

OPTIMASI PROSES *CRYOGENIC FREEZING* DAN *THAWING*

PADA DAGING “AYAM KALASAN” UNGKEP BEKU

INTISARI

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Daging ayam petelur afkir memiliki tekstur yang alot dan kurang diminati oleh konsumen, sehingga UMKM Ayam Goreng Kalasan Mbak Ita mengolahnya menjadi ayam ungkep. Akan tetapi, produk tersebut memiliki umur simpan yang singkat sehingga diperlukan proses pembekuan. Proses pembekuan produk menggunakan metode *cryogenic immersion freezing* dengan nitrogen cair diduga mampu mempertahankan kualitas produk. Namun, salah satu parameter kritis pada metode tersebut adalah durasi pencelupan produk. Di sisi lain, produk yang sudah melalui tahap pembekuan harus melalui proses *thawing*. Akan tetapi, suhu dan durasi *thawing* yang beragam mempengaruhi karakteristik produk. Penelitian ini bertujuan untuk menganalisis pengaruh durasi pencelupan produk ke dalam nitrogen cair, suhu *thawing*, dan durasi *thawing* serta menentukan kombinasi terbaik dari faktor durasi pencelupan produk ke dalam nitrogen cair, suhu *thawing*, dan durasi *thawing* pada produk Ayam Kalasan ungkep beku menggunakan *Response Surface Methodology* (RSM) model *Box Behnken Design* (BBD). Pada penelitian ini, durasi pencelupan produk ke dalam nitrogen cair yang digunakan yaitu 0, 20, dan 40 detik, suhu *thawing* yang digunakan yaitu 20°C, 30°C, dan 40°C, dan durasi *thawing* yang digunakan yaitu 20, 40, dan 60 menit. Hasil respons nilai pH, *water-holding capacity* (WHC), kadar protein, dan kadar lemak dianalisis menggunakan perangkat lunak *Design Expert 13*. Berdasarkan hasil penelitian ini, durasi pencelupan produk ke dalam nitrogen cair dan suhu *thawing* berpengaruh nyata terhadap nilai pH, WHC, kadar protein, dan kadar lemak. Sementara itu, durasi *thawing* tidak berpengaruh nyata terhadap nilai pH, WHC, kadar protein, dan kadar lemak. Hasil kombinasi terbaik pada penelitian ini adalah perlakuan dengan durasi pencelupan produk ke dalam nitrogen cair selama 22 detik, suhu *thawing* 23°C, dan durasi *thawing* selama 39 menit.

Kata Kunci: Ayam Kalasan, Nitrogen Cair, Pembekuan, *Response Surface Methodology*, *Thawing*

OPTIMIZATION OF THE CRYOGENIC FREEZING AND THAWING PROCESS FOR FROZEN “AYAM KALASAN” *UNGKEP* MEAT

ABSTRACT

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The meat from spent laying hens has a tough texture and is less popular with consumers, so the MSME Ayam Goreng Kalasan Mbak Ita processes it into braised (*ungkep*) chicken. However, this product has a short shelf life, thus requiring a freezing process. Freezing the product using the cryogenic immersion freezing method with liquid nitrogen is able to maintain product quality. However, one of the critical parameters of this method is the immersion duration of the product. On the other hand, frozen products must go through a thawing process. However, various thawing temperatures and durations affect the product's characteristics. This study aims to analyze the effect of immersion duration in liquid nitrogen, thawing temperature, and thawing duration, as well as to determine the best combination of these factors on frozen Ayam Kalasan *ungkep* using Response Surface Methodology (RSM) with a Box-Behnken Design (BBD). In this study, the immersion durations in liquid nitrogen used were 0, 20, and 40 seconds; the thawing temperatures used were 20°C, 30°C, and 40°C; and the thawing durations used were 20, 40, and 60 minutes. The response results for pH value, water-holding capacity (WHC), protein content, and fat content were analyzed using Design Expert 13 software. Based on the results of this study, the immersion duration in liquid nitrogen and thawing temperature significantly affected pH value, WHC, protein content, and fat content. Meanwhile, thawing duration did not significantly affect pH value, WHC, protein content, and fat content. The best combination result in this study was the treatment with an immersion duration in liquid nitrogen of 22 seconds, a thawing temperature of 23°C, and a thawing duration of 39 minutes.

Keywords: Ayam Kalasan, Liquid Nitrogen, Freezing, Response Surface Methodology, Thawing