

Research Article

Formulation and Sensory Evaluation of Meat-Analog Nugget (U-GGET)

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Abstract: U-GGET is an innovation of meat-analog nugget made using ulunthu beans which is of a healthier choice to meet growing consumer demand for reduced fat foods. The objective of this study was to formulate three different variations of U-GGET which were made using: (i) ulunthu beans (control), (ii) ulunthu beans and shiitake mushroom powder, and (iii) ulunthu beans and salted egg powder. The main ingredients used for all three variations were ulunthu beans, Holland onion, eggs, wheat flour, cornflour, breadcrumbs, black pepper, salt and sugar. The ingredients were homogenised, compressed, steamed, shaped, breaded and par-fried and stored frozen prior to analysis. Sensory evaluation of fried U-GGET was performed using the 9-point Hedonic scale to evaluate the sensory attributes such as aroma, colour, tenderness, flavour and overall acceptability using thirty untrained panellists. Results showed that U-GGET formulated using ulunthu beans and salted egg powder was the most preferred by the panellists with the highest mean score obtained for all the sensory attributes tested in comparison to the other two variations. U-GGET incorporated with salted egg powder possessed unique buttery and savoury flavours, crispy texture and more appealing bright orange-red colour. U-GGET variations developed offer different flavours of meat-analog nuggets which have potential commercialisation and marketability value as the formulations are low in fat, convenient, unique and suitable for all age groups.

Keywords: Meat-analog, nugget, ulunthu beans, salted egg powder, shiitake mushroom, sensory



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1. INTRODUCTION

Recently, the demand for meat-analog products has grown and is expected to rise gradually. According to Wild (2016), consumers nowadays are interested in meat-analog products as they are healthier, environment friendly, ethical and cost-effective. However, Panoff (2019) states that vegetarian food products available in the market are heavily processed with high sodium, sugar, saturated fat and trans-fat contents. Therefore, this study aimed to formulate different variations of meat-analog nuggets using nutritious ulunthu beans (U-GGET). Ulunthu bean (*Vigna mungo*) that is also known as urdbean or blackgram is a nutritious legume that contains good proportions of carbohydrate, protein, dietary fibre, vitamins and minerals with various health benefits (Gupta et al., 2021; Singh & Pratap, 2016). The new formulation proposed in this study is expected to add variety to existing meat-analog nuggets and meet consumer demand for more healthier, flavourful and tastier vegetarian products.

2. METHOD & MATERIAL

2.1 Materials

All the materials used in this study were purchased from a local grocery shop in Dungun, Terengganu and online shopping platform (Shopee). Table 1 shows the percentage of the ingredients that were used to formulate U-GGET.

Table 1. Percentage of ingredients for the formulation of different variations of U-GGET.

Ingredients	U-GGET (Control)	U-GGET (Shiitake mushroom)	U-GGET (Salted egg)
Ulunthu beans	24.84	23.35	24.12
Holland onion	9.94	9.34	9.65
Egg	9.94	9.34	9.65
Wheat flour	1.59	1.49	1.54
Cornflour	1.59	1.49	1.54
Sugar	0.07	0.07	0.07
Salt	0.07	0.07	0.07
Seasoning	2.38	2.24	2.32
Ground black pepper	1.49	1.40	1.45
White breadcrumbs	38.15	35.87	37.05
Water	9.94	9.34	9.65
Shiitake mushroom	-	5.98	-
Salted egg powder	-	-	2.00
	100	100	100

2.2 Method

All ingredients were prepared and weighed according to the formulation table. Ulunthu beans were soaked for 1 hour until softened prior to usage. The ingredients were homogenised until the mixture is smooth and then was transferred into a container, compressed and steamed for 15-20 minutes. After cooling, the steamed nugget cake was cut into regular shape. The nuggets were then breaded according to the standard breading procedure (SBP) with flour, egg wash and breadcrumbs. The breaded nuggets were then par-fried using palm oil, excess oil was removed and stored in a freezer (-21 °C).

A Hedonic test was conducted to determine the acceptance of U-GGET variations based on five attributes which are colour, aroma, tenderness, flavour and overall acceptability. Thirty random students from UiTM Dungun were selected as panellists. A total of 90 samples were prepared and distributed where each panel received three different samples that were labelled with three coded numbers. The panellists tasted the samples and filled in the designed Sensory Google Form based on their preferences using a scale from 1 to 9 for each attribute. Scale 1 indicates dislike extremely whereas scale 9 indicates like extremely.

3. FINDINGS

3.1 Consumer acceptance of U-GGET

Sensory characteristics such as colour, aroma, tenderness, flavour and overall acceptable were evaluated for all three variations of U-GGET (control, hiitake mushroom, salted egg powder). The range of consumer acceptance score were 6.0 to 7.9 as shown in Table 2. It was found that salted egg powder U-GGET was more preferred compared to the other two variations. The mean sensory scores obtained for this sample were the highest followed by control (only ulunthu beans) and shiitake mushroom added nuggets for all the attributes analysed (Figure 1).

Table 2. Sensory scores for different variations of U-GGET

	Colour	Aroma	Tenderness	Flavour	Overall acceptability
U-GGET (Control)	7.2	7.2	7.8	7.6	7.8
U-GGET (Shiitake mushroom)	6.7	6.4	7.3	6.0	6.3
U-GGET (Salted egg powder)	7.7	7.8	7.8	7.9	7.8

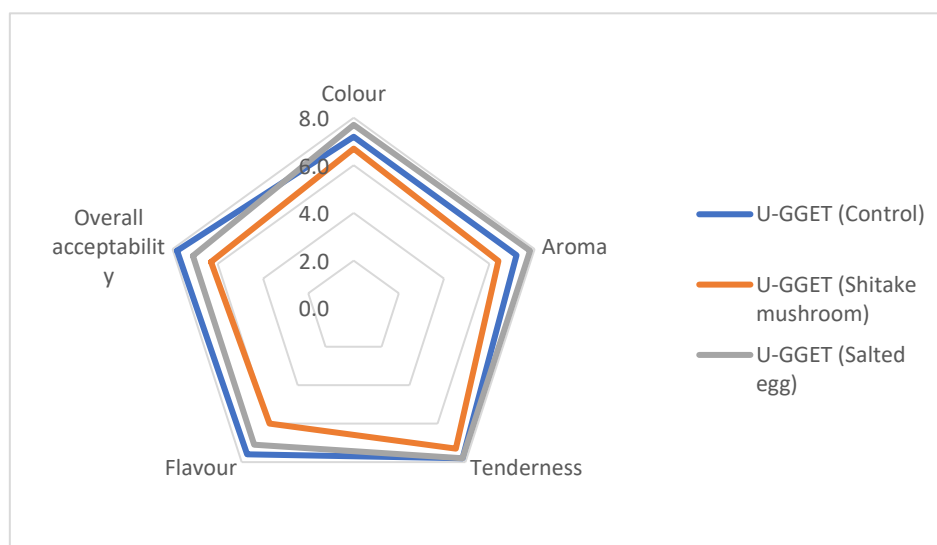


Figure 2. Comparison of consumer acceptance of different formulations of U-GGET.

4. DISCUSSION

Three variations of meat-analog nuggets with ulunthu beans as base were developed and sensory properties were analysed. Overall, the panellists preferred salted egg powder U-GGET which had bright-orange red colour which was more attractive than the other two variations. In fact, colour is among the important sensory properties in food formulation. Meanwhile, the aroma and flavour of shiitake mushroom U-GGET were the least preferred that could be attributed to the unpleasant strong earthy smell of the mushroom itself. Besides, the preference for the tenderness of this sample was also the lowest as the incorporation of mushroom increased the moisture content resulting in mushier texture of nuggets. According to Shinoda et al. (2020), the moisture content of shiitake mushroom is almost 90%.

As for the acceptance of the flavour, salted egg powder U-GGET was the most preferred as it possessed unique buttery and savoury flavour. Overall, salted egg powder U-GGET obtained the highest scores for all the sensory attributes: colour, aroma, tenderness, flavour and overall acceptability which suggest its potential commercialisation and marketability values.

5. CONCLUSION

The novelty of U-GGET includes the formulation of meat-analog nuggets using nutritionally packed ulunthu beans. Besides, the incorporation of shiitake mushroom and salted egg powder added imparted new and unique flavour to the nuggets that could be preferred by ovo-vegetarians too. Future research may include healthier cooking method without the use of oil to fry the nuggets prior to freezing. In conclusion, U-GGET has a good commercialisation potential as the formulations are low in fat, highly nutritious, convenient, unique and suitable for all age groups.

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