

PENGARUH NANOEMULSI MINYAK ATSIRI SERAI DAN KAPULAGA DALAM AIR MINUM TERHADAP KESEHATAN SALURAN PENCERNAAN, KINERJA PERTUMBUHAN, DAN KUALITAS DAGING AYAM BROILER

INTISARI

Tri Ujilestari
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Minyak atsiri serai (*Cymbopogon citratus*) dan kapulaga (*Amomum compactum*) memiliki senyawa bioaktif yang berperan sebagai antibakteri yang dapat bermanfaat untuk menjaga kinerja saluran pencernaan ternak. Minyak serai dan kapulaga bersifat hidrofobik oleh karena itu diperlukan minyak pembawa, surfaktan, dan ko-surfaktan agar dapat terbentuk nanoemulsi. Tahap pertama dari penelitian ini bertujuan untuk menentukan susunan formula nanoemulsi minyak serai dan kapulaga yang optimal. Pada penelitian tahap pertama, dilakukan formulasi dan karakterisasi nanoemulsi minyak atsiri serai dan kapulaga. Hasil formula optimal pada tahap pertama kemudian diverifikasi menggunakan analisis single sample T-test. Rancangan percobaan yang digunakan untuk pengujian aktivitas antibakteri yaitu Rancangan Acak Lengkap Pola Searah. Data hasil analisis statistik yang berbeda antar perlakuan diuji lanjut menggunakan Duncan's new Multiple Range Test (DMRT). Semua indikasi perbedaan yang nyata dalam penelitian ini didasarkan pada probabilitas kurang dari 5%. Hasil penelitian menunjukkan bahwa nanoemulsi minyak atsiri serai dan kapulaga memiliki ukuran partikel kurang dari 15 nm, zeta potensial yang stabil, lolos uji stabilitas, morfologi sferis dan homogen, serta memiliki aktivitas antibakteri menghambat ($P < 0,05$) pertumbuhan bakteri *Escherichia coli* dan *Salmonella typhimurium*. Penelitian tahap kedua bertujuan untuk menguji manfaat penambahan nanoemulsi minyak atsiri serai dan kapulaga yang disuplementasikan secara individu dalam air minum terhadap kinerja pertumbuhan, kesehatan saluran pencernaan, dan kualitas daging ayam broiler. Dua ratus delapan puluh delapan ekor ayam broiler dikelompokkan dalam 8 perlakuan dengan 4 ulangan. Perlakuan terdiri dari T1 = air minum tanpa aditif pakan (kontrol negatif), T2 = air minum + 25 mg/l antibiotik (kontrol positif), T3 = air minum + 25 μ l/l minyak atsiri serai, T4 = air minum + 50 μ l/l minyak atsiri serai, T5 = air minum + 100 μ l/l minyak atsiri serai, T6 = air minum + 25 μ l/l minyak atsiri kapulaga, T7 = air minum + 50 μ l/l minyak atsiri kapulaga, dan T8 = air minum + 100 μ l/l minyak atsiri kapulaga. Rancangan percobaan yang digunakan yaitu Rancangan Acak Lengkap Pola Searah. Data hasil analisis statistik yang berbeda antar perlakuan diuji lanjut menggunakan DMRT. Hasil penelitian menunjukkan bahwa penambahan nanoemulsi minyak atsiri serai dan kapulaga menurunkan total bakteri coliform dalam ileum ($P < 0,01$), menurunkan konversi pakan ($P < 0,05$), dan menurunkan kolesterol daging ($P < 0,05$) pada ayam broiler umur 35 hari. Level suplementasi dalam air minum terbaik dari minyak atsiri serai maupun kapulaga dalam penelitian ini adalah 100 μ l/l, berdasarkan peningkatan kesehatan saluran pencernaan, kinerja pertumbuhan, dan kualitas daging ayam broiler.

Kata kunci: *Amomum compactum*, Ayam broiler, *Cymbopogon citratus*, Kinerja pertumbuhan, Minyak atsiri

THE EFFECTS OF LEMON GRASS AND CARDAMON ESSENTIAL OIL
NANOEMULSION IN DRINKING WATER ON DIGESTIVE
TRACT HEALTH, GROWTH PERFORMANCE, AND
MEAT QUALITY OF BROILER CHICKENS

ABSTRACT

Tri Ujilestari
16/407975/SPT/00186

Lemon grass (*Cymbopogon citratus*) and cardamon (*Amomum compactum*) essential oil contain bioactive compounds that act as antibacterial agents which can be useful to maintain performance of the digestive tract of livestock. Lemon grass and cardamon oil are hydrophobic substance, therefore require carrier oils, surfactants, and co-surfactants to form nanoemulsion. The first step of the research was to determine the optimal arrangement of lemon grass and cardamon nanoemulsion formula. In the first research, formulation and characterization of nanoemulsion essential oils of lemon grass and cardamon were carried out. Results of the optimum formula in first step were then verified using a single sample T-test analysis. The experimental design used to investigate antibacterial activity was Complete Random Design. Data from different statistical analysis results between treatments were tested further using Duncan's new Multiple Range Test (DMRT). All indications of significant differences in our study were based on the probability of less than 5%. Results showed that nanoemulsion of lemon grass and cardamon essential oil had a particle size of less than 15 nm, a stable zeta potential, passed the stability test, spherical and homogeneous morphology, and had antibacterial activity inhibited ($P < 0.05$) the growth of *Escherichia coli* and *Salmonella typhimurium*. The second research was aimed to examine the benefits of lemon grass essential oil and cardamon which were individually supplemented in drinking water on growth performance, digestive tract health, and meat quality of broiler chickens. Two hundred and eighty eight broiler chickens were grouped in 8 treatments with 4 replications. The treatment consisted of T1 = drinking water without feed additives (negative control), T2 = drinking water + 25 mg/l antibiotics (positive control), T3 = drinking water + 25 μ l/l lemon grass essential oil, T4 = drinking water + 50 μ l/l lemon grass essential oil, T5 = drinking water + 100 μ l/l lemon grass essential oil, T6 = drinking water + 25 μ l/l cardamon essential oil, T7 = drinking water + 50 μ l/l cardamon essential oil, and T8 = drinking water + 100 μ l/l cardamon essential oil. The experimental design used was Complete Random Design. Data from different statistical analysis results between treatments were tested further using DMRT. Results showed that the addition of lemon grass and cardamon essential oil nanoemulsion decreased total coliform bacteria in the ileal section ($P < 0.01$), reduced feed conversion ($P < 0.05$), and reduced meat cholesterol ($P < 0.05$) of 35 days old broiler chickens. The best drinking water supplemental levels of lemon grass or cardamon essential oils in our study was 100 μ l/l, based on the improvements of the digestive tract health, growth performance, and meat quality of broiler chickens.

Keywords: *Amomum compactum*, Broiler chicken, *Cymbopogon citratus*, Growth performance, Essential oil