able to detect a significant flavor difference between the treated sample and the control, this level was tested by consumer preference. If no flavor difference was found, the concentration of MSG was progressively increased until there was a significant difference.

Preference was probed by the paired-comparisons method. In each case a sample of the food containing MSG was presented with a control sample of the same food. Each consumer sampled two pairs at a session, either repeating on the same pair of samples or testing the same food at two different concentrations of MSG.

With failure on one level to show a significant preference, concentration of MSG was increased and the food again checked until a preference for the treated sample was established, or until it became evident that further increases would have either no effect or a negative effect.

This procedure was not followed with the nine canned vegetable items provided by industry. For these, the MSG concentrations were determined by the cooperating company's own research department.

The procedure, illustrated in Table I, shows results on frozen peas. Three concentrations of MSG—0.2, 0.4, and 0.6%—were tested for difference. Since only the highest one resulted in a de-

How Different Foods Respond To Addition of MSG

TABLE I—TESTS Show Effect of MSG on Frozen Peas

MSG Percent by Weight	Triangle Difference			Paired Preference		
	N[1]	Correct Percent	Significant Level	N	Preference for MSG Sample (Percent)	Significance Level
0.20	20	30.0	Insig.	....	.....	.....
0.40	20	35.0	Insig.	....	.....	.....
0.60	20	60.0	1%	40	45.0	Insig.
0.80	....	.....	.....	41	49.0	Insig.

[1] Number of observations.

TABLE II—MOST CANNED VEGETABLES Containing MSG Were Preferred Over Untreated Controls

Product	MSG Percent By Weight	N	Preference for MSG Sample (Percent)	Significance Level (Percent)
Asparagus, whole spear[1]	0.20	80	67.5	1
Corn, white cream style[1]	0.20	80	67.5	1
Green beans[1]	0.30	80	68.3	1
Peas[1]	0.20	80	63.8	1
Spinach	0.20	40	72.0	1
Tomato juice	1.00	82	71.0	1
Corn, golden cream style[1]	0.20	80	62.5	5
Corn, golden whole kernel[1]	0.10	80	61.2	5
Hominy, fried[2]	0.40	40	68.0	5
Lima beans[1]	0.20	80	57.3	Trend
Beans with pork	0.30	80	48.8	Insig.
Sauerkraut	0.30	39	54.0	Insig.
Tomatoes, stewed[1]	0.18	80	50.6	Insig.

[1] Prepared by industry and provided by courtesy of the A. E. Staley Co., Decatur, Ill.
[2] MSG added before cooking.

TABLE III—HOW FRESH, Frozen, and Dehydrated Vegetables Containing MSG Compared With Untreated Controls

Vegetable	MSG Percent By Weight	N	Preference for MSG Sample (Percent)	Significance Level (Percent)
Green beans, fresh	0.20	80	63.8	1
Potatoes, dehydrated, mashed	0.40	79	66.0	1
Cabbage, dehydrated, scalloped[1]	0.20	40	68.0	5
Peas, frozen	0.80	41	49.0	Insig.
Lima beans, frozen	1.00	40	60.0	Insig.
Carrots, dehydrated, creamed	0.10	40	48.0	Insig.
Cauliflower au gratin[1]	0.20	38	55.0	Insig.

[1] MSG added before cooking.

TABLE IV—PREFERENCE Was Shown for Many Meat, Poultry, and Fish Recipes Containing MSG.

Product	MSG Percent By Weight	N	Preference for MSG Sample (Percent)	Significance Level (Percent)
Boned chicken, canned	0.75	40	75.0	1
Hamburger, fresh, fried	0.60	78	65.4	1
Pork and gravy, canned	0.25	80	66.2	1
Cod fish, fresh, creamed	0.40	75	77.0	1
Haddock, fresh, fried[1]	0.40	81	70.0	1
Salmon, canned	0.40	40	70.0	1
Beef and gravy, canned	0.25	80	61.2	5
Beef stew, fresh	0.40	80	61.0	5
Hamburgers, canned	0.50	36	67.0	Trend
White fish, fresh, broiled	0.40	38	66.0	Trend
Chopped ham and eggs, canned	0.75	40	55.0	Insig.
Meat loaf, fresh[1]	0.40	80	52.5	Insig.
Tuna fish, canned	0.60	80	53.8	Insig.

[1] MSG added before cooking.

TABLE V—MANY MISCELLANEOUS Foods and Recipes Were Not Improved by MSG

Product	MSG Percent By Weight	N	Preference for MSG Sample (Percent)	Significance Level (Percent)
Baked beans with bacon[1]	0.50	40	72.0	1
Chicken soup	0.06	40	75.0	1
Oleomargarine (army type)	0.20	42	67.0	5
Cream of celery soup	0.40	40	68.0	5
Onion soup (dehydrated onions)	0.70	40	68.0	5
Army bean soup	0.10	40	58.0	Insig.
Eggs, fresh, scrambled[1]	0.40	79	52.0	Insig.
Cottage cheese	0.05	81	43.2	Insig.
Macaroni with cheese[1]	0.20	77	56.0	Insig.
Cooked rice	0.20	39	38.0	Insig.
Bread, army garrison[1]	0.20	81	46.0	Insig.
Chocolate pudding	0.10	40	40.0	Insig.
Vanilla pudding	0.10	41	56.0	Insig.
Corn meal mush	0.05	40	35.0	5[2]
Orange juice, canned	0.10	41	27.0	1[2]
Milk, dry whole, reconstituted	0.07	40	10.0	1[2]
Oatmeal mush	0.10	39	21.0	1[2]

[1] MSG added before cooking.
[2] MSG sample inferior.

TABLE VI—IMPROVEMENT of Foods by MSG as Related to Types of Flavors

Flavor Type	Improved	Not Improved
Sour	Tomato juice	Orange juice Sauerkraut
Bland	Mashed potatoes Creamed codfish Chicken soup Cream of celery soup Oleomargarine Hominy	Vanilla pudding Chocolate pudding Rice Oatmeal mush Cornmeal mush Milk Cottage cheese
Sweet	None	Orange juice Vanilla pudding Chocolate pudding

tectable flavor change, the first check was on preference between the untreated control peas and those with 0.6% MSG. When this comparison resulted in no preference, a second test was conducted with 0.8% MSG. When no preference was established at this high level, work on frozen peas was discontinued.

Compiling the Data

Even though several tests were conducted on each food, only one set of data is given, namely that found to be most favorable to MSG. Triangle-test results were merely preliminary and have been entirely eliminated. Preference tests other than the specific ones shown in Tables II-V gave insignificant results and so were omitted.

However, in referring to the tables, it should be kept in mind that the MSG concentration shown for each food is either at or above that found necessary to bring about a flavor change, and that no concentration above this level gave a more favorable result.

Where not otherwise indicated, MSG concentration represents percent by weight of the food as prepared and ready for serving. For certain foods (indicated by footnotes in Tables) the given concentration represents percent by weight prior to cooking or processing. Within each table the foods have been grouped according to the amount of improvement effected. This corresponds to the statistical significance level as shown in the last column, except in Table V, where four items show a loss in preference.

How They Rated

Canned vegetables (Table II) were most consistently improved. Of the 13 items, only 3 failed to show at least a trend toward improvement. Improvement was not as consistent among the miscellaneous vegetable recipes (Table III), but again a wide variation in effective MSG concentration was found.

There was improvement with most of the meat, poultry, and fish items (Table IV). Here again, only 3 of 13 items failed to show at least a trend.

Results with miscellaneous foods and recipes (Table V) were much less favorable to MSG. Only 5 of the 17 items were improved, and there were 4 foods where detection of a flavor change was accompanied by a loss in preference.

Since these items have been placed together merely for convenience, and since a number of foods are included with which the use of MSG has never been seriously recommended, the low frequency of improvement has no general significance. The table includes 4 soups—and significant improvement was established for 3 of them. It is of interest to note the very low concentrations of MSG which caused a detectable flavor change in some foods, ranging down to 0.05% for corn meal mush and 0.06% for chicken soup.

Table VI shows what happened to a number of foods classified according to the general flavor types of sweet, sour, and bland. The grouping is arbitrary, particularly in regard to bland, where many more items, such as certain vegetables, might also have been included. Some foods which have two dominant flavor characteristics (e.g., orange juice) have been included in two classes. Additional types were not established, since they would have been even less well defined.

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