

## Reducing Preparation Time of Locally Manufactured Baby Food at Household Level

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### Abstract

A locally manufactured baby food, which is sold as a flour mixture for making porridge, has been studied. This maize-soy flour mixture has a long cooking time, short shelf-life and the nutrient values are lower than those of established weaning foods on the international market. Various maize/soy flour mixtures have been studied. When the resultant meal is baked, an instant meal is produced. This meal compares favorably with other brands in terms of nutrients and most importantly it is affordable to most of the people in Malawi.

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### Introduction

The problem of protein-energy-malnutrition (PEM) is common in Malawi. This is mainly due to the lack of nutritious weaning foods at prices that most of the population can afford. Malawi is one of the developing countries in southern Africa with an annual income of US\$200 per household. As such, many children grow up feeding on weaning food that does not give them enough nutrients for their growth

Internationally established baby foods such as Nestum and Cerelac are readily available but it is only a small proportion for the population that can afford to keep up with the cost. It is not affordable to wean children continuously on these food items. Most of the people that can buy the products are forced to interchange them from time to time with local maize porridge that is of low nutritional value. This is a problem as the nutritional value of the porridge is equal to or less than that of maize depending on how the maize flour is processed.

Various alternative foods have been looked at in order to increase the protein intake of as many children as possible. A flour mixture that comprises of groundnuts, beans and maize was developed as way back as 1966, This product called *Likuni Phala*, is made up of maize, groundnuts and beans in the ratio of 2:1:1 [1]. Unfortunately this product has had its own problems which included short shelf life, development of off-flavour and long cooking times [2]. The groundnuts and beans were chosen because they are readily available in many households in the rural areas. This product was later reformulated giving another one that replaces the groundnuts and beans by soybeans.

The major drawback with this product is the long cooking time that is required to prepare the meal. This aspect makes it unpopular among families who now have to pay dearly for their energy requirements in terms of electricity and firewood. It is this wish to developing an instant means that was the driving force behind the work discussed in this paper. Any developments that would reduce or eliminate this cooking time ought to attract many women and encourage them to use the cheaper nutritious meals for their children so as to practice interchange between expensive brands and poor quality maize porridge.

### 2. Experimental

A local manufacturing company provided the extruded as well as roasted flours of soy and maize. The baking took place in a kitchen oven and the cooking oil, sugar and salt were purchased from a local supermarket. The groundnut flour was prepared by grinding dried groundnut in a laboratory blender. The analytical methods used to obtain the nutrient results were according to AOAC.

### 3. Improving on *Likuni Phala* & *Phalalac*

As indicated above, the baby products are already in the market and the work aimed at making it more attractive, more nutritious and above all more affordable to as many people as possible. The soybean and maize flours were roasted or extruded and then mixed in various combinations of the meal for better organoleptic properties, increased shelf life and increased bio-availability. The new flour products, though superior to the previous ones in terms of nutritional

content, still require boiling of more than 10 minutes to prepare a meal. The established brands, such as Nestum or Cerelac are preferred above the local products for various reasons. This work aimed at bridging the gap between the two in terms of several factors namely; cooking time, packaging, nutritional content and also instructions to consumers.

### 3.1 Cooking Time

The local product produces a white or cream porridge when boiled for ten minutes or more whereas the imported brands make instant meals when water or milk is added. The instant meals are convenient for mothers who have busy schedules and cost less in terms of the energy required for preparation.

### 3.2 Packaging

The packaging of established brands have definite suggestions for preparations depending on the age of the child. The local products do not have such suggestions and the preparation is entirely dependent on the mother and very subjective. The local product was studied and suggestions given.

### 3.3 Taste/Nutrient Content

The imported brands are superior in terms of their protein and energy contents as well as the taste they develop when prepared. The various combinations of ingredients produced products that have better nutritional content. These values were compared against Robinson's Junior Meal (UK) and an average of various imported baby foods. The comparison is shown in Table 1.

The old *Likuni Phala* has a protein content of 13.3g which is lower than the 18.7g of the improved soya-containing Phalalac – New product. This value is closer to the UK Robinson's product that contains 19g/100g. The fat content has also increased with the new formulations. Carbohydrate values are however lower for the new products. The energy values compare favorably with the average of other brands as well as Robinson of UK.

### 3.4 Establishing Preparation

#### Instructions

Trails were done aimed at preparing the foods that had similar texture and consistence to those of Nestum or Cerelac using the new Phalalac that is made from extruded soy/maize flour. It was found that this product gives porridge similar to Nestum after boiling for ten minutes. This 10 minutes is required to the boil 20 grams of the flour in 150ml of water. The *Likuni Phala*, which is a roasted soy/maize flour product, needs more time to boil to the same consistency. To bring this cooking time down it was suggested that baking the various supermarket flours would give instant meals on addition of water or milk.

## 4. Results and Discussion

### Baking Phalalac

#### 4.1 Basic Recipe

The factory product is made up of 15%-extruded soya and 85% extruded maize flour. This combination was revised to increase the soya content to 30% with a resultant meal that had protein content close to the average for established foods as shown in Table 1. The initial baked product was baked for 35 minutes at 170 degrees Celsius and the recipe was as shown.

The resulting product was oily. The amounts of sugar and oil are high and since the dough was oily these two were scaled down. The above recipe using *Likuni Phala* gave a product that was light brown and crispy. It however, did not make a ready meal on addition of hot water or milk.

#### 4.2 Reducing Oil

Starting with the basic recipe the oil content was reduced resulting in hardened dough. The recipe containing 5grams of oil did rise on baking.

The water, sugar and flour contents were 30g, 20g and 75 grams respectively.

### 4.3 Replacing Oil with Groundnuts

The reduction in cooking time is welcome as that keeps the cost price low. However since most of the cooking oil in the country is manufactured from groundnuts, readily available groundnut flour was used to replace the cooking oil which has to be purchased from supermarkets.

The groundnut product is loose and crushes easily forming a meal with good flavour

### 4.4 Changing Soya Content

Two products made from flour of varying percentages of soya were compared. The only physical difference is the fact that the 30% soya product cooks in forty minutes whereas the 15% cooks in 30 minutes due to the low soya content.

The nutrient content of products resulting from the new formulation is compared against the values from the old products as well as the values for established brands such as Robinson

Table 1: Comparison of nutrient values between reformulated (NEW) products and established brands.

Analyte (g/100g)	Likuni Phala (OLD)	Phalalac (OLD)	Other Brands AVERAGE	Robinson (UK)	Likuni Phala (NEW)	Phalalac (NEW)
Protein	13.3	14.5	14.7	19.0	15.8	18.7
Fat	5.5	7.5	7.1	9	9	10.6
Carbohydrate	65	67	71.3	68	64	57.3
Energy	1470	1553	1699	1650	1589	1628

Table 2: Initial Recipe for the baked 30%Soy/70%Maize product

Phalalac Flour	Sugar	Cooking Oil	Water	Baking Powder & salt
75g	20g	15g	30mL	¼ teaspoon each

Table 3: Effect of Reducing Oil when baking Phalalac

Recipe with 15g Oil	Recipe with 10g Oil	Recipe with 5g Oil
A soft dough Ready Porridge	A hard dough & biscuit Ready Porridge	Harder dough & biscuit than the rest Ready Porridge

Table 4: Effect of replacing cooking Oil with Groundnut Flour

Recipe with 15g OIL	Recipe with 15g GROUNDNUT FLOUR
Cooks in approx. 30 minutes Ready meal on adding water	Cooks/Bakes in >50 minutes Ready meal on adding water Good Flavour

Table 5: Effect of Reducing Sugar

Recipe with 20g Sugar	Recipe with 10g Sugar	Recipe with 5g Sugar
A soft dough Ready Porridge	A hard dough & biscuit Ready Porridge	Harder dough & biscuit has least sugar taste Ready Porridge

Table 6: Effect of increasing flour content of the recipe

100g Flour & 50mL Water	250g Flour & 160mL Water
Cooks in 40 minutes Instant Meal 74% Flour	Cooks in 50 minutes Instant Meal 87% Flour

Junior Meal of the United Kingdom and an average of other internationally established names such as Nestum and Cerelac. The nutrient differences described in Table 1 show that Phalalac (New) is superior to the old one in all respects. Phalalac (old) is also lower than the "average of other brands" in all aspects except fat content.

#### 4.5 Removing Sugar

It was desirable to make a recipe that is sugar-free. This was checked by gradually decreasing the sugar content of the recipes.

The decrease in sugar does not only affect the taste of the resultant product but it also affects the texture of the dough during kneading. However, the products formed make ready meals when hot water is added.

The dough for the 5 gram-sugar recipe was made more manageable with the additional 15 mL of water to the recipe. The possibility of reducing sugar and oil contents from the recipes without adversely affecting the physical properties of the final meal was encouraging. It was then decided to increase the 30%-Phalalac flour content of the recipe. This increase inevitably requires increase in the water used.

The two recipes given below shows the increase in cooking time that follows when the flour content is increased. Cooking oil was used in the trials above and the scaling up of the flour was tested with recipes containing groundnut flour in reduced quantities. A recipe that still maintained the desired properties of the product such as soft dough, ready meal

and attractive colour contained 7.5 grams of groundnut flour, 5 grams of sugar and 150 grams of flour. The water used was 135 mL.

The product gives a ready meal when milk or hot water is added to it. The recipe given below was therefore adopted.

Flour 150g  
Groundnut flour 7.5  
Sugar 5  
Water 135

The use of 15%Phalalac does not have any visible implications on the quality of the final product. However more work has to be done to ascertain the quality fluctuations related with the baking process. The use of groundnut flour in place of cooking oil ought not adversely affect the protein quantity as the 30%-Phalalac flour already has a protein content of 15.8g/100g which is higher than the average for established brands of 14.7g/100g. Most importantly the product makes an instant meal on addition of water or milk just as the imported brands.

#### 5. Conclusion

It has been shown in this work that the local baby food flour can be turned into an instant meal when the flour sold in the supermarket is precooked. The addition of hot water or milk turns the baked product into an instant meal just as other established and imported baby foods. This baking can be done on a small scale in the household or by the manufacturers.

The shelf life of this product within the household context is more than three months and it has a higher protein content. The products from the 15%-Phalalac and

the 30%-Phalalac flours yield similar products that both make ready meals when water is added resulting into an instant meal. Apart from the cost implications, the removal of cooking time in the preparation of baby food gives mothers more time to look into other areas of child raising and household management.

Groundnut flour replaces oil in the baking process and this adds flavour to the final product. Groundnut flour is also ideal because it is readily available to many households in the rural and urban areas. Thus, baking of Phalalac flour would allow many people access to weaning food that is highly nutritious and one that is conveniently prepared just as the imported one. It will not be necessary, therefore to resort to interchanging the imported product with poor quality maize porridge. People will afford a good quality meal for their children as they grow and there will be no need to revert to poor quality weaning food due to budget constraints. The adoption of a meal as this one will go a long way in alleviating the PEM problem.

#### Reference

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