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I

ZBORNIK RADOVA

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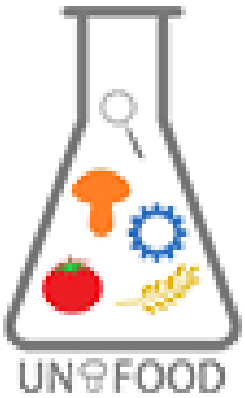

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Antimikrobna aktivnost biotehnološki modifikovanih proteina surutke

Maja Bulatović[1*], Salem Embiriekah[1], Danica Zarić[2], Maja Vukašinović-Sekulić[1], Marica Rakin[1]
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Cilj ovog rada bio ispitivanje antimikrobnog potencijala hidrolizata u prahu proizvedenih enzimskom i mikrobiološkom hidrolizom proteina surutke, koje su praćene postupkom sprej-sušenja, kako bi se ustanovilo koji od ovih procesa omogućava proizvodnju hidrolizata proteina surutke visoke antimikrobne aktivnosti. Enzimska hidroliza je izvršena komercijalnim enzimom tripsinom, dok je fermentacija izvedena primenom soja *Lactobacillus rhamnosus* ATCC 7469. Kvantitativni test antimikrobne aktivnosti dobijenih hidrolizata izveden je testiranjem na tri (G +) bakterije *Staphylococcus aureus* (ATCC 25923), *Bacillus cereus* (ATCC 11778), *Listeria monocytogenes* i (G-) bakteriju *Escherichia coli* (ATCC 25922).
Izvedeni testovi su pokazali da koncentracija 50.0 mg mL^{-1} sprej-sušenog hidrolizata proteina surutke proizvedenog digestijom pomoću tripsina (WPH) suzbija mikrobiološku kontaminaciju uzrokovanu sojevima *S. aureus* ATCC25923, *B. cereus* i *L. monocytogenes*. WPH je sposoban da inhibira rast sojeva *B. cereus* i *L. monocytogenes* za 1,0 log jedinicu i *S. aureus* za 0,94 log jedinice, dok inhibicija rasta Gram-negativne *E. coli* nije primećena. S druge strane, hidrolizat u prahu dobijen fermentacijom surutke (FWH) u istoj koncentraciji ima izraženiju antimikrobnu aktivnost na sve testirane patogene sojeve. Inhibicija rasta je iznosila 2.73 log (CFU mL^{-1}) za *S. aureus*, 3.73 log (CFU mL^{-1}) za *B. cereus*, 4.34 log (CFU mL^{-1}) za *E. coli* i 1.1 log (CFU mL^{-1}) za *L. monocytogenes*. Dobijeni rezultati su pokazali da FWH ispoljava značajno ($p < 0,05$) veću inhibicija rasta sojeva *S. aureus*, *B. cereus* i *E. coli* u poređenju sa WPH.
Na osnovu prikazanih rezultata, fermentacija surutke se može smatrati optimalanim procesom koji omogućava proizvodnju hidrolizata proteina surutke sa izraženom antimikrobnom aktivnošću, koji kao takav može predstavljati kvalitetan prirodni prehrambeni dodatak.

Antimicrobial activity of biotechnologically modified whey proteins

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The aim of this paper was to examine the antimicrobial potential of hydrolysate powders produced by enzymatic and microbial hydrolysis of whey proteins, followed by spray drying, in order to reveal which one of these processes allow the production of whey protein hydrolysate powder with high antimicrobial activity. The enzymatic hydrolysis was carried out by commercial enzyme trypsin, while fermentation was conducted using *Lactobacillus rhamnosus* ATCC 7469 strain. Quantitative tests of the antimicrobial activity of the obtained hydrolysates were performed against three (G^+) bacteria *Staphylococcus aureus* (ATCC 25923), *Bacillus cereus* (ATCC 11778), *Listeria monocytogenes,* and (G^-) bacteria *Escherichia coli* (ATCC 25922).
The performed tests revealed that concentration of 50.0 mg mL^{-1} of spry-dried whey protein hydrolysate produced by tryptic digestion (WPH) suppresses microbial contamination caused by *S. aureus*, *B. cereus* and *L. monocytogenes* strains. The WPH is capable to inhibit growth of *B. cereus* and *L. monocytogenes* for 1.0 log units and *S. aureus* for 0.94 log units, while the growth inhibition of Gram-negative *E. coli* was not observed. On the other hand, hydrolysate powder obtained by whey fermentation (FWH) at same concentration exerts more pronounced antimicrobial activity against all tested pathogenic strains. The growth inhibition was 2.73 log (CFU mL^{-1}) for *S. aureus*, 3.73 log (CFU mL^{-1}) for *B. cereus*, 4.34 log (CFU mL^{-1}) for *E. coli*, and 1.1 log (CFU mL^{-1}) for *L. monocytogenes*. Observed results revealed that FWH has shown significantly ($p<0.05$) higher growth inhibition of *S. aureus*, *B. cereus*, *E. coli* compared to the WPH.
Based on the presented results, whey fermentation could be highlighted as an optimal process that provides the production of whey hydrolysate with the pronounced antimicrobial activity that could be considered as very promising natural food supplement.