

**Research Article**

## **FORMULATION, STANDARDIZATION AND DEVELOPMENT OF VALUE ADDED SPAGHETTI**

**Manjula K, \*Jhansi D, Sowjanya M and Manjunath V**

*Food Technology division, Department of Home science, S.V University, Tirupati, Andhra Pradesh, India – 517502*

*\*Author for Correspondence*

### **ABSTRACT**

Spaghetti (Pasta, Noodles) commonly known as savat has been in use since the early period of Indian civilization. Spaghetti is mostly cereal based, sometimes millets enriched food product which is consumed by majority recently with special reference to Children and Adolescents. It is used by all communities through out the world especially south east and middle east countries. Recently extruded products like noodles, spaghetti, pasta etc are occupying major proportion not only in breakfast preparations but also in snacks, lunch and dinner too. Hence an attempt has been carried out to develop value added Spaghetti by incorporating multi grains and carrot pulp to enrich the nutritive value of the product. Various trials were carried out using different proportion of ingredients using single screw extruder. All the samples were subjected to sensory evaluation with trained panel. The formulation which was acceptable by majority of panel was chosen as standardized formula. The value added spaghetti was then developed in the laboratory, packed and labeled and kept at ambient temperature for further study. The nutrient composition of the product was assessed using the nutritive value of Indian foods. The acceptability studies were carried out with different age groups. The results reveal that the value added spaghetti was highly acceptable by all age groups. The incorporation of multigrain; soy and carrot enrich the nutrient composition of the product.

**Keywords:** *Spaghetti, Multi grains, Carrot pulp, Extrusion, Standardization*

### **INTRODUCTION**

Extrusion processing of food materials has become an increasingly important manufacturing method, and its applications have broadened substantially in the last two decades. Food extrusion is a process by which a set of mixed ingredients are forced through an opening in a perforated plate or die with a design specific to the food, and is then cut to a specified size by blades (Manisha *et al.*, 1997). The machine which forces the mix through the die is an extruder, and the mix is known as the extrudate. The extruder consists of large, rotating screw tightly fitting within a stationary barrel, at the end of which is the die today; Extruders were developed in the 1870's to manufacture sausage. Later on extruders are used in a variety of applications, such as the manufacture of breakfast cereals, pasta, meat analogs, filled snack products and pet food (Mian, 2000). Wheat Spaghetti is a popular type of noodles served as oriental dishes both in Eastern and Western countries (Frank, 2002). The traditional process of wheat spaghetti involves in extruding partially gelatinized wheat paste, from freshly prepared milled wheat into spaghetti size (Jennifer, 2009). Spaghetti can be prepared from raw wheat flour similar to wheat spaghetti.

Various types of noodles including spaghetti are becoming popular breakfast not only in eastern and western countries but also in India (Tiwari *et al.*, 2005). Breakfast is an important meal to keep the individuals active throughout the day. Hence the breakfast should include all the nutrients. In this connection, a value added spaghetti was formulated to enhance the nutrient content of the regularly available cereal based spaghetti by incorporating multi grains, legumes and vegetables to enrich the nutrient content.

### **MATERIALS AND METHODS**

Whole wheat and ragi was procured from local supermarket and milled into a fine powder. Soya flour was purchased from "Raiko" products, Bangalore. Carrot was purchased from local vegetable market and

**Research Article**

washed in clean tap water to remove extraneous matter such as dirt, dust and pesticide residues. Then carrot was made into pulp. Standard procedure was adopted for spaghetti making (Dexter *et al.*). Soya, Ragi and wheat flour were sieved to get soft and fine powder and weighed according to the proportions. The weighed ingredients were mixed with sufficient amount of carrot pulp to make it into smooth dough. The prepared dough was kept in double boiler and steamed for seven minutes. The steamed dough was cooled and placed in extruder (single screw extruder). The operational procedures were followed as per the specifications by the manufacturers. The prepared spaghetti was dried at 100° c for 15 minutes. The formulations designed using various proportions of ingredients to standardize the product was presented in Table 1.

**Table 1: Composition of various samples for standardization of the product**

S.no	Ingredients	Sample-1	Sample-2	Sample-3
1	Soy flour(g)	20	20	20
2	Wheat flour(g)	30	50	40
3	Ragi flour(g)	15	15	20
4	carrot pulp(ml)	10	15	20

Three different samples were worked out to develop value added spagatti in laboratory. In sample-1Soy, wheat and ragi flour were taken in the ratio of 20:30:15 and 10ml carrot pulp was added. In sample-2 Soy, ragi flours were taken in the same proportion as sample -1 but wheat flour and carrot pulp was increased to 50 g and 15ml respectively. The ratio of flours In sample-3 20: 40: 20 respectively and 20ml of carrot pulp was added to it. All the samples were subjected to sensory evaluation with trained panel. Sample-3 got highest score for overall acceptability hence that formula was standardized in terms of ingredients & procedure. Value added spaghetti was prepared in the laboratory and subjected to sensory evaluation with different age groups i.e.; children, adolescents, adults to assess the acceptability of the product. Nutrient composition of the product was calculated using Nutritive Value of Indian Foods (Wang *et al.*, 1999).

**RESULTS AND DISCUSSION**

The formulation in terms of ingredients used to develop value added spaghetti is presented in Table No 2

**Table 2: Composition and Yield of Value Added Spaghetti**

S. No	Ingredients	Quantity
1	Soy flour(g)	20
2	Wheat flour(g)	40
3	Ragi flour(g)	20
4	carrot pulp(ml)	20
<b>Yield of the product</b>		
<b>Observation</b>		<b>Weight</b>
Raw ingredients		100 g
Weight of dough before steaming		110 g
Weight of dough after steaming		125 g
Yield of dry spaghetti		85 g

After pre processing and processing operations carried out as per the procedures, 85 gm of spaghetti was obtained. The final product was packed using appropriate packaging material, labelled and kept for further study.

Sensory evaluation can be defined as quality of product which is assessed by means of human sensory organs. The evaluation is said to be sensory (or) subjective (or) organoleptic. The spaghetti was cooked and prepared as a recipe and subjected to sensory evaluation by different groups i.e. adults, adolescents and children to test the acceptability (Table No: 3). The results reveal that the color and taste of the

**Research Article**

product was more acceptable by the children when compared to adolescents and adults where as the appearance and flavor is more acceptable by the adults. The difference in sensory scores was not observed for overall acceptability of the product among all three age groups. All three age groups were given maximum score for overall acceptability of the product.

**Table 3: Sensory evaluation of value added spaghetti**

S.no	Sensory Attribute	Panel members		
		Adults	Adolescents	Children
1	Appearance	4.1	3.9	3.8
2	Color	3.5	3.9	4.0
3	Flavor	3.2	2.3	2.1
4	Taste	2.9	3.8	3.8
5	Overall acceptability	3.4	3.4	3.2

The nutrient composition of the spaghetti was calculated using the Nutritive Values of Indian Foods (Gopalan *et al.*).

**Table 4: Nutrient composition of Value added spaghetti**

S.No	Nutrient	Amount
1	Energy	287.2k.cal
2	Carbohydrate	43.17 g
3	Protein	15.86 g
4	Fat	5.66 g
5	Calciums	178 mg
6	Iron	5.04 mg

The essential nutrients like Energy, Carbohydrates, Protein, Fat, Calcium, Iron were calculated and presented in Table 4 Spaghetti (100g) contains 287.2 Kcal, 43.17g of Carbohydrates, 15.86g Protein, 5.66g of Fat, 178 mg Calcium, 5.04 mg of Iron. According to Matsuo *et al.*, the wheat spaghetti is judged by their uniformity, cooking and eating quality (Matsuo *et al.*, 1982). The moisture content of spaghetti samples are ranging between 6.2 to 9.6% crude protein in commercial samples has varied between 10.9 to 11.4%. In the value added spaghetti the Protein content is much more than the commercial products. The significance of nutrient composition of the product might be due to the reason that the product was developed with multi grains, legumes and vegetables etc. which imparts the nutritive value to the product and made it as nutrient rich.

**Conclusion**

Extrusion has enabled the production of new processed food products and “revolutionized many conventional snack manufacturing processes” The various types of food products manufactured by extrusion typically have high starch content. Spaghetti is one of the staple in many parts of the globe. Value addition, in terms of various ingredients enriches the product quality. The value added spaghetti is an ideal breakfast or snack as it not only cereal based which provides Carbohydrates & calories but also gives proteins, vitamins&minerals.

**REFERENCES**

**Dexter JE and Matsuo RR (No Date).** The effect of gluten protein fractions as pasta dough rheology and spaghetti-making quality. *Cereal Chemistry* 5(1) 44-57.  
**Frank AM and Anton LS (2002).** Physical and Cooking Quality of Spaghetti Made from Whole Wheat Durum. *Cereal Chemistry* 79(4).  
**Gopalan C (2004),** Nutritive value of Indian foods. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, India.

**Research Article**

**Jennifer AW (2009).** Texture, processing and organoleptic properties of chickpea-fortified spaghetti with insights to the underlying mechanisms of traditional durum pasta quality. *Journal of Cereal Science* **49**(1) 128-133.

**Manisha G, Syed ZA and Suwendu B (1997).** Twin-screw extrusion of rice flour without a die: Effect of barrel temperature and screw speed on extrusion and extrude characteristics. *Journal of Food Engineering* **32**(3) 251-267.

**Mastuo RR, Dexter JE, Kosmolak FG and Leise (1982).** Statistical evaluation tests for assessing spaghetti- Making quality of Durum wheat. *Cereal Chemistry* **59**(3) 222-228.

**Mian NR (2000).** *Extruders in Food Applications* (CRC press, Florida, USA) 182-199.

**Tiwari SP, Sharma M, Kaur J and Shukla M (2005).** Procurement and marketing of wheat and wheat products -since liberalization. *Progressive Agriculture* **5**(1&2) 82-86.

**Wang N, Bhirod PR, Sosusta FW and Tyler RT (1999).** Pasta like product from pea flour by twin-screw extrusion. *Journal of Food Science* **64**(4) 671-678.