# PROCESS OF MAKING READY-TO-COOK RICE-SHAPED KERNEL

Specification

## TECHNICAL FIELD

The present utility model relates to food technology specifically, providing an alternative to rice by white corn.

## BACKGROUND OF THE UTILITY MODEL

The Philippines is prone to natural disasters like typhoons and earthquakes, disrupting access to essential needs, especially food. Relief efforts are vital after such events, but they often face challenges due to insufficient nutritious food supplies. This increases the risk of malnutrition, particularly in vulnerable groups like children.

One of the vital relief good is food, and in the Philippines, rice is one of the highest priority in food groups. Thus, when there is such a scenario wherein there is lack of rice supply, it is important to provide for an alternative.

An alternative to rice is white corn, which is grown locally in Visayas and Mindanao regions. It is rich in dietary fiber, antioxidants, and other essential nutrients.

Prior arts has disclosed and provided improvements in utilizing white corn as an alternative to rice. One such prior art is IDP00202006812A. The invention relates to a formula of rice which is made up by using white corn flour (Zea mays ceratina) and green bean flour (Vigna radiata) as base material and mixing them and adopting hot extruder process to prepare analog rice and its prepared by hot extrusion which includes the steps of material preparation, mixing, extrusion and drying. The raw materials are prepared by weighing the white corn flour and the mung bean flour according to the formula. The two materials are mixed with 2% stearic acid monoglycerol and then 40-60% water is added. Homogenization was followed for 10 minutes. The process of extruding the dough was then carried out in an extruder at 85 oc. at 40 hz screw speed. The produced extrudate rice was then dried using an oven at 60 °C for 3 hours in order to reduce the moisture content of

similar rice from 14% to krang. Afterwards, the simulated rice is packed tightly and in vacuum, and the local raw materials corn and mung bean are processed in the form of the simulated rice, so that people's staple food sources are diversified, and the nutritional ingredients are sufficient.

However, this prior art has not provided for the utilization of white corn grit as a starting material, and improved the resulting flour with additional ingredients to make the rice-shaped kernels.

## SUMMARY AND OBJECT OF THE UTILITY MODEL

The present utility model relates to a process of making rice-shaped kernels that is used as alternative to rice via the utilization of white corn grits.

The present utility model is generally comprised of producing the white corn flour, and producing the ready-to-cook rice-shaped kernel.

In the producing of the white corn flour, white corn grit is used as the source. The moisture content of the final product will depend on the moisture content of the resulting flour. This means that in the producing the ready-to-cook rice-shaped kernel, the amount of water will depend on the moisture content of the resulting flour as it is important to obtain the target moisture content of the final product.

It is the object of the present utility model to provide for alternative to rice.

It is another object of the present utility model to provide utility to white corn grits.

## DETAILED DESCRIPTION OF THE UTILITY MODEL

The present utility model will be further described herein.

The present utility model is a process of making ready-to-cook rice-shaped kernel that is usable as alternative to traditional rice.

The steps comprising the present utility model are generally comprised of producing the white corn flour, and producing the ready-to-cook rice-shaped kernel.

In the production of white corn flour, white corn grits are used as the main source. These grits are ground using a grinding mill to produce the flour and moisture content is determined. Once the moisture content is determined, an

amount of water is added or removed into and from the ground grit to obtain the target moisture content. Afterwards, the prepared flour is stored for further use.

In the production of the ready-to-cook rice-shaped kernel, palm oil, gum arabic, and citric acid are all weighed as per the disclosed wt%. Citric acid is dissolved in water. The prepared white corn flour and gum arabic are mixed in a high-speed mixer for at least one minute. The citric acid solution is then added into the mixer and mixed for additional one minute. Afterwards, palm oil is added and mixed for additional one minute. After mixing, the mixture is removed and placed in a container. This mixture is allowed to stand for thirty minutes to an hour to allow for complete absorption of water. The mixture is then fed into a twin-screw extruder which is heated to 110°C. The feed rate is adjusted to a speed appropriate in part to the diameter of the extruder. The extruded product exits the extruder through a set die and conveyed to a rotary cutter to cut the extruded product into rice-shaped kernels. Afterwards, the rice-shaped kernels are dried in a force draft dryer at about 60°C for thirty minutes or until the target moisture is attained. The kernels are then packaged into PE bags until used.

The composition of the final product is comprised of 95.00-99.50 wt% white corn flour, 0.1-1.0 wt% vegetable oil, 0.1-1.0 wt% gum arabic, 0.01-0.1% citric acid, and water (q.s.).

White corn flour is preferably produced from white corn grits, having particle size of 80 mesh and below.

Vegetable oil is preferably low in peroxide content, at a maximum peroxide value of 5 meq/kg. The preferred vegetable oil is palm oil.

The amount of water added is dependent on the initial moisture of the white corn flour. It is preferred that the final moisture of the composition be at 18% (wet basis) before an extrusion process.

After the extrusion process, the preferred moisture content is 10% (wet basis) or below. If the preferred moisture is not achieved, the extruded product will be dried until such moisture content is achieved.

The final product is preferably having low acrylamide content. During extrusion process, citric acid is added to the formulation to reduce acrylamide formation.

*Tests*

Physico-chemical tests were conducted to make sure that the final product exhibits acceptable physical and chemical properties. Below tables summarize the results obtained.

| Parameter | Value |
|---|---|
| Moisture content (%) | 6-8 |
| Water activity | 0.4-0.6 |
| Color | |
| L* | 85-90 |
| a* | 0-0.5 |
| b* | 10-20 |

Table 1. Physicochemical properties of the final product

In testing the final product, it is first ground into powder using a knife mill (Retsch GRINDOMIX GM200, Germany). Moisture content was determined using rapid moisture content analyzer (Sartorius MA150C-000230V2 Moisture Analyzer, Germany) at a temperature setting of 105°C. Water activity was measured using water activity meter (Novasina AG LabMaster, Switzerland). Color values were assessed using benchtop spectrophotometer (Konica Minolta Spectrophotometer CM-5, Japan). L* is a measure of brightness from black (0) to white (100). a* describes red-green color with positive value indicating redness and negative value indicating greenness. b* describes yellow-blue color with positive value indicating yellowness and negative value indicating blueness.

| Parameter | Limit* | Result |
|---|---|---|
| Aerobic Plate Count (CFU/g) | $10^6$ | <250* |
| Coliform Count (CFU/g) | $10^2$ | <10 |
| *Salmonella*, per 25 g | Negative | Negative |

Table 2. Microbiological content of the final product

Microbial test parameters are based on Philippine Food and Drug Administration (FDA) Circular No. 2022-012 Guidelines on the Microbiological Requirements of Certain Prepackaged Processed Food Products.

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| Product | Parameter |
|---|---|
| Aflatoxin, ppb | <2* |
| Acrylamide, µg/kg | <25** |

Table 3. Acrylamide and aflatoxin content of the final product

| Parameter | Amount per 100 g |
|---|---|
| Moisture (g) | 13.1 |
| Protein (g) | 7.6 |
| Total Fat (g) | 1.5 |
| Ash (g) | 0.3 |
| Total Carbohydrates (g) | 77.5 |
| Total Dietary Fiber (g) | 2.5 |
| Total Sugars (g) | ND |
| Sodium (mg) | ND |
| Energy (kcal) | 354 |

Table 4. Nutritional composition of the final product

| Nutrition Facts |
|---|
| Serving Size 30 g |
| No. of Servings per container/pack: about 1 servings |

| | | | Amount per Serving | %RENI/RNI* |
|---|---|---|---|---|
| Calories (kcal) | 106 | Calories from Fat | 4 | 7 |
| | | | | |
| Total Fat (g) | | | 0 | |
| Saturated fat (g) | | | 0 | |
| Trans fat (g) | | | 0 | |
| Cholesterol (mg) | | | 0 | |
| Sodium (mg) | | | 0 | 0** |
| Total Carbohydrate (g) | | | 23 | |
| Dietary fiber (g) | | | 1 | 5 |
| Sugar (g) | | | 0 | |
| Total Protein (g) | | | 2 | 8 |

Table 5. Nutritional facts of the final product