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Broiler Genetic Strain and Diet on the Incidence of Woody Breast Meat

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Objectives

Woody breast (WB) is characterized by pale, hardened areas and muscle rigidity in the *Pectoralis major* muscle of broilers. Although WB incidence is related to increased growth rate and breast meat yield, the exact causes are still unknown. The objectives of this study were to investigate the effect of genetic strain and diet on the incidence of WB.

Materials and Methods

All experimental procedures were approved by the Institutional Animal Care and Use Committee of Mississippi State University (IACUC-16–542). Five strains of mixed-sex broilers (A1–3, B1–2; $n = 240$ per strain) were fed with commercial or reduced essential amino acid diets (20% reduction of digestible lysine, total sulfur amino acids, and threonine). A 5 (breeds) × 2 (diets) factorial arrangement within a randomized complete block design with 8 blocks (10 pens per block) and 8 replicate pens (15 chicks per pen) of each treatment was utilized. At 8 wk of age, 4 broilers from each pen were randomly selected and harvested in a lab scale commercial processing facility. A total of 32 broilers from each treatment were evaluated for live weight, carcass weight, breast weight, breast pH, and breast color. The WB severity of chicken breasts was evaluated where 0 = normal, 1 = slight, 2 = moderate, and 3 = severe. The pH was measured at 15 min and 24 h post processing, and color was measured 24 h post processing. Cook loss and shear force were also evaluated.

Results

B1 broilers that were fed with the control diet expressed the WB condition with an average of 2.34, which was greater ($P < 0.05$) than all other treatments with the exception of the A1 reduced diet treatment ($P < 0.05$). Feeding broilers with the reduced diet led to less WB incidence in B breeds ($P < 0.05$) but had minimal impact ($P > 0.05$) in the A breeds. This indicates that WB incidence was impacted predominantly by genetics in both cases, but that diet had a greater impact on woody breast incidence in B in comparison to A genetic strains. There was greater than 25% severe WB in the A1 and B1 control diet treatments and the A1 reduced diet treatment. Feeding a reduced diet to B1 decreased incidence from 88% to 28% for moderate and severe WB.

After 15 min of processing, A1 broilers had greater ($P < 0.05$) pH (6.53 to 6.54) than B1 and B2 reduced diet treatments, but did not differ ($P > 0.05$) from other treatments. The pH declined after 24 h of processing, and B1 fed with control diet had a greater ($P < 0.05$) pH (5.96) than all other treatments (5.77 to 5.87). Differences existed among treatments ($P < 0.05$) with respect to cooking loss and shear force, but all samples were tender (< 45 N) and cooking loss was similar to values reported in literature.

Feeding the reduced diet to B decreased ($P < 0.05$) carcass weight when compared to control treatments; but feeding the reduced diet to A led to no difference ($P > 0.05$) in carcass weight. For the control diet, B1 had a greater breast weight ($P < 0.05$) than all other treatments. Feeding the reduced diet decreased ($P < 0.05$) breast weight for all breeds with the exception of A1.

Conclusion

A1 and B1 breeds had the greatest WB incidence. Feeding a reduced diet led to greater reductions in WB incidence and breast meat weight in B genetic strains when compared to A genetic strains.

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