

Development of a Traditional Rice Flour (*Suwendal*) Incorporated Coating for Chicken Fingers

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Abstract

Preference for functional meat products are increasing in the meat industry. In the present study, the possibility of replacing wheat in the coating of chicken fingers by traditional rice variety, *suwendal* was studied. Wheat (100%) flour incorporated coated chicken fingers were considered as the control (C). Wheat flour used in coating was subsequently replaced by three levels (T1-15%, T2-30%, and T3-45%) of *suwendal* rice flour. Sensory evaluation was carried out to evaluate texture, appearance, taste, oiliness, crunchiness and overall acceptability using ten trained panelists. T2 (30% rice flour) showed the highest values for appearance (4.81), external colour (4.31), oiliness (4.75), crunchiness (4.56) and overall acceptability (4.94). All three treatments showed significantly low TBARs (Thio Barbituric Acid Reactive Substances) values compared to control during first and third week of storage. Total aerobic plate count of all treatments and control increased throughout the storage period. However, there was no significant difference in total aerobic plate count among treatments. T1 showed the highest value for coating pick up (31.89) compared to other treatments. Furthermore, T1 showed the highest value for cooking yield (129.17) and the lowest value for cooking loss (2.06). *Suwendal* rice flour can successfully replace the wheat up to 30% in the coating of chicken finger with improved sensory and other quality characteristics.

Key words: *Suwendal*, chicken fingers, coated, rice flour

Introduction

Dietary proteins are essential for human body. Protein is available in a variety of dietary sources. Meat is an excellent source of high quality protein and also it contains large amounts of minerals and essential vitamins, eg. Vitamin B. Increased consumption of meat and meat products increases health risk in humans due to high amount of saturated fatty acids and, therefore, people prefer to consume meat or meat products with functional properties which could reduce the health risk of consuming meat products.

With the increase of income, people prefer to consume fast, ready-to-eat foods or foods that can be quickly prepared. Therefore, breaded products are increasingly becoming popular especially among urban working class people. Breaded products represent a convenient food item that is tasty and can be prepared to fit most consumers' need. Battered and breaded products are coated products in which the meat protein component is the core, surrounded by a cereal based coating. Chicken

fingers are one of the breaded products and consumers tend to eat them because of convenience, variety, economy and nutritional value. Mostly, they are battered and breaded products that need to be fried before consumption. Chicken fingers or sticks are rectangular shape cuts from frozen chicken meat or ground meat, usually coated with batter and crumbed and flash fried.

Traditional rice can replace wheat flour in bread. Abeysekera et al, (2011) have shown that traditional rice varieties of Sri Lanka are known to contain high amount of glutamic acid, vitamins and minerals and furthermore coarse grains contain high fiber content. Therefore, there is a great potential to use these rice varieties in functional food product development with various health benefits. Sri Lanka is a rice producing country where, rice is the staple food and there are over 300 different traditional rice varieties in the country. *Suwendal* is a white rice variety with milky taste and high nutritive qualities.

The objective of the present study was to explore the possibility of replacing wheat flour in a coating of chicken fingers by the flour of the traditional rice variety suwendal.

Materials and Methods

The product development was carried out at the Krest Plant of Keells Food Products PLC. Traditional rice (Suwendal) was purchased from SNA groups of company, Colombo, Sri Lanka and washed, allowed to sundry. Dried suwendal rice was ground two times by home grinder (Preethi Eco Twin Jar Mixer Grinder, 550-Watt) in order to get rice flour for bread crumb and batter. Wheat (100%) flour incorporated, coated chicken fingers were considered as control(C). Wheat flour used in coating was subsequently replaced by weight basis with three levels (T1-15%, T2-30%, T3-45%) of rice flour. Sensory evaluation was conducted to evaluate texture, appearance, taste, oiliness, crunchiness and overall acceptability using ten trained panelists. Objective evaluations such as, thiobarbituric acid reactive substances value (TBARS), proximate analysis, total plate count of chicken fingers samples were taken during three weeks of storage at -18 °C.

Four different samples were tested for appearance, external colour, taste, texture, oiliness, crunchiness and overall acceptability by using a five hedonic scale using ten trained panelists. Samples were presented simultaneously giving similar conditions to all samples. Results were analyzed by Friedman test.

Results and discussion

According to the Friedman test there was no significant difference among four treatments for taste and texture, but there were significant differences among four treatments for appearance, external colour, oiliness, crunchiness and overall acceptability. T2 (30%) showed the highest values for appearance (4.81), external colour (4.31), oiliness (4.75), crunchiness (4.56) and overall acceptability (4.94). Appearance as well as colour plays a major role in consumer perception when making buying decision. Ilo and Berghofer, (1999) have shown that colour changes can give information about the extent of browning reactions such as caramelization, maillard reaction, degree of cooking and pigment degradation during the cooking process. T2 showed the highest median value for oiliness and others showed same median value. Kimber et al. (1987) have shown that rice flour added batter

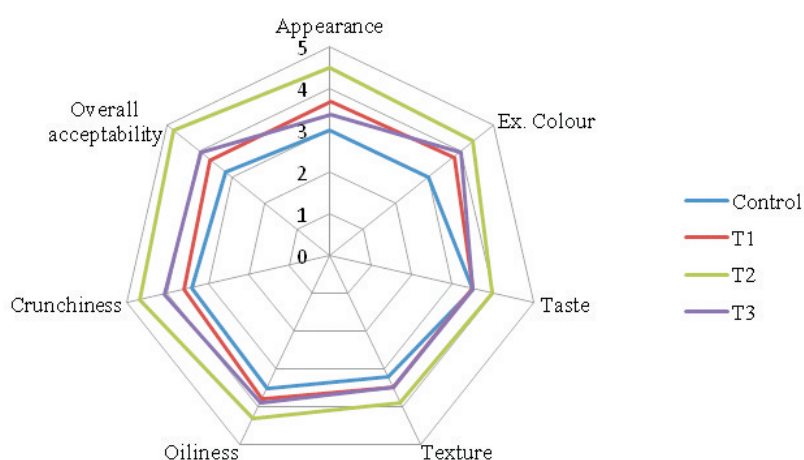


Figure 1: Spider web analysis of chicken fingers for sensory characteristics

showed higher viscosity, reduction in the oil uptake. Batter viscosity not only affected the oil uptake of the fried batter, but also the effectiveness of the food coating operation.

There was a significant difference for dry matter content in samples. Samples of T2 showed significantly higher mean values for dry matter (95.69) content while the control had the lowest dry matter (92.94) mean value. However, T1 and T3 showed no significant difference for dry matter content. However, all treatments showed almost similar values for crude fiber, crude fat and ash content. There was a significant difference for protein among treatments and the control had significantly highest crude protein (25.85), T1 had significantly lowest crude protein (22.80) and T1 and T3 have no significant difference for crude protein. The reason may rice flour contain low protein compare to wheat flour. Kumar, (2011) showed that protein content of wheat flour normally used for bread making is around 11.5% however, proximate analysis of suwendal clearly showed that the protein content of suwendal rice flour is around 7%.

There was a significant difference between T2 and other treatments for coating pick up during processing. T2 showed the lowest mean value (26.57) and T1 showed highest mean value (31.89) for coating pick up. However, there was no significant difference between control, T1 and T3 for coating pick up. This may be due to binding ability of wheat is higher compared to rice flour and particle size of bread crumb increases when more rice flour is incorporated.

T1 showed a significant difference compared to T2 and T3 for cooking yield. T1 had the highest mean value (129.17) for cooking yield whereas T2 showed the lowest mean value (122.52). Control showed a no significant difference compared to all other treatments

for cooking yield. However, incorporation of rice flour in coating would not increase cooking yield thus, T1 samples recorded more weight after frying compared to T2 and T3.

T3 showed the highest cooking loss which is significantly different from T1. T1 showed the lowest value (2.06) for cooking loss which is significantly different from the control (3.69). This may be due to particle size and binding ability of batter. When incorporation of rice flour increased the particle size of bread crumbs also increased. The larger bread crumbs increase the weight of coating but, increase of rice flour can reduce the binding ability of batter because rice flour contains low amount of protein compared to wheat flour. During frying large bread crumbs with low binding ability batters showed higher cooking loss.

During the first week of storage period T3 showed significantly lower total plate count (3.51 log cfu/g) and T1 and control have significantly higher total plate count value and T1 also not significant from control and T2. In second week there was a significant difference in total aerobic plate counts among treatments. The control had the highest total plate count (3.96 log cfu/g) which is not significant with T1 while significant with T2 and T3. The lowest count (3.72 log cfu/g) was recorded by T3. However, in the third week there was no significant difference among treatments and control for total plate count. The reason for increasing total plate counts may be attributed to conamination that may have taken place after frying of chicken fingers. Increase in the carbohydrate in meat products showed higher total plate counts in the present study. Kumar, (2011) reported that wheat contains higher content of carbohydrate compare to rice. Therefore, increase in carbohydrate content in meat products showed high microbial counts.

Conclusions

Suwendal rice flour can successfully replace the wheat up to 30% in the coating of chicken finger with improved sensory quality characteristics. This study indicated that suwendal rice flour incorporated coating inhibited lipid oxidation. Furthermore, 15% suwendal rice flour added coating (T1) showed better processing parameters such as high coating pick up cooking yield and low cooking loss

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