FOOD SAFETY AND QUALITY ENGINEERING MSC THESIS SUMMARY

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SUMMARY

RESISTANCE OF FOODBORNE MICROORGANISMS AGAINST DISINFECTANTS

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Resistance of foodborne microorganisms against disinfectants

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The study investigated the resistance of foodborne microorganisms to disinfectants, with a focus on understanding the efficacy of sodium hypochlorite disinfectants against various microbial strains commonly found in different food types, such as dairy, meat and vegetables. The aim was to assess the susceptibility of these microorganisms to disinfection and to provide insights into the potential implications for food safety by evaluating the biofilm-forming ability of the microorganisms isolated.

This topic is highly important, as foodborne illnesses represent significant public health risks worldwide. The ability of microorganisms to develop resistance to disinfectants threatens the effectiveness of sanitation practices in food processing environments, potentially leading to outbreaks of foodborne diseases. Understanding the resistance mechanisms of these microorganisms is crucial for developing strategies to mitigate the risk of contamination and ensure the safety of food products.

The primary objectives were to isolate and characterize microorganisms from raw milk to test them against a disinfectant and determine the minimum inhibitory concentration (MIC) of sodium hypochlorite against the strains isolated as well as microorganisms isolated from red pepper and pork meat that were added to this study. The biofilm formation capacity of the isolates was also studied on stainless steel slides at 30°C.

From the isolation of microorganisms from raw milk, 25 apparently different colonies were obtained, from which 10 of them were subjected to preliminary identification tests including

oxidase, catalase and KOH test, followed by identification by MALDI-TOF MS obtaining the typical spoilage and pathogenic microbiota of milk.

Agar disk diffusion tests were conducted using disinfectant concentrations ranging from 3.2% to 64% to determine inhibitory effects. MIC values were obtained using both agar disk diffusion and broth microdilution assays for *Kocuria salsicia* and *Macrococcus caseolyticus* (isolated from raw milk); *Micrococcus luteus* and *Pseudomonas antarctica* (isolated from red pepper); *Buttiauxella gaviniae* and *Pseudomonas lundensis* (isolated from pork meat). Biofilm formation on stainless steel slides was assessed for selected isolates over a 7-day period at 30°C.

Among the main results obtained, it was found that there was no inhibitory effect for any strain at the initial testing at 3.2% concentration which is the manufacturer's recommendation of use; Gram-positive bacteria were generally more sensitive to the disinfectant than Gram-negative bacteria; MIC values ranged from 8% to 32% for the tested microorganisms ; intensive biofilm-forming activity was shown in the case of *Kocuria salsicia, Micrococcus luteus,* and *Macrococcus caseolyticus.*

The study revealed varying degrees of resistance to sodium hypochlorite among microorganisms isolated from different food sources. Biofilm-forming capabilities were observed in selected isolates, emphasizing the importance of biofilm control strategies in food safety practices.

This thesis investigated the disinfectant resistance profiles of microorganisms isolated from food and their biofilm-forming capabilities. Through a series of tests and analyses, the study provided valuable insights into the efficacy of the disinfectant and highlighted the need for optimized disinfection strategies in food processing. Further research could be conducted to investigate biofilm susceptibility to disinfectants at different concentrations to have a better insight of the microorganisms in both planktonic and biofilm state. Nevertheless, the findings contribute to the understanding of microbial control in the food industry, aiming to enhance food safety measures and reduce the risk of foodborne illnesses .