**Kandungan Energi, Zat Gizi Makro, dan Karakteristik Sensori Biskuit Tepung Mocaf dengan Substitusi Tepung Kacang Merah (*Phaseolus vulgaris L.*) dan Tepung Biji Kluwih (*Artocarpus camansi*)**

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**ABSTRAK**

**Latar Belakang :** Autisme cenderung mengalami defisiensi makronutrien karena memiliki preferensi terhadap karakteristik sensori makanan. Autisme umumnya alergi terhadap gluten dan kasein sehingga perlu pengembangan produk bebas gluten dan kasein (GFCF).

**Tujuan :** Penelitian ini bertujuan untuk mengetahui pengaruh substitusi tepung kacang merah dan tepung biji kluwih terhadap kandungan energi, zat gizi makro, dan karakteristik sensori serta mengetahui formula terbaik biskuit GFCF.

**Metode :** Penelitian eksperimental dengan empat perlakuan substitusi tepung kacang merah dan tepung biji kluwih, dengan perbandingan F0=100:0:0, F1=30:52,5:17,5, F2=30:35:35, dan F3=30:17,5:52,5. Protein diuji dengan *Kjeldahl*, lemak dengan *Soxhlet*, karbohidrat dengan *by difference*, dan energi dengan konversi makronutrien. Karakteristik sensori diuji dengan hedonik pada 50 panelis tidak terlatih. Analisis statistik menggunakan *One Way* ANOVA dan *Kruskal-Wallis*. Formulasi terbaik menggunakan *multiattribute decision compensatory model (additive weighting technique)*

**Hasil :** Biskuit yang dihasilkan mengandung energi 432-455 kkal, protein 3-8%, lemak 30-32%, dan karbohidrat 32-40%. Terdapat perbedaan signifikan pada kandungan energi (p=0,028), protein (p<0,001), lemak (p=0,005), dan karbohidrat (p<0,001) serta kesukaan pada rasa (p<0,001), aroma (p=0,002), dan keseluruhan (p=0,017). Formulasi biskuit terbaik adalah F1.

**Kesimpulan :** Semakin banyak substitusi tepung kacang merah meningkatkan kandungan protein serta kesukaan pada rasa, aroma, dan keseluruhan. Semakin banyak substitusi tepung biji kluwih meningkatkan kandungan energi dan lemak, namun menurunkan kesukaan pada rasa, aroma, dan keseluruhan. Semakin banyak substitusi tepung kacang merah dan tepung biji kluwih tidak meningkatkan kandungan karbohidrat.

**Kata Kunci :** autisme, biskuit, kacang merah, biji kluwih, karakteristik sensori

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**Energy Content, Macronutrients Composition, and Sensory Characteristics of Mocaf Flour Biscuits with Substitutions of Red Bean Flour (*Phaseolus vulgaris L.*) and Kluwih Seed Flour (*Artocarpus camansi*)**

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**ABSTRACT**

**Background :** Autism tends to experience macronutrient deficiencies due to sensory food preferences. Autism is commonly associated with allergies to gluten and casein, so it is important to development of gluten free and casein free products (GFCF).

**Objective :** The aim of this research is to determine the effect of substituting red bean flour and kluwih seed flour on energy content, macronutrients composition, and sensory characteristics, as well as to identify the best GFCF biscuit formula.

**Method :** An experimental study with four substitution treatments of red bean flour and kluwih seed flour, with ratios denoted as follows F0=100:0:0, F1=30:52.5:17.5, F2=30:35:35, and F3=30:17.5:52.5. Protein was tested using Kjeldahl, fat by Soxhlet, carbohydrates by difference, and energy by macronutrient conversion. Sensory characteristics were analyzed using hedonic involving 50 untrained panelists. Statistical analysis used One-Way ANOVA and Kruskal-Wallis. The best formulation was determined using the multiattribute decision compensatory model (additive weighting technique).

**Results :** The biscuits produced contain 432-455 kcal of energy, 3-8% protein, 30-32% fat, and 32-40% carbohydrates. There is a significant difference in energy content ($p=0.028$), protein ($p<0.001$), fat ($p=0.005$), and carbohydrate ($p<0.001$) content, as well as taste ($p<0.001$), aroma ($p=0.002$), and overall ($p=0.017$). The best formulation was determined to be F1.

**Conclusion :** Increasing the substitution of red bean flour increases protein content and taste, aroma, and overall preference. Increasing the substitution of kluwih seed flour increases energy and fat content, but decreases taste, aroma, and overall preference. Increasing the substitution of red bean flour and kluwih seed flour does not increase carbohydrate content.

**Keywords** : autism, biscuit, red bean, kluwih seed, sensory characteristics

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