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**Optimasi Pembuatan Sediaan Bubuk Bakteri Asam Laktat Lactobacillus plantarum GMP1 dan Weisella sp.
GMP12 serta Aplikasinya pada Peningkatan Mutu Fermentasi Wadi**
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INTISARI

Wadi merupakan produk fermentasi ikan menggunakan bahan baku air tawar, garam dan lumu sebagai sumber karbohidrat yang difermentasi spontan selama 7 - 10 hari. Penelitian ini bertujuan untuk menentukan konsentrasi *skim milk* dan trehalosa terhadap tingkat kelangsungan hidup pasca *freeze drying*, stabilitas penyimpanan *starter* bubuk *Lactobacillus plantarum* GMP1 dan *Weisella* sp. GMP12, serta mutu wadi yang dihasilkan menggunakan *starter* tunggal dan campuran. Pelet bakteri disuspensikan dalam larutan *cryoprotectant* dengan rasio 1:1 (v/v) yang terdiri atas *skim milk* 10% dengan penambahan trehalosa 4%, 7%, 10%, atau 13% sebelum proses *freeze drying*. Fermentasi ikan nila (*Oreochromis* sp.) dilakukan dengan penambahan garam 20% (b/b), *lumu* (beras sangrai) 10% (b/b), serta bubuk starter tunggal (0,25 g *Lactobacillus plantarum* GMP1 atau *Weisella* sp. GMP12) maupun *starter* campuran (masing-masing 0,125 g), kemudian difermentasi selama 9 hari dengan pengamatan tiap 3 hari. Kombinasi *skim milk* 10% dan trehalosa 7% memberikan kelangsungan hidup tertinggi pada *Lactobacillus plantarum* GMP1 (95,67%; 10,28 log CFU/mL), sedangkan kombinasi skim milk 10% dan trehalosa 10% terbaik untuk *Weisella* sp. GMP12 (89,98%; 9,91 log CFU/mL). Penyimpanan bubuk bakteri *Lactobacillus plantarum* GMP1 dan *Weisella* sp. GMP12 pada 4 °C selama 28 hari mempertahankan kelangsungan hidup masing-masing sekitar 62,41% dan 56,21%. Penambahan *starter* tunggal dan *starter* campuran secara signifikan dapat meningkatkan meningkatkan nilai TPC, BAL, dan TAT serta menurunkan pH, Enterobacteriaceae, dan TVBN dibandingkan perlakuan spontan selama fermentasi wadi. Perlakuan terbaik diperoleh pada penambahan *starter* campuran *Lactobacillus plantarum* GMP1 dan *Weisella* sp. GMP12.

Kata kunci: bakteri asam laktat, fermentasi wadi, *freeze drying*, *cryoprotectant*, *starter* bubuk

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Optimization of Powdered Lactic Acid Bacteria Preparation of *Lactobacillus plantarum* GMP1 and *Weisella* sp. GMP12 and Its Application to Improve Wadi Fermentation Quality

ABSTRACT

Wadi is a fermented fish product made from freshwater fish, with salt and lumu as a carbohydrate source, traditionally fermented spontaneously for 7–10 days. This study aimed to determine the effects of skim milk and trehalose concentrations on post-freeze-drying survival and the storage stability of powdered *Lactobacillus plantarum* GMP1 and *Weisella* sp. GMP12 starters, and the quality of wadi produced using single and mixed starter cultures. Bacterial pellets were suspended in a cryoprotectant solution at a 1:1 (v/v) ratio, consisting of 10% skim milk supplemented with 4%, 7%, 10%, or 13% trehalose, prior to freeze drying. Fermentation of Nile tilapia (*Oreochromis* sp.) was conducted with the addition of 20% (w/w) salt, 10% (w/w) *lumu* (roasted rice), and powdered single starters (0.25 g *Lactobacillus plantarum* GMP1 or *Weisella* sp. GMP12) or a mixed starter (0.125 g each), followed by fermentation for 9 days with observations every 3 days. The combination of 10% skim milk and 7% trehalose resulted in the highest survival of *Lactobacillus plantarum* GMP1 (95.67%; 10.28 log CFU/mL), whereas the combination of 10% skim milk and 10% trehalose was optimal for *Weisella* sp. GMP12 (89.98%; 9.91 log CFU/mL). Storage of powdered *Lactobacillus plantarum* GMP1 and *Weisella* sp. GMP12 at 4 °C for 28 days-maintained survival rates of approximately 62.41% and 56.21%, respectively. The addition of single and mixed starters significantly increased TPC, LAB, and TAT values while reducing pH, Enterobacteriaceae, and TVBN compared with spontaneous fermentation during wadi fermentation. The best treatment was achieved by adding the mixed starter *Lactobacillus plantarum* GMP1 and *Weisella* sp. GMP12.

Keywords: cryoprotectant, freeze drying, lactic acid bacteria, powdered starter, wadi fermentation