



COFALEC Toolkit Questions & Answers May 2023

A. GENERAL YEAST QUESTIONS

1. What is yeast?

Yeast is a microscopic living organism. It is a complex eucaryotic cell, belonging to the taxonomic class of "fungi".

2. What is yeast composed of?

Yeast is composed of billions of living cells. It is a natural living microorganism.

3. Which products contain yeast?

Yeast is everywhere. Basically, anywhere there is a carbohydrate (sugar) source, you will probably find yeast. It was discovered by pre-Neolithic populations and therefore, yeast can be considered as man's oldest domesticated microorganism.

Today, it is well known that yeast is a key ingredient of bread and bakery foods. But its role goes far beyond this, and many other products also contain yeast: fermented drinks such as alcohol beverages such as beers, wines or distilled spirits, salad dressings, seasonings, soups and savoury creams, probiotic products, dietary supplements for humans and animals, and more.

4. Why do we need yeast?

Yeast causes fermentation.

- First, fermentation is a key process in human food, enabling the softening of food and making it more digestible and tastier by providing specific and well-known aromas to baked goods. Yeast gives the soft, delicate taste and fresh smell so typical of wheat bread. It also contributes to its nutritional value.
- Secondly, yeast is essential for wine and beer production as it metabolizes sugars present in the fermentation tank to turn them into alcohol. In addition, yeast's greatest contribution consists in revealing aromas in beer and wine during the fermentation process.
- Finally, yeast is a famous nutritional dietary supplement in human health, nails and hair as it is rich in protein, fibre, B vitamins and minerals.

5. What is fermentation?

Fermentation was defined by Louis Pasteur in the 19th Century as a metabolic process during which sugars are transformed into carbon dioxide and alcohol.

6. Can I find organic yeast in the European Union/Is yeast eco-friendly?

Organic yeast is available in the European Union and can be used for any organic production where yeast is used (bread, wine, beer). We can also say that yeast is eco-friendly for three main reasons:

- The main raw materials used in yeast production are of agricultural origin: sugar beet and sugar cane.
- Yeast producers have shown a long commitment to preserve the environment and take care of natural resources. Overall, yeast producers have always actively promoted the development of new methods to save water, energy and waste production.
- The yeast sector offers a wide range of solutions for a sustainable food chain and environment.

7. Is yeast suitable for halal and kosher diets?

Yes, yeast is suitable for halal and kosher diets as long as the manufacturing process is halal and/or kosher certified. Yeast is not from animal origin. It is the producer's responsibility to provide the appropriate production process certificates upon request.

8. Are food & feed yeast derived from GMO techniques??

Selected natural yeasts commercialized in the EU for food and feed purposes are GMO-free.

B. YEAST AND BAKING

9. Why do we use yeast in bread?

Without yeast, there is no bread. It is essential in the fermentation process of bread. Yeast provides the soft, delicate taste and fresh smell typical of wheat bread. It not only provides the distinctive flavour and aroma of bread, but also contributes to its nutritional value. During the proofing and baking of bread, yeast expands the dough and creates an aerated and light end-product. This is because yeast converts sugars into carbon dioxide gas and ethanol. This gas is then trapped in the dough's protein matrix, expanding and stretching it until it produces a sponge-like texture.

10. Can we make bread without yeast?

No, without yeast, the fermentation process cannot happen. Therefore, it is impossible to make bread without yeast. Even sourdough bread contains yeast as a starter and features a mixture of yeast and lactic acid bacteria.

11. What is the impact of yeast in bread?

Beyond its leavening effect, yeast naturally produces aromatic compounds and flavour precursors from the ingredients used in bread. Whether for bread, wine or beer, yeast plays a role in the final taste and aroma of end products. For bread, taste and aroma are influenced by the ingredients, process and yeast fermentation. Yeast is strongly responsible for the characteristic flavour of bread and other yeast-leavened products. Important substrates of yeast's metabolic function in dough are sugars and amino acids, and the longer the fermentation, the richer the flavour.

12. What is the difference between yeast and sourdough?

Yeast is a single-cell fungus used for fermentation in the bread-making process. Today, bakers worldwide use a strain of *Saccharomyces cerevisiae* to make bread. Yeast in bread is used as a leavening agent, meaning it metabolizes the sugar molecules in the dough, converting them into carbon dioxide gas and alcohol. The produced gas makes the dough structure lighter ("rise").

Sourdough is a bread product that also contains yeast. Sourdough is the result of a long fermentation with a starter, consisting of a mixture of yeast, lactic acid bacteria, flour and water. The presence and action of the lactic acid bacteria will give the final product a characteristic slightly acidic taste.

Both yeast and sourdough give a specific flavour, taste and texture to the final product. Baking with yeast permits the baker to efficiently use a stable and process-tolerant fermentation agent in the dough before putting it in the oven. Yeast also allows precise monitoring, which is more complex with sourdough. This means that sourdough bread will require longer proofing than bread made with yeast.

13. What is the difference between wild yeast and selected natural yeast?

Thousands of years ago, Egyptians and Babylonians learned how to make alveolate, light bread via the fermentation of wild yeast. Today, the yeast that you can find in the air may not be a specific baker's strain. To attain a safe and proper product, it is crucial not only to add the right strain to the dough mixture, but also to use yeast from a qualified, audited and food-safe manufacturing process. Furthermore, the amount of yeast present in the environment is typically very low, and its concentration is not high enough to achieve the desired effects in the final product.

Nowadays, bakers worldwide use selected natural yeast, specially chosen for its fermentation capacity, efficiency and consistency: *Saccharomyces cerevisiae*. The use of selected natural yeast is an absolute necessity, as bakers require more stable and more "process-tolerant" yeast that follows the technological evolution of bread-making and new consumption trends.

14. What is the difference between yeast and sodium hydrogen carbonite (baking powder)?

Baking powder is made of sodium hydrogen carbonate. It is a chemical leavening agent that, like yeast, produces carbon dioxide and is a powdered food additive (E500). There is no fermentation with baking powder whereas yeast ferments and generate volatile aromatic compounds and other positive metabolites.

Yeast is a microscopic living organism, formed of just a single cell, belonging to the taxonomic class of the "fungi". It comes in many forms including block (compressed yeast), crumbled, liquid or dry. Yeast not only forms carbon dioxide to leaven dough, but also forms the greatest part of characteristic aromas of bread as well as influences properties of crust, crumb and freshness of bread.

15. Why should I add yeast if yeast is everywhere?

There is a great variety of yeast strains. For example, yeast that you can find in the air may not be of a specific baker's strain. In order to obtain a safe and stable product, it is crucial not only to add the right strain, but also to use yeast from a qualified, audited and food-safe manufacturing process. Further, the amount of yeast present in the environment is typically very low and its concentration is not high enough to achieve the desired effects in the finished product.

Today, bakers worldwide use selected yeast especially chosen for its fermentation capacity and productivity: *Saccharomyces cerevisiae*. The use of highly specialized yeast is an absolute necessity, as bakers require more stable and "process-tolerant" yeast that follows the technological evolution of bread-making and new consumption trends.

16. How many different types of yeast for bread and baking are there?

Again, there is a great variety of yeast strains. However, today bakers worldwide use selected yeast, specially chosen for its fermentation capacity and productivity: the *Saccharomyces cerevisiae*. The use of this highly specialized yeast is an absolute necessity, as bakers require more stable and "process-tolerant" yeast that follows the technological evolution of bread-making and new consumption trends.

17. Is it true that only white bread contains yeast, and dark bread contains sourdough?

No, this assumption is not true. Yeast and sourdough do not determine the colour of the bread. Yeast is essential in the fermentation process of bread, whether this is white or brown bread. Yeast provides the typical alveolated structure, softness, taste and smell of wheat bread. Both yeast and sourdough give a specific flavour, taste and texture to the final baked product whether white and dark bread. Even if not added on purpose, sourdough always contains yeast.

C. YEAST AND WINE & BEER

18. Why do we use yeast in wine or beer?

Without yeast there is no wine or beer. During winemaking or brewing fermentation, yeast converts sugars from grapes or the brew into alcohol. Yeast, through their metabolic activities, then render non-aromatic compounds into odorous and volatile ones that help define the style and signature. Oenologists, brewers and microbiologists carefully select specific yeasts from nature based on specific criteria to optimize wine and beer quality.

19. What are the different types of beer yeast?

There are two main types of beer yeast: bottom-fermenting yeast, *Saccharomyces uvarum* (lager fermentation), and top-fermenting yeast, *Saccharomyces cerevisiae* (ale fermentation). Their way-of-working is identical as they both absorb sugars present in the fermentation tank (melibiose for lager fermentation, fructose for ale fermentation) and then turn them into alcohol.

20. What are the different types of wine yeast?

The main yeast for wine fermentation is *Saccharomyces cerevisiae* but several hundred different strains are available to winemakers. Other yeast species are now studied and selected for different sensory and technological advantages. These include species such as *Torulaspora delbrueckii*, *Metschnikowia pulcherrima*, *Metschnikowia fructicola* and *Lachancea thermotolerans*.

21. How does yeast impact the taste of wine or beer?

For wine, yeast is carefully selected by oenologists based on specific criteria. It can be to reveal the aromas present in the grape variety and terroir, for adaptations to specific wine conditions (pH, alcohol content, *prise de mousse*, cool climate, hot climate, etc.) or for specific technological results (low SO₂, low H₂S or low acetaldehyde, etc.). Yeast, through specific metabolic activity, will render non-aromatic compounds into odorous and volatile ones that help define the wine style and signature.

For beer, yeast uses the sugars present in the fermentation tank and turns them into alcohol.

Each of the two main brewer's yeasts produces different tastes - characteristic of lager beers or ale beers.

The fermentation of lager beers produces a more pronounced hop taste with overtones of sulphur, while ale fermentation has a higher alcohol percentage with more fruity, estery and malty aromas.

D. YEAST AND NUTRITION & HEALTH

22. What is the nutritional value of baker's yeast?

While yeast naturally contributes significant amounts of several nutrients to bread and baked goods, the precise nutritional value of yeast can vary from one manufacturer to another. The

USDA National Nutrient Database for Standard Reference and the Canadian Nutrient File have conjointly established the following nutrient profile of compressed baker's yeast:

Yeast Constituents	Nutrient Profile (100g fresh, compressed yeast)
B1 Thiamine (mg)	1,9
B2 Riboflavin (mg)	1,8
B3 Niacin (mg)	12,3
B5 Pantothenic acid (mg)	4,90
B6 Pyridoxine (mg)	0,4
B9 Folate (mg)	0,6-1,2mg/100g
B12 Cobalamin (mg)	0,01
Sodium (mg)	30
Potassium (mg)	601
Calcium (mg)	19
Iron (mg)	3,2

Magnesium (mg)	40
Manganese (mg)	0,2
Phosphorus (mg)	336
Selenium (mg)	8,10
Zinc (mg)	10
Copper (mg)	0,148
Fibres (g)	8,10
Proteins (g)	15g/100g
Beta-glucans (g)	4,86

When comparing the amount of nutrients found in bread to those provided by yeast, it is clear that baker's yeast significantly contributes to the nutritional value of bread.

Indeed, yeast contributes up to 34% of the pantothenic acid (B5), 15% of the thiamine (B1), 12% of the zinc, 10% of the folate (B9), 10% of the potassium and 8% of the fibre found in regular baked bread made with fortified flour. Additionally, baker's yeast is also known to contain a variety of B vitamins.

23. Is yeast an allergen?

Standard baker's yeast, *Saccharomyces cerevisiae*, is very easily digested by the human body. Furthermore, yeast is not included in the list of products likely to cause allergies or intolerances, subject to mandatory labelling as per European Regulation 1169/2011. With the application of an effective HACCP program, yeast producers can guarantee that yeast is free of allergens. This program notably includes extensive procedures to avoid cross-contamination and ensure traceability and preparation in accordance with Good Manufacturing Practices (GMPs). However, because yeast contains many types of proteins, yeast may be the cause of an allergic reaction in very sensitive individuals, though this is extremely rare.

24. Can I be intolerant to yeast?

Again, it is extremely rare to be intolerant or allergic to yeast. However, because yeast contains many types of proteins, yeast could be the cause of an allergic reaction in very sensitive individuals. Yeast is not included in the list of products causing allergies or intolerances subject to mandatory labelling as per European Regulation 1169/2011.

25. Does eating yeast provoke yeast infections?

No. To our knowledge, there are no known cases of yeast causing infections in a healthy person. In this discussion, it is important not to confuse the common baker's yeast strain *Saccharomyces cerevisiae* with infections caused by candida yeast. Yeast is a generic name that includes a multitude of species, including *Candida albicans*. *Candida albicans* is completely different from baker's yeast and is not used in food. The use of yeast (*Saccharomyces cerevisiae*) in food is safe and has been harmlessly used for millennia.

26. What are glutamic acid or glutamate? Does baker's yeast contain those?

Glutamic acid, or glutamate, is one of the 20 amino acids that our body uses to

synthesize proteins. It is a non-essential amino acid, which means that our body can make it. Like any other product containing proteins, yeast naturally contains glutamates.

27. What are β -glucans? Does yeast contain those?

Beta-glucans are complex carbohydrates. They are a type of polysaccharide that is made of a string of glucose (sugar) molecules joined together. , that are known for stimulating the immune system and having a positive impact on the reduction of cholesterol levels¹. Yeast stores a significant amount of β -glucans in its cell walls. However, beta-glucans concentration in bread is so low that its contribution to health is almost insignificant.

28. Does yeast fermentation have an impact on acrylamide formation?

Acrylamide is a proven carcinogen that is formed during the cooking of starchy foods at high temperatures. Yeast fermentation reduces asparagine, a precursor of acrylamide, by using it for its metabolic activities. A study has shown a correlation between longer yeast fermentation of dough and the reduction of asparagine².

29. Does yeast contain vitamins?

Yes. Baker's yeast contains a variety of vitamins, mainly from the B-group type. However, baking reduces the bioavailability of vitamins and amino acids, depending on the length and intensity of the process. The shorter the baking process and the less heat-intense, the higher the survival rate of the vitamins. Having noted that, we can still say that baker's yeast significantly contributes to the nutritional value of bread.

30. Is yeast a probiotic?

Probiotics are defined by the FAO/WHO as "live microorganisms which, when administered in adequate amounts, confer a health benefit on the host". So far there are only two strains of yeast documented as probiotic: *Saccharomyces cerevisiae boulardii*, which is used as an anti-diarrheal treatment and a specific strain of *Saccharomyces cerevisiae*.

Note: at the end of the baking process, yeast is deactivated. This means that in bread, yeast is not consumed alive and cannot have probiotic actions in the human organism.

31. How much yeast does a person typically eat a day in the European Union?

The quantity of yeast a person eats daily depends on his/her food habits, which are generally linked to origin, region and culture. It can be estimated that a European adult typically eats 3.5g of fresh, compressed yeast on a daily basis. This is based on the average of 180g of bread, rolls and fine pastries consumed every day, and the fact

¹ (EFSA opinion references 2009;7(9):1254, 2011;9(6):2207 ; Commission Regulation (EU) 432/2012 of 16/05/2012). For example, according to the EFSA, consuming 3g of beta-glucans per day (present in oat or oats oat bran) helps lower cholesterol levels in humans.

² Mustafa et al, chapter 30, p. 328

that 3% of fresh, compressed yeast is used per flour weight in these products. By estimation, it can be concluded that a person eats 2 to 10g of yeast per day through bread consumption. This estimation does not take into account the consumption of nutritional yeast in salads or other dishes.

32. Is yeast suitable for vegetarians & vegans?

Yeast belongs to the classification of fungi and is therefore suitable for vegetarians and vegans. The production process of fresh yeast does not involve any animal product. In fact, yeast is very popular with vegetarians and vegans because it is a great source of protein, containing up to 45-55% of protein. Furthermore, yeast can help balance a vegetarian diet by providing a high-quality, non-animal source of protein and vitamins.

33. Is it recommended to take yeast supplements?

Yeast can be found in all kinds of dietary supplements as a source of protein, carbohydrates, lipids, minerals and vitamins. A healthy, balanced and varied food should provide a normal body all it needs to function properly. However, some people might have specific needs and should address their doctor to know more about the best way to supplement their meal choices.