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Effect of feeding diets supplemented with *Artemisia absinthium* leaf powder with or without enzyme treatment on the different carcass, physico-chemical, sensory attributes and oxidative stability of broiler chicken meat

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Abstract
The present study was designed to investigate the effect of feeding diets supplemented with *Artemisia absinthium* leaf powder with or without enzyme on the different carcass, physico-chemical, sensory attributes and oxidative stability of broiler chicken meat. One day old Two hundred and fifty two commercial broiler chicks were reared for the five weeks and divided into seven treatment groups, each with three replicates of twelve birds each. The treatment groups were base diet (control), base diet+1% *Artemisia absinthium* leaf powder (T_2), base diet+ 1.5% *Artemisia absinthium* leaf powder (T_3), base diet+ 2% *Artemisia absinthium* leaf powder (T_4), base diet+ 1% *Artemisia absinthium* leaf powder+ Enzyme (T_5), base diet+ 1.5% *Artemisia absinthium* leaf powder+ enzyme (T_6), base diet+ 2% *Artemisia absinthium* leaf powder (T_7). No significant differences were observed in slaughter characteristics, sensory attributes and carcass traits except for the dressing percentage which was improved in the birds fed diets supplemented with enzyme treated *Artemisia absinthium*. The oxidative stability of meat expressed in terms of Malondialdehyde concentration differed significantly ($P \leq 0.05$) between treatment groups. The Malondialdehyde concentration in treatments containing 1%, 1.5% and 2% enzyme treated *Artemisia absinthium* were significantly ($P \leq 0.05$) decreased as compared to other treatment groups. Thus supplementation of broiler diets with enzyme treated *Artemesia absinthium* leaf powder improved the oxidative stability of broiler meat without adversely affecting the meat quality.

Keywords: *Artemisia absinthium*, oxidative stability, TBARS, enzyme, broiler

Introduction
The poultry industry has been steadily expanding around the world for years, with major advancements in the last fifty years. The use of feed additives in broiler diets has been advanced due to improved feed efficiency and industralisation of poultry husbandry. Antibiotics as growth promoters for birds played a significant part in the poultry business, but the global paradigm is evolving away from productive efficiency towards public security issues. Consumer demand for an antibiotic-free product has risen significantly in recent years. Antibiotic growth promoters have been banned in many countries due to cross-resistance against pathogens and residues in tissues. The phytogenic feed additives or the compounds of plant origin have anti-microbial and growth promoting effect on poultry and therefore are considered as one of the most suitable alternative to these antibiotics. Plant derived products have proven to be natural, less toxic, residue free, and are therefore thought to be ideal feed additives in animal nutrition. Essential oils extracted from the aromatic plants are becoming more important due to their antimicrobial effects and the stimulating effect on animal digestive systems. Also in the poultry industry, the importance of dietary exogenous enzymes in increasing development and feed utilisation efficiency is well understood. The use of enzymes in poultry diets has a number of advantages, including improved bird performance and feed conversion as well as fewer environmental issues due to reduced excreta output (Panda *et al.*, 2011).
The Himalayan region is home to a diverse spectrum of wildlife and remarkable plant biodiversity that is both scientifically interesting and economically beneficial. *Artemisia absinthium*, locally known as "Tethwan," grows abundantly in this region and belongs to the family Asteraceae consisting of almost 500 species.

This family contains valuable medicinal plant species that have been used for pharmacological and culinary purposes since ancient times. It has been established that medicinal plants and their products, such as plant extracts or essential oils, have favourable effects on poultry (Dalkilic and Guler, 2009) [6]. Artemisia species have been used to treat ailments such as hepatitis, cancer, inflammation, and infections caused by fungi, bacteria, and viruses (Asad *et al.*, 2011) [2]. The *Artemisia* genus is known to contain a variety of bioactive chemicals, including artemisinin, which has antimalarial and cytotoxic properties against tumour cells (Bilia *et al.*, 2006) [4]. The dietary intake of phytoadditive compounds has shown beneficial effects on stored meat quality, an effect related to their antioxidant properties in the case of the reduction or delaying of lipid oxidation (Puvaca *et al.*, 2013) [15]. Due to the beneficial effects of these flavonoids and antioxidants present in the phytogenic feed additives, a preliminary growth trial was carried out on broilers in which the supplementation of *Artemisia absinthium* improved the live body weight of birds. Therefore the present study was carried out to study the effect of feeding diets supplemented with *Artemisia absinthium* leaf powder with or without enzyme treatment on the different carcass, physico-chemical, sensory attributes and oxidative stability of broiler chicken meat.

Materials and methods

The research was carried out at Instructional Poultry Farm of the Division of Livestock Production and Management, SKUAST Kashmir. Two hundred and fifty two day old commercial broiler chicks were purchased from a reputable hatchery and reared for the first week under normal brooding conditions at 32-35 ºC. On the eighth day, the chicks were divided into seven treatment groups, each with three replicates of twelve birds each. The plant material was collected and the leaves were stripped, washed and dried at ambient temperature. The leaves were then pulverized, converted into powder and added to the experimental diets. The treatment groups were fed as follows: the control group (T_1) was fed the basal diet, group T2 was fed the basal diet + 1% *Artemisia absinthium* leaf powder, group T3 was fed the basal diet +1.5% *Artemisia absinthium* leaf powder, group T4 was fed the basal diet + 2% *Artemisia absinthium* leaf powder, group T5 was fed the basal diet + 1% enzyme treated *Artemisia absinthium* leaf powder, group T6 was fed the basal diet + 1.5% enzyme treated *Artemisia absinthium* leaf powder and, group T7 was fed the basal diet + 2% enzyme treated *Artemisia absinthium* leaf powder. The cocktail enzyme was used at the rate of 25g/100 kg of feed.

The birds were raised in cages upto five weeks of age under standard managemental conditions with *ad lib* feeding and watering. All birds were vaccinated and assessed twice daily for mortality, if any. At the conclusion of the trial, a total of 42 healthy broiler chickens (2 birds per replication, or 6 birds per treatment) were chosen at random for carcass analysis. The birds were fasted overnight and water was withdrawn three to four hours before slaughter. The birds were weighed to determine their pre-slaughter live weight, slaughtered and then the various carcass characteristics were measured. The carcass was cut into standard portions such as breast, thighs, drumsticks, wings, back, and neck, with each part weighing separately. The broiler meat was sensory evaluated using an 8-point hedonic scale for descriptive attributes of product, as described by Keeton (1983). The carcasses were then kept at refrigeration temperature and next day the proximate composition of meat samples was assessed using the Association of Official Analytical Chemists' standard protocol (AOAC, 2000) [1]. On day 30 of storage, the oxidative stability of broiler meat was assessed by Thiobarbituric Acid Reactive Substances (TBARS) value estimated by method described by Witte *et al.* (1970)

Statistical Analysis

The data was analysed using One way ANOVA and the analysis was conducted using the statistical software SPSS version 20.00 Chicago, United States of America for Windows.

Result and Discussion

The effect of diets supplemented with *Artemisia absinthium* leaf powder with or without enzyme treatment on the different carcass traits is presented in table 1. As shown in table, significant effect of feeding *Artemisia absinthium* leaf powder with or without enzyme treatment was observed only on the dressing percentage of broilers. Significantly (p<0.05) higher dressing percentage was observed in the birds fed diets supplemented with enzyme treated *Artemisia absinthium* leaf powder. No significant effect was seen on other carcass traits of broilers. Khalaji *et al.* (2011) [10] found that dietary supplementation of *Artemsia sieberi* leaves in broilers did not affect the relative weight and length of different parts of the carcass. Hosseinzadeh and Farhoomand (2014) [8] also found no statistically significant effect of feeding different levels (0.125%, 0.25% and 0.5%) of *Artemisia dracunculus* powder on the relative weight of heart, liver, spleen, bursa, cook carcasses and abdominal fat of broilers. Habibi *et al.* (2016) [7] found that the different levels of cumin and wormwood essential oil in diets of broilers did not have a significant effect on carcass yield and relative weights of liver, intestine, heart, gizzard, thigh, breast and abdominal fat at 42 days of age. Saracila *et al.* (2018) [18] also observed that supplementation with *Artemisa annua* oil and powder did not significantly affected the carcass and organ weights of heat stressed broilers

Table 1: Carcass traits of broiler chicken fed diets supplemented with *Artemisia absinthium* with or without enzyme

Carcass trait per cent	Treatment groups						
	T1	T2	T3	T4	T5	T6	T7
Blood loss	3.69± 0.11	3.86± 0.15	4.18± 0.37	3.737± 0.40	3.91± 0.23	4.12± 0.07	3.69± 0.26
Feather loss	7.29± 0.22	7.42± 0.55	8.29± 0.59	9.00± 0.40	8.16± 0.49	8.38± 0.69	8.73± 0.43
Dressing	72.04^{a}± 0.45	72.19^{a}± 0.51	73.50^{ab}± 0.53	74.77^{ab} ±0.49	75.62^{b}± 0.47	76.26^{b}± 0.45	77.14^{b}± 0.55
Breast	31.18± 0.41	31.48± 0.59	34.17± 1.25	31.27± 0.95	32.48± 0.83	31.73± 1.06	31.60± 1.47
Drumsticks	13.56± 0.42	13.44± 0.21	13.03± 0.29	13.54± 0.18	13.17± 0.53	14.07± 0.58	12.77± 0.76
Thighs	13.90± 0.31	14.69± 0.36	13.86± 0.23	13.92± 0.06	13.81± 0.08	13.98± 0.06	13.51± 0.99
Wings	12.21± 0.33	12.62± 0.10	12.70± 0.22	11.93± 0.34	12.97± 0.77	12.16± 0.28	11.61± 0.72
Back	15.70± 0.34	15.98± 0.37	14.56± 1.20	16.00± 0.88	15.96± 0.49	15.41± 1.50	14.15± 0.50
Neck	4.89± 0.55	6.48± 1.09	6.38± 1.03	5.66± 1.10	7.06± 1.90	4.19± 0.14	6.73± 1.62
Visual carcass score	A	A	A	A	A	A	A

The effect of diets supplemented with *Artemisia absinthium* leaf powder with or without enzyme treatment on the proximate composition of broiler meat is presented in table 2. In our study no significant effect on the proximate composition of broiler meat was observed. Contrary to our result, Kim *et al.* (2012a) [11] found that inclusion of *Artemisia princeps* (1% or 2%) and *Pinus densiflora* powder (1% or 2%) in the diets significantly (P<0.05) decreased crude fat contents of chicken thigh meat compared with the control groups. Kostadinovic *et al.* (2015) [13] also found that birds fed with 200 g/kg of *A. absinthium* had higher protein content and significantly (P<0.05) lower fat content as compared to the control.

The effect of diets supplemented with *Artemisia absinthium* leaf powder with or without enzyme treatment on the sensory and organoleptic parameters of broiler meat is presented in table 3. No significant effect was found of feeding *Artemisia absinthium* leaf powder with or without enzyme treatment on the sensory and organoleptic parameters of broiler meat. Puvaca *et al.* (2015) [16] also found that the addition of spices including garlic, black pepper and hot red pepper in the diet did not have an adverse effect on meat quality as the sensory quality of meat had high scores for smell, juiciness and overall impression.

The effect of diets supplemented with *Artemisia absinthium* with or without enzyme on the Thiobarbituric acid reactive substances (TBARS) assay of meat of broilers has been presented in table 4. Statistically significant difference was observed between the various treatment groups and the control group. The supplementation of broiler diets with 1.5% and 2% *A.absinthium* with enzyme treatment significantly lowered TBARS assay of meat as compared to other treatment groups and control group. The TBARS value, given as MDA concentration, has been traditionally used to assess lipid peroxidation levels. Long term storage of meat is one of the main reasons augmenting the lipid peroxidation of meat postmortem (Aziza *et al.*, 2010) [3]. Aromatic and medicinal plants are an edible and easily accessible source of natural antioxidants. The antioxidant activity of *Artemisia spp*. could be attributed to its flavonoidal content. They are rich sources of sesquiterpene lactones, antioxidant phenolics, flavonoids and other biologically active compounds involved in the mechanism of free-radical scavenging activity (Rice Evans *et al*, 1996) [17]. Gouveia and Castilho (2013) found that the diversified phenolic compounds and flavonoids in *A.annua* are potent scavenger of free radicals. The present results are consistent with the findings of Kim *et al.* (2012b) [12] who found that dietary supplementation of *Lactobacillus*-fermented *Artemisia princeps* (LFA) in broilers reduced thiobarbituric acid-reactive substance (TBARS) values in breast and thigh meat during 15 days of storage. Similarly, lipid oxidation products were decreased in breast and thigh muscles of broilers fed diets supplemented with 20 g/kg or 40 g/kg *A. annua* leaves (Cherian *et al.*, 2013) [5]. Addition of *Artemisia princeps* Pamp extract was found to be effective in delaying lipid oxidation of raw chicken patties stored for 12 d under 4 ◦C in refrigeration, which may extend the shelf life of chicken patties (Hwang *et al.*, 2013) [9]. Wan *et al.* (2017) [19] also found that diets supplemented with various levels of enzymatically treated *Artemisia annua* L. (EA) increased ABTS and DPPH free radical scavenging activities of breast and thigh muscles in broilers, indicating that EA can improve antioxidant capacity of meat.

Table 2: Effect of diets supplemented with *Artemisia absinthium* with or without enzyme on the proximate composition of meat of broilers

Parameter	Treatment groups						
	T1	T2	T3	T4	T5	T6	T7
Moisture (%)	75.06± 0.08	75.50± 0.15	75.36± 0.08	75.13± 0.12	75.33± 0.24	75.30± 0.26	75.33± 0.17
Protein (%)	21.03± 0.16	21.15± 0.24	21.25± 0.23	21.42± 0.26	21.41± 0.12	21.27± 0.23	21.60± 0.23
Fat (%)	2.36± 0.17	2.16± 0.08	2.30± 0.29	2.07± 0.07	2.01± 0.05	2.07± 0.07	2.00± 0.01
Total ash (%)	1.76± 0.08	1.72± 0.08	1.47± 0.20	1.39± 0.20	1.60± 0.15	1.35± 0.10	1.29± 0.07

Table 3: Sensory Evaluation/ organoleptic parameters of broiler meat fed diets supplemented with *Artemisia absinthium* with or without enzyme treatment

Attributes		Treatment Groups					
	T_1	T_2	T_3	T_4	T_5	T_6	T_7
Appearance	6.98±0.12	7±0.11	7.19±0.11	7.02±0.11	7.09±0.13	7.10±0.13	7.01±0.12
Flavor	6.81±0.12	6.86±0.12	7±0.13	6.98±0.12	6.90±0.13	7.01±0.12	7±0.13
Juiciness	6.86±0.12	6.97±0.13	6.81±0.12	6.72±0.12	6.87±0.13	6.92±0.13	6.85±0.12
Texture	6.90±0.13	6.95±0.13	6.87±0.12	6.93±0.12	6.96±0.13	6.93±0.14	6.97±0.14
Mouthcoat	7.23±0.12	7.52±0.11	7.57±0.13	7.47±0.13	7.42±0.11	7.53±0.15	7.18±0.15
Overall Acceptability	6.86±0.12	6.96±0.11	7±0.11	7.02±0.11	7.06±0.11	7.12±0.13	7.08±0.11

Table 4: Effect of diets supplemented with *Artemisia absinthium* with or without enzyme on the TBARS assay of meat of broilers

TBARS (nmol MDA/mg of meat)	Treatment groups						
	T1	T2	T3	T4	T5	T6	T7
	0.50^{c}± 0.003	0.496^{c}± 0.003	0.483^{b}± 0.002	0.476^{b}± 0.004	0.463^{a}± 0.002	0.456^{a}± 0.003	0.453^{a}± 0.002

Mean across rows bearing different superscripts differ significantly (P≤0.05)

Conclusion

It is concluded that the supplementation of 1 to 2% of enzyme treated *Artemisia absinthium* leaf powder in broiler diets improved the oxidative stability of meat without affecting the sensory and organoleptic attributes. It can therefore be used as a source of phytogenic feed additive in the broiler diets

References

1. AOAC. Official methods of analysis. 16th edition. Association of Official Analytical Chemists, Arlington, Virginia, USA, 2000, 1094.
2. Asad MHHB, Murtaza G, Siraj S, Khan SA, Azhar S, Hussain MS, *et al*. Enlisting the scientifically unnoticed

medicinal plants of Pakistan as a source of novel therapeutic agents showing anti-venom activity. African Journal of Pharmacology. 2011;5(20):2292-2305.
3. Aziza AE, Quezada N, Cherian G. Antioxidative effect of dietary Camelina meal in fresh, stored, or cooked broiler chicken meat. Poultry Science. 2010;89:2711-2718.
4. Bilia AR, Lazari D, Messori L, Taglioli V. Simultaneous analysis of Artemisinin and Flavonoids of several extracts of *Artemisia annua* L. obtained from a commercial sample and a selected cultivation. Phytomedicine. 2006;13:487.
5. Cherian G, Orr A, Burke IC, Pan W. Feeding Artemisia annua L. alters digesta pH and muscle lipid oxidation products in broiler chickens. Poultry Science. 2013;92:1085-1090.
6. Dalkilic B, Guler T. The effects of clove extract supplementation on performance and digestibility of nutrients in broilers. F.U. Sag. Bil. Vet. Derg. 2009;23:161-166.
7. Habibi R, Jalilvand G, Samadi S, Azizpour A. Effect of different levels of essential oils of wormwood (*Artemisia absinthium*) and cumin (*Cuminum cyminum*) on growth performance carcass characteristics and immune system in broiler chicks. Iranian Journal of Applied Animal Science. 2016b;6(2):395-400
8. Hosseinzadeh Z, Farhoomand P. The effecis of *Artemesia Dracunculus* powders different levels on blood parameters and internal organs weight broiler chickens. International journal of Advanced Biological and Biomedical Research. 2014;2(3):661-668.
9. Hwang KE, Kim HW, Choi YS, Lee SY, Yeo EJ, Ham YK, *et al*. Evaluation of the antioxidant effect of ganghwayakssuk (*Artemisia princeps* Pamp.) extract alone and in combination with ascorbic acid in raw chicken patties. Poultry Science. 2013;92:3244-3250.
10. Khalaji S, Zaghari M, Hatami KH, Hedari-Dastjerdi S, Lotfi L, Nazarian H. Black cumin seeds, Artemisia leaves (*Artemisia sieberi*), and Camellia L. plant extract as phytogenic products in broiler diets and their effects on performance, blood constituents, immunity, and cecal microbial population. Poultry Science. 2011;90:2500-2510.
11. Kim YJ, Kim CM, Choi JH, Choi IH. Effect of dietary mugwort (*Artemisia vulgaris* L.) and pine needle powder (*Pinus densiflora*) on growth performance, serum cholesterol levels, and meat quality in broilers. African Journal of Biotechnology. 2012a;11(55):11866-11873.
12. Kim CH, Kim GB, Chang MB, Bae GS, Paik IK, Kil DY. Effect of dietary supplementation of *Lactobacillus*-fermented Artemisia princeps on growth performance, meat lipid peroxidation, and intestinal microflora in Hy-line Brown male chickens. Poultry Science. 2012b;91:2845-2851.
13. Kostadinovic L, Levic J, Popovic S, Cabarkapa I, Puvaca N, Duragic O, *et al*. Dietary inclusion of *Artemisia absinthium* for management of growth performance, antioxidative status and quality of chicken meat. European Poultry Science. 2015, 79.
14. Beneficial effects of phytoadditives in broiler nutrition.
15. Puvaca N, Stanacev V, Glamocic D, Levic J, Peric L, Stanacev V, Milic D. Beneficial effects of phytoadditives in broiler nutrition. World's Poultry Science Journal. 2013;69(1):27-34.
16. Puvaca N, Kostadinovic Lj, Popovic S, Levic J, Ljubojevic D, Tufarelli V, *et al*. Proximate composition, cholesterol content and lipid oxidation of meat from chickensfed dietary spice addition (*Allium sativum*, *Piper nigrum*, *Capsicum annuum*). Animal Production Science 2015, 55. http://dx.doi.org/10.1071/AN15115.
17. Rice-Evans CA, Miller NJ, Paganga G. Structure–antioxidant activity relationships of flavonoids and phenolic acids. Free Radical Biology and Medicine. 1996;20:933-956.
18. Saracila M, Criste RD, Panaite TD, Vlaicu PA, Tabuc C, Turcu RP, *et al*. *Artemisia Annua* as Phytogenic Feed Additive in the Diet of Broilers (14-35 Days) Reared under Heat Stress (32 ºC). Brazilian Journal of Poultry Science. 2018;20(4):825-832.
19. Wan X, Zhang J, He J, Bai K, Zhang L, Wang T. Dietary enzymatically treated *Artemisia annua* L. supplementation alleviates liver oxidative injury of broilers reared under high ambient temperature. International Journal of Biometeorology. 2017;61:1629-1636.