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SAFETY OF CANNING QUICK BREADS

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Food Safety Fact Sheet

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BACKGROUND

For many years there have been questions about the safety of home canning breads and cakes. Products such as zucchini bread are baked in wide rimmed canning jars and covered with lids and rings immediately after removing from the oven. As the mixture cools, a vacuum seal is formed. The problem with this is that the final system is anaerobic (no oxygen), and has both the pH and available moisture in the right range for the growth of *C. botulinum*. The product has the potential to cause botulism poisoning and kill or seriously impair the person eating the bread.

C. botulinum is found in soil throughout the world. The cleaning and processing of the ingredients that are used in bread would decrease its likelihood of being present, but by no means insure that it is not present. For example, it could be introduced into the batter by being in honey, on grated zucchini, or dust in the mixing bowl.

Although no cases of botulism have been identified as being caused specifically by a home canned quick bread, the potential is there. The product meets all the necessary criteria for the organism to grow.

The organism *C. botulinum* itself is harmless; however, when conditions are right, it can form an extremely potent toxin. Three factors determine if *C. botulinum* will grow or not: a non-acid pH, adequate moisture and an airless environment. Canned breads meet all the requirements. Normally these products are not being held under vacuum and therefore botulism is not a concern. However, sealing the bread in a jar provides the necessary airless condition. The alternative of putting the lids on ***after*** the product has cooled would solve the problem of growth of *C. botulinum* but the presence of air would allow mold to grow.

A recipe for canning zucchini bread which is widely distributed has a 45 minute baking time at 325 degrees F. The baking of the bread does not kill the *C. botulinum*. It is a spore forming organism and spores are resistant to destruction by heat or other environmental factors.

Microbial Experiments in Canned Breads

One research group looked at the effect of oven temperatures and cooking times on the safety of banana nut bread with spores intentionally added to the batter. Half of the samples were inoculated with a nonpathogenic spore (*C. sporogenes*) which has a similar heat resistance to that of *C. botulinum*. The other half of the samples were not inoculated. Samples were baked at three different temperatures (350, 375 and 400 degrees F) from 30 to 55 minutes. Immediately after baking, the active form of the bacteria could not be detected in either the inoculated or non-inoculated samples. The microbial testing methods were such that black colonies represented Clostridium organisms, either the *C. sporogenes* inoculated into part of the samples or naturally present *C. botulinum* or *C. perfringens* (both are pathogens). Black colonies were not detected in any of the non-inoculated samples immediately after baking; however, they were found at a reduced level in the inoculated samples. Or in other words, many of the spores survived the baking of the bread. These could become active over time.

A second part of the study was to see what effect storage times would have on the canned bread samples. The banana nut bread baked at 350 degrees F for 30 minutes was considered to be the best quality product, therefore this variable was used for a further storage study. The samples were stored for 90 days at room temperature and at 95 degrees F. Non-inoculated samples held at room temperature did not have detectable Clostridium-like organisms; however, those stored at 95 degrees F did show microbial growth. The higher temperature was more favorable to repair and growth of organisms. These products would not be safe.

Efforts to Make a Safe Product

We have conducted research at USU to see if it was possible to either raise or lower the acid level enough to control *C. botulinum* or add enough sugar to control water activity (the amount of moisture available to the microorganism) while still having a palatable zucchini bread. Our efforts were based on the measurement of pH and water activity, not by the measurement of survival of spores inoculated into the batter. We were unable to formulate a safe product.

Recommendation

Banana nut bread, zucchini bread or similar products should be either fresh or frozen. **DON'T CAN IT! DON'T EAT IT IF SOMEONE GIVES YOU A HOME CANNED PRODUCT!**

Reference

Aramouni, F. M., K. K. Kone, J.A. Craig and D.Y. C. Fung. 1994. Growth of Clostridium sporogenes PA 3679 in home-style canned quick breads. J. Food Protection 57: 882-886

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