

PRODUKTIVITAS, HISTOMORFOLOGI JEJUNUM, ASAM LEMAK RANTAI
PENDEK DAN EKSPRESI GEN *BARRIER FUNCTION* DAN INFLAMASI
AYAM BROILER YANG DIBERI PAKAN FERMENTASI BUNGKIL INTI SAWIT

INTISARI

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Penelitian ini bertujuan untuk mengetahui potensi penggunaan bungkil inti sawit fermentasi (BISF) yang difermentasi menggunakan *Limosilactobacillus fermentum* BN21 terhadap performa pertumbuhan, histomorfologi jejunum, profil asam lemak rantai pendek sekum, serta ekspresi gen yang berhubungan dengan *barrier function* dan inflamasi usus pada ayam broiler. Sebanyak 320 ekor ayam broiler jantan strain Indian River umur satu hari dibagi secara acak ke dalam lima perlakuan pakan: kontrol (KTRL) dengan pakan basal, 2,5% bungkil inti sawit fermentasi (BISF2.5), 5% bungkil inti sawit fermentasi (BISF5), 7,5% bungkil inti sawit fermentasi (BISF7.5) dan 10% bungkil inti sawit fermentasi (BISF10). Setiap perlakuan terdiri dari 8 ulangan dengan 8 ekor ayam per ulangan. Pemeliharaan dilakukan selama 35 hari dengan pemberian pakan dan minum secara *ad libitum*. Data performa yang diambil meliputi konsumsi pakan, penambahan bobot badan, dan konversi pakan. Satu ekor ayam diambil dari setiap pen pada akhir pemeliharaan. Sampel digesta sekum digunakan untuk analisis produksi asam lemak rantai pendek sementara sampel jejunum digunakan untuk analisis histomorfologi dan ekspresi gen *tight junction* dan inflamasi. Data dianalisis menggunakan analisis varians satu arah (ANOVA) yang dilanjutkan dengan uji Tukey's HSD serta kontras polinomial linier dan kuadratik ($P < 0,05$). Hasil penelitian menunjukkan bahwa pada perlakuan BISF5 tidak memberikan pengaruh negatif terhadap performa pertumbuhan ayam broiler namun pada perlakuan BISF10 menurunkan bobot badan dan meningkatkan konversi pakan ($P < 0,05$). Rasio tinggi vili terhadap kedalaman kripta (*VH:CD*) meningkat pada perlakuan BISF5 ($P < 0,05$). Peningkatan level BISF meningkatkan konsentrasi asetat, propionat, butirat, dan total SCFA dalam sekum ($P < 0,05$). Ekspresi gen *claudin-1* (*CLDN-1*) menurun ($P < 0,001$) sedangkan *zonula occludens-1* (*ZO-1*) meningkat secara linier ($P < 0,001$). Selain itu, ekspresi *tumor nuclear factor- α* (*TNF- α*) tidak menunjukkan perbedaan nyata ($P > 0,05$), ekspresi *interleukin-18* (*IL-18*) menurun, sementara ekspresi *interleukin-10* (*IL-10*) dan *interleukin-13* (*IL-13*) meningkat ($P < 0,001$). Hasil ini menunjukkan bahwa suplementasi 5% bungkil inti sawit fermentasi dengan *Limosilactobacillus fermentum* BN21 meningkatkan kinerja usus melalui peningkatan produksi asam lemak rantai pendek dan modulasi ekspresi gen yang berperan dalam integritas usus serta regulasi imun tanpa menurunkan performa pertumbuhan ayam broiler.

Kata kunci: broiler, fermentasi, histomorfologi, produktivitas, SCFA

PRODUCTIVITY, JEJUNAL HISTOMORPHOLOGY, SHORT-CHAIN FATTY ACID, AND EXPRESSION OF BARRIER FUNCTION AND INFLAMMATORY GENES IN BROILER CHICKENS FED FERMENTED PALM KERNEL MEAL

ABSTRACT

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This study aimed to evaluate the potential use of fermented palm kernel meal (FPKM), fermented using *Limosilactobacillus fermentum* BN21, on growth performance, jejunal histomorphology, cecal short-chain fatty acid (SCFA) profiles, and the expression of genes related to intestinal barrier function and inflammation in broiler chickens. A total of 320 one-day-old male Indian River broiler chicks were randomly allocated to five dietary treatments: a control group fed a basal diet (KTRL), and diets containing 2.5% fermented palm kernel meal (BISF2.5), 5% fermented palm kernel meal (BISF5), 7.5% fermented palm kernel meal (BISF7.5), and 10% fermented palm kernel meal (BISF10). Each treatment consisted of eight replicates with eight birds per replicate. The birds were reared for 35 days with feed and water provided ad libitum. Growth performance parameters measured included feed intake, body weight gain, and feed conversion ratio. At the end of the experimental period, one bird was randomly selected from each pen. Cecal digesta samples were used for the analysis of short-chain fatty acid production, while jejunal tissue samples were used for histomorphological evaluation and analysis of tight junction and inflammatory gene expression. Data were analyzed using one-way analysis of variance (ANOVA), followed by Tukey's HSD test and linear and quadratic polynomial contrasts ($P < 0.05$). The results showed that dietary inclusion of 5% FPKM did not negatively affect broiler growth performance, whereas inclusion of 10% FPKM significantly reduced body weight and increased feed conversion ratio ($P < 0.05$). The villus height to crypt depth (VH:CD) ratio was significantly increased in the FPKM5 treatment ($P < 0.05$). Increasing levels of FPKM significantly increased cecal concentrations of acetate, propionate, butyrate, and total SCFAs ($P < 0.05$). Expression of *claudin-1* (*CLDN-1*) was significantly downregulated ($P < 0.001$), whereas *zonula occludens-1* (*ZO-1*) expression increased linearly ($P < 0.001$). In addition, *tumor necrosis factor- α* (*TNF- α*) expression did not differ significantly ($P > 0.05$), while *interleukin-18* (*IL-18*) expression decreased and *interleukin-10* (*IL-10*) and *interleukin-13* (*IL-13*) expression increased significantly ($P < 0.001$). These findings indicate that dietary supplementation with 5% fermented palm kernel meal fermented by *Limosilactobacillus fermentum* BN21 enhances intestinal function through increased short-chain fatty acid production and modulation of gene expression related to intestinal integrity and immune regulation without adversely affecting growth performance in broiler chickens.

Keywords: broiler, fermentation, histomorphology, productivity, SCFA