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Short Communication

Antimicrobial Effects of Adsorbed Food Grade Powders against Food Pathogens

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Abstract

Bacteriocins effectively inhibit foodborne pathogens via different modes, however, it is difficult to retain their full activity in food products because food components, processing treatments and storage conditions can block or reduce activity rapidly. This has prompted research on retaining antimicrobial activity and the use of new techniques to deliver a more controlled release. Antimicrobial activity of nisin adsorbed silica powder against Listeria monocytogenes (LM) increased as nisin concentration increased from 200 IU/ml to 600 IU/ml. Residual nisin activity was found in the supernatant of the adsorbing solution after centrifugation. Retained nisin activity up to 600 IU/ml by MELOJEL® was higher compared to corn starch. The optimal concentration of nisin adsorbed silica was 600 IU/ml and the highest adsorption rate of nisin was also at 600 IU/ml based on thermogravimetric analysis.

Key Words: Bacteriocin, Listeria monocytogenes, Lactic acid bacteria

Introduction

Consumer demand for food quality and safety has prompted increased awareness of food safety since foodborne pathogens directly affect human health. These pathogens can cause human illness from consumption of foods tainted by cross contamination, poor hygiene and/or improper handling. Antimicrobials can inhibit foodborne pathogens and act as one food safety hurdle in food systems. Nisin has been used in different foods such as cheese (Samelis et al, 2003), fruit beverages (Yuste and Fung, 2004) and meat products (Nattress et al., 2001,) to inhibit bacteria and has been commercially produced since 1953 (Delves-Broughton, 2005). Nisin, a 34-residue peptide, is an antimicrobial produced by *Lactococcus lactis* (Roller, 2000) and is very effective against gram-positive bacteria which include *Listeria monocytogenes (LM).* To maintain antimicrobial activity effectively for more extended time periods or for a delayed action, controlled release would be a very useful technique. Food grade powders can adsorb

antimicrobial agents and can be used as a carrier due to their porous structure. To optimize activated food powders, it is necessary to evaluate and compare adsorbed antimicrobials onto different food grade powders. Through the results of this study, it will be possible to more effectively targeted products.

From the previous research (Dawson et al., 2005), CP-65 (silica) was chosen based on it's efficiency to adsorb and release antimicrobial activity and corn starch was selected due to its widespread use as a low cost film coating. In addition, two modified corn starches were compared for their efficacy of adsorption and release of nisin antimicrobial activity. The objectives in this research were to compare antimicrobial activity of antimicrobial adsorbed powders, to compare which adsorbents were most effective, to determine the optimal concentration in the adsorption solution for optimal activity of the adsorbed powders, and to determine the inhibitory effect of antimicrobial adsorbed food grade powders against foodborne pathogens.

Conclusion

In comparison of antimicrobials 200 did not inhibit the three foodborne pathogens. MicroGARD® 300 showed inhibition against *LM*. However, this effect was not as strong as nisin (Nisaplin®) at the same concentration. It was determined that 600 IU is the optimal concentration for nisin adsorbed silica powder due to maximum retention of antimicrobial activity against *LM*, minimum loss of activity to the supernatant and the TGA result showing maximum % weight retention of nisin. The maximum retention level for CS (40.4%) and modified CS (55.2%) was at 200 IU/ml of nisin. However, both corn starches nisin activity at each concentration was weaker than the activity of silica nisin.

References

[1] Dawson, P.L., Harmon, L., Sotthibandhu, A., and Han, I.Y. 2005. Antimicrobial activity of nisin adsorbed silica and corn starch powders. Food Microbiology. 22:93-99.

[2] Delves-Broughton, J. 2005. Nisin as a food preservative. Food Australia. 57:525-527. Nattress, F.M., Yost, C.K., and Baker, L.P. 2001. Evaluation of the ability of lysozyme and nisin to control meat spoilage bacteria. International Journal of Food Microbiology. 70:111-119.

[3] Samelis, J., Kakouri, A., Rogga, K.J., Savvaidis, I.N., and Kontominas, M.G. 2003. Nisintreatments to control Listeria monocytogenes post-processing contamination on anthotyros, a traditional Greek whey cheese, stored at 4°C in vacuum packages. Food Microbiology. 20:661-669.