Optimasi Sakarifikasi Feses Sapi Perah Peranakan *Friesian Holstein* Pada Produksi Bioetanol

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INTISARI

Penelitian ini bertujuan untuk mengetahui sakarifikasi komponen lignoselulosa feses sapi perah Peranakan *Friesian Holstein* (PFH) oleh enzim selulolitik cairan rumen pada produksi bioetanol dengan melihat parameter produksi glukosa, aktivitas karboksi metil selulase (CMC-ase), penurunan berat sampel, bahan kering (BK) dan bahan organik (BO) serta kadar serat dalam sampel (NDF dan ADF). Feses diberi perlakuan *pretreatment* dengan perendaman dalam NH_4OH dan H_2SO_4 kemudian diinkubasi menggunakan enzim selulolitik cairan rumen. Enzim selulolitik diektraksi dengan penjenuhan cairan rumen dalam amonium sulfat 80% kejenuhan kemudian enzim ditambahkan pada feses hasil *pretreatment* dengan konsentrasi enzim 1% dan 2,5% dan diinkubasi pada temperatur 39^oC selama 12 jam dan 24 jam. Produksi glukosa tertinggi terdapat pada perlakuan B (konsentrasi enzim 2,5%; lama inkubasi 12 jam) sebesar 6,89±0,05% dengan aktivitas karboksimetil selulase 0,049±0,001 U/ml, penurunan berat sampel 10,88±0,08%, penurunan kadar BK 10,83±0,05%, penurunan kadar BO 17,25±0,16%, serta kadar NDF dan ADF masing-masing sebesar 71,16±0,01% dan 50,12±2,17%. Hasil penelitian menunjukkan keterkaitan antara konsentrasi enzim selulolitik cairan rumen dan lama inkubasi terhadap produksi glukosa ($P<0,05$). Perlakuan optimum untuk produksi glukosa terbesar terdapat pada perlakuan B (konsentrasi enzim 2,5%; lama inkubasi 12 jam).

(Kata kunci : Feses Sapi, Limbah Peternakan, Bioetanol, Sakarifikasi, Enzim Selulolitik)

Saccharification Optimization of Peranakan Friesian Holstein (PFH) Dairy Cattle Feces On Biorthanol Production

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Abstract

This study aims to determine the saccharification of the feces lignocellulosic components of Friesian Holstein crossed bred dairy cattle using ruminal cellulolytic enzymes on bioethanol production by looking at the glucose released, carboxy methyl cellulase (CMC-ase) activity, reduction of sample weight, dry matter (DM) and organic matter (OM) as well as fiber content (NDF and ADF). Pretreatment of feces was done by immersed it in NH_4OH and H_2SO_4 and then incubated using ruminal cellulolytic enzymes. Cellulolytic enzymes were extracted from rumen liquor by salting out at ammonium sulfat 80% saturation then be added to and the pretreated feses and incubated at 39^oC for incubation time of 12 and 24 hours. Enzyme were added to get the concentrations of 1% and 2,5%. Highest glucose production were showed in treatment B (enzyme concentration of 2,5%; 12 hours of incubation time) with carboxymethyl cellulose activity of 0,049±0,001 U/ml, sample weight reduction of 10,88±0,08%, DM reduction of 10,83±0,05%, OM reduction of 17,25±0,16%, NDF and ADF contents of 71,16±0,01% and 50,12±2,17%. The results showed a correlation between concentration of ruminal cellulolytic enzymes and incubation time on glucose production ($P<0,05$). The optimum treatment for the largest glucose production was found in treatment B (enzyme concentration 2.5%; incubation time 12 hours).

(Keyword: Feces, Farm Wastes, Bioethanol, Saccharification, Cellulolytic Enzyme)