

## **PRODUKSI DAN APLIKASI KERATINASE ISOLAT *Bacillus cereus* TD5B TERHADAP SUBSTRAT BULU UNGGAS INDONESIA**

### **INTISARI**

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Bulu unggas merupakan salah satu limbah dari industri peternakan yang memiliki kandungan protein tinggi tetapi tingkat pencernaan rendah. Alternatif pengolahan limbah bulu sebagai pakan ternak dapat dilakukan secara biologis menggunakan enzim keratinase. *Bacillus cereus* TD5B merupakan strain bakteri yang diisolasi dari tanah peternakan di daerah Yogyakarta. Penelitian ini bertujuan untuk mengetahui kemampuan enzim keratinase dari *Bacillus cereus* TD5B terhadap tingkat degradasi, profil asam amino, dan berat molekul dari bulu ayam kampung, ayam *layer*, dan angsa. Penelitian dilakukan dalam empat tahapan utama, yaitu pembuatan substrat hidrolisat bulu unggas, pengembangbiakan kultur starter, pertumbuhan bakteri dan aktivitas keratinolitik, serta profil hidrolisat bulu unggas. Analisis dilakukan secara deskriptif. Pembuatan hidrolisat bulu unggas dilakukan menggunakan Na<sub>2</sub>S, HCl, dan NaOH, tetapi hidrolisat bulu unggas dengan NaOH dipilih karena memiliki solubilitas yang baik dan mampu mempertahankan karakter dari bulu ayam kampung, ayam *layer*, dan angsa yang digunakan. Koloni *Bacillus cereus* TD5B memiliki koloni melebar, datar, dengan warna keabuan. *Bacillus cereus* TD5B memiliki aktivitas keratinolitik sebesar 0,00031 U/ml dan kaseinolitik sebesar 0,00384 U/ml. Berdasarkan hasil uji HPLC hidrolisat bulu ayam kampung dan ayam *layer* menghasilkan 10 macam asam amino, yaitu *aspartic acid*, *glutamic acid*, *serine*, *glycine*, *alanine*, *valine*, *phenylalanine*, *ileucine*, *leucine*, dan *lysine*, sedangkan angsa yang tidak memiliki *glycine*. Hasil uji SDS-PAGE menunjukkan bahwa berat molekul enzim keratinase dari *Bacillus cereus* TD5B adalah 100 kDa dan berat hidrolisat keratin sebesar 35 hingga 75 kDa. Tingkat degradasi bulu ayam kampung, ayam *layer*, dan angsa secara berurutan adalah 6,83%, 21,25%, dan 4,3%.

Kata kunci: *Bacillus cereus* TD5B, keratinase, bulu unggas, hidrolisat

## **PRODUCTION AND APPLICATION OF KERATINASE FROM *Bacillus cereus* TD5B ON INDONESIAN POULTRY FEATHERS AS SUBSTRATE**

### **ABSTRACT**

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Poultry feathers are one of the wastes from the livestock industry with high protein content but low digestibility. Biological treatment to convert feathers to be animal feed with keratinase enzyme from bacteria such as *Bacillus cereus* TD5B can be done as an alternative. *Bacillus cereus* TD5B was a bacterial strain isolated from farm soil in Yogyakarta. This study aimed to determine the ability of keratinase enzyme from *Bacillus cereus* TD5B on the level of degradation, amino acid profile, and molecular weight of native chicken, *layer* chicken, and geese feathers. The research was conducted in four main stages, namely: the production of feather hydrolyzate substrate, culture cultivation, bacterial growth and keratinolytic activity, and hydrolyzate profile of poultry feathers at which is analyzed descriptively. Feather hydrolyzate was prepared using Na<sub>2</sub>S, HCl, and NaOH, but feather hydrolyzate with NaOH was chosen because it has good solubility and can maintain the characteristics of the native chicken feathers, *layer* chickens, and geese used. The colony of *Bacillus cereus* TD5B has a wide, flat colony with a greyish colour. The highest keratinolytic activity at *Bacillus cereus* TD5B has keratinolytic activity of 0.00031 U/ml and caseinolytic activity of 0.00384 U/ml. Based on the HPLC test results, the hydrolyzate of native chicken feathers and *layer* chickens produces 10 kinds of amino acids, namely aspartic acid, glutamic acid, serine, glycine, alanine, valine, phenylalanine, isoleucine, leucine, and lysine, while geese do not have glycine. The study shows that *Bacillus cereus* TD5B keratinase enzyme has a molecular weight of 100 kDa, whereas poultry keratin hydrolyzates range from 35 to 75 kDa. The degradation rates of native chicken, *layer* chicken, and geese feathers were 6.83%, 21.25%, and 4.3%, respectively.

Keyword: *Bacillus cereus* TD5B, keratinase, poultry feathers, hydrolyzate