UNIVERSITAS
GADJAH MADA
**Fermentasi Kulit Kacang Tanah (Arachis hypogaea L.) Menggunakan Kapang Mucor irregularis JR 1.1
Sebagai Pakan Ayam Alternatif**
Afrina Syah Putri, Dr. Miftahul Ilmi, S.Si., M.Si
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

FERMENTASI KULIT KACANG TANAH (*Arachis hypogaea* L.) MENGGUNAKAN KAPANG *Mucor irregularis* JR 1.1 SEBAGAI PAKAN AYAM ALTERNATIF

Afrina Syah Putri
22/503860/BI/11109

Dosen Pembimbing: Dr. Miftahul Ilmi, S.Si., M.Si

INTISARI

Tingginya biaya produksi pakan ternak, yang mencapai 60-70% dari total biaya produksi, mendorong perlunya pengembangan bahan pakan alternatif berbasis limbah agroindustri. Kulit kacang tanah (*Arachis hypogaea* L.) merupakan limbah yang tersedia melimpah namun memiliki kandungan serat kasar tinggi (65,7-79,23%) dan protein kasar rendah (4-7%), sehingga kulit kacang tanah dalam pemanfaatannya sebagai pakan ayam alternatif masih memerlukan pengolahan melalui fermentasi dan optimasi kadar protein kasar yang dihasilkan. Penelitian ini bertujuan untuk memperoleh konsentrasi optimal komponen medium fermentasi (kadar air, glukosa, dan *yeast extract*) serta menganalisis pengaruhnya terhadap kadar protein kasar dan lemak kasar produk fermentasi kulit kacang tanah menggunakan kapang *Mucor irregularis* JR 1.1 melalui metode *Solid State Fermentation* (SSF). Optimasi dilakukan menggunakan *Response Surface Methodology* (RSM) dengan rancangan *Box-Behnken Design* (BBD) yang melibatkan tiga variabel bebas, yaitu kadar air (70-100%), konsentrasi glukosa (0-2 g/L), dan konsentrasi *yeast extract* (0-10 g/L), dengan 15 kombinasi perlakuan. Kadar protein kasar diukur menggunakan metode *Kjeldahl* dan kadar lemak kasar menggunakan metode ekstraksi *Soxhlet*. Hasil analisis ANOVA menunjukkan bahwa model RSM yang terbentuk tidak signifikan ($p = 0,317$) dengan nilai R^2 sebesar 74,11% dan *lack of fit* yang signifikan ($p = 0,048$), yang mengindikasikan bahwa rentang variabel yang ditetapkan belum sepenuhnya mencakup zona optimum sistem fermentasi. Prediksi RSM menunjukkan kondisi optimum pada kadar air 100%, glukosa 0 g/L, dan *yeast extract* 0 g/L dengan prediksi kadar protein kasar 9,502%. Hasil validasi eksperimen yang dilakukan di dua laboratorium menunjukkan kadar protein kasar rata-rata sebesar 6,088 ± 0,320% dan kadar lemak kasar rata-rata sebesar 0,604 ± 0,026%, yang keduanya berbeda signifikan dari nilai prediksi ($p < 0,05$). *Mucor irregularis* JR 1.1 tetap berpotensi meningkatkan protein kulit kacang tanah meski belum tervalidasi. Penelitian lanjutan disarankan memakai pendekatan *one factor at a time* menetapkan rentang variabel representatif sebelum penerapan RSM.

Kata Kunci: Kulit Kacang Tanah, *Mucor irregularis*, Fermentasi Substrat Padat, *Response Surface Methodology*, Pakan Ayam Alternatif, Protein Kasar

UNIVERSITAS
GADJAH MADA
**Fermentasi Kulit Kacang Tanah (Arachis hypogaea L.) Menggunakan Kapang Mucor irregularis JR 1.1
Sebagai Pakan Ayam Alternatif**
Afrina Syah Putri, Dr. Miftahul Ilmi, S.Si., M.Si
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

FERMENTATION OF PEANUT SKINS (*Arachis hypogaea* L.) USING THE MOLD *Mucor irregularis* JR 1.1 AS AN ALTERNATIVE CHICKEN FEED

By

Afrina Syah Putri
22/503860/BI/11109

Supervisor: Dr. Miftahul Ilmi, S.Si., M.Si

ABSTRACT

The high cost of livestock feed production, which accounts for 60-70% of total production costs, underscores the need to develop alternative feed ingredients based on agroindustrial waste. Peanut hulls (*Arachis hypogaea* L.) are a readily available waste product but have a high crude fiber content (65.7-79.23%) and low crude protein content (4-7%); therefore, their use as an alternative chicken feed still requires processing through fermentation and optimization of the resulting crude protein content. This study aimed to determine the optimal concentrations of fermentation medium components (moisture content, glucose, and yeast extract) and to analyze their effects on the crude protein and crude fat contents of the fermented peanut hull product using the fungus *Mucor irregularis* JR 1.1 via the Solid-State Fermentation (SSF) method. Optimization was performed using Response Surface Methodology (RSM) with a Box-Behnken Design (BBD) involving three independent variables: moisture content (70-100%), glucose concentration (0-2 g/L), and yeast extract concentration (0-10 g/L), with 15 treatment combinations. Crude protein content was measured using the Kjeldahl method, and crude fat content was measured using the Soxhlet extraction method. The results of the ANOVA analysis showed that the RSM model was not significant ($p = 0.317$), with an R^2 value of 74.11% and a significant lack of fit ($p = 0.048$), indicating that the range of variables defined did not fully cover the optimum zone of the fermentation system. The RSM predictions indicated optimal conditions at 100% moisture content, 0 g/L glucose, and 0 g/L yeast extract, with a predicted crude protein content of 9.502%. Experimental validation results conducted in two laboratories showed an average crude protein content of 6.088 ± 0.320% and an average crude fat content of 0.604 ± 0.026%, both of which differed significantly from the predicted values ($p < 0.05$). *Mucor irregularis* JR 1.1 still has the potential to increase peanut hull protein content, although this has not yet been validated. Further research is recommended using a “one factor at a time” approach to establish representative variable ranges before applying RSM.

Key Words: Peanut Phells, *Mucor irregularis*, Solid State Fermentation, Response Surface Methodology, Alternative Chicken feed, Crude Protein