NOSB NATIONAL LIST
FILE CHECKLIST

PROCESSING

MATERIAL NAME: **#27 Yeast, Bakers**

✓ **NOSB Database Form**

✓ **References**

____ **MSDS (or equivalent)**

✓ **FASP (FDA)**

✓ **TAP Reviews from:** **Joe Montecalvo, Rich Theuer**

NOSB/NATIONAL LIST
COMMENT FORM
PROCESSING

Material Name: #27 Yeast, Bakers

Please use this page to write down comments, questions, and your anticipated vote(s).

COMMENTS/QUESTIONS:

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1. In my opinion, this material is:
_____ Synthetic _____ Non-synthetic.

2. Should this material be allowed in an "organic food" (95% or higher organic ingredients)? _____ Yes _____ No
(IF NO, PROCEED TO QUESTION 3.)

3. Should this substance be allowed in a "food made with organic ingredients" (50% or higher organic ingredients)? _____ Yes _____ No

TAP REVIEWER COMMENT FORM for USDA/NOSB

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. Complete both sides of page. Attach additional sheets if you wish.

This file is due back to us by: Sept 5, 1995

Name of Material: Yeast, bakers

Reviewer Name: DR. JOE MONTECALVO

Is this substance Synthetic or non-synthetic? Explain (if appropriate)

Synthetic

If synthetic, how is the material made? (please answer here if our database form is blank) - only non-genetically modified forms

This material should be added to the National List as:

✓ **Synthetic Allowed** ____ **Prohibited Natural**

or, ____ **Non-synthetic (Allowed as an ingredient in organic food)**

____ **Non-synthetic (Allowed as a processing aid for organic food)**

or, ____ **this material should not be on the National List**

Are there any use restrictions or limitations that should be placed on this material on the National List? - genetically modified forms of this product should not be on the National List

Please comment on the accuracy of the information in the file: - Is the term bioengineered strains synonymous genetically modified i.e. is the DNA changed in any way - this may need further clarification - bio-engineered can also refer to a process manufacturing operation as well

Any additional comments? (attachments welcomed) See above

Do you have a commercial interest in this material? ____ **Yes;** ✓ **No**

Signature Dr. Joe Montecalvo **Date** 8/22/95

Please address the 7 criteria in the Organic Foods Production Act:
(comment in those areas you feel are applicable)

(1) the potential of such substances for detrimental chemical interactions with other materials used in organic farming systems;
none

(2) the toxicity and mode of action of the substance and of its breakdown products or any contaminants, and their persistence and areas of concentration in the environment; none.

(3) the probability of environmental contamination during manufacture, use, misuse or disposal of such substance; none

(4) the effect of the substance on human health;
- Should not be consumed by people with yeast infections (ie. thrush)

(5) the effects of the substance on biological and chemical interactions in the agroecosystem, including the physiological effects of the substance on soil organisms (including the salt index and solubility of the soil), crops and livestock;
none

(6) the alternatives to using the substance in terms of practices or other available materials; and
none

(7) its compatibility with a system of sustainable agriculture.
O.K. (non-genetically engineered forms)

TAP REVIEWER COMMENT FORM for USDA/NOSB

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. Complete both sides of page. Attach additional sheets if you wish.

This file is due back to us by: Sept 5, 1995

Name of Material: Yeast, bakers

Reviewer Name: R Theuer

Is this substance Synthetic or non-synthetic? Explain (if appropriate) DON'T KNOW

If synthetic, how is the material made? (please answer here if our database form is blank)

SYNTHETIC IF BIOENGINEERED

NON-SYNTHETIC OTHERWISE

This material should be added to the National List as:

____ Synthetic Allowed ____ Prohibited Natural

or, ✓ Non-synthetic (Allowed as an ingredient in organic food)

✓ Non-synthetic (Allowed as a processing aid for organic food) } IF NON-SYNTHETIC

or, ✓ **this material should not be on the National List** IF SYNTHETIC

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

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

NEED PRECISION ON NATURE OF PARTICULAR YEAST PREPARATION

Any additional comments? (attachments welcomed)

Do you have a commercial interest in this material? ____ Yes; ✓ No

Signature R Theuer **Date** 8/28/95

Please address the 7 criteria in the Organic Foods Production Act:
(comment in those areas you feel are applicable)

(1) the potential of such substances for detrimental chemical interactions with other materials used in organic farming systems;

NONE

(2) the toxicity and mode of action of the substance and of its breakdown products or any contaminants, and their persistence and areas of concentration in the environment;

NO ISSUES

(3) the probability of environmental contamination during manufacture, use, misuse or disposal of such substance;

MINIMAL

(4) the effect of the substance on human health;

OK - EATEN FOR CENTURIES

(5) the effects of the substance on biological and chemical interactions in the agroecosystem, including the physiological effects of the substance on soil organisms (including the salt index and solubility of the soil), crops and livestock;

NONE

(6) the alternatives to using the substance in terms of practices or other available materials; and

FOR YEAST BREADS, NO ALTERNATIVE

(7) its compatibility with a system of sustainable agriculture.

OK

NOSB Materials Database

Identification

Common Name **Yeast, bakers** **Chemical Name**

Other Names

Code #: CAS **Code #: Other**

N. L. Category Non-agricultural **MSDS** ○ yes ◉ no

Chemistry

Family

Composition *Saccaromyces cerevisiae.*

Properties Can survive in either aerobic or anaerobic environment. Produces carbon dioxide and water or ethanol from sugars. Reproduces rapidly and resists environmental change. Stores well when dry.

How Made Pure yeast culture is propagated in the laboratory from specially selected, and possibly bio-engineered strains. A small flask of fresh culture is inoculated into a culture tank and then transferred into several larger tanks. These fermenters are fed with sterile molasses medium supplemented with necessary growth factors (such as ammonia or urea, phosphoric acid, trace minerals, and biotin). After this scale-up, full scale fermentation is conducted in large tanks with maximum aeration. Next the reast cells are recovered from the spent medium by centrifugation and washed. Yeast cream is obtained with 18-20% dry weight. This is concentrated further by filtration to yield yeast cake of about 27-30% dry matter. Lastly, the yeast cake is mixed with oils, emulsifiers and a small amount of water , and then compressed and extruded into blocks, or granulated.

Use/Action

Type of Use Processing

Specific Use(s) Leavening agent, flavor enhancer.

Action metabolizes sugars into carbon dioxide and water.

Combinations

Status

OFPA

N. L. Restriction

EPA, FDA, etc

Directions

Safety Guidelines

State Differences

Historical status

Internationl status

OFPA Criteria

2119(m)1: chemical interactions **Not Applicable**

2119(m)2: toxicity & persistence **Not Applicable**

2119(m)3: manufacture & disposal consequences

Since the yeast manufacturing process is mostly biological, there is little environmental consequence. Processing plants share the issues of effluent and solid waste disposal with all factories.

2119(m)4: effect on human health

Yeast has been used for millenia without negative effects on most people.

2119(m)5: agroecosystem biology **Not Applicable**

2119(m)6: alternatives to substance

natural leavening, sourdough, baking powder, chemical leavening agents.

2119(m)7: Is it compatible?

References

Encyclopedia of Food Science, Food Technology and Nutrition. 1993. Academic Press, Ltd., San Diego, CA. vol 7; p 4953-4958.

Kirk-Othmer Encyclopedia of Chemical Technology, 3rd edition, 1982. John Wiley and Sons, NY.

See also attached.

BAKERS YEAST REFERENCES

AU: Sajbidor,-J.; Certik,-M.; Grego,-J.
TI: Lipid analysis of baker's yeast.
SO: J-chromatogr-A. Amsterdam ; New York : Elsevier, 1993-. Apr 8, 1994. v. 665 (1) p. 191-198.
CN: DNAL QD272.C4J68

AU: Guinard,-J.X.; Lewis,-M.J.
TI: Study of the phenomenon of agglomeration in the yeast Saccharomyces cerevisiae.
SO: J-Inst-Brew. London : The Institute. Nov/Dec 1993. v. 99 (6) p. 487-503.
CN: DNAL 390.9-In7

AU: Britz,-T.J.; Van-der-Merwe,-M.
TI: Anaerobic treatment of baker's yeast effluent using a hybrid digester with polyurethane as support material.
SO: Biotechnol-lett. Middlesex : Science and Technology Letters. July 1993. v.15 (7) p. 755-760.
CN: DNAL QR53.B56
AB: A high-strength baker's yeast effluent was anaerobically treated using a hybrid digester under mesophilic conditions. The low methane yield and VFA accumulation found in the digester effluent, indicated inhibition on methanogenic level and this was considered to be the rate-limiting step during the anaerobic treatment process. The overall efficiency of the digester indicated that this digester design and support medium was suitable for the treatment of a high-strength, sulfate-rich baker's yeast effluent.

AU: Viljoen,-B.C.; Lues,-J.F.R.
TI: The microbial populations associated with post-fermented dough and compressed baker's yeast.
SO: Food-microbiol. London ; Orlando : Academic Press, c1984-. Oct 1993. v. 10 (5) p. 379-386.
CN: DNAL QR115.F66
AB: A survey was conducted on the microbial populations associated with dough processing in commercial bread baking. Samples were collected from post-fermented bread dough and compressed baker's yeast. In all samples the numbers of Saccharomyces cerevisiae strains (baker's yeast), wild yeast and bacteria were quantified by standard plate counting procedures on selective media and identified according to standard procedures. The bacterial genera isolated from the different stages were divided into four groups for identification purposes: mesophilic, anoxic, psychrotrophic and acid-forming bacteria. Ten different bacterial genera and three different yeast genera namely Saccharomyces, Zygosaccharomyces and Torulaspora were isolated from the dough, whereas only three different bacterial genera (Lactobacillus, Pediococcus and Lactococcus) and two yeast genera (Saccharomyces and Zygosaccharomyces) were isolated from the compressed yeast blocks.

AU: Evans,-I.H.
TI: Yeast strains for baking: recent developments.
SO: Yeast technology / JFT Spencer, DM Spencer eds. New York Springer-Verlag, c1990.. p. 13-54.
CN: DNAL TP580.Y43-1990

AU: Watanabe,-M.; Fukuda,-K.; Asano,-K.; Ohta,-S.
TI: Mutants of bakers' yeasts producing a large amount of isobutyl alcohol or isoamyl alcohol, flavour components of bread.
SO: Appl-Microbiol-Biotech. Berlin, W. Ger. : Springer International. Nov 1990. v. 34 (2) p. 154-159.
CN: DNAL QR1.E9
AB: Mutants resistant to 4-aza-DL-leucine were derived from strains of the bakers' yeast Saccharomyces cerevisiae and selected with respect to overproduction of isobutyl alcohol (i-BuOH) or isoamyl alcohol (i-AmOH). Many mutants that produced i-BuOH or i-AmOH more than the parent strains were obtained. In the evaluation of these mutants, bread containing more i-BuOH was evaluated as giving a favorable characteristic flavour, but bread with more i-AmOH was unfavorable. These mutants were able to ferment dough at similar rates to commercial bakers' yeasts. The mutants overproducing i-BuOH or i-AmOH were released from inhibition of the key enzymes, acetohydroxy acid synthase and alpha-isopropylmalate synthase, respectively, in the pathway of branched-chain amino acids synthesis.

AU: Aarnio,-T.H.; Suihko,-M.L.; Kauppinen,-V.S.
TI: Isolation of acetic acid-tolerant baker's yeast variants in a turbidostat.
SO: Appl-Biochem-Biotechnol. Totowa, N.J. : Humana Press. Jan 1991. v. 27 (1) p. 55-63.
CN: DNAL QD415.A1J62

AU: Vollmar,-A.; Meuser,-F.
TI: Influence of starter cultures consisting of lactic acid bacteria and yeasts on the performance of a continuous sourdough fermenter.
SO: Cereal-Chem. St. Paul, Minn. : American Association of Cereal Chemists. Jan/Feb 1992. v. 69 (1) p. 20-27.
CN: DNAL 59.8-C33

AU: Lotz,-M.; Frohlich,-R.; Matthes,-R.; Schugerl,-K.; Seekamp,-M.
TI: Bakers' yeast cultivation on by-products and wastes of potato and wheat starch production on a laboratory and pilot-plant scale.
SO: Process-Biochem. New York, N.Y. : Elsevier Science Publishers. Oct 1991. v. 26 (5) p. 301-311.
CN: DNAL TP1.P7

AU: Oliver,-S.G.
TI: "Classical" yeast biotechnology.
SO: Biotechnol-Handb. New York, N.Y. : Plenum Press. 1991. v. 4 p. 213-248.
CN: DNAL TP248.2.B578

AU: Latov,-V.K.; Babayan,-T.L.; Gordienko,-S.V.; Kogan,-A.S.; Tsyryapkin,-V.A.; Belikov,-V.M.
TI: Multipurpose processing of yeast biomass.
SO: Sov-Biotechnol. New York, N.Y. : Allerton Press. 1990. (3) p. 18-25.
CN: DNAL TP248.13.S68
AB: This paper describes the induced autolysis of different yeast species for multipurpose processing of their biomass. The flowscheme (process) provides for production of a mixture of amino acids, carbohydrates, nucleic components, and cell envelope fragments. The role of the biomass and inducers is discussed, as is the three-stage autolysis mechanism.

AU: Dam,-H.W.-van
TI: The biotechnology of baker's yeast: old or new business.
SO: Chemistry and physics of baking : materials, processes, and products : the proceedings of an int. symposium held at the School of Agric., Sutton Bonington, 10th-12th April 1985 / edited by J.M.V. Blanshard ... [et al.]. London : Royal Society of Chemistry, c1986. p. 117-131.
CN: DNAL TX763.C54

AU: Reed,-Gerald; Peppler,-Henry-J
TI: Yeast technology
SO: Westport, Conn., AVI Pub. Co. 1973, 378 p.
CN: DNAL TP433.R4-F&N
AB: A broad introduction to the technology of yeast in the food and beverage industries is provided. Both the principles and main features of commercial processes are explained and illustrated. Designed for food technologists and chemists, physicists, and engineers interested in yeast technology, the monograph includes the following topics: naming and classifying yeasts; biological aspects of yeasts; biochemical aspects of yeasts, microbiological aspects of yeast technology; bakers' yeast production; use of yeast in baking; wine yeasts; brewers' yeast; distillers' yeast; sake, kefir, koumiss, and kaffir beer; feed and food yeasts; and yeast-derived products. A glossary lists terms.

)CNUM=2929

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

BAKERS YEAST EXTRACT

\S#:	008013012	HUMAN CONSUMPTION:	0.2161	MG/KG BW/DAY/PERSON
\SP#:	2929	MARKET DISAPPEARANCE:	255000.000	LBS/YR
/PE:	NEW	MARKET SURVEY:	87	
\S#:	0481	JECFA:		
EMA#:		JECFA ADI:		MG/KG BW/DAY/PERSON
RAS#:		JECFA ESTABLISHED:		
		LAST UPDATE:		

N: DENSITY: LOGP:

TRUCTURE CATEGORIES:

)MPONENTS:

NONYMS: YEAST, EXT.

HEMICAL FUNCTION: F

ECHNICAL EFFECT: FLAVOR ENHANCER
FLAVORING AGENT OR ADJUVANT
NUTRIENT SUPPLEMENT
MALTING OR FERMENTING AID

FR REG NUMBERS:

INIMUM TESTING LEVEL:

)MMENTS:

)CNUM=94

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

BAKER'S YEAST GLYCAN

S#:	977014122	HUMAN CONSUMPTION:	3.7	MG/KG BW/DAY/PERSON
SP#:	94	MARKET DISAPPEARANCE:	4366000.000	LBS/YR
PE:	ASP	MARKET SURVEY:	FDA	
S#:	1016	JECFA:		
MA#:		JECFA ADI:		MG/KG BW/DAY/PERSON
AS#:		JECFA ESTABLISHED:		
		LAST UPDATE:	931015	
:		DENSITY:	LOGP:	

RUCTURE CATEGORIES: B8

MPONENTS:

NONYMS: YEAST GLYCAN, BAKERS

EMICAL FUNCTION: D

CHNICAL EFFECT: EMULSIFIER OR EMULSIFIER SALT
FLAVORING AGENT OR ADJUVANT
NUTRIENT SUPPLEMENT
STABILIZER OR THICKENER
TEXTURIZER

R REG NUMBERS: 172.898

NIMUM TESTING LEVEL: 3

MMENTS:

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

UDY: 12 COMPLETENESS: A RANKING FACTOR: 2.466E-4
ECIES: RAT LEL: 15000 MG/KG BW/DAY
FECTS: ORGAN WEIGHT DECREASE
TES: KIDNEY
MMENTS: DECREASED KIDNEY WEIGHT IN FEMALES ONLY

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

UDY: 12 COMPLETENESS: A RANKING FACTOR: 0.000E0
ECIES: RAT LEL: 15000 MG/KG BW/DAY
FECTS: ORGAN WEIGHT DECREASE
TES: KIDNEY
MMENTS: DECREASED KIDNEY WEIGHT IN FEMALES ONLY

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

UDY: 12 COMPLETENESS: A LEL: 15000 MG/KG BW/DAY
ECIES: RAT HNEL: 10000 MG/KG BW/DAY
FECTS: ORGAN WEIGHT DECREASE
MMENTS: DECREASED KIDNEY WEIGHT IN FEMALES ONLY

X 9: ORAL TOXICITY STUDIES (OTHER THAN ACUTE)

UDY: 9 COMPLETENESS: C SOURCE: FAP 6A3188 1:137-140
PE: SHORT TERM YEAR: 1973
ECIES: RAT LEL: > MG/KG BW/DAY
RATION: 7 DAYS HNEL: 10000 MG/KG BW/DAY
FECTS: NO EFFECTS
TES:
MMENTS: MALES ONLY
ONE DOSE LEVEL ONLY

UDY: 12 COMPLETENESS: A SOURCE: GRP 3G0025 4:879-992
PE: SUBCHRONIC RODENT YEAR: 1973
ECIES: RAT LEL: 15000 MG/KG BW/DAY
RATION: 90 DAYS HNEL: 10000 MG/KG BW/DAY
FECTS: ORGAN WEIGHT DECREASE
TES: KIDNEY
MMENTS: DECREASED KIDNEY WEIGHT IN FEMALES ONLY
LEFT KIDNEY WEIGHT DECREASED IN A DOSE RELATED MANNER
RIGHT KIDNEY WEIGHT DECREASE SIGNIFICANT BUT NOT INCREASING
WITH DOSE AT 15000 AND 20000 MG/KG
AUTHOR STATED ORGAN WEIGHTS ARE WITHIN NORMAL LIMITS

UDY: 11 COMPLETENESS: C SOURCE: FAP 6A3188 5,7,8:1266-1980
PE: TERATOLOGY (PHASE OF REPROD.) YEAR: 1974
ECIES: RAT LEL: > MG/KG BW/DAY
RATION: HNEL: 10000 MG/KG BW/DAY
FECTS: NO EFFECTS
TES:
MMENTS: ONE DOSE LEVEL ONLY
F1 GENERATION HAD CONTINUOUS EXPOSURE TO TEST COMPOUND

UDY: 10 COMPLETENESS: C SOURCE: FAP 6A3188 4-7:1008-1855

CNUM=95

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

BAKERS
~~YEAST~~ YEAST PROTEIN

S#:	977014133	HUMAN CONSUMPTION:	0.1242	MG/KG BW/DAY/PERSON
SP#:	95	MARKET DISAPPEARANCE:	146666.666	LBS/YR
PE:	ASP	MARKET SURVEY:	87	
S#:	1017	JECFA:		
MA#:		JECFA ADI:		MG/KG BW/DAY/PERSON
AS#:		JECFA ESTABLISHED:		
		LAST UPDATE:	940315	
:		DENSITY:	LOGP:	

RUCTURE CATEGORIES: B7 B8

MPONENTS:

NONYMS: YEAST PROTEIN, BAKERS

EMICAL FUNCTION: D

CHNICAL EFFECT: LEAVENING AGENT

R REG NUMBERS: 172.325

NIMUM TESTING LEVEL: 3

MMENTS: NO TOX DATA
