

## **PERUBAHAN KADAR PROTEIN SELAMA PROSES PENGOLAHAN TEMPE HEMAT AIR DENGAN FERMENTASI ASAM TANPA PERENDAMAN**

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### **INTISARI**

Industri tempe di Indonesia berjumlah sekitar 81 ribu dengan jumlah konsumsi tempe di Indonesia sebanyak 0,14 kg per kapita dalam seminggu. Tempe merupakan makanan tradisional khas Indonesia yang banyak digemari dan memiliki kadar protein yang cukup tinggi (20,8 gr/100 gr berat kering). Pada industri tempe konvensional, air yang digunakan sebanyak 13.096,9 L/ton produk, sedangkan limbah cair yang dihasilkan sebanyak 10.217,51 L/ton produk. Pengolahan tempe dengan melibatkan air dapat menyebabkan protein larut. Oleh sebab itu, dilakukan modifikasi pada proses pembuatan tempe konvensional menjadi hemat air. Penelitian ini bertujuan untuk mengetahui efektivitas modifikasi proses pengolahan tempe hemat air menggunakan fermentasi asam tanpa perendaman dalam kondisi vakum dan atmosfer terkendali terhadap kadar protein pada proses pembuatan tempe. Pada penelitian ini dilakukan proses pengolahan tempe konvensional dan hemat air dengan metode vakum (non vakum; vakum bertekanan -12 InHg dan -24 InHg) dan atmosfer terkendali (komposisi gas 5% CO<sub>2</sub> & 95% N<sub>2</sub>, 10% CO<sub>2</sub> & 90% N<sub>2</sub>, dan 15% CO<sub>2</sub> & 85% N<sub>2</sub>). Metode analisis yang digunakan dalam penelitian ini adalah uji protein pada sampel kedelai, tempe, dan air limbah. Hasil penelitian menunjukkan bahwa proses perlakuan sampel dapat memberikan penurunan maupun peningkatan terhadap kadar protein kedelai pada berbagai metode. Sedangkan kehilangan protein paling banyak terdapat pada limbah perendaman 2 pada metode konvensional serta limbah pencucian pada metode hemat air. Tempe dengan kadar protein tertinggi terdapat pada proses hemat air dengan metode atmosfer terkendali dengan komposisi gas 10% CO<sub>2</sub> & 90% N<sub>2</sub>.

**Kata kunci:** protein, kedelai, tempe, hemat air, fermentasi asam, vakum, atmosfer terkendali

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## **CHANGES IN PROTEIN CONTENT DURING PROCESSING OF WATER-SAVING TEMPEH WITH ACID FERMENTATION WITHOUT SOAKING**

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### **ABSTRACT**

The tempeh industry in Indonesia amounts to around 81 thousand with a total consumption of tempeh in Indonesia of 0.14 kg per capita in a week. Tempeh is a traditional Indonesian food that is much loved and has a fairly high protein content (20.8 g/100 g dry weight). In the conventional tempeh industry, the water used is 13,096.9 L/ton of product, while the liquid waste generated is 10,217.51 L/ton of product. Processing tempeh by involving water can cause protein to dissolve. Therefore, modifications were made to the conventional tempeh making process to save water. This study aims to determine the effectiveness of water-saving tempeh processing modifications using acid fermentation without soaking under vacuum and controlled atmosphere conditions on protein levels in the tempeh making process. In this study, conventional and water-saving tempeh processing was carried out using vacuum (non-vacuum; vacuum pressurized -12 InHg and -24 InHg) and controlled atmosphere (gas 5% CO<sub>2</sub> & 95% N<sub>2</sub>, 10% CO<sub>2</sub> & 90% N<sub>2</sub>, dan 15% CO<sub>2</sub> & 85% N<sub>2</sub>). The analytical method used in this study was protein test on soybean, tempeh, and wastewater samples. The results showed that the sample treatment process could decrease or increase the protein content of soybeans in various methods. While the most protein loss was found in soaking waste 2 in the conventional method and washing waste in the water-saving method. Tempeh with the highest protein content is found in the water-saving process with a controlled atmosphere method with a gas composition of 10% CO<sub>2</sub> & 90% N<sub>2</sub>.

**Keywords:** protein, soybean, tempeh, water saving, acid fermentation, vacuum, controlled atmosphere

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