

## ABSTRAK

Protease adalah enzim yang dapat menghidrolisis protein menjadi senyawa-senyawa yang lebih sederhana seperti peptida rantai pendek dan asam amino. Sebagian besar genus *Bacillus* merupakan produsen utama protease ekstraseluler. Ekstrak kasar enzim protease yang diisolasi dari bakteri *Bacillus subtilis* B298 dapat berperan dalam hidrolisis protein dari susu kambing Peranakan Etawa. Susu kambing Peranakan Etawa memiliki kandungan protein sangat tinggi terdiri dari kasein dan *whey*. Tujuan penelitian adalah untuk mengetahui potensi bakteri *B. subtilis* dalam menghasilkan enzim protease dan menguji aktivitas antioksidan protein hidrolisat susu kambing Peranakan Etawa hasil hidrolisis oleh protease. Tahap penelitian adalah penentuan aktivitas proteolitik *B. subtilis* B298, fase eksponensial, aktivitas protease terhadap pengaruh waktu inkubasi, kadar protein, karakterisasi suhu dan pH optimum protease dan uji aktivitas antioksidan protein hidrolisat. Hasil penelitian menunjukkan bahwa aktivitas proteolitik secara kualitatif ditandai dengan terbentuknya zona bening di sekitar koloni bakteri pada media yang mengandung susu skim dengan indeks proteolitik sebesar 1,248, fase eksponensial terjadi pada waktu inkubasi jam ke-9, aktivitas protease tertinggi terjadi pada waktu inkubasi jam ke-12 sebesar 0,841 Unit/mL, dan kadar protein sebesar 2,3644 mg/mL. Enzim menunjukkan aktivitas optimum pada suhu 45 °C dengan aktivitas sebesar 0,0715 Unit/mL pada pH 8. Nilai derajat hidrolisis tertinggi diperoleh pada inkubasi selama 60 menit dengan derajat hidrolisis kasein sebesar 57,9% dan *whey* sebesar 38,5%. Protein hidrolisat yang diinkubasi selama 10 menit memiliki persentase inhibisi tertinggi terhadap radikal DPPH. Nilai AAI protein hidrolisat dari kasein adalah 0,0182 dan *whey* 0,0161 yang menunjukkan aktivitas antioksidan lemah.

**Kata Kunci:** antioksidan, *Bacillus subtilis*, hidrolisis, protease, susu kambing

## ABSTRACT

Proteases are enzymes that can hydrolyze proteins into simpler compounds such as short chain peptides and amino acids. Most of the genus *Bacillus* are major producers of extracellular proteases. Crude extract of protease enzyme isolated from *Bacillus subtilis* B298 bacteria can play a role in protein hydrolysis from Etawa Crossbred goat milk. Etawa Crossbred goat's milk has a very high protein content consisting of casein and whey. The aims of the study were to determine the potential of *B. subtilis* bacteria in producing protease enzymes and to test the antioxidant activity of protein hydrolyzate of Etawa Crossbred goat milk hydrolyzed by proteases. The research phase was the determination of the proteolytic activity of *B. subtilis* B298, the exponential phase, the protease activity on the effect of incubation time, protein content, characterization of the optimum temperature and pH of the protease and testing the antioxidant activity of protein hydrolysates. The results showed that proteolytic activity was qualitatively characterized by the formation of a clear zone around bacterial colonies on media containing skim milk with a proteolytic index of 1.248, the exponential phase occurred to 9 hour of incubation, the highest protease activity occurred to 12 hour of incubation time with an activity of 0.841 Unit/mL, and protein content of 2.3644 mg/mL. The enzyme showed optimum activity at 45 °C with an activity of 0.0715 Unit/mL at pH 8. The highest degree of hydrolysis was obtained at 60 minutes of incubation with 57.9% of casein and 38.5% of whey. Protein hydrolyzate which was incubated for 10 minutes had the highest percentage of inhibition against DPPH radicals. The AAI value of protein hydrolyzate from casein was 0.0182 and whey 0.0161 which showed weak antioxidant activity.

**Keywords:** antioxidant, *Bacillus subtilis*, goat's milk, hydrolysis, protease