PALM-BASED MOZZARELLA CHEESE ANALOGUE

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Cheese analogue, commonly known as substitute cheese, is a cheese made with dairy, partial dairy or non-dairy ingredients. In cheese analogues, milk fats or milk proteins are partially or completely substituted with vegetable fats and oils. Milk fat substitution with vegetable oils is a growing trend in producing cheese-like products (Villamil *et al*., 2021). In recent years, the increase in demand for cheese as a food ingredient has been reflected in the growth of the ready-to-eat meals industry. Shredded, diced, sliced and even liquid cheese have been created to fulfil the needs of the modern food industry as the popularity of convenience foods continues to rise (Kamath *et al*., 2022). According to Future Market Insights (2022), the global cheese analogue market was anticipated to be worth USD2.1 billion in 2022. Between 2022 and 2032, the market for cheese substitutes is predicted to increase at a CAGR of 6.3%, reaching around USD3.9 billion.

Palm oil and its fraction are excellent substitutes for milk fat in the production of cheese analogues, as they are *trans*-free and cholesterol-free. In addition, palm oil is abundant with natural vitamin E, which acts as an antioxidant that is beneficial to our health. Furthermore, the substitution of milk fat with palm oil and its fractions are advantageous due to their sustainability and cost-effectiveness.

THE TECHNOLOGY

The technology offered is the formulation and processing method for palm-based Mozzarella cheese analogue. The processing method for palm-based Mozzarella cheese analogue requires simple procedures. Palm-based mozzarella cheese analogue offers a healthier choice of cheese as it does not contain cholesterol compared to Mozzarella cheese. *Table 1* shows the composition of palm-based Mozzarella cheese analogue against commercial pizza cheese topping.

The functionality attributes of cheese are stretchability, meltability and free oil are shown in *Table 2*. The stretchability and meltability are the desired qualities of Mozzarella cheese. Palm-based Mozzarella cheese analogue showed superior qualities with higher stretchability and meltability compared to the commercial pizza cheese topping.

The sensory properties of palm-based Mozzarella cheese analogue against commercial pizza cheese topping are shown in *Figure 1*. The attributes evaluated were appearance, colour, aroma, taste, saltiness, texture and overall acceptability and were evaluated by 60 panellists. Palm-based Mozzarella cheese analogue showed superior attributes compared to the commercial pizza cheese topping. This shows that the palm-based Mozzarella analogue is well-accepted among the panellists.

NOVELTY

Palm-based Mozzarella cheese analogue with the incorporation of 100% palm oil blends, provides comparable qualities and functions as commercial pizza cheese topping giving a cost-saving and reliable supply of raw materials and reduction in processing time.

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TABLE 1. COMPOSITION OF CHEESE

Samples	Protein (%)	Fat (%)	Moisture (%)	Carbohydrate (%)	Ash (%)
Palm-based Mozzarella cheese analogue	18.0	21.0	43.5	11.3	6.0
Commercial pizza cheese topping	5.8	23.6	46.2	20.9	3.5

TABLE 2. FUNCTIONALITY OF CHEESE

Samples	Stretchability (cm)	Meltability (%)	Free oil (%)
Palm-based Mozzarella analogue	30	150.81	2.10
Commercial pizza cheese topping	5	55.84	2.34

TABLE 3. ECONOMIC ANALYSIS OF PALM-BASED MOZZARELLA ANALOGUE

Economic analysis	Value
Net Present Value (NPV)	RM7205,644
Internal Rate of Return (IRR)	44.10%
Discounted Payback Period	3.2 years
Discounted benefit: Cost ratio	1.63: 1

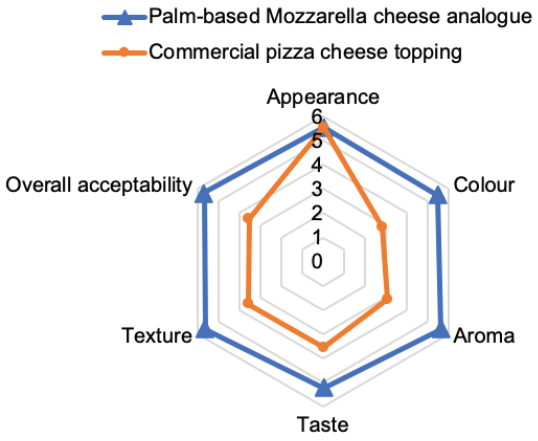

Figure 1. Sensory scores of cheese.

BENEFITS & ADVANTAGES

- Cost-effective formulation and processing
- Simple processing method with reduced time
- Excellent taste and texture
- Contains no cholesterol
- Flavour can be tailor-made according to preferences

ECONOMIC ANALYSIS AND COMMERCIAL BENEFITS

The estimated expenditure and other economic evaluations are shown in *Table 3*. This economic evaluation is based on the assumption that the palm-based Mozzarella analogue is sold at RM11.00 per pack of 250 g and consistent production capacity of 576, 000 packs/per year.

CONCLUSION

Palm-based Mozzarella analogue is cost-effective with a simple processing method and shorter time. The quality and functionality of palm-based Mozzarella analogue are superior and preferred by the sensory panellist.

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