

## INTISARI

Jagung merupakan sumber energi utama mencapai 60% pada formulasi pakan. Adanya persaingan kebutuhan jagung untuk pakan unggas dengan pangan manusia maka diperlukan sumber alternatif lain seperti limbah ampas aren. Namun, penggunaan limbah tersebut terkendala kandungan serat kasarnya. Tujuan penelitian ini yaitu mempelajari pengaruh hidrolisis ampas aren oleh xilanase dari *Trichoderma virens* MLT2J2 terhadap peningkatan daya cerna pati dan produksi prebiotik xilooligosakarida (XOS) untuk diaplikasikan ke dalam pakan sehingga diharapkan dapat meningkatkan produktivitas ayam pedaging.

Penelitian mencakup tiga tahap yaitu produksi xilanase dari *T. virens* MLT2J2, optimasi hidrolisis ampas aren oleh xilanase, dan pengujian *in vivo* pada ayam pedaging meliputi evaluasi pengaruh pakan mengandung ampas aren terhidrolisis (AAH) terhadap kinerja pertumbuhan (tahap 1) dan pemanfaatan energi (tahap 2). Pada tahap 1, 300 ekor ayam strain Ross dibagi dalam 5 perlakuan dengan 5 ulangan berisi 12 ekor mengikuti Rancangan Acak Lengkap. Perlakuan pakan meliputi: P0 (tanpa AAH), P5 (pakan mengandung 5% AAH), P10 (pakan mengandung 10% AAH), P15 (pakan mengandung 15% AAH), dan P20 (pakan mengandung 20% AAH). Sementara itu, tahap 2 menggunakan 30 ekor ayam pedaging jantan yang dibagi dalam 6 perlakuan dengan 5 ulangan berisi 1 ekor dengan perlakuan sama dengan *in vivo* tahap 1.

Hasil penelitian menunjukkan bahwa fermentasi tongkol jagung dengan *T. virens* MLT2J2 menghasilkan total xilanase (181,22 U/g) endo-xilanase (21,02 U/g), dan  $\beta$ -xilosidase (3,52 U/g) media fermentasi. Suhu 40 °C dan pH 5,0 optimum menghasilkan aktivitas xilanase tertinggi. Aktivitas relatif xilanase stabil >50 % selama 5 jam pada suhu 40 °C. Kondisi optimum hidrolisis ampas aren yaitu 16 U xilanase pada suhu 40 °C selama 8 jam. Hidrolisat ampas aren mengandung gula reduksi (0,26%), glukosa (0,15%), xilosa (0,08%), dan XOS terutama xiloheksosa (0,39%). Hidrolisis enzimatis oleh xilanase mampu meningkatkan daya cerna pati ampas aren (22,74%). Hasil uji *in vivo* tahap 1 menunjukkan bahwa kelompok P15 menghasilkan indeks produktivitas (IP) yang sama dengan kelompok P0. Konsentrasi asam asetat dan butirir di ileum meningkat pada kelompok P15, sedangkan konsentrasi asam propionat dan butirir pada kelompok P10 dan P20 menurun ( $P < 0,05$ ). Histomorfologi menunjukkan perubahan patologi organ pada semua perlakuan terutama pada kelompok P20. Kelompok P15 memiliki populasi *Lactobacillus* sp. tertinggi dan *Salmonella* sp. terendah ( $P < 0,05$ ) di ileum. Uji *in vivo* tahap 2 diperoleh hasil bahwa kelompok P5, P10, dan P15 menghasilkan energi termetabolisme yang sama dengan kelompok P0, sedangkan pada kelompok P20 energi termetabolisme menurun ( $P < 0,05$ ). Hasil penelitian menunjukkan bahwa xilanase *T. virens* MLT2J2 dapat diaplikasikan pada proses hidrolisis ampas aren. Penambahan 15% ampas aren terhidrolisis direkomendasikan dalam formulasi pakan.

Kata kunci: ampas aren, hidrolisis enzimatis, produktivitas ayam pedaging, *Trichoderma virens*, xilanase

## ABSTRACT

Corn has become the poultry's main energy source hits 60% in feed formulation. With the competing needs of corn for poultry feed with human food, a study was needed to find another alternative such as sugar palm dregs (SPD). Regardless of the issue of crude fiber content in the waste, the objective of this study is to determine the effect of hydrolyzing the sugar palm dregs using the xylanase from *Trichoderma virens* MLT2J2 to enhance the starch digestibility and the production of xylooligosaccharides (XOS) prebiotic applied to the feed in order to increase the broiler productivity.

The study included three stages: the production of xylanase from *T. virens* MLT2J2, the optimization of sugar palm dregs hydrolysis by xylanase, and the *in vivo* assay in broilers consisting of evaluation the effect of feed contained hydrolyzed sugar palm dregs on growth performance (stage 1) and energy utilization (stage 2). In stage 1, 300 DOC strain Ross were divided into 5 treatments with 5 replications, and 12 chickens/replicate following a Complete Randomized Design. The treatment groups included: P0 (diet without hydrolyzed SPD), P5 (diet contained 5% of hydrolyzed SPD), P10 (diet contained 10% of hydrolyzed SPD), P15 (diet contained 15% of hydrolyzed SPD), and P20 (diet contained 20% of hydrolyzed SPD). Meanwhile, stage 2 used 30 male broilers Ross strain divided into 6 treatments with 5 replications consisting of 1 chicken with the treatment groups similar to the *in vivo* study in stage 1.

The results showed that corn cob fermentation with *T. virens* MLT2J2 produced total xylanase (181.22 U/g), endo-xylanase (21.02 U/g), and  $\beta$ -xylosidase (3.52 U/g) of fermentation media. The optimum temperature of 40 °C and pH 5.0 produced the highest xylanase activity. The relative activity of xylanase was stable >50% for 5 h at 40 °C. The optimum condition for SPD hydrolysis was 16 U of xylanase at 40 °C for 8 h. The SPD hydrolysate contained reducing sugar (0.26%), glucose (0.15%), xylose (0.08%), and XOS particularly xylohexaose (0.39%). Enzymatic hydrolysis by xylanase increased the starch digestibility of SPD (22.74%). The stage 1 *in vivo* assay results showed that broilers in the P15 group produced the same productivity index (IP) as P0 group. Acetic acid and butyric acid concentration in the ileal digesta were increased in P15 group, while propionic and butyric acid concentration in the P10 and P20 groups decreased ( $P < 0.05$ ). The histomorphology showed the changes in organ pathology in all treatments, especially in the P20 group. The P15 group had the highest population of *Lactobacillus* sp. and the lowest *Salmonella* sp. ( $P < 0.05$ ) in ileal digesta. In stage 2 of *in vivo* assay, the results showed that the P5, P10 and P15 groups produced the same metabolized energy as P0 group, while in the P20 group the metabolized energy was decreased ( $P < 0.05$ ). The study results revealed that xylanase from *T. virens* MLT2J2 could be applied in the enzymatic hydrolysis of sugar palm dregs. The addition of 15% hydrolyzed sugar palm dregs was recommended in feed formulation.

Keywords: sugar palm dregs, enzymatic hydrolysis, the productivity of broiler chickens, *Trichoderma virens*, xylanase