

NOSB NATIONAL LIST FILE CHECKLIST

PROCESSING

MATERIAL NAME: **Yeast, smoked**

CATEGORY: **Non-agricultural**

Complete?: _____

✓

NOSB Database Form

✓

References

✓

MSDS (or equivalent)

✓

FASP (FDA)

Date file mailed out: 2/6/95

✓

TAP Reviews from: Mark Schwartz

✓

Supplemental Information:

Dictionary of Additives

Letter from BakerYeast

MISSING INFORMATION: another TAP review from Rich Thayer

NOSB/NATIONAL LIST COMMENT FORM/BALLOT

Use this page to write down comments and questions regarding the data presented in the file of this National List material. Also record your planned opinion/vote to save time at the meeting on the National List.

Name of Material Yeast smoked

Type of Use: Crops; Livestock; Processing

TAP Review by:

1. Mark Schwartz
2. _____
3. _____

Comments/Questions:

My Opinion/Vote is:

Signature _____ Date _____

USDA/TAP REVIEWER COMMENT FORM

Use this page or an equivalent to write down comments and summarize your evaluation regarding the data presented in the file of this potential National List material. Attach additional sheets if you wish.

This file is due back to us within 30 days of: 6 Feb

Name of Material: Yeasts, smoked

Reviewer Name: MARK SCHWARTZ

Is this substance Natural or Synthetic? Explain (if appropriate)

Natural

Please comment on the accuracy of the information in the file:

Very good

This material should be added to the National List as:

Synthetic Allowed Prohibited Natural

or, This material does not belong on the National List because:

Depending on substrate used to grow yeast and source of smoke flavor

Are there any restrictions or limitations that should be placed on this material by use or application on the National List?

Not as a supplement source

Any additional comments or references?

Signature Mark L Schwartz

Date 2/24/95

Identification

Common Name	Yeast, smoked	Chemical Name	
Other Names	Bakon Yeast, Hickory Smoked Yeast, Smoked Torula Yeast	Code #: CAS	
Code #: CAS		Code #: Other	
N. L. Category	Non-agricultural	MSDS	<input type="radio"/> yes <input checked="" type="radio"/> no

Chemistry

Family

Composition Cells of dried Torula Yeast solely impregnated with 100% sweet hickory wood smoke. 45% Protein, 1% Fat, 4% Crude Fiber, 22.4% Carbohydrates, 9% Minerals. See attached "General Specifications for Bakon Yeast".

Properties Uniform light tan color yeast with characteristic smoked odor and taste.

How Made Torula yeast is grown on a carbon source, usually a vegetable derived carbohydrate such as corn or molasses, or on wood pulp. Resulting "yeast cream" is spray-dried under conditions which make it stable and non-fermenting. 100% Hickory smoke added to flavor.

Processing

Use/Action

Type of Use

Specific Use(s) Adds bacon-like taste to foods as well as vitamins and protein. Enhances meat flavors and masks soy taste in extended meat products. Used in soups, cheese spreads, crackers and snack foods.

Action Provides flavoring when added as ingredient to foods.

Combinations

Status

OFPA

N. L. Restriction Yeasts grown on petroleum for this purpose should not be allowed.

EPA, FDA, etc

Directions

Safety Guidelines

State Differences

Historical status yeasts generally accepted as approved non-organic ingredients.

International status

NOSB Materials Database

4.

OFPA Criteria

2119(m)1: chemical interactions Not Applicable

2119(m)2: toxicity & persistence Not Applicable

2119(m)3: manufacture & disposal consequences

Possibly from petroleum grown yeasts.

2119(m)4: effect on human health

Ingestion of nucleic acids in yeast increases blood level of uric acid which may cause gout. Daily intake of inactive dry yeast should be limited to 20 grams/day. Contains naturally-occurring glutamic acid.

2119(m)5: agroecosystem biology Not Applicable

2119(m)6: alternatives to substance

Smoked meats: i.e. bacon, ham, etc.

2119(m)7: Is it compatible?

References

"General specifications for Bakon Yeast" (attached)

Dictionary of Additives: "yeasts" (attached)

GENERAL SPECIFICATIONS FOR BAKON YEAST

Bakon Yeast is a pure vegetable-derived product that adds a unique bacon-like taste to foods, as well as natural vitamins and protein. This product is a dry stable powder consisting of the cells of dried Torula Yeast solely impregnated with 100% sweet hickory wood smoke by the Bakon process. Bakon Yeast also enhances meat flavors and masks soy taste in extended meat products. Because of its natural nucleotide, glutamic acid, and soluble amino acid content; Bakon improves food flavors.

PHYSICAL DATA

- Process Used: The original patented BAKON YEAST PROCESS with all the subsequent improvements made by the original inventor.
- Odor : Characteristic, closely resembles that of smoked bacon or ham.
- Taste : Characteristic, imparts a delightful bacon-like hickory smoked taste.
- Color : Bakon Yeast has a uniform light tan color.

TYPICAL ANALYSIS

Protein (N x 6.25)	>45.0%
Fat (ether extract)	1.0%
Crude Fiber	4.0%
Carbohydrates (by difference)	22.4%
Moisture	<7.0%
Minerals	9.0%
Natural Lecithin	4.5%
pH	6.0%
Sulfite	<1 ppm

MICROBIOLOGICAL SPECIFICATIONS

Total Plate Count, max	7,500/g
Yeast and Mold, max	50/g
Coliforms, max	10/g
E. Coli	Negative
Salmonella	Negative
Staphylococcus aureus	Negative

TYPICAL VITAMIN ANALYSIS (mg/100 g)

Thiamine	0.7	Folic Acid (total) ..	0.6
Riboflavin	4.1	PANA	0.8
Pyridoxine HCl	2.1	Inositol	450.0
Pantothenic Acid ...	11.3	Choline Chloride ...	580.0
Biotin	0.05	Vitamin B12	0.0001
Niacin	43.2		

TYPICAL AMINO ACID ANALYSIS (g/100 g N)

Lysine	6.7	Alanine	5.2
Histidine	2.1	Cysteine	0.7
Arginine	5.5	Valine	5.3
Aspartic Acid ...	8.5	Methionine	1.2
Threonine	4.9	Isoleucine	4.3
Serine	4.4	Leucine	6.7
Glutamic Acid ...	16.3	Tyrosine	3.2
Proline	2.9	Phenylalanine	4.1
Glycine	4.3	Tryptophan	1.0

INGREDIENTS

Inactive Dried Food Yeast and Sweet Hickory Filtered Smoke

AVAILABLE GRADES

Type SFBN - Regular Smoke Strength
 Type HFBN - Heavy Smoke Strength

PACKAGING

150# lever-loc fiber drums with poly liner (net weight)

LABELING

"SMOKED YEAST" is the commonly accepted ingredient designation in label statements. Since Bacon Yeast is a 100% genuine hickory-smoked product, "HICKORY SMOKED YEAST" may also be used.

STORAGE

Storage under cool and dry conditions is recommended. Avoid storage at elevated temperatures for prolonged period of time. Drums should be kept sealed and dry. Shelf life: 1 to 2 years in unopened bag stored as recommended.

ORDERING

Rhineland, Wisconsin: Phone/Fax: 715-362-6533
 or
 Barrington, Illinois: Phone/Fax: 708-381-5912

We cannot anticipate all conditions under which this information and our products, or the products of other manufacturers in combination with our products, may be used. We accept no responsibility for results obtained by the application of this information or the safety and suitability of our products, either alone or in combination with other products. Users are advised to make their own tests to determine the safety and suitability of each such product or product combination for their own purposes. Unless otherwise agreed in writing, we sell the products without warranty, and buyers and users assume all responsibility and liability for loss or damage arising from the handling and use of our products, whether used alone or in combination with other products.



BAKON YEAST

INCORPORATED

TO WHOM IT MAY CONCERN:

The products and packaging materials comprising each shipment or other delivery hereafter made by Bakon Yeast Inc., are hereby guaranteed, as of the date of each such shipment or delivery, to be, on that date, not adulterated or misbranded within the meaning of the Federal Food, Drug and Cosmetic Act, as amended; and not articles which may not, under the provisions of Section 404 or 505 of the Act, be introduced into interstate commerce.

Our basic product is Primary Grown Dried Torula Yeast, as identified in the National Formulary XIX as "Torula Dried Yeast". Torula Dried Yeast is grown strictly on a vegetable-derived derivative (corn). A strain of yeast called "Torulopsis utilis" is used to consume only the corn sugars. The resulting so-called "yeast cream" is spray dried under conditions which make it stable and non-fermenting.

To this yeast, we only add 100% hickory smoke obtained by actually burning hickory chips and impregnating the yeast particle therewith. We use approximately the same smoking equipment as do meat packers to smoke ham, bacon, sausages, etc.; except that we filter out any tars or resins that might be contained in the natural hickory smoke before mixing with the yeast. NO MEAT PRODUCTS, LIQUID SMOKE OR OTHER ARTIFICIAL FLAVORINGS ARE USED - AND ABSOLUTELY NO COLORING MATERIAL OF ANY CHARACTERISTIC IS EVER ADDED. In other words, Bakon Yeast is simply a mixture of sweet hickory filtered smoke & Dried Torula Yeast!

P.O. Box 651, Rhinelander, Wi. 54501 - Tele. 715-362-6533

YEASTS*

Baker's Yeast; Brewer's Yeast; Dried Yeast; Smoked Yeast; Torula Yeast

Yeast, a type of fungus, is produced or grown by the fermentation of carbohydrates. The yeast used in food may be *baker's yeast*, a strain of *Saccharomyces cerevisiae* used in breadmaking and producing the leavening effect of copious amounts of gaseous carbon dioxide; *brewer's yeast* (a different strain

which produces greater amounts of alcohol in fermenting sugar, but is not effective in leavening), which is obtained as a by-product from the fermentation of beer made from cereal and hops (after removal of the bitter material derived from hops); or *torula yeast* (*Candida* species), which is obtained from cultures grown on molasses, the carbohydrate residues of papermaking from wood pulp, or more recently, petroleum. *Dried yeast* consists of the dry cells of any suitable yeast fungi, usually from brewer's yeast. It is high in protein (45 percent), and is rich in many of the B vitamins. It is also high in nucleic acids, and this has limited use of yeast as a major protein source. *Smoked yeast* is used as a flavoring agent in soups, cheese spreads, crackers, and snack foods; it is prepared by exposing dried yeast to wood smoke.

Yeasts are useful in foods as dough conditioners and leavening agents in baked goods; as a fermenting aid, particularly for alcoholic beverages; in formulating flavors in soup mixes, gravies, and other foods; and in providing nutrients.

SAFETY: In 1975 yeast used in food processing averaged 545 milligrams per person in the daily diet. Dried yeast approximated a tenth of the total. Smoked yeast flavoring had an average daily consumption of 4 milligrams per person in 1978.

In earlier years, yeast was used as a dietary source of vitamins. Today pure vitamins are available at much lower cost, so the use of yeast as a nutrient is primarily for its protein value. A high-lysine baker's yeast has been suggested as a protein supplement to improve the nutritional quality of cereal foods, which tend to be limited in lysin (see p. 475). Yeast also has enhanced the nutritional benefit to humans of several kinds of formulation of vegetable protein mixtures. The usefulness of yeast as a diet supplement has been demonstrated many times during the past decades: at levels up to 10 percent of yeast in the diet, weight gain has increased and the nutritive value of the dietary protein has improved. Many thousands of tons of yeast were used as meat substitutes and to extend meat, and in army rations in Germany, Russia, and Japan during World War II.

In humans, the nucleic acids in yeast are converted to uric acid when metabolized in the body. A large excess of uric acid can cause gout, a painful inflammation of the toes and joints. A safe intake of nucleic acid is about 2 grams per day. Since the daily intake of yeasts in the diet totals less than 0.5 gram, a harmful excess of uric acid from this source is unlikely unless

MAJOR REFERENCE: *Single Cell Protein*, II, S. R. Tannenbaum and D. I. Wang, eds. (Cambridge, Mass.: M.I.T. Press, 1975).

*For autolyzed yeast, a hydrolyzed brewer's yeast, see p. 613.

yeast is consumed as a major source of protein in the diet, perhaps 20 grams or more, and this is not the way yeast is used as a food additive.

Clinical studies with human subjects indicate that an intake of 20 grams of yeast may result in nausea and diarrhea. At these high levels of consumption, there can be a sensitization to yeast.

In the 1970s there was interest in growing torula yeast on petroleum rather than using carbohydrate sources. The safety of this practice has been examined primarily because petroleum products may contain small amounts of cancer-inducing chemicals. Yeast grown on petroleum hydrocarbons has been dried and fed to rats to provide 30 percent of the protein; in 90-day studies, there were no significant effects of these yeasts on appearance, behavior, growth, food intake, blood components (including blood uric acid, though rats can metabolize uric acid and degrade it further, in contrast to humans), or on various pathological measures (including microscopic examination of the tissues and organs for precancerous changes) as compared with animals on a casein (see p. 507) diet. Proteins prepared from such yeasts have been fed to rats as the sole source of protein (20 percent of the diet). During the 100-day study there was no effect on deaths of the animals or on their general condition and behavior, but there was some occurrence of calcium deposits in the kidney. The level of feeding in this study would be equivalent to well over a thousand times the average human intake, adjusted for body weight.

A study has been conducted in which mice were given an injection of some 30,000 cancer cells. The mice were then tested for effects of feeding a yeast preparation as a food supplement. The tumor growth over the next four weeks was reduced, apparently because the yeast in the diet antagonized the establishment and early growth of the cancer. Yeasts grown on petroleum fractions have also been tested to see what effect they might have on tumor growth. In one test, rats were treated with a cancer-inducing chemical and fed yeast at a level of 17 to 27 percent of the diet (up to 80 percent of the protein) for seven months. The yeast did not influence growth or food consumption, nor did it affect the cancer development or incidence in the treated rats.

ASSESSMENT: Yeasts are useful nutrient supplements. They have been used for centuries and are indispensable for certain

fermentation processes, such as making bread or brewing. No safety problem appears to come from growing yeast on either carbohydrate by-products or on petroleum. The use of yeast as a food additive poses no hazard to the consumer at levels now used or likely to be used in foods in the future. However, smoked yeast has not been adequately tested for safety, and there are reasons for concern about possible health hazards from the wood smoking (see p. 625).

RATING: S for all yeasts except smoked yeast; ? for smoked yeast.

AUG 94

E 1

CNUM=2927

U.S. FOOD AND DRUG ADMINISTRATION
FOOD ADDITIVE SAFETY PROFILE

~~ADD~~ YEAST
AUTOLYSATE

S#: 977046755
SP#: 2927
PE: NEW
S#: 0365
MA#:
AS#:

HUMAN CONSUMPTION: 7.1045 MG/KG BW/DAY/PERSON
MARKET DISAPPEARANCE: 8383333.333 LBS/YR
MARKET SURVEY: 87

JECFA:
JECFA ADI:
JECFA ESTABLISHED: 940215 MG/KG BW/DAY/PERSON
LAST UPDATE:

DENSITY: LOGP:

STRUCTURE CATEGORIES: B7

COMPONENTS:

NONYMS:
YEAST, AUTOLYZED
AUTOLYZED YEAST

EMICAL FUNCTION: F
CHEMICAL EFFECT:
FLAVOR ENHANCER
FLAVORING AGENT OR ADJUVANT
ANTICAKING AGENT OR FREE-FLOW AGENT
DRYING AGENT
HUMECTANT
MALTING OR FERMENTING AID
LEAVENING AGENT
NUTRIENT SUPPLEMENT

R REG NUMBERS:

MINIMUM TESTING LEVEL: 3

REMARKS: NO TOX DATA

OCNUM=2931

U.S. FOOD AND DRUG ADMINISTRATION
FOOD ADDITIVE SAFETY PROFILE

~~ASST~~ YEASTS

AS#:	977030399	HUMAN CONSUMPTION:	35.8757	MG/KG BW/DAY/PERSON
ASP#:	2931	MARKET DISAPPEARANCE:	42333333.333	LBS/YR
TYPE:	NEW	MARKET SURVEY:	87	
AS#:	0333	JECFA:		
3MA#:		JECFA ADI:		
AS#:		JECFA ESTABLISHED:		MG/KG BW/DAY/PERSON
		LAST UPDATE:		

4: DENSITY: LOGP:

STRUCTURE CATEGORIES: B7

COMPONENTS:

NONYMS: LEVURE

CHEMICAL FUNCTION: G

TECHNICAL EFFECT:

- LEAVENING AGENT
- MALTING OR FERMENTING AID
- FLAVOR ENHANCER
- FLAVORING AGENT OR ADJUVANT
- NUTRIENT SUPPLEMENT
- ANTICAKING AGENT OR FREE-FLOW AGENT
- DRYING AGENT
- HUMECTANT

PR REG NUMBERS: 160.105 160.185 160.145

MINIMUM TESTING LEVEL: 3

REMARKS:

ICNUM=1569

U.S. FOOD AND DRUG ADMINISTRATION
FOOD ADDITIVE SAFETY PROFILE

~~YEAST~~
YEASTS, DRIED

.S#:	977009361	HUMAN CONSUMPTION:	5.3954	MG/KG BW/DAY/PERSON
.SP#:	1569	MARKET DISAPPEARANCE:	6366666.666	LBS/YR
.PE:	ASP	MARKET SURVEY:	87	
.S#:	1186	JECFA:		
.MA#:		JECFA ADI:		
.AS#:		JECFA ESTABLISHED:	931115	MG/KG BW/DAY/PERSON
		LAST UPDATE:		

LOGP:

STRUCTURE CATEGORIES: C23 C24

COMPONENTS:

NONYMS: DRIED YEAST

EMICAL FUNCTION: D

CHNICAL EFFECT:

LEAVENING AGENT
FLAVOR ENHANCER
FLAVORING AGENT OR ADJUVANT
NUTRIENT SUPPLEMENT
SOLVENT OR VEHICLE
MALTING OR FERMENTING AID

REG NUMBERS:	172.896	139.122	139.155
	137.235	139.115	

MINIMUM TESTING LEVEL: 3

COMMENTS:

EX 4A: LOWEST EFFECT LEVEL OBSERVED IN ALL AVAILABLE RAT OR MOUSE STUDIES

STUDY:	5A	COMPLETENESS:	A	RANKING FACTOR:	3.596E-4>
SPECIES:	RAT	LEL:	>15000	MG/KG BW/DAY	

EFFECTS: NO EFFECTS

COMMENTS: HIGHEST DOSE TESTED

>CNUM=1569

BOX 4C: LOWEST EFFECT LEVEL OBSERVED IN ALL AVAILABLE STUDIES

STUDY: 5A COMPLETENESS: A RANKING FACTOR: 3.596E-4
 SPECIES: RAT LEL: >15000 MG/KG BW/DAY
 EFFECTS: NO EFFECTS
 NOTES:
 COMMENTS: SEE BOX 4A

BOX 6: HIGHEST OBSERVED NO-EFFECT LEVEL IN SPECIES OF BOX 4C

STUDY: 5A COMPLETENESS: A LEL: >NONE MG/KG BW/DAY
 SPECIES: RAT HNEL: 15000 MG/KG BW/DAY
 EFFECTS: NO EFFECTS
 COMMENTS:

BOX 9: ORAL TOXICITY STUDIES (OTHER THAN ACUTE)

STUDY: 5A COMPLETENESS: A SOURCE: FOOD COSMET TOXICOL 9:787-800
 (PE: CHRONIC RODENT YEAR: 1971
 SPECIES: RAT LEL: > MG/KG BW/DAY
 DURATION: 728 DAYS HNEL: 15000 MG/KG BW/DAY
 EFFECTS: NO EFFECTS
 NOTES:
 COMMENTS: YEASTS WERE GROWN ON HYDROCARBONS

STUDY: 29 COMPLETENESS: C SOURCE: ASP 001569
 (PE: SUBCHRONIC RODENT YEAR: 1976
 SPECIES: RAT LEL: > MG/KG BW/DAY
 DURATION: 90 DAYS HNEL: 30000 MG/KG BW/DAY
 EFFECTS: NO EFFECTS
 NOTES:
 COMMENTS:

STUDY: 30 COMPLETENESS: C SOURCE: ASP 001569
 (PE: SUBCHRONIC RODENT YEAR: 1976
 SPECIES: RAT LEL: > MG/KG BW/DAY
 DURATION: 90 DAYS HNEL: 30000 MG/KG BW/DAY
 EFFECTS: NO EFFECTS
 NOTES:
 COMMENTS:

STUDY: 4 COMPLETENESS: A SOURCE: FOOD COSMET TOXICOL 8:499-507
 (PE: SUBCHRONIC RODENT YEAR: 1970
 SPECIES: RAT LEL: > MG/KG BW/DAY
 DURATION: 365 DAYS HNEL: 15000 MG/KG BW/DAY
 EFFECTS: NO EFFECTS
 NOTES: