# A COMPOSITION OF INSTANT IRON-FORTIFIED RICE KERNELS

Specification

## TECHNICAL FIELD

The present utility model relates to food technology specifically, an instant iron-fortified rice kernel.

## 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.

Iron deficiency is a prevalent health issue in the Philippines, particularly among children and pregnant women. Fortifying rice, the most common staple food in the country, with iron is a valuable solution in addressing this deficiency because iron-fortified rice is an excellent vehicle for increasing iron intake. The fortification process ensures that rice retains its nutritional benefits without altering its taste, making it ideal for large-scale feeding programs and disaster relief efforts.

Prior arts have disclosed instant rice with iron fortification. One of these prior arts is PH22010000315U1. The utility model teaches an instant iron fortified rice meal in different variants. The rice has been precooked and dehydrated, all that is necessary to prepare the instant rice is to simply rehydrate it with hot water. The instant iron fortified rice meal is available in different variants with pork, with beef, and with seafood and vegetables. With no preservative added and with a shelf-life of one (1) year.

However, this prior art failed to teach the improvements presented by the utility model which will be further described in the following sections.

## SUMMARY AND OBJECT OF THE UTILITY MODEL

The present utility model relates to a composition that is comprised of 95-99 wt% rice flour, 0.1-1.0 wt% vegetable oil, 0.1-1.0 wt% gum arabic, 0.01-0.1% citric acid, 0.1-1.0% iron premix rice powder, and water (q.s.). The iron premix rice powder's iron content is derived from micronized dispersible ferric pyrophosphate.

It is the object of the present utility model is to provide for an alternative of rice that is fortified with iron.

It is another object of the present utility model to provide an improved formulation that prevents the accumulation of acrylamide via the incorporation of citric acid.

It is another object of the present utility model to provide an improved formulation that contains gum arabic to act as thickener to simulate texture of traditional rice upon rehydration.

It is another object of the utility model to provide a rice that does not need cooking and only requires rehydration before consumption.

**DETAILED DESCRIPTION OF THE UTILITY MODEL**

The present utility model will be further described herein.

The present utility model is a composition for instant iron-fortified rice kernels.

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Rice flour is preferably produced from polished, intermediate amylose variety, having a particle size of 80 mesh or 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 rice flour and iron premix rice powder. It is preferred that the first target moisture content of the composition be at 18% (wet basis) before an extrusion process.

After the extrusion process, the preferred or second target 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. This is maintained as it is recommended that the rice product-water or any other liquids for consumption ratio for rehydration to make a porridge is 1:6 by weight. The utility model is soaked in hot water or milk for 7 to 10 minutes to make said porridge.

The iron premix rice powder used in the present utility model has an iron content of about 400-480 mg/ 100 g. The iron source of this iron premix rice is micronized dispersible ferric pyrophosphate (MDFPP). The particle size is 80 mesh or below.

Citric acid is incorporated into the present utility model to reduce acrylamide formation during the extrusion process.

The steps in making the present utility model are comprised of grinding the rice and the iron premix rice separately to produce the rice flour and iron premix rice powder, respectively; determining the moisture content of the rice flour and iron premix rice powder; calculating the amount of water to be added to achieve target first moisture content of the rice flour-iron premix rice powder mixture; weighing each component as required; dissolving citric acid in water; mixing the dry ingredients (mixture of rice flour and iron premix rice powder, and gum arabic) in a mixer for at least 1 minute; adding the citric acid solution and continuing mixing for at least 1 minute; adding vegetable oil and continuing mixing for at least 1 minute; curing the iron-fortified rice mixture to allow the complete absorption of water for 1 – 3 hours; extruding the mixture to produce the iron-fortified rice kernels; determining the moisture content; drying the iron-fortified rice kernels until target second moisture content is achieved; cooling the rice kernels; and packing the rice kernels.

*Tests*

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

| Parameter | Value |
|---|---|

| | |
|---|---|
| Moisture content (%) | 7-9% |
| Water activity | 0.30 to 0.50 |
| Color | |
| *L** | 86-88 |
| *a** | -1-1 |
| *b** | 9-11 |

Table 1. Physicochemical properties of the utility model

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

Table 2. Microbiological content of the utility model

| Product | Acrylamide content |
|---|---|
| Extruded Instant Iron-Fortified Rice Kernels without added citric acid as formation inhibitor | <25 µg/kg |
| Extruded Instant Iron-Fortified Rice Kernels with added citric acid as formation inhibitor | ND<br>LOD = 10 µg/kg |
| Reference Criteria (proposed limit from Safe Food Advocacy Europe) | |
| Cereal-based food (excluding porridge) | 300 µg/kg |

Table 3. Acrylamide content of the utility model

| Parameter | Amount per 100 g |
|---|---|
| Moisture (g) | 12.8 |
| Protein (g) | 6.8 |
| Total Fat (g) | 1.2 |
| Ash (g) | 0.3 |

| | |
|---|---|
| Total Carbohydrates (g) | 78.9 |
| Total Dietary Fiber (g) | 1.1 |
| Total Sugars (g) | ND |
| Sodium (mg) | 6.0 |
| Energy (kcal) | 354 |
| Iron, mg | 2.8 |

Table 4. Nutritional composition of the utility model

| Nutrition Facts | | | | |
|---|---|---|---|---|
| Serving Size 30 g | | | | |
| No. of Servings per container/pack: about 1 serving | | | | |
| | | | Amount per Serving | %RENI/RNI* |
| Calories (kcal) | 106 | Calories from Fat | 3 | 7 |
| | | | | |
| Total Fat (g) | | | 0 | |
| Saturated fat (g) | | | 0 | |
| Trans fat (g) | | | 0 | |
| Cholesterol (mg) | | | 0 | |
| Sodium (mg) | | | 2 | <2** |
| Total Carbohydrate (g) | | | 24 | |
| Dietary fiber (g) | | | 0 | 2 |
| Sugar (g) | | | 0 | |
| Total Protein (g) | | | 2 | 7 |
| Iron (mg) | | | 1 | 8 |
| **Percent REI/RENI values are based on PDRI 2015 for Children, Male 6-9 years old*<br>***Sodium RNI is based on WHO Guideline on Sodium Intake for Adults and Children (2012)* | | | | |

Table 5. Nutritional facts of the utility model.