



Tropentag, September 16-18, 2026, hybrid conference

“Towards multi-functional agro-ecosystems
promoting climate resilient futures”

Choice feeding of fermented rice bran in broilers: Impacts on growth, physiology, metabolism, and meat quality

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Abstract

This study evaluated the effects of fermentation on the nutritional quality of rice bran (RB) and its suitability as a supplementary feed for broilers under a choice feeding system, with emphasis on identifying the optimal fermentation duration. Rice bran was fermented with 2% yeast at 60% moisture under anaerobic conditions (29–33 °C), then dried and pelleted. A total of 192 Arbor Acres broiler chicks were randomly assigned to four dietary groups (48 birds per group; 6 replicates of 8 birds): (1) control (commercial feed only), (2) commercial feed plus unfermented RB, (3) commercial feed plus RB fermented for 24 h, and (4) commercial feed plus RB fermented for 48 h. Diets were offered separately under a free-choice system with ad libitum feeding for 35 days. Proximate composition, pH, amino acid profiles, growth performance, carcass traits, meat composition, and serum biochemical indices were evaluated. Fermentation significantly improved RB nutritional quality. Crude protein increased from 18.1% to 23.2%, while crude fiber decreased from 20.8% to 15.2% ($p < 0.001$). Metabolizable energy increased from 3323 to 3873 kcal/kg at 48 h. Total amino acids increased by 10% in the unfermented (with yeast) group and 5% at 48 h, while functional amino acids such as γ -aminobutyric acid and ornithine were significantly higher in the 24 h and 48 h groups ($p < 0.01$). Broilers showed increased intake of fermented RB with longer fermentation duration, partially replacing commercial feed without affecting total intake ($p > 0.05$). The 24 h group achieved the highest final body weight (2352 g) and weight gain (2159 g), although differences were not significant. Feed conversion ratio and carcass yield were similar across treatments. Meat fat content decreased significantly from 3.60% (control) to 1.92% (48 h) ($p < 0.001$). Serum biochemical parameters remained within physiological ranges despite some significant variations. In conclusion, fermented rice bran can be effectively used as a supplementary feed in broiler free-choice feeding systems without compromising performance. Fermentation of RB for 24 h appears optimal, providing balanced improvements in nutrient quality, feed utilisation, and growth performance.

Keywords: Broiler, fermentation, free choice, nutritional value, performance, rice bran

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