

ABSTRAK

OPTIMASI PRODUKSI HIDROLISAT PROTEIN DARI LIMBAH BULU AYAM MENGGUNAKAN BAKTERI ISOLAT LOKAL B-9-6

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Peningkatan jumlah pemotongan ayam ras pedaging yang mengakibatkan jumlah limbah bulu ayam dan berpotensi mengakibatkan pencemaran lingkungan. Kandungan protein berupa keratin dalam bulu ayam berpotensi untuk dimanfaatkan sebagai bahan baku pakan unggas. Biodegradasi bulu ayam oleh mikroba dipilih karena lebih ramah lingkungan dibandingkan proses degradasi secara kimia lainnya. Isolat B-9-6 dilaporkan sebelumnya memiliki kemampuan untuk mendegradasi limbah bulu ayam sebesar 62,52% pada medium uji FML dengan volume inokulum 5 mL, menggunakan sumber nitrogen pepton dan *yeast extract*, dan menghasilkan kadar hidrolisat protein sebesar 748 ppm. Penelitian ini bertujuan untuk mengoptimasi kondisi kultur dalam mendegradasi limbah bulu ayam menggunakan tiga sumber karbon dan tiga sumber nitrogen, mengetahui kadar asam amino yang dibebaskan, dan mengukur kadar hidrolisat protein selama proses biodegradasi oleh isolat tersebut. Uji biodegradasi dilakukan menggunakan medium FML dengan tiga variasi inokulum dan penambahan 1% sumber karbon dan nitrogen dengan waktu inkubasi 12 hari. Data persen degradasi, aktivitas enzim, kandungan asam amino yang dibebaskan, dan kadar hidrolisat protein pada kultur dikumpulkan selama penelitian ini. Hasil penelitian menunjukkan proses biodegradasi menggunakan volume inokulum 10 mL selama 12 hari dengan sumber karbon sukrosa memberikan %-degradasi sebesar 68,8% dan dengan sumber nitrogen KNO_3 sebesar 53,6%. Medium FML tanpa penambahan sumber C dan sumber N, mengizinkan isolat B-9-6 mendegradasi bulu ayam sebesar 65,71%; medium ini dipilih untuk proses kultur lebih lanjut. Pada medium tersebut diperoleh aktivitas enzim terbaik pada hari ke-8 sebesar 34,19 U/mL, kadar asam amino yang dibebaskan tertinggi pada hari ke-12 sebesar 859,27 ppm, dan kadar hidrolisat protein pada hari ke-6 sebesar 689,14 ppm. Data-data yang diperoleh membuktikan bahwa kondisi biodegradasi pada penelitian ini tidak dipengaruhi oleh penambahan sumber C dan sumber N.

Kata kunci: Limbah Bulu Ayam, Biodegradasi, Keratin, Bakteri B-9-6, Hidrolisat

ABSTRACT

OPTIMIZATION OF PROTEIN HYDROLYSATE PRODUCTION FROM CHICKEN FEATHER WASTE USING B-9-6 LOCAL BACTERIA ISOLATE

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The increase in broiler slaughterings has resulted in feather waste and can potentially cause environmental pollution. The protein content in the form of keratin in chicken feathers has the potential to be utilized as a raw material for poultry feed. Biodegradation of chicken feathers by microbes was chosen because it is more environmentally friendly than other chemical degradation processes. Isolate B-9-6 was previously reported to have the ability to degrade chicken feather waste by 62.52% on FML test medium with an inoculum volume of 5 mL, using peptone and yeast extract nitrogen sources and producing protein hydrolysate levels of 748 ppm. This study aimed to optimize culture conditions in degrading chicken feather waste using three carbon sources and three nitrogen sources, determine the levels of amino acids liberated, and measure the levels of protein hydrolysates during the biodegradation process by these isolates. Biodegradation tests were carried out using FML medium with three variations of inoculum and the addition of 1% carbon and nitrogen sources with an incubation time of 12 days. Data on percent degradation, enzyme activity, liberated amino acid content, and protein hydrolysate content of the culture were collected during this study. The results showed that the biodegradation process using an inoculum volume of 10 mL for 12 days with sucrose as carbon source gave a %-degradation of 68.8% and with a KNO₃ nitrogen source of 53.6%. FML medium without the addition of C and N sources, allowed isolate B-9-6 to degrade chicken feathers by 65.71%; this medium was chosen for further culture process. The best enzyme activity was obtained on day 8 at 34.19 U/mL, the highest liberated amino acid content on day 12 at 859.27 ppm, and protein hydrolysate content on day 6 at 689.14 ppm. The data obtained proved that the addition of C and N sources did not influence the biodegradation conditions in this study

Keyword: *Chicken Feather Waste, Biodegradation, Isolate B-9-6, Protein Hydrolyzate*