A Comparison of the Quality of Various Cutting Boards When Microorganisms Were Observed from Raw *Gallus gallus domesticus*

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Abstract

The purpose of this experiment was to determine which type of common cutting board holds the least amount of microorganisms when used with raw chicken. This is vital for safety in private homes and in professional settings to help prevent foodborne illnesses and diseases. Wooden, bamboo, and plastic cutting boards were each swabbed immediately after being rubbed with raw chicken, and an hour post collection The collections were placed into labeled petri dishes in zig-zag patterns. The petri dishes were sealed and put into an incubator for two days prior to observation of microorganism growth. The least amount of microorganisms were collected from the wooden cutting boards; the bamboo cutting boards had a moderate amount of microorganism growth, and the plastic cutting boards had the highest amount of growth. Porosity, texture, coating, and cross-contamination are all factors affecting cutting boards and safety. Proper food preparation techniques are important for safety and prevention of illnesses.

Introduction

Pathogenic microorganisms, especially in food, are extremely dangerous because they can cause illnesses and diseases. It is approximated that 48 million people get sick, 128,000 people are placed in a hospital, and 3,000 die from a foodborne disease (Centers for Disease Control and Prevention). "*Salmonella* is a bacteria that commonly causes foodborne illness, sometimes called 'food poisoning.' The CDC estimates *Salmonella* causes 1 million foodborne illnesses every year in the United States" (Centers for Disease Control and Prevention). It is extremely important to use proper techniques when handling food. The purpose of this experiment was to determine the type of cutting board that holds the least bacteria and is the safest.

Microorganisms are easily transferred from foods to cutting boards during food preparation. These microorganisms can then be transmitted to other foods or items being chopped on the same cutting board. This increases the chances of a foodborne illness or disease, such as food poisoning. "Cutting boards are commonly perceived as important fomites in cross-contamination of foods with agents such as Salmonella spp., despite the lack of supporting epidemiological data" (Cliver, 2006).

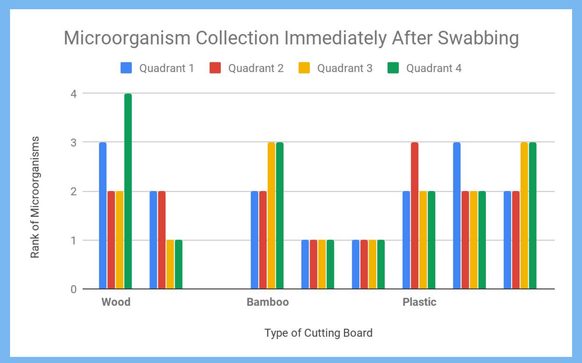
Public knowledge is especially low when it comes to this topic. The World Health Organization states that if consumer knowledge is increased, several of the outbreaks of foodborne illnesses, many of which occur in the home, could be reduced (Rocourt, et al. 2013). It is vital to use safe cutting boards that do not retain microorganisms to lessen the risk of disease. It was hypothesized that plastic cutting boards would retain the least microorganisms, then bamboo, and then wood.

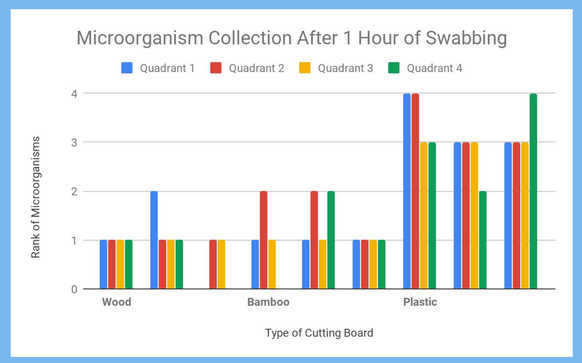
Materials and Methods

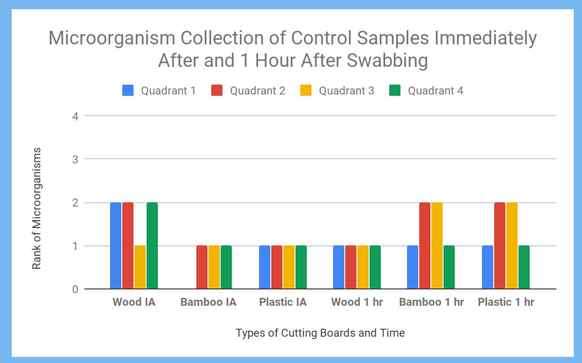
Before beginning the experiment, a Little Giant incubator was stabilized and tested to ensure that it was functioning properly to grow microorganisms collected. Next, 36 petri dishes were labeled according to the type of cutting board, amount of time to collection, and soap used for cleaning. In this experiment, different types of cutting boards were used. The three types were wood, bamboo, and plastic. Plastic gloves were used to ensure safety and the accuracy of the experiment. Microorganisms were then collected using sterilized swabs from the unused cutting boards to show the amount of microorganisms before any chicken was placed on the boards. This was the control trial. These samples were placed in the petri dishes by dragging the swabs across the surface of the blood agar in several zig-zag motions. The collection method was slowly moving the swab across the cutting board in a zig-zag pattern from one corner to the other and back again. Raw chicken breasts were rubbed across each cutting board to thoroughly transfer microorganisms to each board. Sterilized swabs were again used to collect these microorganisms immediately afterward. Each time microorganisms were collected after the chicken was rubbed, three samples were taken to produce more trials, which would show precise results. The microorganisms were put in petri dishes using the same method as before. These cutting boards were then left out for an hour, before the next collection. Three more unused cutting boards of the same types were also left out to be used for the control trial after waiting an hour. The microorganisms that were collected after an hour were then placed in their corresponding petri using the same method as before. All of the petri dishes containing microorganisms were sealed with masking tape and placed in sealable, plastic bags. These bags were placed in the stabilized incubator to grow the microorganisms. They were left there for two days, undisturbed. Face masks, plastic gloves, and protective goggles were used for safety when the petri dishes were removed. The microorganisms inside were observed and photographed.

Results

The results showed that overall, the wooden cutting boards retained the least amount of microorganisms in collection immediately after and collection after sitting out for an hour. The highest amount of microorganisms were present on the plastic cutting boards in the samples both immediately after and after an hour. The bamboo cutting boards had the medium amount of microorganisms in both tests. The amount of microorganisms present on wood and bamboo cutting boards seemed to decrease after staying out for an hour, while the microorganism amount decreased on the plastic cutting boards.







Discussion and Conclusion

At the beginning of the experiment, it was predicted that the plastic cutting boards would retain the least microorganisms when compared to bamboo and wood This hypothesis was proven incorrect. Wooden cutting boards retained the least amount of microorganisms, followed respectively by bamboo and then plastic.

"Wood is intrinsically porous, which allows food juices and bacteria to enter the body of the wood unless a highly hydrophobic residue covers the surface" (Cliver, 2006). This could be the reason that the wooden cutting boards showed the least amounts of microorganisms after collection. The microorganisms were most likely drawn into the deeper portion of the thick, wooden cutting board, which would have resulted in a decrease of microorganisms on the surface of the board, where the collection occurred. This could also be why the amount of microorganisms present on the wood cutting board decreased after an hour. This was a longer amount of time for the microorganisms to sink deeper in the surface. Also, the plastic cutting boards had a coarse surface, so more microorganisms may have been caught on the rough grooves. This could have increased the overall amount of microorganisms present on the plastic cutting boards.

It is recommended to separate raw chicken from other foods and to use a different cutting board when preparing raw chicken to ensure safety and prevent cross-contamination (Centers for Disease Control and Prevention). It may also be beneficial to thoroughly disinfect cutting boards as opposed to only washing them. Both in private homes and professional settings, it is vital to use proper practices when preparing food to assure safety and good health.

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