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FORMULATION AND DEVELOPMENT OF MOCK MEAT USING TOFU AND YAM

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Abstract: Mock meat is a term use to describe foods that mimic meat products but are made from plants. These products include vegetarian friendly alternatives. Plant based ingredients are a source of protein and calcium. The plant based diets contain different nutrients than meat products. The nutritional content of both meats and plant based substitutes varies depending on the specific ingredients. The purpose of the study was to develop a convenient choice of replacement for the meat. The meat was evaluated for its sensory properties, nutritional composition and packaging and labelling. The developed product was formulated by tofu and yam in different ratios. The nutritional composition was noted for all the four variations and variation III has been accepted as the best variation. The highest mean values for the overall acceptability of the variation III was (8.96 ± 0.18) compared to control in terms of sensory attributes. The sensory evaluation was conducted using 30 panel members. The product was developed based on economic and nutritional factors. The product was subjected to shelf life analysis and packaging methods.

Index Terms **– Mock meat, tofu, yam, plant based, replacement of meat**

I. INTRODUCTION

New product development (NPD) is often recommended as a suitable strategy to build competitive advantage and long-term financial success in today's global food markets. Product innovation is said to help maintain growth (thereby protecting the interests of investors, employees and food chain actors), spread the market risk, enhance the company's stock market value and increase competitiveness.

Meat is a very rich source of protein in human diet. The consumption of meat or animal flesh is being carried out from the Stone Age when man first used stone as his weapon. But in the current scenario the tremendous increase in slaughtering and consumption of animals has lead to unnoticeable disturbances in ecological balance. Excessive consumption of meat has also led

to several diseases. It has been found vegans are less prone to diseases. In order to deal with such issues, meat alternatives or mock meat are being introduced in the market.

The popularity of meat analogs is booming as increasing numbers of consumers seek protein alternatives and sustainable food. Notably, in Germany, France, the Netherlands, the United Kingdom, Italy, and Sweden are among the top countries in research and development of alternative meat proteins, with Europe dominates the global meat substitutes market. Although today we believe that replicating the meat alternative so-called "meatless" is going to break the market in coming years ahead due to big companies eager to expand their market share as demand soars for meat alternatives.

II. METHODOLOGY

The methodology pertaining to study entitled on "Formulation and Development of Mock Meat using Tofu and Yam" is presented.

Selection and procurement of raw materials:

Wheat flour: Wheat flour was purchased from the local super market in Coimbatore. The major health benefits of wheat flour is aids digestion, prevents weight gain, cleanses the system, reduce chronic inflammation, lowers the risk of heart diseases and reduces the risk of cancer.

Tofu: Tofu was also purchased from the local super market in Coimbatore and stored in refrigerator. The major health benefits of tofu are it is a source of protective antioxidants, it alleviates menopausal symptoms, it is a source of complete plant protein, it supports blood sugar management, maintains cardiovascular health, lowers cholesterol level and manages weight.

Yam: Yam was purchased from the local shop in Nehru nagar, Coimbatore it is covered with a paper and stored. The main health benefits of yam are, they are packed with nutrients, it eases symptoms of menopause, may fight against cancer, it may reduce inflammation and improves blood sugar control.

Processing of tofu:

- Tofu production begins with soaking and grinding the soybeans.

1. Soak and blend:

Soak 3 cups of dry soy beans overnight in the refrigerator.

⇩

Rinse the soaked beans and discard the discolored ones.

⇩

Blend a little at a time with enough water to cover the beans.

⇩

Add the processed beans to a largest pot with 12 cups of water.

2. Stir and simmer:

Stir frequently and simmer for about 20 minutes.

⇩

This will foam up, not to let it boil over.

3. Strain out milk:

Strain into a second pot.

⇩

Use a spoon to press out as much of the milk.

⇩

The liquid is soy milk.

⇩

The solids are okara.

4. Coagulate:

Heat the soy milk back up to around 180 degrees (Fahrenheit).

⇩

Dissolve 2 TBSP of Epsom Salt in 1 and 1/2 cups of warm water. (Alternatively you could use 75ml of lemon juice.)

⇩

Remove from heat and gently stir together.

⇩

In about 5 to 10 minutes the curds will separate.

5. Add to mold:

Colander with a mesh bag or cloth makes an excellent mold.

⇩

Skim out curds and pour into mold.

⇩

Press down with a small plate and heavy object.

⇩

Leave for about 20 minutes.

⇩

The tofu is processed.

Drain and rinse tofu, rinse the tofu and remove the water by wrapping the tofu in a dish towel and dry it well with kitchen paper towels. Then place a heavy object on top such as a sheet pan, heavy frying pan or a combination of those to weigh down the tofu and press out the excess water and add it to blender.

Rinse the yam well in water drain, remove the peel of yam and cut it slightly into pieces and boil the yam in tamarind water for about 10 minutes and cook it well and drain the water completely and cool it in room temperature.

Add the tofu and yam to the blender add water, oil and salt to the blender and blend it until it becomes smooth and transfer the wet mixture. Add wheat flour and knead about 5 minutes after kneading the dough has developed a proper texture.

Knead it and make the dough into two balls and shape each balls into a log, wrap the logs tightly in aluminium foil with two layers, aluminium foil is used because it is one of the least reactive metals, it does not react with food and has no effect on flavour and it cover baking surfaces and to wrap foods to prevent them from losing moisture while cooking.

After wrapping with the aluminium foil, fill the pressure cooker with water and place the logs in the pressure cooker and pressure cook it for 30 minutes.

III. FIGURES AND TABLES

TABLE 1: STANDARDIZATION OF MOCK MEAT

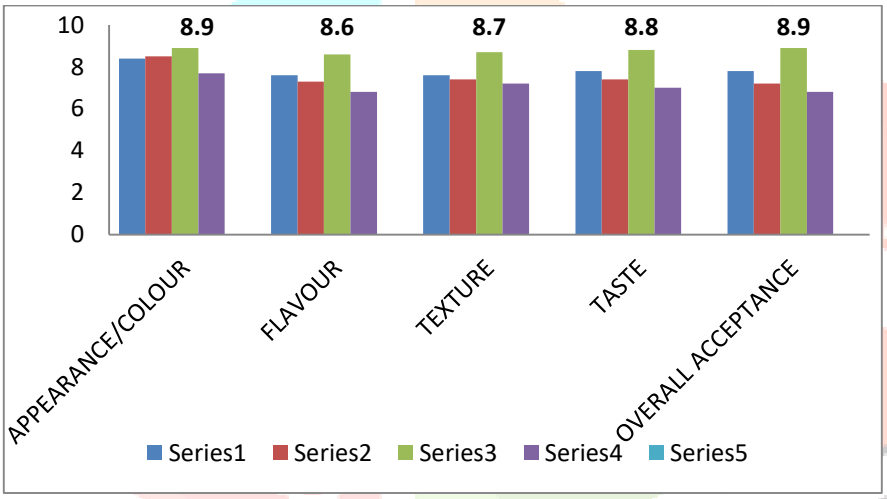
Ingredients	Variation I	Variation II	Variation III	Variation IV
Tofu	50	50	50	50
Yam	40	35	30	25
Wheat flour	10	15	20	25

TABLE 1: The standardized products were standardized in terms of amount of ingredients, procedure and serving size. For the purpose of standardized products, a number of preliminary trials were conducted. It was formulated into four different variations. Different variations of Mock meat incorporated with Tofu and Yam were prepared by altering the proportion of all the ingredients for standardization.

TABLE 2: ORGANOLEPTIC EVALUATION OF MOCK MEAT

Criteria	Control	V-I	V-II	V-III	V-IV
Appearance/Colour	8.93±0.25	8.43±0.77	8.53±0.68	**8.96±0.18**	7.7±0.65
Flavour	8.33±0.47	7. 63±0.49	7.36±0.55	**8.6±0.49**	6.86±0.68
Texture	8.76±0.43	7.6±0.67	7.46±0.73	**8.76±0.43**	7.26±0.82
Taste	8.46±0.57	7.83±0.53	7.43±0.72	**8.86±0.34**	7.06±0.63
Overall acceptance	8.73±0.52	7.83±0.46	7.23±0.72	**8.96±0.18**	6.86±0.57

FIGURE 1: FIGURE OF ORGANOLEPTIC EVALUATION OF MOCK MEAT

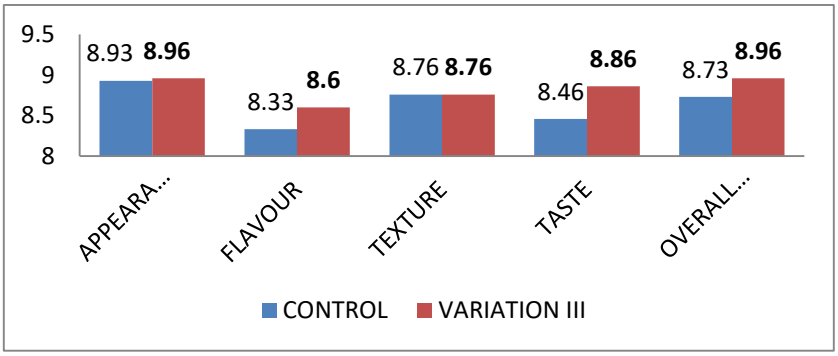


Organoleptic evaluation of mock meat incorporated with tofu and yam has given to 30 semi trained panel members using the score card with a nine hedonic scale. In evaluation, the qualities of the product were asked to judge by 30 semi trained panel members with respect to appearance, colour, consistency, texture, taste and overall acceptability. The individual mean sensory scores for control, variation I, variation II, variation III and variation IV are noted.

TABLE 3: MEAN SENSORY SCORE OF CONTROL AND FORMULATED MOCK MEAT

	Control	Variation III
APPEARANCE/COLOUR	8.93	**8.96**
FLAVOUR	8.33	**8.6**
TEXTURE	8.76	**8.76**
TASTE	8.46	**8.86**
OVERALL ACCEPTANCE	8.73	**8.96**

FIGURE 2: FIGURE OF MEAN SENSORY SCORE OF CONTROL AND FORMULATED MOCK MEAT

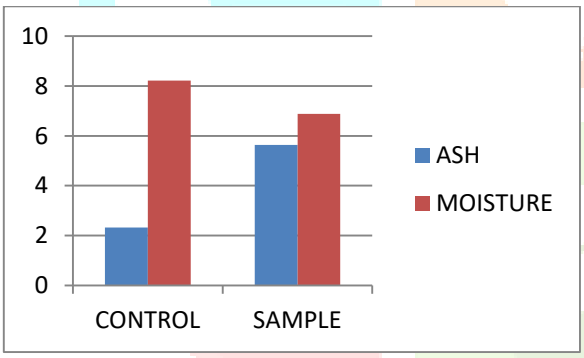


From the above table, it was clear that the formulated mock meat has better score than control and based on organoleptic evaluation the variation III has the highest score among the other variations. Hence the highest scored overall acceptability variation III has been used for the further analysis.

TABLE 4: PHYIO-CHEMICAL ANALYSIS OF MOCK MEAT

Criteria	Control	Sample
ASH	2.32	5.63
MOISTURE	8.22	6.88

FIGURE 3: FIGURE OF PHYSIO-CHEMICAL ANALYSIS OF MOCK MEAT



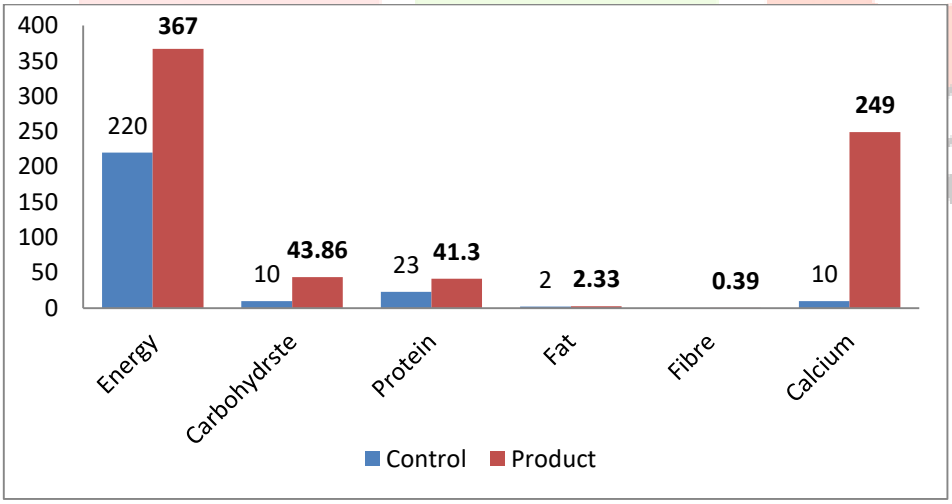
The experimental mock meat (Variation III) has got the higher score of ash value when compared with control. The ash content of the control and sample was (2.32 & 5.63). The moisture content of sample was lesser than control, lower the moisture content helps to minimize the growth of microorganism and food spoilage. The moisture content of the control and sample was (8.22 & 6.88) respectively.

TABLE 5: NUTRITIONAL ANALYSIS OF MOCK MEAT

CONTROL AND SELECTED VARIATION

Criteria	**Control**	**Selected Variation**
Energy(kcal)	220kcal	**367.0kcal**
Carbohydrate(g)	10g	**43.86g**
Protein(g)	23g	**41.3g**
Fat(g)	2g	**2.33g**
Fibre(g)	-	**0.39g**
Calcium(g)	10mg	**249mg**

FIGURE 4: FIGURE OF NUTRIENT ANALYSIS OF MOCK MEAT



From the above table and figure, it was clear that the formulated mock meat contains high nutritional values like **Energy (367.0kcal), Carbohydrate (43.86g), Protein (41.3g), Fat (2.33g), Fibre (0.39g) and Calcium (249mg)** when compared to control **Energy (220kcal), Carbohydrate (10g), Protein (23g), Fat (2g), Fibre (0g) and Calcium (10mg)** the selected variation has more amounts of calcium and protein than control. Hence it reduces the risk of energy malnutrition and nutritional deficiency disorders.

TABLE 6: COST CALCULATION OF MOCK MEAT

Ingredients	Quantity	Cost in market (per kg)	Cost of selected variant
Tofu	50g	395	**19.75**
Yam	30g	67.50	**2.025**
Wheat flour	20g	52	**1.04**
		Total	**22.815**

Raw material cost = 22.815

Overhead cost (15%) = 3.42

Total cost = 22.815 + 3.42

= **26.235**

The total calculation of prepared mock meat which contains 100g was Rs. 26 of Indian currency. These ingredients are easily available in market of all population area. Hence these are applicable in all population of country.

IV. DISCUSSION

Mock meat is a term used for alternative meat options. It can be created from plant-based proteins to resemble the real deal in taste, colour and texture. The plant-based ingredients like soya bean, wheat protein, pea, jackfruit, yam can be used. Plant based meats are generally healthier than traditional mock meats, and they are also more healthful than real meat. Protein is an essential macronutrient in the human diet.

The number of people turning to veganism is on the rise for both health reasons and ethical ones depending on type of fake meat we consume. But on the flip side, people after consuming these food products reported with digestive complications due to high fiber and protein content. Mock meats are the best way for a transition from non-vegetarian to a vegan diets it does not serve the purpose. It is a main replacement in meat.

The salient findings of the study are the organoleptic evaluation of the mock meat, the physio-chemical analysis of the mock meat, the nutrient analysis of the mock meat and the cost effectiveness of the mock meat are discussed under the tables and figures.

Storage stability is essential for the shelf life of the food products. The storage stability of the control and the best variation mock meat was done by nutrient analysis. The nutrient analysis was attributed for all the nutrients after a period of 15 days. The analysis was carried out using standard procedure.

Packaging ensures the protection of the products that are meant to be distributed in the market for the purpose of sale, storage, use, etc. Generally it refers to the process of designing, evaluating and producing packages. The formulated mock meat has been packed in an air tight covers such a way that ensures the shelf life of the food product.

V. CONCLUSION

In present scenario, one needs to emphasize on the consumption of locally available and cost-effective sources which could enhance the nutritional potential of traditional recipe. In this study, intended to develop a healthy nutritious mock meat by incorporating tofu and yam to enhance the digestibility and absorption into formulated product to use as a replacement of meat.

REFERENCE

[1] The Vegan Society [Accessed 27 Nov 2019]; Statistic [Internet] 2019 https://www.vegansociety.com/news/media/statistics.

[2] Joshi, V.K., & Kumar S. (2015). Meat Analogues: plant based alternatives to meat products-A review. International Journal of Food and Fermentation Technology, 5(2), 107-119.

[3] Kyriakopoulou K, Dekkers B, van der Goot AJ. Plant-based meat analogues. In: Galanakis CM, editor. Sustainable meat production and processing. London: Academic Press; 2019.

[4] Sadler, Meat alternatives; market developments and health benefits. Trends Food Science and Technology.,2019.

[5] Modak, A.,&Choudhary, B. "Mock Meat – The need of the Hour"

[6] Nath,J.,&Prideaux,D.(2011). The civilized burger: Meat alternatives as a conversion aid and social instrument for Australian vegetarians and vegans. Australian Humanities Review, (51).

[7] Avieli, N., & Markowitz, F. (2018). Slavery food, soul food, salvation food: veganism and identify in the African Hebrew Israelite Community. African and Black Diaspora: An International Journal, 11(2), 205-220.