JRIFST

www.journals.rifst.ac.ir
Journal of Research and Innovation
in Food Science and Technology

Research Institute of Food Science and Technology

Volume 8, Issue 3, Autumn 2019, Page 213-224
Document Type: Extended Abstract
DOI: 10.22101/JRIFST.2019.09.17.831

Extended Abstract

Replacing of Pea and Lentil Seed-Flour Instead of Chicken Meat in 55% Semi-vegetarian Cocktail Formulation

Amene Abbasi Monfared[1], Mohsen Zarghar[2], Mahdi Abedini Naeini[3]*

1- MSc. Graduate, Department of Food Science and Technology, Mahalat Branch, Islamic Azad University, Mahalat, Iran
2- Assistant Professor, Department of Food Science and Technology, Mahalat Branch, Islamic Azad University, Mahalat, Iran
3- Ph.D. Student in Operation Research, Farabi Campus of Tehran University, Tehran, Iran
* Corresponding author (mahdi.abedini@ut.ac.ir)

Received: 2018.07.17; **Accepted**: 2019.01.19

Abstract

Considering the industrialization of society and people's tendency to fast foods, consumption of these products has increased compared to the past. Therefore, enriching these products can be influential in promoting public health. In this research, the researchers checked semi-vegetarian sausage with higher quality and nutritional value and lower price, physicochemical, chemical, microbial and sensory properties by replacing pea and lentil seed flour at three levels of 5, 10, and 15 % instead of chicken in the formulation of sausage cocktail. To check this product, Sausage samples were tested by physicochemical, microbial, chemical and sensory experiments. Data from three iterations of this study's tests were analyzed by Duncan test. The results of variance analysis indicated a significant difference between protein, ash, hardness of product and free water WHC content of sausages and control group. Also, these showed that replacement of chickpea and lentil seed flour in sausage did not have a significant effect on fat, moisture, cooking loss, and pH content of the product. The results from sensory test indicated that parameters' scores decreased significantly with the increase of replacement level.

Keywords: Cocktail, Lentil, Pea, Sausage Formulation

Introduction

Access to proper food is one of the social and cultural rights of individuals and inadequate food access is a major social issue that has been going on for centuries (Azadbakht & Esmaillzadeh, 2009). Meat and meat products are the most important sources of protein supply for the body, whose enriching as much as possible can be useful in improving the health of people in the community (Jokar, Hashemi Nasab, Ghanaatzade, Farahnaky, & Hosseini, 2012). Regarding the lack of animal meal (white and red) and the high cost of this rich source of protein, it is necessary to replace the alternative source of nutrients that can supply protein, fiber, phosphorus and calcium for the body and also could be affordable. After meats, legumes are the second source of protein that has these conditions and can be used.

This research is aimed at producing semi-vegetarian sausages, seeking to replace lentil and chickpea flour at rates of 5, 10 and 15 % in the formulation of 55% cocktail sausage rather than part of chicken meat. In addition to providing and increasing the required nutrients for the body, it should include the variety of meat products, quality improvement and price reduction.

Materials and methods

Research method

This research method, in terms of purpose, is fundamental and developmental but in terms of methodology, is experimental.

Method

In the first stage, chicken meat entered the cutter. Then nitrite and phosphate (to stabilize the color and create the proper texture) and salt (to taste and disable microorganisms) were added to it. After cutting meat, lentil or chickpea flour were added to 5, 10 and 15 % depending on the production sample. In the next step, starch, then oil and finally ascorbic acid and some spices were added. It should be noted that during the processing steps, ice was added in order to prevent the rising temperature. Then the mixture entered the filler machine. The baking step was carried out at 80 °C in 90 min, and finally it took 20 min of cold water and took 48 h in the fridge.

Necessary tests

In order to bring this research to a successful conclusion, the following experiments have been carried out on samples of production and control sausages:

- Chemical tests such as protein, fat, moisture and ash on chickpeas and lentils floor.
- Physical and chemical tests of sausage produced including pH, cooking loss, texture analysis, outlet water.
- Sausage microbial tests including total bacterial count, coliform, mold and yeast, clostridium perforogenes.
- Sausage sensory test including color, taste, texture and appearance.

Results and discussion

The results of variance analysis of protein, like Borghei, Baghaei, & Motamedi (2016), shows Significant differences between the produced sausages and the control sample (P<0.05). Regarding ash, this significant difference is also consistent with the research by Choe, Kim, Lee, Kim, & Kim (2013). However, this difference in fat and moisture is not confirmed (Table 1).

Table 1. The results of the chemical test of different sausage samples

Sausage type	Protein (%)	Ash (%)	Fat (%)	Moisture (%)
Control sample (%)	12.06^{a}±0.15	2.73^{a}±0.06	18.16^{a}±0.04	60.09^{a}±0.02
Sausage with 15% chickpea flour	15.55^{e}±0.02	3.07^{c}±0.04	18.14^{a}±0.17	60.46^{a}±0.30
Sausage with 10% chickpea flour	14.03^{d}±0.02	2.95^{bc}±0.04	17.99^{a}±0.10	60.29^{a}±0.18
Sausage with 5% chickpea flour	13.11^{b}±0.03	2.84^{ab}±0.35	17.79^{a}±0.39	60.19^{a}±0.08
Sausage with 15% lentil flour	17.06^{f}±0.04	3.12^{c}±0.06	17.87^{a}±0.18	60.38^{a}±0.32
Sausage with 10% lentil flour	15.56^{e}±0.03	2.85^{ab}±0.02	17.80^{a}±0.26	60.44^{a}±0.43
Sausage with 5% lentil flour	13.98^{c}±0.03	2.8^{ab}±0.25	17.78^{a}±0.10	60.30^{a}±0.38

*Numbers are the average of three ± standard deviations.

*Non-similar letters in each row and column indicate a significant difference (P<0.05).

The results of the texture analysis test (Table 2), as well as the research of Choi *et al*. (2010), showed a significant difference between the lentil production samples of 10 and 15% and chickpea 15% with the control sample and represented the stiffening of the product texture by increasing the amount of seeds flour. The result of this study is similar to the research by Borghei *et al*. (2016), because replacing the seeds flour instead of the meat in the sausage, creates a significant difference between the WHC of the produced specimens and the control sample. In the case of pH tests and cooking loss, the results did not show a significant difference between the samples.

Table 2. The results of the physical and chemical test of different sausage samples

Sausage type	pH	Texture analysis (N)	Cooking loss (%)	Outlet water (%)
Control sample (%)	6.11^{a}±0.005	15.42^{a}±1.84	7.13^{a}±0.13	7.53^{f}±0.10
Sausage with 15% chickpea flour	6.07^{a}±0.02	22.65^{d}±1.01	7.05^{a}±0.16	3.18^{a}±0.25
Sausage with 10% chickpea flour	6.05^{a}±0.04	20.52^{c}±1.24	7.04^{a}±0.02	4.07^{c}±0.05
Sausage with 5% chickpea flour	6.11^{a}±0.51	17.83^{b}±0.86	7.16^{a}±0.04	5.72^{e}±0.05
Sausage with 15% lentil flour	6.08^{a}±0.02	18.32^{b}±0.31	7.08^{a}±0.15	5.62^{e}±0.41
Sausage with 10% lentil flour	6.06^{a}±0.02	16.99^{ab}±0.70	7.09^{a}±0.07	5.22^{d}±0.56
Sausage with 5% lentil flour	6.11^{a}±0.025	16.35^{ab}±0.61	7.11^{a}±0.06	3.46^{b}±0.04

*Numbers are the average of three ± standard deviations.
*Non-similar letters in each row and column indicate a significant difference (P<0.05).

The results of microbial tests for the control and produced samples have been reported negatively (Table 3). This result can show that, under proper cooking conditions (suitable raw materials, temperatures above 80 °C with long pressures and cooking time), the factors affecting the growth of bacteria, mold, and yeasts and coliforms are eliminated.

The results of the sensory tests show that all sensory parameters in the produced sausages compared to the control sample are acceptable. However, due to the darkening of the produced sausage containing lentil seeds, the hardening of the sausage texture containing chickpea flour and the taste variation in high percentage of seeds flour, the sensory parameters score is reduced by increasing the replacement level, except for the sausage containing 5% chickpea flour.

Table 3. The results of the sensory test of different sausage samples

Sausage type	Color	Taste	Texture	Appearance	General acceptance
Control sample (%)	6.30^{c}±0.67	6.30^{d}±0.82	5.90^{e}±0.73	5.90^{d}±0.85	6.10^{d}±0.73
Sausage with 15% chickpea flour	4.40^{b}±0.52	4.11^{a}±0.78	3.30^{a}±0.70	4.50^{c}±0.72	3.66^{a}±0.70
Sausage with 10% chickpea flour	4.90^{b}±0.70	4.20^{ab}±0.64	3.90^{ab}±0.70	4.40^{c}±0.68	4.40^{bc}±0.93
Sausage with 5% chickpea flour	6.40^{c}±0.69	4.90^{bc}±0.73	5.20^{d}±0.63	4.80^{c}±0.78	5.80^{d}±0.63
Sausage with 15% lentil flour	3.80^{a}±0.78	3.80^{a}±0.63	4.40^{bc}±0.51	2.70^{a}±0.67	3.60^{a}±0.51
Sausage with 10% lentil flour	4.50^{b}±0.84	4.10^{a}±0.73	4.50^{bc}±0.84	3.40^{b}±0.51	4.00^{ab}±0.66
Sausage with 5% lentil flour	4.60^{b}±0.51	5.10^{c}±0.73	4.90^{cd}±0.73	4.60^{c}±0.51	4.80^{c}±0.43

*Numbers are the average of three ± standard deviations.
*Non-similar letters in each row and column indicate a significant difference (P<0.05).

Conclusions

The purpose of the present study is to improve quality, increasing the value of sausage and also reducing the cost of sausage production .The results of this study showed that in order to produce semi-vegetarian sausage, peas and lentils can be used in sausage and thus a product with a higher percentage of nutrients will be produced. Without significant difference in the amount of moisture and fat, the ash and protein amount of the product increased in comparison with the control sample. While sensory parameters were relatively reduced, they were still at an acceptable level.

References

Azadbakht, L., & Esmaillzadeh, A. (2009). Diet variety: a measure of nutritional adequacy and health. *Journal of Qazvin University of Medical Sciences, 13*(2), 88-98 (in Persian).

Borghei, M. a. s., Baghaei, H., & Motamedi, A. (2016). Replacing of pea and lentil seedflour in chicken sausage and investigation of physicochemical and sensorial properties of this product. *Journal of Research and Innovation in Food Science and Technology, 4*(4), 315-324 (in Persian).

Choe, J.-H., Kim, H.-Y., Lee, J.-M., Kim, Y.-J., & Kim, C.-J. (2013). Quality of frankfurter-type sausages with added pig skin and wheat fiber mixture as fat replacers. *Meat Science, 93*(4), 849-854. doi:https://doi.org/10.1016/j.meatsci.2012.11.054

Choi, Y.-S., Choi, J.-H., Han, D.-J., Kim, H.-Y., Lee, M.-A., Jeong, J.-Y., . . . Kim, C.-J. (2010). Effects of replacing pork back fat with vegetable oils and rice bran fiber on the quality of reduced-fat frankfurters. *Meat Science, 84*(3), 557-563. doi:https://doi.org/10.1016/j.meatsci.2009.10.012

Jokar, A., Hashemi Nasab, A., Ghanaatzade, L., Farahnaky, A., & Hosseini, M. (2012). Using germinated pinto bean flour instead of wheat flour in producing sausage. *Iranian Journal of Nutrition Sciences & Food Technology, 7*(1), 111-118 (in Persian).

Extended Abstract