

POTENSI NANOEMULSI MINYAK ATSIRI BIJI KETUMBAR
(*Coriandrum sativum*) SEBAGAI AGEN ANTIBAKTERI
DAN GROWTH PROMOTER AYAM PEDAGING

INTISARI

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Penelitian ini bertujuan untuk mengetahui potensi penggunaan nanoemulsi minyak atsiri biji ketumbar (NBK) yang dicampurkan dalam air minum sebagai agen antibakteri alami dan *growth promoter* ayam pedaging. Penelitian dilaksanakan dalam 3 tahap, tahap pertama, eksplorasi formula optimum kombinasi kombinasi minyak atsiri biji ketumbar: VCO: Tween 80: PEG 400, serta karakteristisasi (uji stabilitas; distribusi dan ukuran partikel; potensial zeta; dan morfologi nanoemulsi). Tahap kedua, pengujian aktivitas secara *in vitro* terhadap *Escherichia coli* dan *Salmonella typhimurium*. Tahap ketiga, studi efikasi NBK yang diaplikasikan pada 180 ekor *day old chicks* jantan *strain New Lohmann* dengan menggunakan kinerja pertumbuhan (konsumsi pakan, bobot akhir, pertambahan bobot badan, konversi pakan, dan konsumsi air minum), mikroflora usus (total BAL dan *Salmonella sp.*) dan histomorfologi usus (tinggi vili, lebar vili, kedalaman kript, dan rasio tinggi vili dan kedalaman kript) sebagai respon parameter yang diamati. Setiap ayam akan mendapatkan pakan basal yang sama dan salah satu dari 5 perlakuan air minum sebagai berikut: air minum tanpa aditif pakan (kontrol negatif; KN), air minum 50 ppm antibiotik *Tetracycline* (kontrol positif; AT), air minum + 25 µl/l NBK (NBK 1), air minum + 50 µl/l NBK (NBK 2), atau air minum + 100 µl/l NBK (NBK 3). Setiap perlakuan akan diberikan replikasi 4 kali, masing-masing dengan 9 ekor ayam pada setiap kandang replikasi. Data yang diperoleh akan dianalisis variansi mengikuti rancangan acak lengkap pola searah, didasarkan pada probabilitas kurang dari 5%. Apabila terdapat indikasi perbedaan nyata maka data akan diuji lanjut menggunakan Duncan's Multiple Range Test dan kontras ortogonal. Hasil penelitian menunjukkan formula NBK diperoleh dengan rasio campuran 16,9% fase minyak (75% minyak atsiri biji ketumbar dan 25% VCO), 68,81% Tween 80, dan 14,29% PEG 400 dengan karakteristik ukuran partikel 13,05 nm, *polydispersity index* 0,2577, nilai potensial zeta -5,65, lulus uji stabilitas, dan morfologi sferis dan homogen. Aktivitas antibakteri secara *in vitro* menunjukkan NBK mampu menghambat pertumbuhan bakteri patogen seperti *Escherichia coli* dan *Salmonella typhimurium* tergolong dalam kategori kuat. Pemberian NBK yang disuplementasikan dalam air minum meningkatkan kinerja pertumbuhan (bobot akhir, pertambahan bobot badan, dan konversi pakan), memperbaiki kesehatan mikroflora usus (meningkatkan populasi BAL, menekan *Salmonella sp.*), serta memperbaiki histomorfologi usus (tinggi dan lebar vili, kedalaman kript). Hasil terbaik diperoleh pada level pemberian nanoemulsi minyak atsiri biji ketumbar 50 µl/l dalam air minum. Nanoemulsi minyak atsiri biji ketumbar berpotensi digunakan sebagai agen antibakteri alami dan alternatif *growth promoter* pengganti antibiotik ayam pedaging.

Kata kunci: Ayam pedaging, Nanoemulsi minyak atsiri biji ketumbar, Kinerja Pertumbuhan, Mikroflora usus, Histomorfologi usus

THE POTENTIAL USE OF CORIANDER (*Coriandrum sativum*) ESSENTIAL OIL NANOEMULSION AS AN ANTIBACTERIAL AGENT AND GROWTH PROMOTER OF BROILER CHICKENS

ABSTRACT

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This research was conducted to investigate the potential use of *Coriandrum sativum* essential oil nanoemulsion (NCSEO) as a natural antibacterial agent and growth promoter of broiler chickens. The research consisted of 3 stages. In the first stage, exploration of the optimum formula using mixture of coriander oil: VCO: Tween 80: PEG 400 and characterization (stability test; distribution and particle size; zeta potential; and nanoemulsion morphology) were examined. The second stage, in-vitro evaluating antibacterial activity against *Escherichia coli* and *Salmonella typhimurium* was analyzed. The final stage, was in-vivo experiment on 180 one-day-old male broiler chickens. The parameters that were observed included growth performance (feed intake, final body weight, body weight gain, feed conversion ratio, and water intake); intestinal microflora (total LAB and *Salmonella* spp.); intestinal histomorphology (villus height, villus width, crypt depth, and villus to crypt depth ratio). The chickens were allocated randomly into five treatments with four replicates, and 9 chicks per replicate pen. The treatments applied were as follows: drinking water without any addition (KN), drinking water with 50 ppm antibiotic Tetracycline (AT), or drinking water added NCSEO at 25 µl/l (NBK 1), 50 µl/l (NBK 2), and at 100 µl/l (NBK 3). All collected data were analyzed using ANOVA in a completely randomized design and mean differences among treatments were evaluated by Duncan's Multiple Range Test and Orthogonal contrast based on $P < 0.05$. The results showed that the optimum formula of coriander essential oil nanoemulsion consisted of 16.9% oil phase (75% coriander seed essential oil and 25% VCO), 68.81% Tween 80 and 14.29% PEG 400 which resulted in particle size of 13.05 nm, with a polydispersity index (PI) of 0.257, a zeta potential value of -5.65, passed the stability test, and spherical shape. The in vitro experiment showed that the optimum formula of NCSEO can inhibit the growth of pathogenic bacteria such as *Escherichia coli* and *Salmonella typhimurium*. The addition of NCSEO in drinking water was able to improve growth performance (final weight, body weight gain, and feed conversion ratio). The LAB population was improved and the *Salmonella* spp. was not found in NCSEO treatments. Different levels of NCSEO stimulated villus height, villus width, and crypt depth. The best results were obtained at the level of 50 µl/l resulting highest for promoting growth performance, intestinal microflora, and histomorphology. It concluded that, coriander seed essential oil nanoemulsion has the potential to be used as a natural antibacterial agent and growth promoter as an alternative for antibiotics of broiler chickens.

Keywords: Broiler chicken, Coriander (*Coriandrum sativum*) essential oil nanoemulsion, Growth performance, Intestinal microflora, Intestinal histomorphology