

## **Aktivitas Antimikroba dan Antioksidan Yoghurt Susu Kedelai (Soyghurt) dengan Penambahan *Pulp* Stroberi (*Fragaria sp.*) dan Ekstrak Daun Stevia (*Stevia rebaudina*)**

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### **INTISARI**

Inovasi pengembangan pangan fungsional salah satunya dengan yoghurt susu kedelai (soyghurt) yang diperkaya bahan alami bernilai kesehatan. Stroberi (*Fragaria sp.*) dipilih karena mengandung senyawa bioaktif antosianin dan fenolik. Formulasi ini memanfaatkan ekstrak daun *Stevia rebaudiana* untuk menghasilkan rasa manis non-gula karena kandungan senyawa bioaktifnya juga bersifat antioksidatif. Penelitian ini mengevaluasi karakteristik mikrobiologis dan fisikokimia, menentukan aktivitas antimikroba dan antioksidan, serta mengetahui karakteristik sensori soyghurt dengan penambahan *pulp* stroberi (10%, 15%, 20%, dan 30%) dan ekstrak daun stevia (0,5%). Penelitian menggunakan lima formulasi yaitu kontrol (Y1), 10% *pulp* stroberi + 0,5% stevia (Y2), 15% (Y3), 20% (Y4), dan 30% (Y5). Evaluasi mutu soyghurt meliputi Total Plate Count (TPC); Total Bakteri Asam Laktat (BAL); Angka Kapang Khamir (AKK); Total *Enterobacteriaceae*; nilai pH; total asam laktat; kadar protein; uji aktivitas antimikroba terhadap *Escherichia coli*, *Staphylococcus aureus*, dan *Candida albicans*; uji antioksidan metode DPPH (presentase inhibisi); serta uji sensori oleh panelis tidak terlatih dengan analisis Friedman. Hasil penelitian menunjukkan bahwa nilai TPC soyghurt pada seluruh perlakuan (Y1–Y5) berada pada kisaran  $2,65 \times 10^5$ – $9,3 \times 10^6$  CFU/mL dan total BAL sebesar  $1,85 \times 10^6$ – $3,45 \times 10^6$  CFU/mL, sedangkan nilai AKK dan total *Enterobacteriaceae* berada di bawah batas hitung ( $< 2,5 \times 10^5$  CFU/mL) dengan jumlah koloni masing-masing 2–18 dan 0–3 atau tidak terdeteksi yang menunjukkan mutu mikrobiologis soyghurt tergolong aman. Aktivitas antibakteri tertinggi terhadap *E. coli* dan *S. aureus* diperoleh pada Y3 ( $1,60 \pm 0,00$  mm dan  $1,20 \pm 0,00$  mm), sedangkan aktivitas antijamur tertinggi terhadap *C. albicans* terdapat pada Y2 ( $9,10 \pm 0,14$  mm). Penambahan *pulp* stroberi dan ekstrak daun stevia pada seluruh perlakuan cenderung menurunkan pH soyghurt dari  $3,81 \pm 0,05$  menjadi  $3,46 \pm 0,01$ , meningkatkan total asam laktat dari  $1,10 \pm 0,03\%$  menjadi  $1,49 \pm 0,09\%$ , serta menurunkan kadar protein dari  $5,51 \pm 0,43\%$  menjadi  $4,37 \pm 0,14\%$ ; namun tidak signifikan ( $p > 0,05$ ) pada ketiga parameter. Aktivitas antioksidan berdasarkan persentase DPPH Radical Scavenging Activity berbeda signifikan antar perlakuan ( $p < 0,05$ ) dengan aktivitas tertinggi pada Y2 dibandingkan formulasi lainnya. Uji sensori menunjukkan bahwa sebagian besar atribut sensori berbeda signifikan ( $p < 0,05$ ) kecuali tekstur, di mana Y5 memiliki tingkat penerimaan panelis paling baik. Secara keseluruhan, Y2 merupakan formulasi paling efektif sebagai produk pangan fungsional karena memiliki aktivitas antioksidan sangat kuat dan aktivitas antimikroba relatif lebih tinggi dibanding perlakuan lainnya dengan karakteristik mikrobiologis dan fisikokimia yang memenuhi mutu soyghurt.

**Kata kunci:** Soyghurt, Stroberi, Daun Stevia, Antimikroba, Antioksidan

## **Antimicrobial and Antioxidant Activity of Soy Milk Yoghurt (Soyghurt) with the Addition of Strawberry Pulp (*Fragaria sp.*) and Stevia Leaf Extract (*Stevia rebaudina*)**

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### **ABSTRACT**

One of the innovations in developing functional food is soy milk yogurt (soyghurt) enriched with natural ingredients with health value. Strawberries (*Fragaria sp.*) were chosen because they contain bioactive anthocyanin and phenolic compounds. This formulation utilizes *Stevia rebaudiana* leaf extract to produce a non-sugar sweet taste because the bioactive compounds also have antioxidative properties. This study evaluated the microbiological and physicochemical characteristics, determined the antimicrobial and antioxidant activities, and determined the sensory characteristics of soyghurt with the addition of strawberry pulp (10%, 15%, 20%, and 30%) and stevia leaf extract (0.5%). The study used five formulations, namely control (Y1), 10% strawberry pulp + 0.5% stevia (Y2), 15% (Y3), 20% (Y4), and 30% (Y5). Evaluation of soyghurt quality includes Total Plate Count (TPC); Total Lactic Acid Bacteria (LAB); Yeast Mold Number (YMN); Total *Enterobacteriaceae*; pH value; total lactic acid; protein content; antimicrobial activity test against *Escherichia coli*, *Staphylococcus aureus*, and *Candida albicans*; antioxidant test using the DPPH method (inhibition percentage); and sensory testing by untrained panelists using Friedman analysis. The results showed that the TPC value of soyghurt in all treatments (Y1–Y5) was in the range of  $2.65 \times 10^5$ – $9.3 \times 10^6$  CFU/mL and total LAB was  $1.85 \times 10^6$ – $3.45 \times 10^6$  CFU/mL, while the YMN and total *Enterobacteriaceae* values were below the counting limit ( $<2.5 \times 10^5$  CFU/mL) with the number of colonies of 2–18 and 0–3, respectively, or not detected, indicating that the microbiological quality of soyghurt was classified as safe. The highest antibacterial activity against *E. coli* and *S. aureus* was obtained in Y3 ( $1.60 \pm 0.00$  mm and  $1.20 \pm 0.00$  mm), while the highest antifungal activity against *C. albicans* was found in Y2 ( $9.10 \pm 0.14$  mm). The addition of strawberry pulp and stevia leaf extract in all treatments tended to reduce the pH of soyghurt from  $3.81 \pm 0.05$  to  $3.46 \pm 0.01$ , increase total lactic acid from  $1.10 \pm 0.03\%$  to  $1.49 \pm 0.09\%$ , and reduce protein content from  $5.51 \pm 0.43\%$  to  $4.37 \pm 0.14\%$ ; but not significant ( $p > 0.05$ ) in all three parameters. Antioxidant activity based on the percentage of DPPH Radical Scavenging Activity differed significantly between treatments ( $p < 0.05$ ) with the highest activity in Y2 compared to other formulations. Sensory testing showed that most sensory attributes differed significantly ( $p < 0.05$ ) except for texture, where Y5 had the best panelist acceptance rate. Overall, Y2 is the most effective formulation as a functional food product because it has very strong antioxidant activity and relatively higher antimicrobial activity compared to other treatments with microbiological and physicochemical characteristics that meet the quality of soyghurt.

**Keywords:** Soyghurt, Strawberry, Stevia Leaf, Antimicrobial, Antioxidant