

# Different approaches to reduce the acrylamide formation in pizza

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Pizza is one of the most consumed foods in Italy and all over the world. However, being a product derived from flour-based dough, pizza can also be a source of acrylamide, a substance that even taken in modest quantities has harmful effects on health. In fact, acrylamide is formed during cooking at high temperatures by reaction between free sugars, like glucose, and specific amino acids, such as asparagine, which are naturally present in the flour.

Acrylamide concentration in processed food products has become a very serious health issue. Benchmark levels of acrylamide in bakery products are of 50-800 µg/kg while for fried potatoes and coffee 750-4000 µg/kg are accepted (Regulation EU 2017/2158).

Although there is a lack of literature on the level of acrylamide in cooked pizza, targeted interventions for the reduction of this toxic substance are always welcome.

The aim of this study concerns on the possibility to reduce the acrylamide formation in pizza by different approaches. The first line of action is to eliminate the asparagine from the flour and this can be obtained either by selecting wheat seeds with a low asparagine content in the grains, or by the enzymatic action of the asparaginase on the flour during the formation of the dough. Preliminary experiments showed that the addition of increasing amount of asparaginase (2, 17, 34 and 69 U/g of flour) in wheat flour resulted in reduction of acrylamide content in the final products by 34% up to 60%. This result suggests that the asparaginase could represent a useful tool to degrade the asparagine in the flour-based dough.

However, the asparagine is only one of the actors involved in acrylamide formation; the other component of the reaction is represented by the free sugars. Monosaccharides are both naturally occurring in the flour and produced by starch degradation by amylase during the dough leavening. Thus, the second intervention strategy could involve lowering the levels of free sugars in the dough by using a sourdough rich in lactic acid bacteria. The fermentation processes operated by these microorganisms for their growth, would lead to a reduction in glucose in the dough, thus subtracting it from the subsequent Maillard reaction, which triggers the production of acrylamide. At the same time, lactic bacteria could use the amino acids present in the flour, and therefore also the asparagine, for their growth needs with the advantage of lowering also the levels of the amino acid that triggers the reaction with glucose.

The last approach will also be explored and compared to the enzymatic one. Therefore, the best way to reduce the levels of acrylamide will be evaluated in order to ensure the safety of consumers, without affecting the technological, functional and sensory properties of the pizza.

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