

**UJI AKTIVITAS ENZIM PROTEASE DARI
PAKAN IKAN YANG DICAMPUR PROBIOTIK *BOOSTER BIO LACTO***

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ABSTRAK

Efisiensi pakan adalah faktor kunci dalam budidaya ikan, menyumbang hingga 70% biaya produksi. Pendekatan bioteknologi melalui probiotik seperti *Booster Bio Lacto* (BBL) yang mengandung *Lactobacillus casei* dan *L. bulgaricus* dapat meningkatkan aktivitas enzim pencernaan, termasuk protease. Penelitian ini bertujuan menguji aktivitas protease dari pakan ikan yang difermentasi BBL secara in vitro, membandingkannya dengan kontrol, serta menentukan waktu fermentasi optimal (0, 6, 12, 24 jam). Metode meliputi fermentasi pakan dengan BBL (9 ml/kg), ekstraksi enzim, dan uji aktivitas protease menggunakan substrat kasein dengan spektrofotometri pada λ 280 nm. Data dianalisis menggunakan ANOVA satu arah dan uji Tukey HSD. Hasil menunjukkan bahwa fermentasi dengan BBL meningkatkan aktivitas protease secara signifikan ($p < 0,05$) dibandingkan kontrol. Aktivitas tertinggi dicapai pada fermentasi 6 jam ($0,8171 \pm 0,0472$ U/mg protein). Perpanjangan fermentasi hingga 24 jam justru menurunkan aktivitas enzim dan meningkatkan variabilitas data. Simpulannya, probiotik BBL efektif meningkatkan aktivitas protease pakan ikan, dengan waktu fermentasi optimal 6 jam. Temuan ini mendukung pengembangan pakan pra-digesti yang dapat meningkatkan efisiensi pakan dan keberlanjutan akuakultur. Disarankan penelitian lanjut menguji pakan fermentasi 6 jam terhadap pertumbuhan ikan secara in vivo serta mengevaluasi aktivitas enzim pencernaan lainnya.

Kata kunci: protease, probiotik, *Booster Bio Lacto*, fermentasi pakan, efisiensi pakan ikan

EVALUATION OF PROTEASE ENZYME ACTIVITY IN FISH FEED FERMENTED WITH BOOSTER BIO LACTO (BBL) PROBIOTIC

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ABSTRACT

Feed efficiency is a key factor in aquaculture, accounting for up to 70% of production costs. A biotechnology-based approach using probiotics such as Booster Bio Lacto (BBL), which contains *Lactobacillus casei* and *Lactobacillus bulgaricus*, has the potential to enhance the activity of digestive enzymes, including protease. This study aimed to evaluate the protease activity of fish feed fermented with BBL *in vitro*, compare it with a control treatment, and determine the optimal fermentation time (0, 6, 12, and 24 hours). The methodology included feed fermentation with BBL (9 mL/kg), enzyme extraction, and protease activity assay using casein as the substrate, followed by spectrophotometric measurement at a wavelength of 280 nm. The data were analyzed using one-way analysis of variance (ANOVA) followed by Tukey's Honestly Significant Difference (HSD) test. The results showed that fermentation with BBL significantly increased protease activity ($p < 0.05$) compared to the control. The highest protease activity was obtained after 6 hours of fermentation (0.8171 ± 0.0472 U/mg protein). Extending the fermentation period to 24 hours resulted in decreased enzyme activity and greater data variability. In conclusion, the BBL probiotic effectively enhanced the protease activity of fish feed, with an optimal fermentation time of 6 hours. These findings support the development of predigested fish feed to improve feed efficiency and promote sustainable aquaculture. Further studies are recommended to evaluate the effects of 6-hour fermented feed on fish growth *in vivo* and to investigate the activity of other digestive enzymes.

Keywords: protease, probiotic, *Booster Bio Lacto*, feed fermentation, fish feed efficiency