**Antimicrobial Activity of Novel Probiotic Strains against Listeria monocytogenes, Salmonella and E. coli O157:H7**

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**Abstract**

A natural alternative to counteract foodborne pathogens are probiotics, live microorganisms that when administered in adequate amounts confer beneficial health effects to the host. Probiotics are also an alternative to decrease the use of antibiotics in animal feed, which could have potential risks such as the development of antimicrobial resistance and the spread of antibiotic resistance genes.

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**Introduction**

In the United States, 9.4 million episodes of foodborne illness are caused by 31 major pathogens, from which Listeria monocytogenes, Salmonella and E. coli O157:H7 are among the most common causes of foodborne infections. Indeed, over 40,000 and 3,500 laboratory-confirmed Salmonella and E. coli O157:H7 cases respectively are reported annually to the Centers for Disease Control and Prevention. On the other hand, an estimated 1,600 people get listeriosis each year, and about 260 die. Probiotics are a natural alternative to counteract foodborne pathogens, they are live microorganisms that when administered in adequate amounts confer beneficial health effects to the host. Lactic acid bacteria are the most commonly used group of bacteria as probiotic strains, they produce antimicrobial compounds such as bacteriocins able to reduce and/or inhibit human foodborne pathogens. This study aimed to characterize potential probiotic strains to reduce Salmonella, E. coli O157:H7, and Listeria monocytogenes.

**Methods**

- 200 strains of probiotics isolated from meat and vegetables samples
- 28 most effective strains selected

**Results**

**Antimicrobial Activity of Probiotic Strains by Well Diffusion Agar Method**

From the selected panel of 28 probiotic strains, 13 probiotic strains had antimicrobial activity on the agar well diffusion assay against Salmonella with a maximum inhibition zone of 12 mm; 13 strains for E. coli O157:H7 with 9mm; and all 28 strains showed antimicrobial activity against L. monocytogenes with up to 26 mm of inhibition.

**Antimicrobial Activity of Probiotic Strains by Broth assay**

The antimicrobial activity of probiotic strains tested by broth assay showed inhibition of Listeria monocytogenes up to 6.60 log₁₀ CFU/ml and probiotic growth of up to 8.66 log₁₀ CFU/ml.

**Antimicrobial Susceptibility Profile**

- Erythromycin
- Levofloxacin
- Clindamycin
- Vancomycin
- Gentamicin
- Rifampicin
- Synercid
- Tetracycline
- Nitrofurantoin
- Penicillin
- Linezolid
- LevoFlaxacin
- Gentamicin
- Erythromycin
- Daptomycin
- Chloramphenicol
- Amoxicillin

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**Conclusion**

- Probiotic strains analyzed in this study were able to reduce Salmonella, E. coli O157:H7, and Listeria monocytogenes.
- A similar effect was observed when comparing the antimicrobial effect of overnight cultures to cell-free suspensions.
- Probiotics showed bacteriostatic activity against Salmonella and E. coli O157:H7, compared to a bactericidal activity against Listeria monocytogenes.
- From the 28 selected strains, 3 were selected for further study to reduce Listeria monocytogenes in ready-to-eat meats.