

**Influence of dietary ratios of n-6: n-3 fatty acid on gene expression, fatty acid profile in liver and breast muscle tissues, serum lipid profile, and immunoglobulin in broiler chickens<sup>1</sup>**

ABSTRACT

The study was conducted to investigate the influence of varying concentrations of dietary n-6: n-3 fatty acid ratio (FAR) on fatty acid (FA) structure, expression of peroxisome proliferator-activated receptor (PPAR) $\alpha$ , PPAR $\gamma$ , and stearoyl-CoA desaturase (SCD) on liver and breast muscle tissue, lipid profile in serum and immunoglobulin in broiler birds. A total of 180 one-day-old Cobb 500 broiler birds were randomly allotted to 5 dietary treatments as follows: (T1) basal diet containing 6% palm oil (PO) as a control; (T2) basal diet containing 4% PO + 1% soybean oil (SO) + 1% linseed oil (LO); (T3) basal diet containing 3% PO + 2% SO + 1% LO; (T4) basal diet containing 3% PO + 1% SO + 2% LO; (T5) basal diet containing 2% PO + 2% SO + 2% LO. The n-6: n-3 ratio for the T1, T2, T3, T4, and T5 were 17.68, 3.70, 3.67, 2.18, and 2.05, respectively, whereas the ratios were 19.02, 3.28, 3.82, 2.28, and 2.23 for the T1, T2, T3, T4, and T5 in the finisher diets, respectively. The ratios of C22:6n-3, C18:3n-3, and C22:5n-3 in liver and breast muscle tissue amplified in response to a decrease in the proportion of n-6: n-3 FAR in diets. In addition, reducing the n-6: n-3 FAR in broiler diets up regulated the expression of PPAR $\gamma$  and PPAR $\alpha$  but down regulates the expression of SCD ( $P < 0.05$ ) in the breast and liver tissues. Moreover, reducing the dietary n-6: n-3 FAR improved plasma immunoglobulin and decreased the amount of cholesterol in breast meat and serum. The results suggest that decreasing the n-6: n-3 FAR in broiler diets may improve the immune response and enriched broiler meat with lower ratio of n-6: n-3 fatty acids and potential health beneficial n-3 FA for human diet.

**Keyword:** Broiler chickens; Fatty acid profile; Immunoglobulin; Gene expression; n-6: n-3 ratio