



Evaluating Dietary Inclusion of High Oleic Soybean Meal and Oil on Broiler Performance and Lipid Quality

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Objectives

The objective of this study was to evaluate the effect of dietary inclusion of high oleic soybean meal and oil on broiler performance and lipid quality.

Materials and Methods

Male Ross 308 broiler chicks ($n = 160$) were sorted by weight and randomly assigned to one of two treatments containing 10 replicate pens with 8 broilers each. Treatment groups consisted of a control corn-soy diet that included commodity soybean meal and oil (CON) and a corn-soy diet containing high oleic soybean meal and oil (HO). Broilers received, ad libitum, a two-phase diet consisting of starter (d0–21) containing 5% oil and grower (d21–42) containing 3% oil. Pen weight (PW) and feed intake (FI) were recorded on Days 0, 21, and 42 and used to calculate feed to gain ratio (F:G). Broilers were slaughtered on d42, after which carcasses were weighed and fabricated. Weights of fabricated parts were recorded for carcass yield. Samples of breast and thigh meat were taken for fatty acid profile analysis, which was conducted using a modified version of methods by Folch et al. (1957) and Morrison and Smith (1964). To measure lipid oxidation, boneless, skinless breast halves chosen randomly from each pen were placed on Styrofoam trays and overwrapped with oxygen permeable, polyvinyl chloride and placed in retail storage (4°C) and used for collection of thiobarbituric acid reactive substances (TBARS) on Day 1, 3, and 5 of storage. Data was analyzed using PROC GLM procedure in SAS, with level of significance set at $P < 0.05$.

Results

CON pens had a greater ($P < 0.002$) change in weight (23480.61 g. vs. 21829.39 g.), however, the

CON treatment had an increase in FI ($P < 0.0003$) compared to the HO treatment (29841.74 g. vs. 27405.68 g.). Thus, there was no significant difference ($P = 0.22$) in F:G between treatments. While there was no difference ($P = 0.39$; $P = 0.71$) in percent carcass yield or breast yield, the CON treatment had a higher ($P = 0.01$) percent thigh yield compared to the HO treatment (16.36% vs. 15.86%). Results of lipid oxidation showed there was an effect of day ($P < 0.0001$), but no treatment or interaction effects were observed. Diet changed ($P < 0.0001$) the proportion of saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), and polyunsaturated fatty acids (PUFA) in breast and thigh meat. HO treatment increased the proportion of MUFA and decreased the proportion of PUFA and SFA in both breast and thigh meat. Both breast and thigh samples from the HO treatment had increased ($P < 0.0001$) proportions of oleic acid (C18:1) and decreased proportions of linoleic acid (C18:2) compared to the control. Inclusion of HO soybean meal and oil in broiler diets resulted in increased uptake of MUFA (C18:1) and decreased PUFA (C18:2) in both breast and thigh meat, while having no impact on broiler feed efficiency.

Conclusion

Pull through effect of HO acid seen in fatty acid analysis of broiler meat shows the ability to serve as a mechanism to increase oleic acid inclusion in human diets. Oleic acid needs are potentially related to omega-3 fatty acid needs which are shown to have health benefits related to cardiac health in humans among other things. Studies have shown that increases in oleic acid in diets can lead to an increase in omega-3 fatty acids.