

PENGARUH SUPLEMENTASI NANO ENKAPSULASI EKSTRAK DAUN MINDI (*Melia azedarach* L.) MELALUI AIR MINUM TERHADAP KESEHATAN, PRODUKTIVITAS, DAN KUALITAS KARKAS AYAM BROILER

INTISARI

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Penelitian ini bertujuan untuk mengetahui pengaruh penggunaan teknologi nano enkapsulasi untuk melindungi senyawa bioaktif daun mindi (*Melia azedarach* L.) yang diberikan melalui air minum untuk meningkatkan status kesehatan, produktivitas, dan kualitas karkas ayam broiler jantan. Penelitian dilaksanakan dengan 3 tahap yang simultan. Penelitian tahap I mengkaji formulasi perbandingan ekstrak daun mindi (EDM): kitosan: Sodium Tripolifosfat (STPP) yang tepat dalam pembuatan nano enkapsulasi. Penelitian tahap II mengkaji manfaat ekstrak daun mindi secara *in vitro*, yaitu uji daya hambat bakteri dan karakteristik nanoenkapsulasi. Penelitian tahap III mengkaji manfaat nano enkapsulasi ekstrak daun mindi secara *in vivo* menggunakan 192 ekor ayam broiler jantan, dengan menggunakan formulasi terbaik yang diperoleh pada tahap I dan II. Pada penelitian *in vivo*, ayam mendapatkan salah satu dari 8 macam perlakuan, yaitu: air minum tanpa penambahan aditif pakan (kontrol negatif; P1), air minum + 100 ppm antibiotik tetracycline (kontrol positif; P2), air minum + 100 mg/liter EDM (P3), air minum + 200 mg/liter EDM (P4), air minum + 400 mg/liter EDM (P5), air minum + 100 mg/liter nano enkapsulasi ekstrak daun mindi atau NEDM (P6), air minum + 200 mg/liter (I) NEDM (P7), air minum + 400 mg/l NEDM (P8). Setiap perlakuan diberikan replikasi 4 kali, dengan 6 ekor ayam di setiap replikasi. Seluruh data yang diperoleh dianalisis statistik menggunakan Rancangan Acak Lengkap pola searah dengan aplikasi Statistical Package for the Social Science Version 16. Indikasi perbedaan antar perlakuan didasarkan pada nilai probabilitas kurang dari 5%. Seluruh data dengan perbedaan yang nyata diuji lanjut menggunakan Duncan's new Multiple Range Test. Hasil penelitian pada tahap I menunjukkan bahwa ukuran partikel nano enkapsulasi ekstrak daun mindi yaitu $535,2 \pm 12,83$ nm dengan nilai *Polydispersity Index* (PI) $0,436 \pm 0,21$ dan zeta potensial $59,73 \pm 0,35$ mV. Hasil penelitian pada tahap II menunjukkan bahwa EDM dan NEDM memiliki daya hambat terhadap bakteri *Escherichia coli* dan *Salmonella typhimurium*. Hasil penelitian pada tahap III menunjukkan bahwa suplementasi air minum dengan level pemberian 100 – 400 mg/l EDM dan NEDM tidak mempengaruhi kinerja pertumbuhan ayam broiler, namun dapat menurunkan pH jejunum dan ileum ($P < 0,05$). Suplementasi NEDM terbukti mampu meningkatkan tinggi dan lebar vili jejunum ($P < 0,01$). Suplementasi EDM dan NEDM tidak mempengaruhi kualitas daging ayam broiler, namun meningkatkan daya ikat air dan kadar protein daging ($P < 0,05$). Dapat disimpulkan bahwa penambahan air minum dengan 400 mg/l EDM dan NEDM memperbaiki tingkat keasaman, profil *adsorptive cells* pada saluran pencernaan, dan meningkatkan kualitas daging ayam broiler.

Kata kunci: Ayam broiler, Kinerja pertumbuhan, Kualitas karkas, Nano enkapsulasi ekstrak daun mindi, Tingkat kesehatan usus

THE EFFECTS OF NANOENCAPSULATED MINDI (*Melia azedarach* Linn.) LEAF EXTRACT SUPPLEMENTATIONS VIA DRINKING WATER ON HEALTH, PRODUCTIVITY, AND CARCASS QUALITY OF BROILER CHICKENS

ABSTRACT

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The aim of this research was to determine the effect of nanoencapsulation technology to protect bioactive compounds of mindi (*Melia azedarach* L.) leaves which were given through drinking water to improve the health status, productivity, and carcasses quality of broiler chickens. The study was conducted in 3 simultaneous steps. First step examined the appropriate comparative formulation of mindi leaf extract: chitosan: Sodium Tripolyphosphate (STPP). Second step examined the benefits of mindi leaf extract (MLE) with *in vitro* study, using bacterial inhibition and characteristics of nanoencapsulation as two response criterion observed. Third step examined the benefits of nanoencapsulation of mindi leaf extract (NMLE) by *in vivo* with 192 male broiler chickens, using the best formulation obtained in step I and II. In the *in vivo* study, chickens were fed one of the eight treatments: a negative control group without any treatment in the drinking water (T1), a positive control group with tetracycline 100 ppm (T2), groups with 100 mg (T3), 200 mg (T4), 400 mg (T5) mindi leaf extract per litre (mg/l), or groups with 100 mg (T6), 200 mg (T7), 400 mg (T8) nanoencapsulated mindi leaf extract per litre (mg/l). Each treatment was replicated four times with six birds in each pen. Oneway ANOVA was used to analyse collected data, continued with Duncan's new Multiple Range Test for data with significant differences. Results of the first step showed that particle size of nanoencapsulated mindi leaf extract was 535.2 ± 12.83 nm with Polydispersity Index (PI) value 0.436 ± 0.21 and zeta potential value 59.73 ± 0.35 mV. Results of the second step showed that mindi leaf extract – nanocapsulated or non-nanocapsulated – was found to possess inhibitory activities against *Escherichia coli* and *Salmonella typhimurium*. Results of third step showed that no treatment effect of MLE or NMLE supplementations were detected on growth performance, except for the reduction of the digesta pH in the jejunal and ileal sections ($P < 0.05$). Supplementation of NMLE increased ($P < 0.05$) villi height and width on the jejunal cell wall. No treatment effect of mindi leaf extract – nanocapsulated or non-nanocapsulated – was found on the quality of broiler chicken meat. However, 400 mg/l EDM increased ($P < 0.05$) the water holding capacity and protein content of meat. It might be concluded that addition of drinking water with 400 mg/l EDM or NEDM beneficially improved intestinal acidity, adsorptive cell profile, and meat quality of broiler chickens.

Keywords: Broiler chickens, Carcass quality, Growth performance, Intestinal health, Nanoencapsulated mindi leaf extract