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Comparison of rheological properties of dough and quality of biscuits enriched with processed wheat and rice bran

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ABSTRACT

Adding the fiber sources in food formulation is one of the best methods for enriching and improving nutritional value of food. Cereal bran is one of the best and most economical sources of dietary fiber supply. In this study hydrothermaled wheat and rice bran in optimum condition and in different content (0, 4, 8%) were added to wheat flour. The result of Rheological experiment indicated that increasing in the content of wheat and rice hydrothermaled bran in dough leads into significant decrease of dough quality number and significant increase in water absorption. On the other hand, increasing the amount of rice and wheat bran was also associated with an increase in dough development time. Evaluation of texture and color changes also indicated a direct relationship between biscuit hardness, color and content of wheat and rice bran. Sensory evaluation performed by evaluators on biscuit samples also indicated a significant decrease, in case of increasing the amount of wheat and rice bran and replacing the hydrothermal rice bran in the formulation. According to the results, the use of 4% hydrothermaled wheat and rice bran is suitable for enrichment of nutritional value of biscuits and it is suggested.

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1. Introduction

The consumption of fiber among people is increasing because of its role in the health of the digestive system, reducing blood cholesterol and treating obesity[1]. The amount of fiber required for each person is 20-35 grams per day[2]. Therefore, cereal bran is considered as a rich source of fiber, valuable amino acids, minerals and antioxidants for human consumption. Rice bran is one of the side products of turning paddy into white rice, which has a high nutritional value. The annual production of rice in the country is 2.4 million tons, and if 7 to 10 percent of bran is included, the amount of rice bran produced in the country is estimated to be more than 168,000 tons annually. Considering the annual production of this by-product and its high nutritional value, the use of rice bran becomes important for producing profitable products.[3]. On the other hand, phytic acid as an anti-nutritional compound in the bran of cereals, legumes and some oil seeds with a chemical structure consisting of an inositol ring and six phosphate groups with chelating properties, causes the formation of a very insoluble complex of phytic acid with cations. It becomes bivalent like iron, which causes this compound to be removed from the body[5 and 4].The right solution to solve the problem of phytic acid in fiber is to reduce its amount. There are various ways to reduce the amount of phytic acid, which include reducing the size of bran particles, fermentation, soaking, adding malt, sprouting and hydrothermal processing, among which the hydrothermal method has the most effect in reducing the amount of phytic acid. and at the same time it is economically affordable[5 and 4].The hydrothermal process (soaking, steaming and drying) leads to breaking down its structure into myo-inositol and free phosphorus. The reason for the breaking of the phytic acid structure is the activation of the phytase enzyme inside the seed during the soaking stage and then applying heat. The optimal conditions for applying the hydrothermal method are pH equal to 5-5.4 and temperature 50 degrees Celsius[1]. One of the methods of using fiber in people's food basket is to enrich cereal products such as biscuits with bran. Biscuit has been introduced as one of the most consumed food products in the world, which is due to its reasonable price, favorable nutritional quality (mainly energy-generating), different flavors, and its long shelf life.[6]. The addition of wheat bran and rice bran at different levels (10 to 40%) to the biscuit dough increases the hardness of the dough, which was attributed to the interaction between polysaccharides and proteins.[7]. The results of Majzoubi et al.'s research (2012) showed the effect of wheat bran treated by hydrothermal method to reduce the amount of phytic acid on the physical and sensory properties of biscuits. 10% in both processed and normal forms can produce a product with desirable sensory properties[8]. Therefore, the main goal of this research is to determine the optimal level of using wheat and rice bran processed by hydrothermal method in the formulation in order to maintain the rheological properties and textural and sensory characteristics of biscuits.

2- Materials and methods

2-1- Materials

In the present study, wheat flour with a moisture content of 13.86%, gluten 26.5%, protein 10.8%, fat 2.21% and extraction degree 72%, sugar, oil, sodium bicarbonate (baking soda), sodium chloride (table salt), lecithin, powdered milk, starch and invert syrup were obtained from Nadi Company (Gilan, Lahijan Industrial City). Also, all materials used in this research were purchased from Merck, Germany.

Rice bran of the Hashemi variety in raw form with an average particle size of about 250 micrometers was obtained from Giltaz Rice Milling Factory (Chaf area of Langrod city) and wheat bran with an average particle size of about 280 micrometers was obtained from Kusheh Flour Factory (Gilan, Rasht Industrial City) and Air and moisture resistant polyethylene packages were stored in the freezer (-18 degrees Celsius).

2-2-preparation of samples

Optimum conditions of the hydrothermal process of rice bran with the help of applying the response surface method based on the central compound design and using four independent variables including temperature 43.37 degrees Celsius, time 94.38 minutes, pH equal to seven and volume ratio of buffer to bran equal to There

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were eight, under these conditions, the concentration of phytic acid was 788 ppm and the rate of color change was 22[9]. 50 grams of rice bran was soaked in eight times the volume of acetate buffer, pH equal to seven, in a 500 ml Erlenmeyer flask and covered with aluminum foil. The prepared sample was placed in an oven with a temperature of 43.37°C for 94.38 minutes, then the samples were kept in an oven at a temperature of 60°C for 24 hours. After that, they were washed several times with distilled water (on a funnel and filter paper) until the final pH was 6.2 ± 0.2, and then they were dried in an oven at 50°C to reach a moisture content of 10-11% for eight hours.[9-7w 2w 5].

For the hydrothermal processing of wheat bran, 50 grams of sample was placed in acetate buffer with a pH of 4.5 at a temperature of 55°C for 24 hours, then the samples were dried at a temperature of 37°C to reach a moisture content of 10-11%.[6].

Treatments of zero, four and eight percent of hydrothermal rice and wheat bran were selected in enriched wheat flour samples to prepare the samples (Table 1).

Table 1 Treatments specifications

Ttreatments	1	2	3	4	5	6	7	8	9
Rice bran(%)	0	4	8	0	4	8	0	4	8
Wheat bran(%)	0	0	0	4	4	4	8	8	8

2-3- Investigating the rheological properties of biscuit dough by farinograph device

The farinograph test was performed according to the international standard (AACCS4-21) and the national standard of Iran 1-3246 by the farinograph device model (FA-202) manufactured by Ardazamalian Company (Iran).[10]. The farinograph test is performed to check the rheological characteristics of the dough, which is used to determine the quality parameters of the wheat flour, such as water absorption, the optimal time of mixing the dough (development time) and the quality number of the dough.

2-4- Biscuit color evaluation

The color measurement was done using the Hunter Lab model hp-200 (b, a, L system). The following equation was used to calculate the overall color changes (DeltaE). Subtitle 1 is the average color component in the image of the control sample and subtitle 2 is the average color component in the sample image containing bran.[11].

$$\Delta E = \sqrt{\left(L_2^* - L_1^*\right)^2 + \left(a_2^* - a_1^*\right)^2 + \left(b_2^* - b_1^*\right)^2}$$

2-5- Determining the biscuit texture with a texture measuring device

Brookfield model TPA device, made in USA, was used to evaluate the texture characteristics of biscuits such as crispness and firmness.[12]. Based on this, texture measurements were made in pieces with dimensions of 25 mm. Then it was done by a probe with a diameter of 25 mm and with 50% penetration in the sample and at a speed of 2 mm/s and stopping for 30 seconds between the first and second compression.

6-2- Sensory evaluation

A descriptive test was used for sensory evaluation. This test was done to determine the intensity of sensory characteristics (aroma and taste, appearance, chewability, porosity and overall acceptance). The anonymous samples were coded with a form (based on the AACC standard, 30-74) and provided to 10 trained evaluators [13]. Biscuit grading in these forms was as follows: score 5: excellent, score 4/99-5: very good, 4-4-49: good, 3-99: acceptable and less than 3: Undesirable.

2-7-Statistical analysis

The treatments of zero, four and eight percent hydrothermal rice and wheat bran in enriched wheat flour samples according to Table 1 were analyzed in the form of a complete random design with three replications by one-way analysis of variance and with the help of SPSS software. Means were compared using Duncan's multi-range test at the five percent probability level. Graphs and tables were also drawn by EXCEL software.

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3. Results and Discussion

3-1-farinographic features of biscuit dough

Examination of farinography characteristics of dough (Table 2) indicates a significant effect of bran addition. The results of the average comparison table show that in the treatments containing bran processed by hydrothermal method, compared to the control sample without bran, an increase in water absorption, dough expansion time and also a decrease in the qualitative number of dough can be observed, which is statistically significant. has In addition, the analysis of the data confirms a significant decrease in the quality of the dough due to the addition of rice bran and processed wheat, so that the lowest quality number is related to the treatment containing 8% of processed rice bran together with 8% of processed wheat bran (56). . Also, the amount of water absorption by adding the amount of bran along with the simultaneous use of two types of wheat bran and processed rice showed a significant increase in the samples containing high amounts of processed rice bran (8%) either alone or in combination with wheat bran. Gives. Increasing the amount of hydrocolloid compounds by adding bran in the samples can be the reason for the significant rise of this variable. On the other hand, since in the process of hydrothermal gelatinization of the remaining starch in bran, it can increase the concentration of gelatinized starch and increase the water absorption capacity.[14]. Also, studies show that the presence of fiber and the formation of hydrogen bonds due to its presence and the higher amount of protein and gelatinous starch reduce the tolerance to mixing and the strength of the dough.[15]. In addition, the reduction of bran particles in the application of processing is also effective on the process of increasing water absorption or preventing the reduction of its absorption by flour. There is no significant difference between the amount of water absorption in bran processed by extrusion method with coarse particles and unprocessed.[16]. The decrease in dough consistency can be the result of dilution caused by the presence of a high amount of fiber in the samples containing high amounts of both types of bran at the same time and as a result of the reduction of intermolecular disulfide bridges responsible for stability during mixing.[5]. Also, the destruction of disulfide bonds and the gluten network leading to a decrease in dough consistency can be caused by the reaction between phenolic acid and the remaining cysteine.[17]. The researchers mention the reduction of the alpha helix bond and the formation of the beta sheet, which occurs as a result of the presence of fiber, among the reasons for the reduction of dough consistency.[7]. Although more swelling and adhesion between starch granules and gluten in bran processed by hydrothermal method improves the rheological characteristics of the dough, still the consistency of the dough in treatments containing bran is lower than the control sample.[18]. It seems that the increase in the proteolytic breakdown of proteins along with the decrease in the size of starch granules and the increase in damaged starch can be one of the factors that increase the time to reach the maximum consistency in the dough.[14]. Increasing the concentration of soluble fiber and gelatinized starch in hydrothermal processing can be one of the factors that increase the water absorption capacity of starch compared to protein and thus increase the time of dough expansion.

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Table 2 Farinography characteristics of biscuit paste containing wheat and rice bran processed by hydrothermal method

Treatment	Quality number	Water absorption (%)	Dough development time (min)
1	59[a]	59.30[c]	4.88[b]
2	58[ab]	59.30[c]	4.90[b]
3	57[b]	59.36[c]	4.90[b]
4	58[ab]	59.40[c]	4.90[b]
5	58[ab]	60.02[c]	5.00[a]
6	57[b]	59.60[c]	5.00[a]
7	57[b]	63.10[b]	5.00[a]
8	57[b]	63.15[b]	5.00[a]
9	56[c]	64.40[a]	5.00[a]

[a-d] Each column with the same code letters are not significantly different at $p<0.05$

1: (blank), 2: (4% rice bran), 3: (8% rice bran), 4: (4% wheat bran), 5: (4% rice bran & 4% wheat bran), 6: (8% rice bran & 4% wheat bran), 7: (8% wheat bran), 8: (4% rice bran & 8% wheat bran), 9: (8% rice bran & 8% wheat bran)

2-3- Texture characteristic of biscuits

Firmness is one of the most important characteristics of biscuits that participates in determining its quality. The results of the texture evaluation (Young's model) after adding wheat bran and rice processed by hydrothermal method indicate a significant increase in hardness with the increase in the amount of two types of bran in the treatments (Figure 1). So that the treatment containing two types of bran in amounts of 8% shows the highest level of hardness (N52.4). Due to the presence of fiber in bran and the possibility of interactions between starch and gluten, the increase in stiffness in the tissue can be justified. On the other hand, the decrease in volume as a result of the decrease in the number of bubbles in dough mixing is considered to be one of the reasons for the increase in stiffness[8].

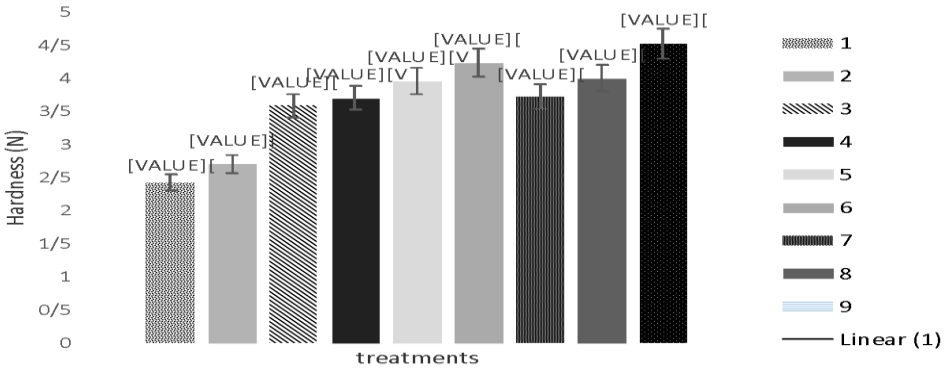

Fig1 Textural characteristic of biscuits containing wheat and rice bran

1: (blank), 2: (4% rice bran), 3: (8% rice bran), 4: (4% wheat bran), 5: (4% rice bran & 4% wheat bran), 6: (8% rice bran & 4% wheat bran), 7: (8% wheat bran), 8: (4% rice bran & 8% wheat bran), 9: (8% rice bran & 8% wheat bran)

Reduction of brittleness and increase of hardness in treatments containing amounts of 10 to 40% of cereal bran have also been reported in similar studies.[18 and 8].Yaqchi et al. (2019) also stated in the results of their research that the high amount of protein in the by-products used in the mentioned study can reduce the spreadability and thus increase the hardness of the biscuit.[16].

3-3-Changing the color of the biscuit

Determining the color difference between the samples (ΔE) compared to the control sample

showed that by adding rice and wheat bran to the biscuit, a significant color difference is created between the samples and the control sample (Table 3). The highest amount of color change is observed in the treatment containing both types of bran in the amount of 8% (13/01). It seems that increasing the amount of bran and performing hydrothermal processing causes an increase in darkness. The color change and darkening of the appearance of the product, which directly affects customer acceptance, is the result of Maillard and caramelization reactions, which depend on the amount of bran as an acceptable source of protein and sugar.[1 and 14].

Table 3 The effect of adding wheat and rice bran on biscuit color

Treatment	ΔE
1	0.00[d]
2	6.79[c]
3	10.19[b]
4	10.01[b]
5	10.79[b]
6	10.92[b]
7	12.45[ab]
8	12.08[ab]
9	13.01[a]

[a-d] Each column with the same code letters are not significantly different at $p<0.05$

1: (blank), 2: (4% rice bran), 3: (8% rice bran), 4: (4% wheat bran), 5: (4% rice bran & 4% wheat bran), 6: (8% rice bran & 4% wheat bran), 7: (8% wheat bran), 8: (4% rice bran & 8% wheat bran), 9: (8% rice bran & 8% wheat bran)

In a similar study, Majzoubi et al. (2013) also investigated the effect of adding hydrothermal wheat bran on the sensory characteristics of biscuits and found that the two factors of sugar and protein in bran and in addition water absorption by pigments and fibers in bran and acting as The buffer and the effect on pH and as a result intensifying the Maillard reaction and the formation of color in the product can result in its darkening[8].

3-4- Sensory evaluation

The sensory evaluation results of biscuits containing rice bran and wheat showed that the effect of adding the amount of rice bran and wheat simultaneously in the biscuit formulation or replacing rice bran instead of wheat bran caused a significant decrease in the evaluators' scores (Figure 2). So that the treatments containing 4% of processed wheat bran (treatment no. 7) and the combination of wheat bran and hydrothermalized rice at the rate of 4% (treatment no. 5) have the highest evaluation score, and the treatments containing 8% rice bran And 4% wheat bran (treatment no. 6) and the treatment containing 8% rice bran and 8% wheat bran (treatment no. 9) received the lowest score from the evaluators. It seems that despite the application of hydrothermal processing and its positive effect on the texture, crispiness and reduction of bran bitterness, the effect of adding the amount and changing the type of bran in amounts above 4% is evident on the sensory quality of the samples. The effect of increasing the amount of enrichment with hydrothermal rice bran in bread also indicates a decrease in the sensory quality score in values above 3%.[12].

Meanwhile, Majzoubi et al. (2012) stated that there was no significant difference between treatments enriched with oat bran up to 20%. These researchers believe that the dark color of biscuits is due to the increase in the amount of bran used before and after hydrothermal processing caused by the Maillard reaction and the use of heat in hydrothermal processing or the drying stage of bran in the oven and the stiffness of the texture and the high correlation of volume. The product is due to the effect of fiber on the dilution of wheat flour protein[8].

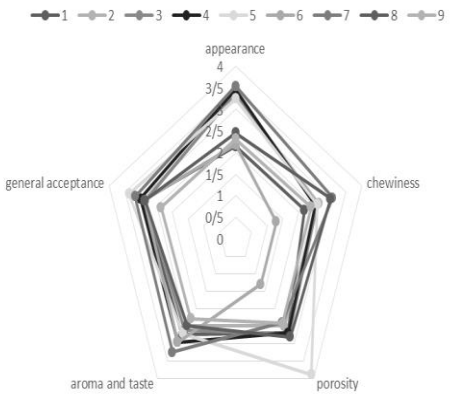

Fig 2 The effect of adding wheat bran and rice on sensory properties of biscuits

1: (blank), 2: (4% rice bran), 3: (8% rice bran), 4: (4% wheat bran), 5: (4% rice bran & 4% wheat bran),

6: (8% rice bran & 4% wheat bran), 7: (8% wheat bran), 8: (4% rice bran & 8% wheat bran), 9: (8% rice bran & 8% wheat bran)

4- General conclusion

The use of wheat bran and hydrothermal rice alone and simultaneously in the biscuit formulation in order to enrich it showed that the addition of hydrothermal bran under optimal conditions increases the absorption of water in the dough, reduces the consistency and increases the dough expansion time. Examining the changes in textural and color characteristics also indicates a significant increase in firmness and color change with increasing bran content. Considering the reduction of sensory evaluation scores in amounts above 4% in the treatments containing processed wheat bran and the combination of wheat bran and hydrothermalized rice, the treatment containing 4% of rice bran and hydrothermalized wheat, in terms of having high amounts of bioactive, nutritious compounds And the acceptable limit of rheological, textural and sensory characteristics can be suggested for the enrichment of biscuit samples.

5-Resources

[1] Lazou, A., & Krokida, M. (2010). Structural and textural characterization of corn–lentil extruded snacks. Journal of Food Engineering, 100(3), 392-408.

[2] Didar, Z., Ardabili, S. M. S., Mizani, M., Khodaparast, M. H. H., & Ghaemi, A. (2008). Effect of different method of soaking, hydrothermal and fermentation on reduction of phytic acid content in wheat bran. Food Technology & Nutrition, 5(3), 88-99.

[3] Gharib, S., Atayesalehi, A., Mohammadi, A. 2012. The effect of rice bran on rheological properties of dough and oil cake compounds, Journal of Innovation in Food Technology, 5(2), 1-7.

[4] Vahabzadeh, M., Esfahani, M., Aalami, A., Shhadi-Koumleh, A., Fallah-Shamsi, S. A., & Hemmati, S. (2015). Effect of phosphorus fertilizer levels and parboiling of paddy on phytic acid and mineral content of three rice (Oryza sativa L.) cultivars. Iranian Journal of Crop Sciences, 17(4).

[5] Abka, R., Kadivar, M., & Shahedi, M. (2016). Phytic acid reduction in four brans through fermentation, hydration and hydrothermal treatment. Journal of Food Technology Researches, 26(4), 659-665.

[6] Mosharraf, L. (2012). Phytic acid reduction by hydrothermal method. Institue of agricultural engineering and technology researches. 1:13-500.

[7] Nawrocka, A., Szymańska-Chargot, M., Miś, A., Kowalski, R., & Gruszecki, W. I. (2016). Raman studies of gluten proteins aggregation induced by dietary fibers. Food chemistry, 194, 86-94.

[8] Majzoobi, M., Nematolahi, Z., & Farahnaky, A. (2013). Effect of hydrothermal treatment on decreasing the phytic acid content of wheat bran and on physical and sensory properties of biscuits. Iranian Journal of Nutrition Sciences & Food Technology, 8(3), 171-178.

[9] Mosharraf, L, kadivar, M, shahedi, M ، (2009), effect of hydrothermaled bran on physicochemical rheological and microstructural characteristics of sangak bread ،jounal of cereal science, 49,398-404.

[10] AACC, 1-3246 Physical properties of dough- Determination of water absorption and rheological properties using farinograph device, 2-3246 physical properties of dough, determination of water absorption and rheological properties using farinograph device.

[11] Shahidi, F., Mohebi, M., Noshad, M., Ehtiati, A., Fathi, M. 2012. The effect of osmosis and sonication premederation on some qualitative properties of bananas Dried in hot air. Iranian Food Science and Technology. 7(4), 263-272.

[12] Tayefe, M., Shahidi, S. A., Milani, J. M., & Sadeghi, S. M. (2020). The effect of hydrothermal rice bran on physical, textured and sensory properties of bread. Iranian Food Science and Technology, 18(112), pp.43-52.

[13] Bagherzadeh, S., Mohammadzadeh Milani, J., & Kasaee, M. R. (2018). The effect of tartaric ester of monoglycerides and maltogenic α-amylase on physical and textural properties of pan-bread. Journal of food science and technology, 78 (15), 143-156.

[14] Gomez, M., Jimenz, S., ruiz, E., & oliete, B. (2011). Effect of extruded wheat bran on

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dough rheology and bread quality. Lwt –food sci.technol, 44, 2231-2237.
[15] YAĞCI, S. (2019). Rheological properties and biscuit production from flour blends prepared from cereal based by-products. Harran Tarım ve Gıda Bilimleri Dergisi, 23(2), 142-149.
[16] Movahhed, G. G., Milani, E., & Jafari, M. (2018). Utilization of extruded wheat bran in Barbary bread: Evaluation of sensory, color and texture properties of bread and rheological properties of dough. Food Sciences & Technology, 82(15), 129-137.
[17] Khalid, K. H., Ohm, J. B., & Simsek, S. (2017). Whole wheat bread: Effect of bran fractions on dough and end-product

quality. Journal of Cereal Science, 78, 48-56.
[18] Tayefe, M., Shahidi, S. A., Milani, J. M., & Sadeghi, S. M. (2020). Development, optimization, and critical quality characteristics of new wheat-flour dough formulations fortified with hydrothermally treated rice bran. Journal of food measurement and characterization, 14 (5), 2878-2888.

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چکیده

یکی از بهترین روش های غنی سازی و بهبود ارزش تغذیه ای، به کارگیری منابع فیبر در فرمولاسیون مواد غذایی می باشد. سبوس غلات از بهترین و اقتصادی ترین منابع تامین فیبر در رژیم غذایی محسوب می شوند. از این رو، در این مطالعه تاثیر افزودن سبوس برنج و گندم فرآوری شده به روش هیدروترمال تحت شرایط بهینه در مقادیر ۰، ۴ و ۸ درصد بر ویژگیهای رئولوژیکی خمیر، بافت، رنگ و خصوصیات حسی بیسکویت حاصل مورد بررسی قرار گرفته است. بررسی نتایج آزمون رئولوژیکی خمیر حاکی از آن بود که افزایش مقادیر سبوس برنج و گندم فراوری شده به روش هیدروترمال در خمیر، منجر به کاهش عددکیفی و افزایش میزان جذب آب شده است. از طرف دیگر افزایش میزان سبوس گندم و برنج در خمیر با افزایش زمان گسترش خمیر نیز همراه بود. ارزیابی تغییرات بافت و رنگ نیز وجود ارتباط مستقیم بین سفتی بافت بیسکوئیت، تغییر رنگ و مقادیر سبوس گندم و برنج را نشان داد. ارزیابی حسی انجام گرفته توسط ارزیابان بر روی نمونه های بیسکویت نیز، بیانگر تاثیر منفی و کاهش معنی دار نمرات ارزشیابی، در صورت افزایش میزان سبوس گندم و برنج فراوری شده و جایگزینی سبوس برنج هیدروترمال شده در فرمولاسیون، برویژگیهای حسی می باشد. با توجه به نتایج حاصل، استفاده از میزان ۴ درصد سبوس گندم و برنج هیدروترمال شده جهت غنی سازی محتوای تغذیه ای بیسکوئیت مناسب بوده و پیشنهاد می گردد.