



Flour Food Safety: 10 FAQs and Answers

1. How is it possible that pathogens could be in wheat flour?

Wheat is a raw agricultural product and is grown outdoors, where it may be exposed to pathogens in soil or water, or from birds and animals. Once a pathogen is on the wheat kernel, it is possible for the pathogen to survive being transported to the elevator, where wheat is stored as well as through delivery to the flour mill, where it is milled into flour. After wheat arrives at the mill, it is mechanically separated to remove foreign materials, such as other grains, after which it is tempered and sent through the milling process. In general, flour produced using traditional milling methods does not go through a validated lethality step to remove any potential pathogens. Because of this, it is possible for pathogens, such as *pathogenic E. Coli* and *Salmonella*, to survive all the way to the finished flour. However, thoroughly baking, cooking, frying and boiling flour products will provide the lethality step to remove any potential pathogens.

For more information, visit https://www.namamillers.org/wp-content/uploads/2017/08/RHflourSafety_ENG_CNMA-NAMA2.mp4.

2. Are whole grains or bran more susceptible to micro-issues?

The wheat kernel is composed of three essential parts: the bran, the germ and the endosperm. The bran is the outermost layer of the wheat kernel, and therefore carries a greater likelihood of microbiological risk than the other parts because it's directly exposed to the environment. Whole wheat flour, which contains all of the components of the wheat kernel, and bran, may carry a greater risk of pathogens. Because there is no microbial separation during a patent flour milling process, which is used to produce traditional white flour, there is a risk that pathogens may be present in all types of flour. Therefore, all flour types should be evaluated during risk assessments. For more information, visit <http://bakerpedia.com/ingredients/wheat-kernel/>.



WHEAT KERNEL

Image Source: www.wheatfoodscouncil.com

3. What are the risk factors with raw flour, and how can risks be avoided?

Because of potential pathogen exposure, the FDA recommends baking or cooking items containing flour (including flour used for thickening), raw dough or raw batter thoroughly before eating them, as well as following package directions on mixes for proper cooking temperatures and times. The FDA advises consumers avoid:

- Eating or playing with flour, raw dough or raw batter that is intended to be cooked.
- Using flour in items that are not intended to be cooked.
- Adding flour to foods that will not be cooked, such as milkshakes and ice-cream mixes.
- Tasting flour, raw dough or raw batter. Eating even a small amount can make you sick.

The FDA has issued an excellent summary of Flour, Raw Dough, and Raw Batter Flour Safety Basics. For more information, visit <https://www.foodsafety.gov/keep/types/flour/index.html>.

4. Does tempering contribute to the microbiological load of wheat or flour?

Tempering is a part of the milling process where wheat kernels have a small amount of water added for a period of time to soften the bran layer in preparation for milling. Tempering systems are designed with potable water and proper flow characteristics to ensure the wheat moves continuously. Because of this, tempering systems are not considered to contribute risk to the microbiological load of wheat.

5. Is flour a medium for the growth of pathogens?

Flour is not documented to be a growth medium for bacterial organisms and pathogens based on the low water activity within flour (less than 0.60 Aw). It is important to note, however, that low water activity is only a mechanism for growth inhibition and not lethality. In other words, bacteria may not grow in flour, but they can survive in it.

6. How can flour labeling and language on bags help prevent flour pathogen risks?

To help educate flour users, storage and safety instructions are frequently included on labeling and bags. Here is some recommended language:

SAFE HANDLING INSTRUCTIONS:

Raw flour is not ready-to-eat and must be thoroughly cooked before eating to prevent illness from bacteria in the flour. Do not eat or play with raw dough; wash hands, utensils and surfaces after handling.

Source: North American Millers' Association Voluntary Food Safety Statement



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7. What are the implications of the Food Safety Modernization Act for wheat flour, millers and customers?

The Food Safety Modernization Act (FSMA) is a major update in the area of food safety and is the most sweeping reform of our food supply regulations since the late 1930s. FSMA shifts the focus from reacting to contamination to preventing contamination. All domestic and foreign facilities that are required to register under the Bioterrorism Act of 2002 must comply with the regulations that have been established for the Current Good Manufacturing Practice and Hazard Analysis and Risk-based Preventive Controls for Human Food. This law requires comprehensive, science-based preventive controls to be applied across all food, including human (flour) and animal food (milling co-products).

8. Can't customers just test their flour? If testing does not provide assurance, what does?

Many customers believe that testing can provide assurance of the food safety of flour ingredients. Because of the low occurrence of bacteria in flour and how bacteria tend to be distributed, testing does not provide assurance that flour will be pathogen-free without having first gone through a lethality step. Regarding flour, testing is best deployed and provides food safety assurance when it is used to validate a kill step for pathogens. A validated lethality step utilized as late as possible in the supply chain process, coupled with good manufacturing processes, provides a high degree of food safety assurance.

9. How can heat-treated flour address raw flour risk, and how does heat-treating impact flour functionality?

Using a carefully controlled heat treatment process can reduce pathogen risks in flour, while maintaining gluten functionality. For more information about this process, visit <https://www.ardentmills.com/media/1084/2018-am-safeguard-brochure-update-v-5-final-4-27-18.pdf>.



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10. Where can people find more information regarding pathogens in flour?

Several studies have been conducted on this topic. Here are some useful references:

- Berghofer, L.K., A.D. Docking, D. Miskelly, and E. Jansson. 2003. Microbiology of Wheat and Flour Milling in Australia. *Int. J. Food Microbiol.* 85:137-149.
- Dack, G.M. 1961. Public Health Significance of Flour Bacteriology. *Cereal Sci. Today* 6:9-12.
- Eglezos, S. 2010. Microbiological Quality of Wheat Grain and Flour from Two Mills in Queensland, Australia. *J. Food Prot.* 73:1533-1536.
- Neil, K.P., G. Biggerstaff, J.K. MacDonald, E. Trees, C. Medus, K.A. Musser, S.G. Stoika, D. Zink, and M.J. Sotir. 2011. A Novel Vehicle for Transmission of Escherichia Coli O157:H7 Infections Associated with Consumption of Ready-to-bake Commercial Prepackaged Cookie Dough — United States, 2009. *Clinical Infectious Dis.*
- Richter, K.S., E. Dorneanu, K.M. Eskridge, C. Rao. 1993. Microbiological Quality of Flours. *Cereal Foods World.* 38:367-369.
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