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**FORMATION AND QUALITY STUDIES OF EXTRUDED WEANING  
FOOD USING LESS POPULAR GRAINS AND PULSES**

By

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## **DECLARATION**

The work in this thesis was carried out by me under the supervision of Prof. Arthur Bamunuarachchi (Coordinator/ Food Science & Technology Programme, University of Sri Jayawardhanapura); and a report on this thesis has not been submitted to any university for another degree.

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I, Prof. Arthur Bamunuarachchi hereby certify that the statement in the preceding page made by the candidate is true and that this thesis is suitable for submission for the university for the purpose of evaluation.

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## **Abstract**

Weaning is a process where Gradual transition from single food milk to mixed diet. From the age of six month until approximately two years, infants and young children should gradually be introduced to provide more energy and vitamin for growth. In order to avoid malnutrition among children well balanced weaning food is needed.

Extrusion cooking is a popular means of preparing snack food and ready to eat breakfast cereals using starch based raw materials

Studies were conducted to develop a ready-to-eat-extruded weaning food from grains (maize and rice) and pulses (Mung bean) using a single screw extruder and determined the best formulation. Extruded product was converted into powder form using grinder. Based on the recommended daily allowances predetermined quantity of vitamin and mineral premix was added to the powder and mixed well. Weaning food was prepared at four different formulations of ingredients blends. Sensory evaluations (5 point modified Hedonic scale) were conducted to find out the best formulation. Results revealed the possibility of manufacturing ready- to- eat weaning food from maize, rice, potato starch, semolina and green grame with satisfactory consumer acceptability. And it provides the ½ of the nutrient content from the Recommended Daily Allowances (RDA)

Moisture content was 8.240%, ash content was 2.001%, protein content was 14.20% and fat content was 8.41% in selected product

Vitamin A content was 2300IU, Vitamin B1 content was 0.75mg, Vitamin B2 content was 0.69mg, Niacin content was 4 mg and L-Lysine HCl content was 13.6 mg in 100g of powder product

**Key words:** weaning food, extruder, Hedonic scale, maize, rice, potato starch, samollina, green gramme,RDA.

## **CHAPTER 01**

### **1.0 Introduction**

Recent past 26 million infants were suffering from malnutrition in developing countries of Asian region. Birth rate of Srilanka is 18.5('000) 2004 and infant mortality rate is 11.2 ('000) 2003([http://www. centralbanklanka.org](http://www.centralbanklanka.org))

According to the World Health Organization reports 11 million children (under 5 Years) are dying all over the world. Further their clarification, most of the deaths due to infection and malnutrition.

Lack of exclusive breastfeeding is a significant cause of infection in early infancy and result in malnutrition.

Children's are particularly vulnerable to malnutrition during the weaning process, defined as the transition from breast milk as the sole source of nourishment to the usual family diets.

By six months of age, most babies need other foods in addition to breast milk. The foods offered to infants are often contaminated and woefully inadequate in calories, protein and micronutrients. Obviously, it leads to growth faltering and malnutrition.

To address this problem, in this study is focused to develop ready to eat infant formula with nutritionally well-balanced ingredient.

Extrusion cooking is a popular means of preparing snack food and ready to eat breakfast cereals using starch based raw materials. (Harper, 1981). Therefore extrusion cooking is selected

## 1.1 Objectives

- Formulate & Develop a weaning food
- Analyze of product
- Evaluate the nutrition content ( protein, fat, energy, and vitamin content)

## **CHAPTER 02**

### **2.0 Literature Review**

#### **2.1 Value of Breast Feeding**

1. Fewer infection

- Human milk contains immunoglobins that act as protective substances.
- Protect from respiratory infection
- Protect from ear infection
- Prevent tooth decay

2. Fewer allergies and intolerance

3. Convenience

4. Optimum nutrition

5. Appropriate growth

Up to four month both breast fed and bottle fed show same growth rate, but after 04 month bottle fed babies show obesity

6. Good brain development

7. Other protective benefits

Less chance to diseases

#### **2.2 Weaning Process**

Gradual transition from single food milk to mixed diet. There is always the need to introduce soft, easily swallowed food to supplement the infant's feeding early in life.

## **2.2.1 Importance of Weaning Food**

Breast milk is the ideal food for infants during the first six month of life. Even though it cannot provide all of the nutrients and calories that allow infants to thrive after the first six month of life.

From the age of six month until approximately two years, infants and young children should gradually be introduced to provide more energy and vitamin for growth.

In order to avoid malnutrition among children well balanced weaning food is needed.

In Sri Lanka also 7 million of the babies and children are under fed and subjected to malnutrition. It is important to develop well balance nourish weaning food.

## **2.2.2 The Basics of Weaning**

Between four and seven months of age a baby starts to show that she is ready for solids. Many babies can sit with help, hold food in their mouths and mix it with saliva. They may chew anything within reach, drool or cry when they see food and appear hungry after milk feeds.

Once it has been decided to start weaning, a regular mealtime can be established when baby is given undivided attention. Some babies are hungriest in the morning, others in the evening. (<http://www.childrensfood.org>)

Initially, try offering the child small amounts of food on the end of a spoon. Some babies eat what is offered and look around for more. Other may protest at a spoon being placed in their mouths. The majority swallows some food and dribbles the rest down their chins. Each day, offer the child extra teaspoonfuls of food if she seems hungry. About two weeks after the first meal, introduce a second. If feeding progresses well, offer a third meal after two more weeks. (<http://www.westafricanweaningfood.org>)

## **Preparing purees**

For the first food, try mixing boiled rice with water, formula or breast milk and pureeing it to the consistency of thick soup. Alternatively, try a pure baby rice. If this is well received, try introducing cooked, pureed apple or pear. For a third meal, try cooked, pureed potato or carrot.

An increasing number of pureed organic fruit and vegetables are produced commercially for babies. However, it is easy to make your own purees. Some foods, such as banana, can be simply mashed with a fork. Other foods can be pushed through a sieve, but a hand blender or food processor is a time-saving purchase. Fibers and pips should be removed and fruit and vegetables should be peeled before cooking and pureeing. At this age, very fibrous matter is difficult for a baby to digest.

Start to add more protein - meat, fish, cheese, yoghurt and beans - to a baby's diet. Protein should be introduced gradually, at first just once a day, to avoid straining the child's kidneys. (<http://www.goodies.uk.com>)

### **2.2.3 Weaning Around the World**

In every culture, weaning aims to accustom babies to the staple diet, while relying on milk as the main source of nutrition. In countries where food is in short supply, mother may breast-feed for up to two years. Weaning foods are universally bland and of high carbohydrate composition. In many cases, recipes for traditional weaning foods have been passed down through generations. In Asian countries, rice is the basis of kedgeree or kongi, which is fed to babies from five months of age. Initially, boiled, sieved rice is added to cooked lentil juice. (<http://www.babyorganix.co.uk>)