

BAKING UPDATE

Nutritional and Health Benefits of Yeast

Practical technology from Lallemand Inc.

The Roles of Yeast in Baking, Nutrition, and Health

YEAST NOT ONLY leavens dough and gives it a light, sponge-like texture—yeast also provides flavor and aroma and contributes to the nutritional value of bread.

LEAVENING

The carbon dioxide gas produced by yeast expands the dough as it is trapped within the dough's protein matrix. This stretching results in the light, airy structure associated with yeast-leavened products. The dough matures or develops through the action of fermentation on the gluten structure.

Yeasts that are more tolerant and resilient are selected for high-stress processes. The availability of yeasts specifically selected for their ability to survive subzero

temperatures has revolutionized the frozen and parbaked sectors.

As a result of no-time dough processing, volume-processed standard bread has lost bread's characteristic fermentation flavor. Consequently, certain yeast suppliers have turned their attention to yeast strains that provide excellent and, more interestingly, variable flavor profiling in bread.

FLAVOR

Bread's taste and aroma are the result of its ingredients, the aromas originating from the yeast's fermentation, and the thermochemical reactions during baking. Yeast imparts the characteristic flavor of bread and other yeast-leavened products.

Sugars are metabolized when yeast

produces carbon dioxide. This produces a spectrum of intermediate metabolites, many of which are precursors for flavor.

Yeast fermentation products that can be detected both in dough and in the finished bread include ethanol and higher alcohols, aldehydes, and organic acids, which are by-products of the yeast's primary metabolic function in dough. Some of these by-products enhance the rate of browning reactions and the formation of melanoids and caramels in the bread crust. Important substrates for these types of reactions are sugars and amino acids. By contributing some of these substrates, the yeast also influences the eventual taste and flavor of the bread.

Continued

THE NUTRITIONAL AND HEALTH BENEFITS OF YEAST

Yeast can naturally contribute significant amounts of numerous nutrients to bread and baked goods.

VITAMIN D (PHYTOSTEROLS)

Phytosterols are natural plant sterols that have been shown to effectively lower blood cholesterol, enhance the immune system, and decrease the risk of certain cancers. The lowering of cholesterol is phytosterol's most documented health property. When exposed to UV light, ergosterol is converted to vitamin D. Apart from the prevention of the deficiency diseases rickets and osteomalacia, vitamin D is involved in maintaining calcium balance in the body, normal cell division and immune system function, a healthy inflammatory response, and normal muscle function.

Bakers yeast typically contains 0.5 percent (w/w) ergosterol, but selected strains can contain up to 1.5 percent ergosterol. The vitamin D level in yeast can be adjusted to any needs.

B VITAMINS

Soluble in water, the B vitamins found in yeast are structurally dissimilar yet equally essential for normal cellular functions, growth, and development.

Thiamin (B1) acts as a coenzyme in a variety of critical metabolic reactions related to energy metabolism. B1 deficiency can lead to a variety

of clinical abnormalities, including neurological and cardiovascular (heart failure) disorders.

Niacin (B3) is involved in glucose and fatty acid oxidation. It is one of the five vitamins that when lacking in human diet is associated with a pandemic deficiency disease called pellagra, which causes diarrhea, dermatitis, and dementia.

Pantothenic acid (B5) is involved in fatty acid synthesis and degradation as well as in the synthesis of cholesterol, steroid hormones, heme, and acetylcholine. B5-deficiency symptoms are similar to those of other vitamin B deficiencies. Impaired energy production, due to low CoA levels, could cause irritability, fatigue, and apathy.

Folate (B9) has a well-established role in the prevention of neurotubular birth defect (spina bifida). It also has a possible preventative role against cardiovascular disease, certain cancers, and neuropsychiatric conditions.

MINERALS

The minerals found in yeast are involved in growth, development, energy metabolism, and the reproductive system.

Potassium acts as an osmotic pressure regulator and is involved in the body acid-base balance and muscle contraction. Epidemiological studies indicate that diets high in potassium can reduce the risk of hypertension and possibly stroke.

Zinc is an important constituent of insulin and the DNA and RNA repair/enzyme function. It is involved in flavor perception and acts as vitamin A carrier. Symptoms of zinc deficiency include depressed growth, diarrhea, impotence and delayed sexual maturation, alopecia, and eye and skin lesions.

PROTEINS

Proteins are the chief actors within the cell, said to be carrying out the duties specified by the information encoded in genes. The best-known role of proteins in the cell is as enzymes, which catalyze chemical reactions. Proteins have recently been recognized for their role in weight management and satiety. They represent more than 50 percent of yeast (w/w).

DIETARY FIBERS

Dietary fibers play a role in maintaining normal intestinal function and stimulating the immune system. They are also known to act as prebiotic, improve insulin resistance, and reduce serum cholesterol. Yeast typically contains 30 to 40 percent (dry weight) fibers, of which 60% are beta-glucans.

Beta-glucans, polysaccharides found in yeast cell walls, have been shown to reduce blood cholesterol concentrations. Reports have also been published on the immune benefits of yeast (*Saccharomyces cerevisiae*) beta-glucans.

The Roles of Yeast in Baking, Nutrition, and Health *(Continued)*

NUTRITION

The precise nutrient values of yeast can vary with manufacturer. This is why the Canadian Nutrient File and the USDA National Nutrient Database for Standard Reference have conjointly established the nutrient profile of compressed bakers yeast.

The Nutrition Facts table on a baked product's packaging shows the percentage of Daily Values that a bread serving can contribute. When considering the Daily Values for different nutrients versus the nutrients provided by compressed bakers yeast used in bread at 3%/fl, except for vita-

min D and folate, yeast only contributes small percentages. However, when comparing the amount of nutrients found in bread with that provided by yeast, it is clear that bakers yeast significantly contributes to bread's nutritional value.

COMPARISON OF BREAD AND YEAST NUTRIENT VALUES

Nutrients in Yeast	Daily Values*	Bread Nutrition Facts		Lallemand Yeast Contribution to Bread Nutrition Facts (%)†
		Amount per 100 g Serving**	Yeast Contribution to Daily Values (%)***	
Vitamin D	200–400 IU	90–400 IU**	0 or 6–100†††	28–100
B1 Thiamin	1.3–1.5 mg	0.46 mg	2.4–2.7	15
B2 Riboflavin	1.6–1.7 mg	0.33 mg	1.2–1.3	7
B3 Niacin	20–23 mg	4.39 mg	1.0–1.1	7
B5 Pantothenic Acid	7–10 mg	0.20 mg	0.9–1.3	34
B6 Pyridoxine	1.8–2.0 mg	0.08 mg	0.4	7
B9 Folate	220–400 mcg	111 mcg	3.6–6.6	10
Copper	2 mg	0.25 mg	0.1	2
Iron	14–18 mg	3.74 mg	0.3–0.4	1
Magnesium	250–400 mg	23 mg	0.2–0.3	3
Phosphorus	1000–1100 mg	99 mg	0.6	5
Selenium	50–70 mcg	17.3 mcg	0.2–0.3	1
Zinc	9–15 mg	0.74 mg	1.2–2.1	12
Sodium	2400 mg	681 mg	0	0
Potassium	3500 mg	100 mg	0.3	10
Total Proteins	50 g	7.64 g	1.9	13
Total Fiber	25 g	2.40 g	0.6	8

* Based on FDA and CFIA highest Recommended Dietary Allowances for each age and sex group; apply to most people aged 2 and over, but do not include extra needs for pregnancy and breastfeeding.

** Based on the Canadian Nutrient File for bread, white (includes soft crumbs), commercial.

*** Based on the Canadian Nutrient File and the USDA National Nutrient Database for compressed bakers yeast and white bread; obtained by dividing the amount of each nutrient provided by yeast used in bread at 3%/fl by the Daily Values, and then multiplied by 100.

† Based on nutritional analyses of Lallemand compressed bakers yeast (30% solids); obtained by dividing the amount of each nutrient in Lallemand yeast used in bread by the amount of each nutrient in bread, and then multiplied by 100.

†† According to current regulations, yeast can contribute a maximum of 400 IU (US) and 90 IU (Canada) of vitamin D per 100 g of bread.

††† Normally, yeast does not contribute to the vitamin D content of bread, but when using Lallemand standard yeast or Vita D[®] Plus yeast, it can provide significant percentages of vitamin D Daily Value.

Lallemand Yeast Specialty Products

LALLEMAND continues to innovate its products, by optimizing yeast production processes, to create products that can contribute significantly to the nutritional content of baked goods . . . reviving the 1930's 'yeast for your health' motto. Bakers can take advantage of this nutritional knowledge when updating their label declarations.

The vitamin D content of bread* can be declared when using **Lallemand Vita D[®]** yeast, which is a nonfortified and vegetarian source of vitamin D.

Lallemand also produces inactivated whole cell yeast (*Saccharomyces cerevisiae*) products containing elevated levels of specific minerals and/or vitamins. Some bakers already use **Lalmin[®] Se**, a yeast rich

in selenium used by dietary supplement and food manufacturers, to make their baked goods a source of selenium.

Glucans-30, a natural cell wall fraction rich in *beta*-1,3/1,6-glucans, is also used in baked goods.

Contact Lallemand for more information on these nutrient-rich bakers yeast products.

* Following a petition submitted by Lallemand on behalf of the US baking industry, the FDA has amended the food additive regulations to provide for the use of vitamin D bakers yeast as a source of vitamin D and as a leavening agent in yeast-leavened baked products at levels not to exceed 400 IU of vitamin D per 100 g in the finished food.

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BAKING UPDATE

Lallemand Baking Update is produced by Lallemand Inc. to provide bakers with a source of practical technology for solving problems. If you would like to be on our mailing list to receive future copies, or if you have questions or comments, please contact us at:

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