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Characterization and optimization of bacteriocin from *Lactobacillus plantarum* isolated from fermented beef

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Many lactic acid bacteria (LAB) were isolated from 'Shermout', a popular Sudanese fermented beef product intended for long storage. An isolate that demonstrated significant antibacterial activity was identified *as Lactobacillus plantarum* PM4 based on phenotypic, physiological and biochemical characteristics and carbohydrate utilization patterns. The inhibitory activity of the partially purified bacteriocin was completely arrested by the proteolytic enzymes proteinase-k and pepsin but not by α-amylase, asserting its proteinaceous nature. The activity was not due to H2O2 as similar inhibition was obtained by cell-free supernatant (CFS) produced under anaerobic conditions. The bacteriocin showed a molecular weight in the range of 3-5 kDa and had a bactericidal mode of action. No significant reduction in activity was observed on heating at 60°C for 60 min, but activity was lost on heating at 100°C or autoclaving. Highest inhibitory activity was at pH 5.5 and there was appreciable reduction in activity at pH 3, 7 or 9. There was no drop-in activity at -80 or -20°C up to four weeks of storage. However, at 4 and 35°C a gradual decline in activity was observed. *L. plantarum* PM4 exhibited bactericidal activity against *Staphylococcus aureus, Bacillus subtilis, Enterococcus faecalis, Escherichia coli* ATCC25922, *Klebsiella pneumoniae and Proteus vulgaris*. Bacteriocin production generally coincided with the phase of maximum growth and the best combination for maximum production of inhibitory activity was at pH 5.5 for 48 hours, further incubation at 25, 30 or 37°C. *L. plantarum* PM4 showed promise as a starter culture in the fermentation of preserved meat products.

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