International Journal of Multidisciplinary Research and Development
Online ISSN: 2349-4182, Print ISSN: 2349-5979; Impact Factor: RJIF 5.72
Received: 13-03-2019; Accepted: 15-04-2019
www.allsubjectjournal.com
Volume 6; Issue 6; June 2019; Page No. 75-79

Development and quality evaluation of pulse (soya) based beef nuggets

Sahreen Nazir
Islamic University of Science and Technology, Awantipora, Jammu and Kashmir, India

Abstract
The expense of beef source protein is expanding step by step. So it is important to examine the utilization of less expensive and nutritive options in different meat businesses. The examination was directed with the end goal of exploring the incorporation of soya meat in beaf nuggets and its impacts on physical characteristics, nourishing arrangement and tangible quality with five (5) treatments, 0% (T0), 25% (T1), 50% (T2), 75% (T3) and 100% (T4) having three (3) replications. The results indicated that the incorporation of soya meat decreased moisture, crude protein, ether extract, and cooking loss but increased carbohydrate, ash and cooking yield in beef nugget samples. Highly significant (<0.0001) difference was observed in moisture, crude protein, ether extract, ash, carbohydrate and cooking yield. L* values increased and a* values decreased with a high level of soya meat incorporation. No significant difference was observed in the color parameter except in L* values. Incorporation of soya meat decreased aroma and taste score of beef nugget whereas appearance and texture indicated the highest score. Production cost was reduced for incorporating soya meat in a beef nugget. Beef nugget treated with 50% and 100% soya meat found to be more acceptable in terms of sensory evaluation.

Keywords: Beef Nugget; Soya Meat; Characteristics; Price

1. Introduction
The earliest stage of human presence without a doubt relied upon chasing and assembling of wild nourishments from nature. Amid that period no plants or beefs were likely trained. Apparently, various kinds of crude civic establishments created with the progression of time. Dynamically people created mind and intellectual elite and never again depended on the visually impaired powers of nature and had in this way, went into the controlled generation of sustenance for his very own necessities. Despite everything he needed to adapt to negative seasons, misfortunes through floods, hail and dry spells; and the toll taken by rodents, creepy crawlies, ices, and other antagonistic powers. The unavoidable non-delivering periods of the calm zones and parts of the tropics must be survived and aced by creativity. Up to the finish of the nineteenth century, oneself continuing ranch was a late example of this sort of nourishment arrangement. It ought to in any case, be accentuated that all phases of improvement still exist on earth and are spoken to in the social orders with different degrees of crudeness. Nourishment has been the essential need of life. The living body must eat every day, except nourishment is developed regularly. Sustenance is a composite of three substances, that are devoured by living beefs for development, upkeep and generation. With the exception of maybe for water and salts, every one of these substances are of the organic root. Sustenance must give a persistent supply of vitality and with these basic mixes, which can't be delivered. For vitality, the body oxidizes a significant part of the starches, proteins, lipids to carbon-di-oxide and water but unfit to orchestrate numerous fundamental mixes like amino acids, and unsaturated fats and so forth 2 Proteins are intricate natural nitrogenous mixes, which contain carbon, hydrogen, oxygen, nitrogen, sulphur and phosphorous. The nearness of nitrogen recognizes protein from sugar and fats. Proteins are fundamental forever forms. They assume a significant job in numerous biochemical, biophysical and physiological procedures in the body. The vast majority of the compounds are additionally proteins. The significant elements of dietary proteins are to supplant the every day loss of body proteins, to give amino acids to the development of tissue proteins amid development, to give amino acids important to the arrangement of catalyst, blood proteins and certain hormones of proteineous nature and to give amino corrosive to the development of baby in pregnancy and for the creation of milk protein amid lactation. As prescribed by FAO/WHO master bunch the day by day necessity of protein represents 1.0 gram of protein per kilogram of body weight. The protein recompense is all the more amid explicit physiological conditions as pregnancy and lactation and furthermore amid early stages and youth. Protein, the most significant segment of sustenance can be of plant birthplace or beef starting point yet beef proteins have favorable position of greater absorbability, higher organic esteem and nearness of fundamental amino acids, which are typically missing or ailing in plant proteins. Among different wellsprings of beef root wc have egg, milk, meat, sheep, chevon, fish and so on. Other than egg and milk, which are viewed as generally complete nourishments, are separated into veggie lover sustenances in contrast with the non-vegan sustenances as per the Indian arrangement, however eggs are characterized into both veggie lover and non-vegan sustenances relying on whether egg is prepared or not. Lamb and chevon are observed to be wealthy in amino acids particularly argenine, lucine and isolucine (Srinivasan and Moorjani, 1974). Among the proteins of plant starting point, oats, beans and heartbeats are the best sources. These proteins are viewed as halfway fragmented in light of the fact that fractional or complete nonattendance of a portion of the fundamental amino acids. Accordingly, 3 for the veggie lover portion it is normally prescribed to

enhance their one segment of oat/beat with other segment of grain/heartbeat to conquer this insufficiency. With the sustenance researchers and human nutritionists being increasingly worried about the predominant inadequacies, suggest the supplementation/stronghold/complementation of the grain based nourishments with other rich wellsprings of amino acids. Consequently complementation can be accomplished by blending two plant-based fixings, for example, wheat-flour and soy-flour; bracing meat based items with vegetable proteins as fillers or extenders and so on. The scan for new flighty wellsprings of protein to meet our prerequisites of the regularly extending populace is the desperate need of great importance. Soybean with 40 percent protein and 20 percent oil has an extraordinary potential in taking care of the issues of the PEM (Protein Energy Malnutrition) that exists in numerous pieces of India. In spite of their nourishing centrality soybean items in India are not getting to be mainstream as dietary instruments as a result of their trademark beany flavor and nearness of antiiiutritional factors. In spite of the fact that the broad Indian cooking renders the trypsin inhibitor (TI) as practically inadequate. For a long time quick development in meat based inexpensive food industry has brought about an expanded usage of plant proteins as folios, fillers and extenders in comminuted structure. Readiness of useful meat emulsion is the premier advance for the assembling of good quality items. Extenders, for example, non-fat-dry-milk-solids texturized vegetable proteins and plant starches have been utilized to boost quality and limit cost. Non-meat fixings are helpful in emulsified meat items in light of their utilitarian properties (emulsification, water and fat restricting limit, improvement of surface and appearance). Expansion of non-meat fixings to meat items decreases fat and cholesterol content by weakening. In certain occurrences, they decline cooking misfortunes with little impact on surface. These items are 4 for the most part alluded to as covers or extenders, fillers, cmulsifiers or stabilizers are added to meat definitions to lessen plan costs, to improve cooking yield, to improve cutting qualities, to improve enhance, to expand the protein content, to improve the emulsion strength, to improve fat official, to build water authoritative and to decrease shrinkage amid cooking The natural estimation of the protein devoured depends up on the amount and extent of the fundamental amino acids. For whatever length of time that the sustenance is of beef birthplace, the fundamental amino acids are available in the amounts that approach the proportions vital for protein arrangement in people; a large portion of the basic amino acids can be found in plant materials significant as protein sources however typically just in littler amounts than would normally be appropriate. Since the weight training estimation of a protein is portrayed by the fundamental amino acids present at all amount, the nutritive estimation of the plant, is commonly not as much as that of beef protein. Creation costs, despite what might be expected, are a lot higher for beef proteins than for plant proteins. Along these lines, an insufficiency can emerge in organically viable proteins, notwithstanding a lack in adequate vitality substance and absolute protein content, for the most part with shoppers of lower earnings. Finished plant proteins have picked up acknowledgment as meat substitutes/extenders in various pieces of the world. The two mechanical procedures for the arrangement of meat analogs depend on the turning of protein disengages and amass into fiber (spun filaments) and expulsion. The chewy gel approach dependent on the gelation property of vegetable proteins is one more potential strategy for the readiness of meat analogs. The significant properties for the planning of meat analogs are high dissolvability of proteins, stream properties of protein scatterings, rheological conduct in connection to warm (gelation), water take-up and maintenance and emulsification limit of the protein. 5 The control of sustenances that appears to stress buyers isn't new, anyway the impression of this control is new a result of increases across the board training. Prior to the only remaining century, individuals didn't know and to be sure we're not worried about how their nourishment was readied. Today buyers know that something has been done to their sustenance yet lamentably, just in constrained sense (Kalia and Sood, 1996) Considering that protein inadequacy is a noteworthy issue confronting the present reality, especially in the immature and creating nations, there has been a quickly developing mindfulness for abusing brilliant ease plant proteins. Nutritionists and technologists are worried about making the quality and amount of plant proteins satisfactory for human sustenance. Some work has been done on the texturized proteins from soybeans in the state of protein secludes, protein focuses and spun filaments. An endeavor was made in the present investigation to utilize soy proteins to achieve the accompanying destinations:

- To endeavor the advancement of reproduced veggie lover meat items dependent on nearby taste and surface prerequisites.
- To utilize soy proteins as meat simple and meat extenders.
- To decide the proximate substance of the readied sustenance items.
- To work out the financial aspects of the plans created and institutionalized It is trusted that the consequences of the present examination would bear some significance with the understudies, researchers, purchasers, nutritionists, technologists and industry faculty inspired by this zone. It will locate its immediate application in the R and D zone of accommodation nourishments, comminuted meat items and in mimicked items dependent on texturized vegetable proteins.

It is hoped that the results of the present investigation would be of interest to the students, scientists, consumers, nutritionists, technologists and industry personnel interested in this area. It will find its direct application in the R & D area of convenience foods, comminuted meat products and in simulated products based on texturized vegetable proteins.

Materials and Methods

The study entitled 'Development of meat analogues and extenders using soy-proteins (o suit Indian ' was carried out in the Department of Food Science and Nutrition, Islamic University, of science and technology Kashmir, academic sessions of 2018-19

The experiment included the collection of raw materials (soybean, beefnuggets, spices, ingredients etc.) of required quality and specification. The preparation soy-protein-isolate and soy-protein-concentrate was undertaken. The utilization of soy-isolate and soy-concentrate as extenders, extruder and analogue was undertaken. A shelf life study of

the products was done up to three weeks in refrigerated conditions. The physico-chemical and organoleptic evaluation of the fresh as well as the stored products was also done.

The experiment mainly envisaged the following major considerations:

1. Standardization and development of soy-protein-isolate and soy protein-concentrate from soybeans.
2. Utilization of soy-isolate and soy-concentrate as extender, in the preparation of the products like patties, balls and nuggets after blending with mutton in the ratio of 90:10, 80:20 and 70:30.
3. Development of minced meat nuggets using soy-isolate and soyconcentrate keeping the protein source as the major ingredient and blending it with mutton in the ratio of 90:10, 80:20 and 70:30. 29
4. Development of spun fibres and its utilization in the development of meat analogues.
5. Storage study of patties, balls and nuggets up to 21 days in refrigerated conditions.
6. Physico-chemical and organoleptic evaluation of products to assess its quality and acceptability.

Experiment design

The experiment was scientifically designed according to the Completely Randomized Block Design (CRBD) and replicated three times. One treatment in each set was kept as control for the sake of comparison and interpretation of results.

Experimental layout the experiment was laid out scientifically. An effort was made to keep the determinate, indeterminate errors and chance variables under control. Wherever necessary appropriate correction factors were applied to minimize the errors.

Development of minced beef nuggets

The minced beef, partially steam cooked was added in the soy protein concentrates and isolates, which was already in fine powdered form. The whole mixture was made into fine dough of desirable consistency by adding water. The amount of isolate and concentrate powder was replaced with meat at the rate of 10, 20 and 30 per cent. The noodle dough was extruded through extruder and was dried in tray dryer maintained at 65+ 5°C for 6 - 8 hrs. The basic recipe followed in the preparation of minced beef noodles. Development of texturized protein the basic principle behind the preparation of texturized protein was to give the protein a texture, which is somewhat similar to that of the meat. For this, soy protein isolate and concentrate (2 g) were dissolved in 20 "C water. In the slurry, an alkali was added to gelate the protein. This gelled mass was 36 extruded in a coagulating acidic bath to precipitate proteins. The fibrous precipitates were washed with glass distilled water 8-10 times and then were frozen before further use (Fig 3.3). 3.3.6.2 Utilization of texturized protein as meat analogue the texturized protein developed was minced in electric mincer (National brand) with other ingredients as indicated in Table 3.3 and were molded in the shape of patties in Petri dishes. The molded patties were spread over the greased surface. The patties were cooked in oven maintained at 200 + 5 °C for 15 minutes approximately. The patties were turned occasionally after slight browning, which takes approximately 5min for one side. Care was taken to ensure that the emulsion did not stick to the cooking surface. The end point was recorded as when the fat stops oozing out of the emulsion. The steps followed in the preparation of patties are indicated in Appendix V 3.4.0.0 Sample and sampling technique A sample has been defined as a unit, which must be representative of the entire lot or population and must have been selected at random. In the present study simple random sampling technique as proposed by Gould and Kalia (1978) and Kalia (2002) was followed. The samples were selected at random to secure a representative sample of the lot. Unrest care was taken to minimize the errors and keep the variates with in the control limits. 3.5.0.0 Standardization of recipe 3.5.1.0 Ground mutton the hygienically slaughtered and de-boned mutton was minced and ground in electrical mincer twice, as described in 3.3.2.0, to get finely ground mutton for product preparation. The ground mutton was collected in a pre washed and dried tray. The mutton was then weighed according to the requirement, as per the recipe standardized and was stored in scalable highdensity polyethylene bags marked accordingly, for further use.

Results and Discussion

The present investigation involving the development and utilization of soy- protein-isolates and soy-protein-concentrates are undertaken to meet the objectives as outlined in the introduction

1. To attempt the development of simulated vegetarian meat products based on local taste and texture requirements.
2. To use soy proteins as meat analogue and meat extenders,
3. To determine the proximate content of the prepared food products.
4. To work out the economics of the recipes developed and standardized the development process of soy-proteins was standardized in the laboratory. Keeping the Indian conditions and palatability in mind, an attempt was made to utilize the soy-protein-isolate and soy-concentrate as extenders. The proteins as the extenders were blended with mutton and the products like patties, balls and nuggets were prepared. The evaluation of the products developed using different cooking methods was done for their proximate composition and organoleptic acceptability. A storage study of the products under refrigerated conditions was also done. The composition and acceptability of samples were ascertained at weekly intervals upto 21 days. Also, the proteins were used as the major ingredient for the development of minced-meat-noodles. The noodles were subjected to physico-chemical and organoleptic evaluation. An attempt was made towards the development of 44 meat analogues using texturised proteins from the soy-isolates and soyconcentrates. These analogues were also subjected to physico-chemical and organoleptic evaluation. The corresponding results on each parameter are presented and discussed hereunder.

Summary and Conclusion

.An effort has been made to achieve the objectives as envisaged and planned. The animal proteins constitute an important component of the human diet. However, the non-vegetarian diets have inherited limitations of (a) higher cost or expensive, (b) lower shelf-life, (c) religious bindings and

(d) certain food fads and fallacies etc. The majority of the consumers are vegetarian either due to religious belief or by choice. The vegetarian foods have its own advantages over the animal foods like being less expensive and easier to grow in bulk; but have a serious limitation of lacking some essential amino acids. Since the body building value of a protein is characterized by the essential amino acids present in the least quantity, the nutritive value of the plant proteins is generally less than that of animal protein. The biological value of the protein consumed depends up on the quantity and proportion of the essential amino acids. As long as the food is of animal origin, the essential amino acids are present in the quantities that approach the ratios necessary for protein formation in humans. Most of the essential amino acids can be found in plant materials, important as protein 158 sources but usually only in smaller quantities than necessary. Production costs, on the contrary, are much higher for animal proteins than for plant proteins. Therefore, a deficiency can arise in biologically effective proteins, in addition to a deficiency in sufficient energy content and total protein content, mostly with consumers of lower incomes. And therefore, it is imperative to ensure limiting amino acids either by supplementation or complementation in the vegetarian diets. Based on the data obtained it has been found that: 1. The soybean (PK 416) contained 7.99 per cent moisture, 39.14 per cent proteins, 18.64 per cent fat, 3.14 per cent ash and 4.87 per cent crude fiber. 2. For the development of soy-isolate iso-electric precipitation process was found satisfactory and the technology was standardized and tested in the laboratory. The best recovery (35.70 %) was obtained by using 0.2 M Hydrochloric acid, when used at the rate of 20 ml per 10 g of the soy-flour. 3. For preparation of the soy-concentrates, the leaching technology in alcohol was tested and perfected. The best recovery (34.10%) was obtained on using the absolute alcohol at the rate of 75 ml per 10 g of soy-flour. 4. The mutton used for the preparation of products was slaughtered in hygienic conditions and the proximate composition of the mutton obtained from the sheep was 18.86 per cent proteins, 9.97 per cent fat and 0.94 per cent ash. 5. The physico-chemical evaluation of the soy-proteins for their colour and texture was done as a quality parameter. The soy-concentrate was slightly yellow in colour with soft texture and a slightly beany flavour. Soy-isolate was whiter with a very soft and fluffy texture and had a bland taste.

References

1. Abdel-Aziz SA, Esmail SA, Hussein L, Janssen F. Chemical composition and levels of non-meat proteins in meat brands extended with soy protein concentrate. Food Chemistry. 1997; 60:389-395.
2. Hsieh H, Clarke I, Huff AD, HE. Extrusion for producing low fat pork and its use in sausage as affected by soy protein isolate. Journal of Food Science. 1999; 64:267-271.
3. Alden DE. Soya processing from beans to ingredients. Journal of Americal Oil Chemists Society. 1975; 92:244-248, Alvarez VB, Smith DM, Morgan RG, Booren AM, 1990.
4. Restructuring of mechanically deboned chicken and non-meat binders I a twin screw extruder. Journal of Food Science. 55: 942-946 Andres, C.1986. Soybean proteins. Food processing. 47:8 Anon, 1956.
5. The wealth of India. Vol-IV (F-G). Raw material. CSIR. New Delhi. Anonymous, 2002, 142-150.
6. The miracle bean. (Ed) Khan F, Bahrgava D, Singh M, Parwal, SOP A. Soybean Association of India. Anupma, Quality evaluation and economic feasibility of microwave Vs conventionally cooked chevon. Ph. D Thesis, 1996.
7. HPKV, Palampur. India AOAC. Approved Methods of Assciation of Official Analytical Chemists.AOAC. Washington. Baliga, B.R. and Madiah, N. Preparation of mutton sausage. Journal of Food Science. 35-383-385 Bartholomew, D.T. and Osualo, C.I, 1986.
8. Acceptability of flavour, texture and appearance in mutton processed meat products made by smoking, curing, spicing, adding starter culture and modifying fat source.
9. Journal of Food Science. 51:1560-1562
10. Bater B, Descamps, O, Maurer AJ. Quality characteristics of hydrocolloid added oven-rosted turkey breasts.Journal of Food Science. 57:1068-1070. 169 Bawa, A.S, 1992-1986.
11. Extenders and fillers in communited meat products. In Production and processing of poultry and meat products. AFST (I). Mysore. India. Bawa AS, Usborne WR, Orr HL. Effect of levels of fillers and extenders on the functionality of a meat system, 1986.
12. Journal of Food Science and Technology.25:84-88 Beiken S, Eaxdie LM, Jones PN, Harris PV. 1991. Objective and subjective assessment of Australian sausage. Journal of Food ScienceBerry, BW. 1994; 56:636-642.
13. Properties of low aft, non graded pork nuggets with added gums and modified starches. Journal of Food Science. 59:742-746 Berry, B.W. and Leddy, K.F. 1989. Effects of freezing rate, frozen storage temperature and storage time on tenderness values of beef patties. Journal of Food Science.54: 1190-1192 Berry, B.W. and Wergin, W.P. 1993.
14. Modified pregelatinized potato starch in low fat ground beef ptties. Journal of Muscle Foods. 4: 305-320.
15. Berry BW, Smith JJ, Secrist JL. Effect of flake size on textural and cooking properties of restructured beef and pork steaks. Journal of Food Science. 1986; 52:558-563.
16. Berwal JS, Dhanda JS, Berwal RK. Studies on rice and turkey meat blend papads. Journal of Food Science and Technology. 1996; 33:237-239.
17. Bhatnagar PS. History of soybean with special reference to India: Production, utilization and importance. In Soybean for health and nutrition in India. SOP A, India, 2002.
18. Bhoyar AM, Pandey NK, Anand SK, Verma SS. Development of restructured chicken steaks using texturized soy protein as extender. Indian Food Packer. 1996; 4:15-22.
19. Binger ME, Berry BW. Cooking and sensory properties of pork crumbles as affected by Pregeltinised potato starch crumble diameter and fat content. Journal of Food Science. 1997; 62:203-207 170.
20. Bodwell CE. Effects of soy-protein on iron and zinc utilization in humans. Ceral Food World. I983; 281:342-348.
21. Brandenburg AH, Weller CL, Testin RF. Edible films and coatings from soy protein. Journal of Food Science. I983; 58:1086-1089.

22. Breen MD, Seyam AA, Bansaik A. The effect of mill by products and soy protein on the physical characteristics of extruded snack foods. Cereal Chemistry. 1977; 54:728-736.
23. Brennan JG. Texture perception and measurement. In: Sensory analysis of food. Piggot, R.A. (cd). Elsevier. Applied Science Publisher London, 1984, 59.
24. Brown WL. Meat and vegetable protein blends for engineered foods. Journal of American Oil Chemists Society. 1979; 96:316-318.
25. Camire ME, King CC. Protein and fiber supplementation effects on extruded corn meal snack quality. Journal of Food Science. 1991; 56:760-763.
26. Cannel LE, Savell JW, Smith SB, Cross HR, StJohn LC. Fatty acid composition and calorific value of ground beef containing low levels of fat. Journal of Food Science. 1989; 54:1163-1166.
27. Chambers EN, Bowers JR. Consumer perception of sensory qualities in muscle foods. Food Technology. 1993; 47:116-120.
28. Chanderkanta. Biological, biochemical and nutritional factors affecting the palatability of the fish fillet incorporated with cereal adjuncts. Ph.D. Thesis. HPKV, Palampur. Lndia, 1993.
29. Chatterjee AK. The properties and prospects of developing meat industries in South East Assian countries with special reference to India. Indian Food Packer. 1985; 39:53-75.
30. Chin KB, Keeton JT, Longnecker MT, Lamkey JW. Functional, textural and microstructural properties of low fat bologna (model system) with konjac blend. Journal of Food Science. 1998; 63:801-807.
31. Chodhury J, Kumar S, Keshri RC. Physico-chemical and organoleptic properties of chicken patties incorporating TSP. Proceedings of ICFOST. AFST(I), Mysore, 1992.