The Effects of Nanoencapsulated Lime (*Citrus aurantifolia*) Leaf Extract Administration via Drinking Water on Antioxidant Profile and Productivity of Broiler Chickens

ABSTRACT

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Purpose of the study was to investigate the characteristic of nanoecapsulated lime leaves extract (LLE) and the effects of LLE supplementations in drinking water on broiler growth performance, antioxidant profiles, and meat proximate composition. One hundred ninety-two day-old chicks were allotted randomly and raised into 6 treatments, 4 replicates, and 8 birds in each replicate cage, in a completely randomized design. The treatments consisted of non-supplemented group (T_0, control treatment), a group supplemented with 50 ppm of tetracycline (T_1, control negative), groups supplemented with 0.015% v/v (T_2) and 0.030% v/v (T_3) LLE, and groups supplemented with 0.015% v/v (T_4) and 0.030% v/v (T_5) nanoencapsulated LLE. The diet was based on corn and soybean meal which contained 22.01% crude protein, 3113.12 kcal/kg metabolizable energy, 8.24% fat, 3.55% fiber, 1.10% calcium, 0.64% phosphorus, 1.18% lysine, 0.45% methionine, and 0.78% threonine. Diet and drinking water were supplied *ad libitum*. The collected data were: phytochemicals content of crude lime leaves extract (flavonoid, carotenoid, total phenol and tannin), characteristic of nanoencapsulated lime leaves extract (particle size, potential zeta, and TEM), growth performance (feed intake, weekly weight gained, feed conversion ratio, and water consumption), carcass production, blood antioxidant profile (catalase and glutathione peroxidase), and meat proximate composition (dry matter, organic matter, protein, and fat). All analyzed data were subjected to Oneway ANOVA. Data with significant different were later separated with Duncan's new Multiple Range Test. Results showed that crude extract of lime leaves contained flavonoid 16,29%, carotenoid 2,37%, total phenols 12,62% and tannin 16,63%. Nanoencapsulated extract provided particle size of 64,9nm with 57,7mV of zeta potential, and its molecular had spherical shape and monodispersed with polymeric chain. Drinking water supplementations with LLE or nanoencapsulated LLE did not affect feed intake, water intake, FCR, and carcass production of the chickens. As for antioxidant profile, catalase increased notably in group T_5 ($P<0.01$) and glutathione peroxidase increased remarkably in group T_4 ($P<0.01$). Meat proximate analyses showed that no noteworthy effect found on dry matter, protein, and fat contents, except the group T_3 had the greatest percentage of organic matter among other groups. In conclusion, LLE and nanoencapsulated LLE had no effect on the growth performance and meat proximate composition of broiler chickens. However, nanoencapsulated LLE improved production of blood catalase and glutathione peroxidases, two enzymes that responsible for anti-oxidation process in broiler chickens.

Keywords: Antioxidant profile, Broiler chicken, *Citrus aurantifolia* leaves extract, Nanoencapsulation, Productivity