

INTISARI

OPTIMASI SISTEM PENGEMASAN SUSU KUDA SUMBAWA BERPROTEIN TINGGI DENGAN PENDEKATAN *ROBUST DESIGN* METODE TAGUCHI

Susu kuda Sumbawa merupakan produk pangan yang memiliki kandungan protein tinggi, biasanya dijual dalam kondisi segar tanpa perlakuan tambahan. Namun kualitasnya dapat mengalami perubahan selama distribusi akibat pengaruh jenis kemasan primer yang kurang baik dan kondisi lingkungan. Dalam industri pangan, kemasan yang efektif sangat penting untuk menjaga kualitas produk dan meningkatkan daya saing di pasar. Penelitian ini bertujuan untuk mengetahui pengaruh berbagai jenis kemasan primer terhadap mutu susu kuda sumbawa sebagai upaya optimalisasi jenis kemasan yang tepat, untuk mengetahui perubahan mutu produk agar memenuhi standar mutu SNI 01-6054-1999. Metodologi yang diterapkan melibatkan pendekatan eksperimental dengan Metode Taguchi. Faktor yang diteliti meliputi jenis kemasan primer (kaca, PET, dan HDPE), suhu penyimpanan (25°C, 35°C, dan 45°C), serta jumlah lapisan *wrap* (1, 3, dan 5 lapis). Parameter yang diamati menghasilkan nilai yang beragam, pada uji organoleptik memiliki bau asam menyengat, rasa asam, warna putih, kenampakan cair, memiliki kadar lemak 0,62%, cemaran *Coliform* 29,0 namun tidak memenuhi standar SNI. Untuk bobot jenis 27,5°C 1,041, kadar protein 3,55%, dan pH 5,35 diatas standar SNI (tergolong asam ringan), serta cemaran *Escherichia coli* sesuai SNI Negative atau tidak ditemukan adanya cemaran. Optimasi multirespon dilakukan menggunakan *Grey Relational Analysis* (GRA), kombinasi perlakuan optimum diperoleh pada kemasan botol kaca, suhu penyimpanan 25°C, dan *wrap* 1 lapis (A1B1C1). Kombinasi tersebut menghasilkan nilai GRG yang tinggi sekaligus memberikan kestabilan respon yang lebih baik dibandingkan kombinasi perlakuan lainnya. Namun untuk rekomendasi UMKM yang memiliki keterbatasan modal, kemasan HDPE dengan suhu penyimpanan 25°C dan *wrap* 1 lapis (A2B1C1) merupakan alternatif yang lebih layak secara ekonomi.

Kata kunci : jenis kemasan, mutu, proses distribusi, susu kuda sumbawa, taguchi

ABSTRACT

OPTIMIZATION OF A PACKAGING SYSTEM FOR HIGH-PROTEIN SUMBAWA MARE'S MILK THROUGH THE TAGUCHI ROBUST DESIGN METHOD

Sumbawa horse milk is a food product with a high protein content that is commonly marketed in fresh form without additional treatment. However, its quality may change during distribution due to the type of primary packaging used and exposure to environmental conditions. In the food industry, appropriate packaging is essential for maintaining product quality and improving product competitiveness. This study aimed to evaluate the effect of different types of primary packaging on the quality of Sumbawa horse milk and to optimize the selection of primary packaging to maintain product quality in accordance with the Indonesian National Standard (SNI 01-6054-1999). An experimental approach using the Taguchi method was employed. The experimental factors consisted of primary packaging type, storage temperature, and the number of bubble wrap layers. The primary packaging types were glass, polyethylene terephthalate (PET), and high-density polyethylene (HDPE); the storage temperatures were 25°C, 35°C, and 45°C; and the numbers of bubble wrap layers were 1, 3, and 5 layers. The observed quality parameters showed varying results. Organoleptic evaluation indicated a characteristic sour odor and sour taste, with a white color and liquid appearance. The fat content was 0.62%, while the Coliform count was 29.0, which did not meet the SNI requirement. The specific gravity at 27.5°C was 1.041, the protein content was 3.55%, and the pH was 5.35. These parameters met the corresponding SNI requirements, with the pH indicating a mildly acidic characteristic. *Escherichia coli* contamination was negative, indicating that no detectable *E. coli* contamination was present and that the result complied with the SNI requirement. Multi-response optimization was performed using Grey Relational Analysis (GRA). The optimum treatment combination was obtained with glass bottle packaging, a storage temperature of 25°C, and one layer of bubble wrap (A1B1C1). This combination resulted in a high Grey Relational Grade (GRG) and provided better overall response stability than the other treatment combinations. The results indicate that the combination of glass bottle packaging, 25°C storage, and one layer of bubble wrap was the optimal treatment for maintaining the quality characteristics of Sumbawa horse milk under the experimental conditions. However, for MSMEs with capital constraints, HDPE packaging combined with a storage temperature of 25°C and a single wrapping layer (A2B1C1) may serve as a more cost-effective and economically viable alternative.

Keywords: distribution process, packaging type, quality, sumbawa horse milk, taguchi