

**MINYAK ATSIRI KAYU MANIS (*Cinnamomum burmannii*) BERBASIS
NANOEMULSI UNTUK MEMPERTAHANKAN KUALITAS DAGING
AYAM BROILER SELAMA PENYIMPANAN SUHU 4°C**

INTISARI

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Daging ayam broiler rentan rusak akibat kontaminasi mikroorganisme, sehingga memerlukan pengawet. Penggunaan pengawet kimia seperti nitrit menimbulkan kekhawatiran kesehatan, mendorong pencarian pengawet alami dari minyak atsiri kayu manis (*Cinnamomum burmannii*) yang memiliki potensi antioksidan dan antimikroba. Namun, sifat minyak atsiri yang hidrofobik dan tidak stabil membatasi aplikasinya secara langsung. Penelitian ini bertujuan mengembangkan formula nanoemulsi minyak atsiri kayu manis berbasis nanoemulsi dan mengevaluasi potensinya sebagai pengawet alami untuk mempertahankan kualitas fisik, kimia, mikrobiologi, dan sensoris daging ayam broiler. Penelitian dilaksanakan di beberapa laboratorium Universitas Gadjah Mada dan Badan Riset dan Inovasi Nasional (BRIN) pada bulan Desember 2023 hingga Februari 2025. Metode meliputi formulasi nanoemulsi SNEDDS (Metode C, rasio minyak:air 1:9), karakterisasi (ukuran partikel <200 nm, rata-rata 88,35 nm; PDI tinggi; zeta potensial -12,4 mV; morfologi bulat), pengujian aktivitas antioksidan (IC₅₀ 4,16 ppm, sangat kuat) dan antibakteri terhadap *Salmonella sp.* dan *E. coli* (daya hambat kuat >20 mm). Nanoemulsi kemudian diaplikasikan pada daging ayam broiler dan disimpan selama 0, 4, 8, dan 12 hari pada suhu 4°C. Evaluasi kualitas daging dilakukan secara fisik (pH, susut masak, warna L*, a*, b*, dan tekstur berpengaruh nyata), kimia (kadar air berpengaruh nyata), mikrobiologi (Angka lempeng total pada P2 menunjukkan pertumbuhan yang lebih lambat dan cemaran salmonella hingga hari ke-12 masih negatif), dan sensoris (Perlakuan P2 menunjukkan aroma dan daya terima yang lebih banyak disukai oleh panelis). Data dianalisis menggunakan rancangan acak lengkap pola faktorial dilanjutkan uji *Duncan's Multiple Range Test* (DMRT). Aplikasi nanoemulsi 50.000 ppm pada daging ayam broiler mampu mempertahankan kualitas fisik, kimia, mikrobiologis, dan sensoris selama penyimpanan. Hasil ini menunjukkan potensi besar nanoemulsi minyak atsiri kayu manis sebagai pengawet alami yang efektif dan aman dalam industri pangan.

Kata kunci: Nanoemulsi, Minyak atsiri kayu manis, Antioksidan, Antibakteri, Pengawet alami

ESSENTIAL OIL OF CINNAMON (*Cinnamomum burmannii*) BASED ON
NANOEMULSION TO MAINTAIN THE QUALITY OF BROILER
CHICKEN MEAT DURING STORAGE AT 4°C

ABSTRACT

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Broiler chicken meat is highly susceptible to spoilage due to microbial contamination, necessitating the use of preservatives. The use of chemical preservatives such as nitrites raises health concerns, prompting the search for natural alternatives. Cinnamon essential oil (*Cinnamomum burmannii*) has shown promising antioxidant and antimicrobial properties; however, its hydrophobic nature and low stability limit its direct application. This study aimed to develop a cinnamon essential oil-based nanoemulsion formulation and evaluate its potential as a natural preservative to maintain the physical, chemical, microbiological, and sensory quality of broiler chicken meat. The research was conducted in various laboratories at Universitas Gadjah Mada and the National Research and Innovation Agency (BRIN) from December 2023 to February 2025. The methodology included the formulation of a SNEDDS-based nanoemulsion (Method C, oil-to-water ratio of 1:9), followed by characterization (particle size <200 nm, average 88.35 nm; high PDI; zeta potential of -12.4 mV; spherical morphology). The antioxidant activity was assessed (IC50 of 4.16 ppm, indicating very strong activity), along with antibacterial activity against *Salmonella* spp. and *E. coli* (strong inhibition zone >20 mm). The nanoemulsion was subsequently applied to broiler chicken meat and stored at 4°C for 0, 4, 8, and 12 days. Quality assessments were conducted on physical parameters (pH, cooking loss, color L*, a*, b*, and texture, all significantly affected), chemical parameters (moisture content significantly affected), microbiological parameters (total plate count on treatment P2 showed slower microbial growth; *Salmonella* contamination remained undetected until day 12), and sensory attributes (treatment P2 was preferred in terms of aroma and overall acceptability by panelists). Data were analyzed using a completely randomized factorial design followed by Duncan's Multiple Range Test (DMRT). The application of 50,000 ppm cinnamon oil nanoemulsion effectively preserved the physical, chemical, microbiological, and sensory qualities of broiler chicken meat during storage. These findings demonstrate the significant potential of cinnamon essential oil nanoemulsion as a safe and effective natural preservative for use in the food industry.

Keywords: Nanoemulsion, Cinnamon essential oil, Antioxidant, Antibacterial, Natural preservative