

**SELEKSI, OPTIMASI DAN KARAKTERISASI BAKTERIOSIN YANG
DIPRODUKSI BAKTERI *Bacillus* DARI SALURAN
PENCERNAAN AYAM KAMPUNG
(*Gallus domesticus*)**

INTISARI

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Penelitian ini bertujuan untuk melakukan isolasi, optimasi dan karakterisasi bakteriosin yang diproduksi bakteri *Bacillus* dari saluran pencernaan ayam kampung (*Gallus domesticus*). Penelitian ini terbagi dalam tiga tahap. Tahap pertama yaitu isolasi, seleksi dan identifikasi bakteri *Bacillus*. Tahap kedua yaitu optimasi produksi biomasa sel *Bacillus* menggunakan kondisi pH medium (5; 5,5; 6; 6,5; 7; 7,5; 8; 8,5) dan suhu inkubasi berbeda (31, 33, 35, 37, 39, 41°C). Tahap ketiga yaitu karakterisasi bakteriosin. Data isolasi, seleksi, identifikasi bakteri dan berat molekul dianalisis menggunakan analisis deskriptif. Data optimasi produksi dan pengujian stabilitas bakteriosin dianalisis menggunakan *one-way analysis of variance* (ANOVA), kemudian bila terdapat perbedaan yang nyata besarnya variabel karena perlakuan, dilanjutkan dengan uji *Duncan's New Multiple Range Test* (DMRT). Seleksi isolat bakteri *Bacillus* unggul dilakukan dengan menguji daya hambat isolat terhadap patogen *Escherichia coli*. Berdasarkan hasil seleksi diperoleh tiga isolat unggul yang menghasilkan luasan zona bening paling tinggi, yaitu isolat 2, 3B dan 11A (23,7; 18,6 dan 19,9 mm). Ketiga isolat diidentifikasi secara biokimiawi dan diperoleh hasil bahwa ketiga isolat merupakan jenis bakteri *Bacillus*, Gram positif, menghasilkan spora dan katalase positif. Berdasarkan hasil optimasi produksi biomasa yang dilakukan, suhu dan pH terbaik untuk produksi biomasa sel bakteri *Bacillus* 11A adalah pada pH 6,5 dan suhu 39°C. Bakteriosin mulai diproduksi pada akhir fase log atau awal fase stasioner. Bakteriosin yang diproduksi *Bacillus subtilis* 11A memiliki spektrum luas terhadap patogen Gram positif (*Staphylococcus aureus*) dan Gram negatif (*Escherichia coli* dan *Salmonella typhimurium*). Karakteristik bakteriosin yang diproduksi *Bacillus subtilis* 11A yaitu, spektrum luas, termostabil hingga suhu 90°C, stabil pH 6 – 9, berat molekul 21,45 kDa dan mampu bertahan hingga lama penyimpanan 28 hari pada *refrigerator*. Berdasarkan hasil yang diperoleh, dapat diambil kesimpulan bahwa bakteri *Bacillus* pada saluran pencernaan ayam kampung menghasilkan bakteriosin yang memiliki aktivitas antimikrobia.

Kata kunci: *Bacillus*, Bakteriosin, Isolasi, Karakterisasi, Optimasi biomasa sel

SELECTION, OPTIMIZATION AND CHARACTERIZATION OF BACTERIOSIN PRODUCED BY *Bacillus* BACTERIA FROM DIGESTIVE INTESTINAL TRACT OF NATIVE CHICKEN (*Gallus domesticus*)

ABSTRACT

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This research aimed to isolate, to optimize and to characterize bacteriocin produced by *Bacillus* bacteria from digestive intestinal tract of native chicken (*Gallus domesticus*). This research was divided into three steps. The first step was to isolate, to select and to identify potential superior *Bacillus* bacteria. Second step was to optimize the biomass cell production of *Bacillus* bacteria using different pH medium conditions (5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5) and different incubation temperatures (31, 33, 35, 37, 39, 41°C). Third steps was to characterize the bacteriocin produced by *Bacillus* bacteria. The data of isolation, selection, identification of *Bacillus* bacteria and molecular weight of bacteriocin was analyzed descriptively. The data of biomass cell production and the stability of bacteriocin on pH, temperature and storing time were analyzed by one-way analysis of variance (ANOVA), if there was significant value, test followed by Duncan's New Multiple Range Test (DMRT). Selection of *Bacillus* bacterial isolate was carried out by inhibitory activity assay of all isolates against pathogen *Escherichia coli*. Based on the results of the selection, three isolates were obtained which produced the highest clear zone (isolate 2, 3B and 11A (23.7; 18.6 and 19.9 mm)). The three isolates were identified biochemically and the results showed that the three isolates were *Bacillus* bacteria, Gram positive, produced spores and catalase positive. Based on the results of biomass cell production optimization, best temperature and pH for the biomass cell production of *Bacillus subtilis* 11A was at pH 6.5 and temperature 39°C. Bacteriocin was produced at the end of the log phase or at the beginning of the stationary phase. Bacteriocin produced by *Bacillus subtilis* 11A had a broad spectrum against Gram positive (*Staphylococcus aureus*) and Gram negative (*Escherichia coli* and *Salmonella typhimurium*). The characteristics of bacteriocin produced by *Bacillus subtilis* 11A were broad spectrum, thermostable temperature up to 90°C, stable pH 6 – 9, molecular weight of 21.45 kDa and could last up to 28 days long storage in the refrigerator. Based on the results obtained, it could be concluded that *Bacillus* bacteria in the digestive tract of native chickens produced bacteriocin which had antimicrobial activity.

Keywords: *Bacillus*, Bacteriocin, Cell biomass optimization, Isolation, Characterization