ADDITION OF OAT FIBER IN MEAT BREADED RESTRUCTURED PRODUCT

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Abstract - Breaded meat products represent a category with great potential for the application of functional ingredients with health appeals. This class of products is well accepted by the population, by its feature, practicality and convenience. The technology of breaded products allows you to add nutritional value and increase its shelf life. The value is given by the increase in income that the process allows to improve appearance and for providing diversification of flavor. The aim of this work is to add Oat Fiber in meat breaded product restructured (nuggets), in order to raise its nutritional value by inserting insoluble fibers. With this, offer a product with high content of fiber for the population and also to expand the use of sub-products of vegetable in industrialization of meat. The results obtained with breaded chicken indicate that there is a difference between the content of proteins and lipids, respectively according with the increase in the addition of Oat Fiber. In moisture, the samples with the addition of 6% of Oat Fiber presented a reduction, in water contents, but not noticed sensorially. Both formulations with 3% and 6% of Oat Fiber were well accepted by the panelists This analysis also indicated an intention to purchase, where 47.61% of panelists indicated the formulation of 3% and 42.90% indicated intent to purchase the formulation with 6% Oat Fiber.

Key Words – Nuggets, Poultry meat, Oat hulls

I. INTRODUCTION

In recent years, there has been a change in life style of the population in view of facilities encountered to acquire foods such as pre-cooked, frozen and ready to eat in the market, which leads to a lower consumption of natural foods and consequently decreases the consumption of food sources of dietary fiber which is associated with increased number in chronic diseases. The number of people seeking a healthier lifestyle with a balanced diet, choosing foods with low levels of fats and sugars and higher amounts of fiber, has increased significantly in recent years. These ingredients must meet this need without interfering in two other major issues: product quality and consumer health, which is increasingly aware and critical of their food. According to information from Nielsen Institute, breaded market increased 5% in volume in 2010, much because of the great versatility, practicality and affordability in the face others available to the consumer market. These are considered by the industry a great product, because its aggregate value is high since their production costs are low and are characterized by their great convenience in consumption. Therefore, this study aims to develop and analyze a product that uses coated meat and mechanically separated meat enriched with Oat Fiber aiming to use together by products generated by the poultry slaughterhouse and industries to develop new meat products with functional properties so far not naturally found in such products. Some of the ingredients with functional properties have been applied in the food industry, and among them we highlight the dietary fibers, constituting over 50% of the total ingredients used worldwide without [1]. The functional segment is considered the new frontier of the food market, with annual growth of 10%, three times the rate for conventional food products in the world [2]. The addition of fiber in food can change the consistency, texture, rheology and consequently the sensory characteristics of the final product. The fiber may also be used with technological and economic purposes [3]. According

THEBAUDIN [4] dietary fibers are not only desirable for its nutritional properties, but also for its functional and technological properties and because they can still be used to increase the demand for agricultural products and by-products as ingredients for the food industry. The proposed use of Oat Fiber came from a more refined analysis on available data company-university partnership which showed great potential in the application of this fiber in breaded meat products and from the large production of mechanically separated meat (CMS) in the slaughterhouses in the region and that when aggregated could result in a new kind of product with singular characteristics being offered to the consumer market. A simple consideration of these two factors shows the great viability in developing this project because a double gain associated with the quality and the availability of a new product to be developed will be obtained.

II. MATERIALS AND METHODS

The process of elaborating of breaded meat with the addition of oat fiber was made in the meat plant of Federal Technological University of Paraná - UTFPR. The oat fiber was produced by SL Alimentos. Were prepared two different formulations of breaded containing added 3% and 6% of Oat Fiber, besides the control formulation with no added fiber. The analysis Moisture followed the methodology of Instituto Adolfo Lutz - 012/IV [5]; Analysis of ashes by Adolfo Lutz Institute - 018/IV, lipids is based on AOCS official method (3-49 modified AOCS Bc[6]), adapted by Embrapa and the determination of protein content was conducted by Kjeldahl digestion process (Adolfo Lutz 036/IV). Carbohydrates were calculated by the percentage difference from the other components (except fiber); The water holding capacity was determined using the method by Robertson [7] and the rate of water absorption is measured by the AACC [8] [method 56-20, modified by Jin et al (1995). In Oat Fiber were made the following physico-chemical analysis: Moisture (AACC 44-19), ash (AACC 08-01), lipids (3-49 modified AOCS Bc); Protein (AACC 46-12) Carbohydrates (will be calculated by difference). Was also fractionated the ratio between total dietary fiber (a) Soluble fiber (b) Insoluble fiber; composition of fibers (cellulose, hemicellulose and lignin) of Oat fiber. The sensory evaluation was performed with scale test preferably according to Dutcosky [9] with 0-5 points and buying intention with 30 untrained panelists from UTFPR. The calculations of production costs were carried out through the relationship between price per kilo and amount of raw material used in the formulation. Results were submitted to variance analysis by Statistic software version 10.0. [10]

III. RESULTS AND DISCUSSION

As a result, the characterization of oat hulls can be seen in Table 1, which is complemented by Table 2, where there is the composition ratio of fiber present in oat hulls. We observe that this is a material with a high content of total and insoluble fiber constituting a factor highly beneficial to human physiology because the amount recommended daily intake is between 25 and 30 g of total dietary fiber, 75% of these being consisting of insoluble fibers.

Table 1 - Chemical composition of oat hulls

	(%)
Proteins	4,30±0,12
Ashes	3,50±0,02
Lipids	1,83±0,04
Total Dietary Fiber	88,05±0,57
Soluble Dietary Fiber	0,74±0,17
Insoluble dietary Fiber	87,31±0,19
Carbohydrates	2.32

Table 2 - Composition of fiber of oat hulls

COMPONENTES	**(%)**
Cellulose	48,09±0,78
Hemicellulose	29,45±1,76
Hemicellulose A (insoluble)	23,13±0,43
Hemicellulose B (soluble)	6,32±0,98
Lignin	6,53±0,10
Insoluble Pectin	3,98±0,36

After characterization of fiber, different formulations were performed from a standard, which the meat percentage varied in proportion to the addition of Oat Fiber. At the end of testing

two formulations were selected with 3% and 6% Oat Fiber. They were then subjected to physicochemical and sensory analyzes. Table 3 shows the chemical composition of breaded product.

Table 3 - Composition of the physical chemistry of breaded product (nuggets) with the addition of Oat Fiber

	Control	3%	6%
Moisture	45.02[a] (±0.78)	45.56[a] (±1.08)	43.75[b] (±0.90)
Proteins	18.86[a] (±2.87)	18.10[a] (±1.00)	14.66[b] (±0.99)
Lipids	16.64[a] (±1.11)	15.52[b] (±0.53)	20.96[c] (±0.76)
Ashes	2.99[a] (±0.01)	2.90[b] (±0.03)	2.61[c] (±0.01)
carbohydrates	16.49	17.92	18.02

Means followed by different letters on the same line differ by t-test at 5% significance level ($p \leq 0.05$). The teste are realized in triplicate.

It was observed that the addition of Oat Fiber of physicochemical changes the profile composition of the product, which the increase in the addition of fiber resulted in decreased protein and moisture contents. However to lipids the opposite occurs, since the higher fiber addition, the greater the absorption of lipids, which occurs during the stages of pre-frying the nuggets. Among the results, specifically for moisture is important to note that the content of water is crucial to the quality of meat products, so when there is a reduction of water, it is expected that there are consequences, especially in sensory aspects of the product being developed. In the preparation of formulations, the control treatment had 8% added water, whereas treatments 3% and 6% Oat Fiber had 17% and 26% of added water, respectively. In calculating the cost, values of $ 2.49, $ 2.29 and $ 2.10 (U.S. dollars) were obtained for control, 3% and 6%, respectively. The combination of Oat Fiber and water result in lower product cost as well as increasing the nutritional value of the final product. In tests of sensory analysis was verified the potential of consumers responded in relation to the acceptance of this product. It was expected that would be indicated by consumers that the formulation with 6% Oat Fiber would not be well received, especially by presenting lower water content in their formulation, however this information was not detected. Figure 1 indicates the intensity of consumer preference, compared with formulations containing 3% to 6%. It was observed that the panelists had good acceptability of the enriched formulations presented, showing a slight preference for the formulation with the addition of 6% Oat Fiber compared to 3%.

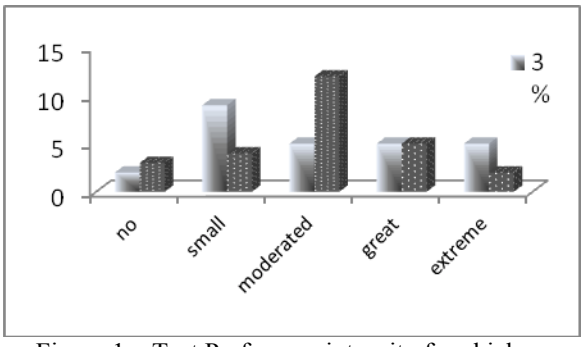

Figure 1 – Test Preference intensity for chicken restructured products (nuggets) with the addition of Oat Fiber

This result can be corroborated in relation to buying intention test (Figure 2), it was observed that the formulations showed profiles interested consumers since it was more than 80% of purchase intention for formulations containing added fiber, demonstrating a positive result for this type of product.

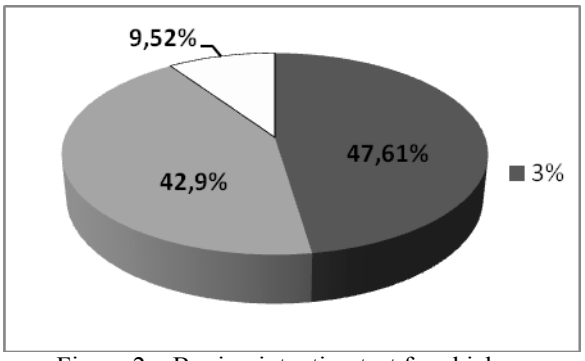

Figure 2 – Buying intention test for chicken restructured products (nuggets) with the addition of Oat Fiber

IV. CONCLUSION

It is concluded that addition of Oat Fiber is a viable option for the development of restructured meat product, and is presented as an alternative source of fiber in food of the population and a more affordable product, since the inclusion of the fibers results in lower production cost.

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REFERENCES

1. Saura & Calixto, F (2006). Evolución del concepto de fibra. In F. M Lajolo, E. W. Menezes, Carboidratos em alimentos regionales ibero americanos (pp 88-96). São Paulo: Edusp

2. Sociedade Brasileira de Alimentos Funcionais - SBAF (2007). In: Salgado, J. M. O que são alimentos funcionais.

3. Guillon, F. & Champ, M (2000). Dietary fiber functional products. In G. R. Gibson, C. M. Willians, Functional foods: concept to product (pp 140-147). Boca Raton: CRC Press

4. Thebaudin, J. Y. & Lefebvre, A. C. (1997). Dietary fibers: Nutritional an technological interest. Trends in food Science & Technology: 41-48.

5. Instituto Adolfo Lutz (2005). Métodos físico-químicos para análise de alimentos. Brasília.

6. AOCS - American Oil Chemistry Society (2009). Sampling and analysis of oilseed by-products. Boulder: David Firestone

7. Robertson, J. A. (2000). Hydratation properties of dietary fiber and resistant starch: a european collaborative study (pp 72-79). Lebensmittel Wissenschaft Tecnology.

8. AACC - American Association of Cereal Chemistry (1990). Aproved Methods of the American Association of Cereal Chemists. Minnesota: St Paul.

9. Dutcosky, S. D. (2011). Análise Sensorial de Alimentos. Curitiba: Champagnat.

10. STATSOFT (2011). Statistica: data analysis software systems. Version 10.0. Tulsa: StatSoft.