Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(4): 1579-1582

Received: 10-05-2020
Accepted: 12-06-2020

Sadiya Sajad
Division of Livestock Products Technology, Faculty of Veterinary Sciences and Animal Husbandry, SKUAST-Kashmir, Jammu and Kashmir, India

SR Ahmad
Division of Livestock Products Technology, Faculty of Veterinary Sciences and Animal Husbandry, SKUAST-Kashmir, Jammu and Kashmir, India

Snober Irshad
Division of Livestock Products Technology, Faculty of Veterinary Sciences and Animal Husbandry, SKUAST-Kashmir, Jammu and Kashmir, India

AI Qureshi
Division of Livestock Products Technology, Faculty of Veterinary Sciences and Animal Husbandry, SKUAST-Kashmir, Jammu and Kashmir, India

Aaliya Fayaz
Division of Livestock Production and Management, Faculty of Veterinary Sciences and Animal Husbandry, SKUAST-Kashmir, Jammu and Kashmir, India

Farukh Mehraj
Division of Animal Nutrition, Faculty of Veterinary Sciences and Animal Husbandry, SKUAST-Kashmir, Jammu and Kashmir, India

Heena Jalal
Division of Livestock Products Technology, Faculty of Veterinary Sciences and Animal Husbandry, SKUAST-Kashmir, Jammu and Kashmir, India

Corresponding Author:
Sadiya Sajad
Division of Livestock Products Technology, Faculty of Veterinary Sciences and Animal Husbandry, SKUAST-Kashmir, Jammu and Kashmir, India

Influence of the aqueous extract of dandelion (*Taraxacum officinale*) powder on the quality of chicken meat loaves

Sadiya Sajad, SR Ahmad, Snober Irshad, AI Qureshi, Aaliya Fayaz, Farukh Mehraj and Heena Jalal

Abstract
Consumers are increasingly concerned about their health and pay more attention to their lifestyle and the healthiness of their diet, leading to an increase in the demand of functional foods of natural origin, which are very useful in decreasing the incidence of many chronic illnesses. Hence, a study was carried out to assess the effect of extract obtained from one of the rich and natural source (dandelion) of antioxidants and other functional ingredients on quality of chicken meat loaves. The results revealed that the cooking yield of chicken meat loaves showed a non-significant (P>0.05) increase with increase in levels of extract. The percent moisture as well as protein showed a non-significant (P>0.05) increase whereas the percent fat content showed a non-significant (P>0.05) decrease upon addition of the extract. The percent ash content showed a significant (P≤0.05) increase with increase in levels of extract and was higher at 10% level of extract incorporation. The antioxidant activity in terms of DPPH-RSA value showed a significant (P≤0.05) increase with increase in levels of extract and was highest at 10% level. Sensory evaluation of the products revealed a non-significant (P>0.05) difference in various attributes of control and all the other treatments containing dandelion extract. Therefore, it was concluded that even at 10% level of dandelion leaf powder extract, the chicken meat loaves so prepared were rich in different functional properties including the antioxidant potential.

Keywords: Chicken meat loaves, dandelion, DPPH, extract, functional, quality

Introduction
The rapid economic growth in recent years along with the globalization of the food industry has led to increased production and consumption of chicken meat. Moreover, due to cost competitiveness, nutritional quality, universal availability and absence of religious taboos, chicken meat has become an indispensable part of the Indian diet. It is a rich source of proteins and polyunsaturated fatty acids (PUFA) besides being low in saturated fat content; thus, considered as one of the most desirable meats all over the world [7]. However, the relatively high concentrations of polyunsaturated fatty acids, makes poultry meat more vulnerable to lipid oxidation and thus, adversely reflecting on the quality and acceptability of products [11].A large number of plant based natural antioxidant sources have been used in various meat products to study the protective effect, which is mainly attributed to various non-nutrient plant compounds such as the carotenoids, flavonoids, is flavonoids and phenolic acids. These phytochemicals have been found to possess huge functional activities, like protection against lipid oxidation, inhibition of cancer cell proliferation and regulation of inflammatory and immune response etc. [10]. Plants of the genus *Taraxacum* have long been used as medicinal herbs. Dandelion (*Taraxacum officinale)* is a rich source of various antioxidant compounds like phenolic compounds, flavonoids and a variety of vitamins and minerals. Extracts are reported to contain adequate functional ingredients required to bring about the desired effect in the product, eventually passed on to consumer. Keeping the above facts in mind, the study was designed to assess the effect of oven-dried Dandelion Leaf Powder Extract (DLE) on quality of chicken meat loaves.

Materials and Methods
1. Dandelion leaf extract (DLE) preparation
Fresh/sun-dried dandelion (*Taraxacum officinale*) leaves were procured from the local market after which they were oven-dried at 60˚C for 3 hours. Oven-dried dandelion (*Taraxacum*

officinale) leaves were ground to fine powder in an electric grinder and then stored in plastic containers for further use [3]. In order to prepare the extract, 10 g of oven-dried powder was mixed with 50 ml of boiled and cooled distilled water and the volume made up to 100 ml. This was left for 1 hour in a water bath (60ºC). The extract was filtered using a clean sterile muslin cloth and used at different concentrations [12].

2. Chicken Meat Loaf Preparation

The study was conducted in the Division of Livestock Products Technology, Faculty of Veterinary Sciences and Animal Husbandry, SKUAST-Kashmir. Live chicken (broiler) were procured from the local market. After proper rest and Ante-mortem examination, they were slaughtered in the Experimental Slaughter Hall of the Division of Livestock Products Technology by Halal method. The dressed chicken were deboned manually and chilled overnight before use or were stored in frozen condition until used. Lean meat obtained from broiler chicken was minced in a mincer (MSW-627) with 4 mm plate. Meat emulsion for broiler chicken meat loaves was prepared in Bowl chopper (SCHARFEN, Germany). Minced meat was loaded in the bowl chopper, wherein salt along with half of chilled water was added for better extraction of salt soluble proteins. The chopping was done for 2 minutes. After that, vegetable oil was gradually added and chopping continued for another 2 minutes. This was followed by addition of whole egg liquid, dry spice mix and condiment paste (onion: garlic: ginger = 3:2:1). The contents were again chopped for 1 minute to get the proper emulsion. This formulation served as control. Throughout the preparation, the Dandelion Leaf Extract (DLE) at different levels viz. 2.5%, 5%, 7.5%, 10% was added by replacing chilled water from the basic formulation (Table 1) of the product. The emulsion prepared was then weighed and filled in stainless steel moulds. Moulds were covered with lid and tied with thread and cooked in hot water (90˚C) for 35 minutes to an internal temperature of around 80˚C. All the four treatments of chicken meat loaves *viz.*, T_1, T_2, T_3 and T_4 having 2.5, 5, 7.5 and 10 percent DLE along with control (T_0) were assessed for various parameters. The optimum level of DLE was selected on the basis of overall quality of the product. The experiment was repeated thrice.

Table 1: Basic formulation of chicken loaves

Ingredients	Quantity (w/w) per 100 g for T_0 (control)	
Lean meat	78.0	Dandelion Leaf Extract (DLE) at different levels viz. 2.5% (T_1), 5% (T_2), 7.5% (T_3) and 10% (T_4) was added by replacing chilled water from the basic formulation
Chilled water	10.0	
Vegetable oil	5.0	
Condiment paste	3.0	
Whole egg	2.0	
Salt	1.0	
Dry spice mix	1.0	

Methods of Estimation

i) Cooking yield: The weight of chicken meat loaves was recorded before and after cooking and the yield was calculated as;

$$\text{Cooking yield (\%)} = \frac{\text{Weight of cooked loaves}}{\text{Weight of uncooked emulsion}} \times 100$$

ii) pH

The pH of chicken meat loaves was determined by the method of Trout *et al.* (1992) [16] by using digital pH meter (Model EE-011, Tanco Laboratory Equipments Ltd. India).

iii) Proximate composition

The percentage moisture, protein, ether extract and ash content of the product samples were evaluated as per standard procedure of Association of Official Analytical Chemists (AOAC, 2005) [1].

iv) Antioxidant potential (DPPH assay)

The DPPH assay was done according to the method of Brand-Williams *et al.* (1995) [5] with some modifications. The stock solution of DPPH was prepared by dissolving 24 mg of DPPH dissolved with 100 ml methanol and then stored at -20^{0}C until needed. The working solution was obtained by mixing 10 ml stock solution with 80 ml methanol to obtain an absorbance of 1.1±0.02 units at 515 nm using the spectrophotometer. 150 µl of meat extract was allowed to react with 2850 µl of the DPPH solution for 24 h in the dark. Then, the absorbance was taken at 515 nm. The radical scavenging activity was measured using the formula:

$$\text{Radical scavenging percentage (\%)} = \frac{\text{Blank absorbance} - \text{Sample absorbance}}{\text{Blank absorbance}} \times 100$$

v) Sensory evaluation

Samples of products from all treatments were presented to the semi-trained experienced taste panel members consisting of scientists and post-graduate students of Faculty of Veterinary Sciences and Animal Husbandry, Shuhama, SKUAST-K for evaluation of various sensory parameters viz., appearance, flavour, texture, juiciness, saltiness, mouth coating, and overall acceptability as per 8-point descriptive scale [9],where 8 is extremely desirable and 1 is extremely undesirable. The samples were suitably warmed before serving to the panelists.

vi) Statistical Analysis

The statistically analyzed results have been interpreted and tabulated. The results were analyzed and tabulated statistically by analysis of variance (ANOVA) [15] using SPSS software (IBM SPSS statistics – Version 20). The results were expressed as Mean ± S.E. at 5% level of significance.

Results and discussion

1. Cooking yield and pH

The results for cooking yield and pH of chicken meat loaves containing various levels of oven-dried Dandelion leaf powder extract are given in table 2. A non-significant (P>0.05) increase in the cooking yield of chicken meat loaves with increase in levels of Dandelion leaf powder extract was found. The pH values increased with Dandelion Leaf Powder Extract (DLE) addition and the increase was significant (P≤0.05) at 7.5% and 10% level when compared to control.

The higher pH (around 6.5) of the dandelion leaves can be the reason for slight increase in the pH values by the addition of DLE. The results were in agreement with the results of Qureshi (2017) [12] who also reported an increase in the yield as well as pH in spent hen meat patties incorporated with Fenugreek seed extract.

Table 2: Physico-chemical properties of chicken meat loaves containing various levels of oven-dried Dandelion Leaf Powder Extract (Mean±S.E)

Parameters	Control	Oven-dried Dandelion Leaf Powder Extract			
		2.5%	5%	7.5%	10%
Product pH	6.14± 0.02^{a}	6.17±0.01^{ab}	6.17±0.01^{ab}	6.18±0.01^{b}	6.18 ±0.00^{b}
Cooking yield (%)	86.64±0.46	87.09±0.75	87.54±0.83	88.26±0.40	88.78±1.29

Row-wise group means with different superscript differ significantly (P<0.05)
For CY, N = 3 and for pH, N=6

2. Proximate Composition

The results of proximate composition are given in table 3. There was a non-significant (P>0.05) difference caused by the incorporation of DLE on the moisture, protein and fat contents of chicken loaves. However, there was a significant (P≤0.05) increase in the ash content of chicken meat loaves with increase in levels of Dandelion leaf powder. The increasing trend of ash content with increase in the level of Dandelion leaf powder may be due to high levels of ash content of the dandelion leaves. Similar types of findings were observed by Hazra *et al.* (2012) [6], Ramchandra (2016) [13] and Qureshi (2017) [12] in different meat products treated with extracts of *Moringa oleifera* (Lam.) leaves, garlic and fenugreek seeds respectively.

Table 3: Proximate composition of chicken meat loaves containing various levels of oven-dried Dandelion Leaf Powder Extract (Mean ± S.E)

Parameters		Oven-dried Dandelion Leaf Powder Extract (DLE)			
	Control	2.5%	5%	7.5%	10%
Moisture (%)	69.54±0.39	69.99±0.96	70.39±0.18	70.60±0.14	70.74±0.22
Protein (%)	17.40±0.24	17.35±0.31	17.50±0.19	17.53±0.20	17.68±0.17
Fat (%)	6.58±0.06	6.58±0.06	6.55±0.85	6.53±0.08	6.52±0.80
Ash (%)	0.92±0.06^{a}	1.0±0.02^{b}	1.01±0.00^{b}	1.11±0.00^{c}	1.32±0.00^{d}

Row-wise group means with different superscript differ significantly (P<0.05)
*N = 6

3. Radical Scavenging Activity

The results for DPPH-RSA are given in table 4. There was a significant (P≤0.05) increase in the antioxidant potential of chicken meat loaves as depicted by significant increase in DPPH-RSA values with increase in the levels of Dandelion leaf powder extract. The reason for this overall increase in the DPPH values with increasing levels of Dandelion leaf powder extract might be attributed to the phenolic rich compounds present in dandelion leaves. Sheikh *et al.* (2015) [14] conducted a study on the *in vitro* antioxidant activity, total phenolic and total flavonoid contents of dandelion leaves and reported a huge antioxidant potential of its leaves. Barimah *et al.* (2017) [3] also concluded about the tremendous antioxidant potential of *Taraxacum officinale* leaves.

Table 4: Antioxidant activity of chicken meat loaves containing various levels of oven-dried Dandelion Leaf Powder Extract (Mean ± S.E)

Parameter		Oven-dried Dandelion Leaf Powder Extract			
	Control	2.5%	5%	7.5%	10%
DPPH-RSA	42.31±0.36^{a}	51.33±0.31^{b}	55.68±0.27^{c}	61.16±0.43^{d}	72.95±0.47^{e}

Row-wise group means with different superscript differ significantly (P<0.05)
* N = 6

3. Sensory Evaluation

The results of sensory evaluation are given in table 5. Incorporation of DLE did not cause any adverse effect on the sensory attributes of chicken loaves. Organoleptic evaluation of the products revealed a non-significant (P>0.05) difference in various attributes of control and all the other treatments. Hazra *et al.* (2012) [6] observed no significant difference between the samples of cooked ground buffalo meat treated with the crude extracts of *Moringa oleifera* (Lam.) leaves. Similar results were also revealed by Qureshi (2017) [12] in case of fenugreek seed extract incorporated spent hen meat patties.

Table 5: Sensory attributes of chicken meat loaves containing various levels of oven-dried Dandelion Leaf Powder Extract (Mean ± S.E)

Sensory attributes		Oven-dried Dandelion Leaf Powder Extract			
	Control	2.5%	5%	7.5%	10%
Appearance	7.67±0.13	7.76±0.10	7.67±0.13	7.86±0.08	7.71±0.10
Flavour	7.24±0.10	7.10±0.07	7.00±0.00	7.14±0.08	7.00±0.14
Texture	7.29±0.10	7.24±0.10	7.10±0.10	7.19±0.09	7.00±0.15
Juiciness	7.24±0.12	7.38±0.11	7.29±0.10	7.33±0.11	7.29±0.10
Saltiness	7.62±0.11	7.48±0.13	7.62±0.11	7.48±0.11	7.38±0.13
Mouth-coating	7.00±0.00^{ab}	7.14±0.08^{b}	7.10±0.07^{ab}	7.00±0.00^{ab}	6.95±0.05^{a}
Overall acceptability	7.33±0.11	7.19±0.09	7.10±0.07	7.14±0.08	7.29±0.10

Row-wise group means with different superscript differ significantly (P<0.05)
* 8-point descriptive scale (8 = extremely desirable, 1 = extremely undesirable)
**N = 21

Conclusion

Natural sources are of antioxidants are being preferred by scientists for use in meat industry because of health concerns associated with synthetic ones. Dandelion being a rich source of various functional ingredients was successfully exploited for its antioxidant potential in chicken meat loaves. Hence, it was concluded that the functional quality of chicken meat can further be improved with dandelion extract without having any adverse effect on the sensory quality of chicken meat.

Acknowledgements

I would like to extend sincere appreciation to my Advisor and whole staff of Division of LPT, F.V.Sc & A.H. Shuhama, SKUAST-K for accompanying me during my research.

Author Contributions

Sheikh Rafeh Ahmad and Mohammad Ashraf Pal designed the study, Sadiya Sajad performed the experiments, Sadiya Sajad and Sheikh Rafeh Ahmad drafted the manuscript, Asma Irshad Qureshi assisted in laboratory work, Sadiya Sajad and Sheikh Rafeh Ahmad analysed the data.

References

1. AOAC. Official Methods of Analysis of the Association of Official Analytical Chemists International, 18th edition. Maryland, USA, 2005.
2. APHA. Compendium of Methods for the Microbiological Examinations of Foods, 5th ed., Yvonne Salfinger and Mary Lou Tortorello) American Public Health Association, Washington, D.C, 2015.
3. Barimah J, Yanney P, Laryea D, Quarcoo C. Effect of drying methods on phytochemicals, antioxidant activity and total phenolic content of dandelion leaves. American Journal of Food and Nutrition. 2017; 5(4):136-141.
4. Bhat ZF, Kumar S. Effect of *Aloe-vera* on the lipid stability and storage quality of chicken nuggets. Nurition and Food Science. 2014; 45:54-67.
5. Brand W, Cuvelier ME, Berset C. Use of free radical method to evaluate antioxidant activity. Lebensmittel Wissenschaft Und technologie. 1995; 28:25-30.
6. Hazra S, Biswas S, Bhattacharya D, Das SK, Khan A. Quality of cooked ground buffalo meat treated with crude extract of *Moringa oleiferia* (Lam.) leaves. Journal of Food Science and Technology. 2012; 49:240-245.
7. Jayasena DD, Jung S, Kim HJ, Bae YS, Yong HI, Lee JH *et al*. Comparison of quality traits of meat from Korean native chickens and broilers used in two different traditional Korean cuisines. Asian-Australasian Journal of Animal Sciences. 2013; 26:1038-1046.
8. Kamboh A, Zhu WY. Effect of increasing levels of bioflavanoids in broiler feed on plasma antioxidative potential, lipid metabolites, and fatty acid composition of meat. Poultry Science. 2013; 92:454-461.
9. Keeton JT. Effect of fat and Nacl/phosphate levels on the chemical and sensory properties of pork patties. Journal of Food Science. 1984; 48:878-881.
10. Kumar Y, Yadav DN, Ahmad T, Narsaiah K. Recent trends in the use of natural antioxidants for meat and meat products. Comprehensive Reviews in Food Science and Food Safety. 2015; 14(6):796-812.
11. Mielnick MB, Olsen E, Vogt G, Adeline D, Skrede G. Grape seed extract as antioxidant in cooked, cold stored turkey meat. Food science and Technology. 2006; 39:191-198.
12. Qureshi AI. Development of fenugreek spent hen meat patties via incorporation of fenugreek seed powder and its extract. M.V.Sc. Thesis, Faculty of Veterinary Sciences and Animal Husbandry, Sher-e-Kashmir University of Agricultural Sciences and Technology, Kashmir, India, 2017.
13. Ramchandra YS. Assessment of quality of chicken nuggets treated with garlic extract at refrigerated storage. M.V.Sc. Thesis, Bombay Veterinary College, Mumbai, India, 2016.
14. Sheikh MA, Tembhre M, Shammi QJ, Ahirwar P, Akram, MA. *In vitro* antioxidant activity, total phenolic and total flavonoids contents of *Taraxacum officinale* leaves. International Journal of Innovative Pharmaceutical Sciences and Research. 2015; 3(6):697-707.
15. Snedecor GW, Cochran WG. Statistical methods 7th edition. The Iowa State University Press, Ames, Iowa, 1994.
16. Trout ES, Hunt MC, Johnson DE, Claus JR, Kastner CL, Kropt DH. Characteristics of low fat ground beef containing texture modifying ingredients. Journal of Food Science. 1992; 57:19-24.