The Pharma Innovation Journal 2020; SP-9(7): 198-201

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2020; SP-9(7): 198-201

www.thepharmajournal.com
Received: 10-05-2020
Accepted: 13-06-2020

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Proximate composition and sensory properties of poultry meat cocktail nuggets

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Abstract
The present study was designed to develop poultry meat cock tail nuggets using chicken and duck meat and to evaluate the proximate composition and sensory attributes of the developed product. In order to optimise the level of duck meat in cocktail nuggets the lean chicken meat was initially replaced with different levels of duck meat viz., 25, 50, 75 and 100 per cent. Protein, fat and ash percentage of 100 per cent duck meat was significantly (P<0.001) higher and the moisture content was significantly lower when compared to control and all other treatment samples. The lowest values for Appearance, colour, texture, mouth coating and overall acceptability attributes was noticed for 100 percent duck nuggets. Significantly higher sensory scores in terms of appearance, flavour, juiciness, saltiness, mouth coating and overall acceptability was obtained for the cocktail nuggets containing 75 per cent chicken and 25 per cent duck meat. The result revealed that duck meat could be successfully incorporated in the preparation of functional chicken nuggets at 25 per cent level without any adverse effects on the sensory characteristics of chicken nuggets.

Keywords: Cocktail nuggets, poultry meat cock

Introduction
Poultry meat has high nutritional value and is a good source of protein. It has low calorific value and balanced lipid content which can easily cater to the demand of health conscious consumers. Poultry meat contains less cholesterol, when compared to most other animal based foods. Due to high biological value, palatability, tenderness and easy digestibility, it is the food of choice for people of all age groups. Poultry meat has no religious inhibition and its many products satisfy the variety quest of the consumers.
Duck meat is highly comparable to that of chicken and is a rich source of protein, minerals and other nutrients for humans. It has combined characteristics of red meat and the dietetic characteristics of poultry meat. There is an increasing trend in the consumption of white meat and duck meat due to the studies stating the association of red meat with cardiovascular pathologies. The duck meat has been appreciated for its nutritional qualities, but has not yet become a very popular meat in India because of its inherent flavour. Keeping in view all the above facts, the present study was envisaged to attempt the develop poultry meat cocktail nuggets incorporating chicken and duck meat and to evaluate the proximate composition and sensory Properties of the developed product.

Materials and methods
Chicken and duck meat: Broiler chicken and duck each of 2.5 to 3 kg live body weight procured from the local market were humanely slaughtered and dressed under hygienic conditions at Meat Technology Unit, Mannuthy. The dressed carcasses were immediately chilled for around 24 hours and deboned. Deboned meat was aerobically packed in high density polyethylene (HDPE) bags, kept frozen and thawed at 4±1 °C before the preparation of nuggets.

Vegetable Oil: Refined sunflower oil (sunrich) was used throughout the study.
Condiment: The condiment mixture was prepared as and when required by blending peeled and chopped onion and garlic (3:1 w/w) to the consistency of a fine paste.

Spice mixture: consists of coriander 22%, cumin seeds 16%, black pepper 20%, red chilli 7%, anise 5%, dry ginger 5%, turmeric 5%, cinnamon 5%, cardamom 5%, curry leaves 2%, clove 2%, nutmeg 3% and mace 3%.

Curing ingredients: Sodium chloride 1%, sugar0.3%, sodium-tri-polyphosphate 0.3%, sodium ascorbate 550 ppm and sodium nitrite 120ppm.

Product formulation

The formulation of emulsion based cocktail nuggets was standardized by conducting several trials. The standardized formulation was used for the entire study (Table.1).

Table 1: Formulary for the preparation of control and functional cocktail nuggets

Ingredients	Control nuggets (%)	Functional cocktail nuggets (%)
Ground chicken	50.625	50.625
Ground duck meat	0	*
Ice flakes	10	10
Vegetable oil (sunflower oil)	12	12
Condiments	4.0	4.0
Spice mix	1.7	1.7
Soya powder	2.0	2.0
Corn flour	1.5	1.5
Refined Wheat flour	1.5	1.5
Salt	1.0	1.0
Sugar	0.3	0.3
Sodium Tripolyphosphate	0.3	0.3
Sodium ascorbate	0.3	0.3
Sodium nitrite	120 ppm	120 ppm
Egg	3.33	3.33

*duck meat was added replacing lean chicken meat at three different levels.

Preparation of poultry meat cocktail nuggets

Deboned broiler chicken was minced through a 9 mm grinder plate in a meat mincer (MADO primus Model MEW 613, Germany) for the control chicken nuggets. For the preparation of cocktail nuggets deboned broiler chicken and duck meat was minced through a 9 mm grinder plate in a meat min %. The ground chicken and duck meat was preblended with salt, sodium-tri-polyphosphate, sugar, and sodium ascorbate and sodium nitrite at the levels given in the Table 1 and kept under refrigeration for about 12 hours. The emulsion was prepared in a bowl chopper (MADO GARANT, Germany) by chopping the pre-blended chicken and duck meat for 3-5 min with simultaneous addition of ice flakes. Beated egg was added and chopped further for 1-2 min, followed by the addition of pre-chilled refined sunflower oil till it was evenly dispersed in the batter during chopping. Then binders corn flour and refined wheat flour (1.5%) each, soya powder (2%), condiments (4%) and spices mix (1.7%) as per formulary were added. The batter was taken and manually filled in stainless steel mould under hygienic condition. The mould covered with lid was steam cooked for 40 minutes to get proper cooked blocks. The blocks so obtained were cooled and kept under refrigeration for 12-15 hours. These blocks were sliced into nuggets of size 1.5cm x 1.5cm x 1.5cm.

Analytical procedures

Proximate analysis

The proximate composition of the control chicken nuggets and cocktail nuggets were determined by the standard procedure of AOAC (2016). Analyses were conducted in duplicate.

Moisture was determined by weight loss after 16 hours drying in a hot air over at 105ºC. The fat content was determined in moisture free samples by an ether extraction procedure in an Automatic Solvent Extraction System (SOX plus, Model SCS 6, Pelican Equipments, Chennai, India). Moisture and fat free samples were used to estimate the protein and ash content. The protein content was determined by Block Digestion Method (KEL plus, Model KES 6L, Pelican Equipments, Chennai, India). Ash was determined by weight loss after 2 hours drying in muffle furnace (HF-electric furnace, Hindustan Furnance, Thrissur, Kerala) at 600ºC. The amount of carbohydrate was calculated as 100 minus sum of the percentage of moisture, protein, fat and ash. The proximate composition was expressed in as-is-basis.

Calorific Value

Total calories content of chicken nuggets were arrived at as per FAO (2002) on wet matter basis.

Calories from fat= fat per cent × 9

Calories from protein= protein per cent × 4

Calories form carbohydrate= carbohydrate per cent × 4.

Total calories (kcal/100g) = (fat% x 9) + (protein% x 4) + (carbohydrate % x 4).

Organoleptic evaluation

Sensory attributes of the chicken nuggets were assessed organoleptically using 8 point Hedonic scale score card. (AMSA, 1983) with the help of seven semi-trained taste panellists drawn from the Department of Livestock Products Technology, Mannuthy, Thrissur. The nuggets were shallow fried in sunflower oil and served warm to the panellists with code numbers to the samples. The average of the individual scores was taken as the score for the particular attribute.

Statistical analysis

The experiment was replicated four times and the data obtained for proximate composition and sensory evaluation of different products were statistically analyzed as per Snedecor and Cochran (1994) by one-way ANOVA and Kruskal-Wallis test using SPSS software version 24.

Result and Discussion

Based on the experimental design, four different levels of duck meat, *viz.*, 25, 50, 75 and 100 per cent were used for the direct replacement of chicken in the control nuggets formulary. This study was conducted for the selection of an optimum level of duck meat in the formulation of cocktail

nuggets.

The proximate composition of the cocktail nuggets incorporated with different levels of duck meat is given in the Table 1.

The moisture content of T_1 was significantly ($p< 0.001$) lower than T_3, T_4 and C. However, no significant difference was noticed between C and T_4, T_1 and T_2, T_2 and T_3, T_3 and T_4. Significant ($p<0.001$) decrease in the moisture content was noted at higher levels of inclusion of duck meat. Significantly ($p<0.05$) higher protein content was observed for T_1 when compared to all other treatments and control samples. There was no significant difference in the protein content between C, T_2, T_3 and T_4.T_1 showed significantly ($p<0.001$) higher value for fat percentage than all other treatments and control. No significant difference was noticed in the fat content of T_2, T_3 and T_4. The carbohydrate contents did not differ significantly ($p>0.05$) among the treatments and control. The ash contents of C, T_2, T_3 and T_4 was significantly ($p<0.001$) lower when compared to T_1. The ash contents of T_2 was significantly ($p<0.001$) higher than C, T_3 and T_4. No significant difference was observed in the ash content of C, T_3 and T_4. This difference can be attributed to the difference in composition of both type of meats. Huda *et al.* (2010) [5] noticed a similar increase in fat, protein and ash values and a decrease in moisture content with the increase in proportion of duck meat in chicken and duck meat cocktail sausage.T_1 showed significantly higher ($p<0.001$) calorie content than all other treatments and control. There was no significant difference between T_2 and T_3, T_3 and T_4. Control nuggets was having significantly ($p<0.001$) lower values when compared to all the treatment samples. The increase in calorie content with the higher level of duck meat incorporation can be attributed to the increase in fat content.

Table 2: Effect of different levels of duck meat on the proximate composition and calorie content of the cocktail nuggets

Parameters	C	T_1	T_2	T_3	T_4	F- value (p-value)
Moisture (%)	62.46 ± 0.54^{a}	58.49 ± 0.37^{d}	$59.90 \pm 0.33^{c,d}$	$60.92 \pm 0.65^{b,c}$	$61.73 \pm 0.47^{a,b}$	10.282^{**} (<0.001)
Protein (%)	18.21 ± 0.35^{b}	19.43 ± 0.32^{a}	18.51 ± 0.35^{b}	17.97 ± 0.23^{b}	18.13 ± 0.16^{b}	3.884^{*} (0.014)
Fat (%)	12.31 ± 0.46^{c}	15.78 ± 0.36^{a}	14.37 ± 0.24^{b}	14.15 ± 0.30^{b}	13.44 ± 0.47^{b}	11.349^{**} (<0.001)
Carbohydrate (%)	5.36 ± 1.05	3.69 ± 0.71	4.90 ± 0.29	5.25 ± 0.65	5.10 ± 0.76	0.842^{ns} (0.512)
Ash (%)	1.67 ± 0.02^{c}	2.61 ± 0.08^{a}	2.32 ± 0.03^{b}	1.72 ± 0.05^{c}	1.60 ± 0.02^{c}	90.179^{**} (<0.001)
Calorie (kcal/100 g)	205.02 ± 1.50^{d}	234.51 ± 1.32^{a}	222.97 ± 2.21^{b}	$220.21 \pm 3.74^{b,c}$	213.90 ± 2.59^{c}	20.239^{**} (<0.001)

** Significant at 0.01 level, * significant at 0.05 level, ns – non- significant at 0.05 level. No of observations – 6

Mean ± SE with same superscripts in a row does not differ significantly ($P > 0.05$)

C_1 – Control 1 (nuggets with 100% chicken), T_1 – Treatment 1 (nuggets with 100% duck meat), T_2 – Treatment 2 (nuggets with 75% duck meat, 25% chicken), T_3 – Treatment 3 (nuggets with 50% duck meat, 50% chicken), T_4 – Treatment 4 (nuggets with 75% chicken, 25% duck meat).

Organoleptic evaluation

The organoleptic qualities *viz.*, appearance and colour, flavor, texture, juiciness, saltiness, mouth coating and overall acceptability of functional cocktail nuggets incorporated with different levels of duck meat were evaluated using eight point Hedonic scale with the help of seven semi-trained taste panelists. The results are given in the Table 2.

The panel scores revealed significant difference in the appearance and colour, flavour, juiciness, texture, saltiness, mouth coating and overall acceptability between control and the treatments containing duck meat at all the four levels, which indicated that the addition of duck meat had significant effect on the sensory attributes.

T_4 showed significantly ($p<0.001$) higher values for all the sensory attributes when compared to control and all other treatment samples. Treatment T_1 showed lowest value for appearance and colour but was not significantly ($p> 0.05$) different from T_2 and T_3. T_1 showed significant difference in appearance when compared to control. The decrease in appearance scores for T_1 may be due to increase in darkness of product colour with increase in amount of added duck meat. Contrary to this, Biswas *et al.* (2006) [2] noticed higher score for general appearance duck meat patties when compared with chicken patties. T_1 scored the lowest values for texture, mouth coating and overall acceptability but no significant difference was noticed when compared to C, T_2 and T_3. This can be related to the coarser texture of duck muscle fiber when compared to chicken. The results for texture was in accordance with Huda *et al.* (2010) [5] who observed significantly lower texture values for duck sausages when compared to chicken sausages. Kumar *et al*. (2015) [8] noticed no significant difference between the overall acceptability scores of duck and chicken nuggets. The treatment T_2 had lowest score for flavour, juiciness and saltiness but was not significantly different from C, T_1 and T_3. The lower value for flavour with increase in duck meat incorporation in various treatments may be due to nonpreferred inherent odour of duck meat by the panellists. The reduction in juciness scores might be due to the lower moisture content of the duck meat incorporated product. Contrary to this, Kumar *et al*. (2015) [8] observed significantly lower flavour and higher juiciness values for duck nuggets when compared to chicken nuggets.

Table 3: Effect of different levels of duck meat on the sensory attributes of cocktail nuggets

Attributes	C	T_1	T_2	T_3	T_4	χ^2 - value (p-value)
Appearance	6.62 ± 0.09^{b}	6.36 ± 0.10^{c}	$6.62 \pm 0.07^{b,c}$	$6.59 \pm 0.10^{b,c}$	7.06 ± 0.09^{a}	33.804^{**} (<0.001)
Flavor	6.69 ± 0.09^{b}	6.64 ± 0.08^{b}	6.61 ± 0.11^{b}	6.68 ± 0.09^{b}	7.13 ± 0.06^{a}	28.512^{**} (<0.001)
Juiciness	6.49 ± 0.10^{b}	6.62 ± 0.08^{b}	6.42 ± 0.13^{b}	6.51 ± 0.10^{b}	7.06 ± 0.09^{a}	24.220^{**} (<0.001)
Texture	6.85 ± 0.08^{b}	6.54 ± 0.10^{b}	6.60 ± 0.10^{b}	6.66 ± 0.08^{b}	7.21 ± 1.17^{a}	31.013^{**} (<0.001)
Saltiness	6.76 ± 0.10^{b}	6.68 ± 0.10^{b}	6.58 ± 0.10^{b}	6.66 ± 0.11^{b}	7.13 ± 0.07^{a}	19.576^{**} (<0.001)
Mouth coating	6.76 ± 0.10^{b}	6.67 ± 0.09^{b}	6.68 ± 0.12^{b}	6.85 ± 0.07^{b}	7.21 ± 0.07^{a}	25.974^{**} (<0.001)
Overall acceptability	6.86 ± 0.08^{b}	6.70 ± 0.09^{b}	6.75 ± 0.08^{b}	6.82 ± 0.09^{b}	7.40 ± 0.06^{a}	48.938^{**} (<0.001)

Based on 8-point Hedonic scale (1=extremely undesirable; 8 = extremely desirable.

** Significant at 0.01 level; * significant at 0.05 level, ns – non- significant at 0.05 level. No of observations – 58

Mean ± SE with same superscripts in a row does not differ significantly ($P > 0.05$)

C_1 – Control 1 (nuggets with 100% chicken)
T_1 – Treatment 1 (nuggets with 100% duck meat)
T_2 – Treatment 2 (nuggets with 75% duck meat, 25% chicken)
T_3 – Treatment 3 (nuggets with 50% duck meat, 50% chicken)
T_4 – Treatment 4 (nuggets with 75% chicken, 25% duck meat).

Conclusion

Significantly higher sensory scores in terms of appearance, flavour, juiciness, saltiness, mouth coating and overall acceptability was obtained for the cocktail nuggets containing 25 per cent duck meat. The cocktail nuggets containing 25 percent duck meat and 75 percent chicken had proximate composition comparable to that of the control chicken nuggets. The results revealed that duck meat could be successfully incorporated in the preparation of functional chicken nuggets at 25 per cent level without any adverse effects on the quality characteristics of chicken nuggets.

References

1. Alvarado C, McKee S. Marination to improve functional properties and safety of poultry meat. J Appl. Poult. Res. 2007; 16(1):113-120.
2. Biswas S, Chakraborty A, Sarkar S. Comparison among the qualities of patties prepared from chicken broiler, spent hen and duck meats. J Poult. Sci. 2006; 43(2):180-186.
3. Brahma ML. Comparative study of certain qualitative characteristics of duck and hen meat: pH, water holding capacity and palatability characteristics of meat. Indian Vet. J. 1984; 61:978-983.
4. Chartrin P, Meteau K, Juin H, Bernadet MD, Guy G, Larzul C, *et al*. Effects of intramuscular fat levels on sensory characteristics of duck breast meat. Poult. Sci. 2006; 85:914-922.
5. Huda N, Lin OJ, Ping YC, Nurkhoeriyati T. Effect of chicken and duck meat ratio on the properties of sausage. Int. J Poult. Sci. 2010; 9(6):550-555.
6. Huda N, Putra AA, Ahmad R. Proximate and physicochemical properties of Peking and Muscovy duck breasts and thighs for further processing. J Food Agric. Environ. 2011; 9(1):82-88.
7. Kanagaraju P, Jalaludeen A, Rathnaprabha S. An analysis on factors influencing consumption pattern of duck and duck products among people of Kerala, India. Res. J. Poult. Sci. 2012; 5(3):31-35.
8. Kumar R, Biswas S, Singh V, Ram M. Quality and shelf life evaluation of nuggets prepared from spent duck and spent hen meat. Explor. Anim. Med. Res. 2015; 5(2):176-182.