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Effect of Dried Medicinal Crops on the Performance and Carcase Flavour of Broilers

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Abstract: The present study was planed to evaluate the effect of adding 2% of Mint, Thyme and Cardamom to the broiler finisher diet for 0, 6, 12 and 18 days before slaughter at 42 days old on the performance, carcase yield and meat flavouring using the two-way ANOVA method for means analysis. The final results showed that there was no significant negative affect for the dried medicinal crops on the performance and carcase traits. On the other hand a significant ($p<0.01$) positive flavour was indicated for the medicinal crop fed broilers compared to the control, when a cooked samples from breast were evaluated though a taste panel test using a Triangle test method. Serum biochemistry parameters did not differ significantly between treatment groups. Low Density Lipoprotein (LDL) means were numerically 17.8 and 4.5% low in cardamom and thyme fed broiler serum and the High Density Lipoprotein (HDL) means were 1.7, 11.2 and 17.4% high in cardamom, mint and thyme crop fed broiler serum compared with the control respectively.

Key words: Medicinal crops, broiler performance, meat flavouring, serum biochemistry

INTRODUCTION

Considerable changes in quality of meat demand have taken place in last ten years. Market demand has influenced significantly by the consumer opinion. Results of some researches indicated that people preference on leany meat has increased and demand on fatty tissues has decreased (Wood, 1982; Dahal, 1987). Broilers have a very wide demand all around the world. Flavour is considered as a major factor in marketing broiler. It is a key part of meat acceptability by consumer (Channon *et al*., 2003). The quality oriented the consumer to pay a premium price for tasty and flavoured foods. Studies aimed a better understanding production factors affecting flavour, has lead to production and processing practices that improve quality. Some dietary supplementation have no adverse effects on flavour intensity of the broiler meat. as rendered spent hen meal (Wiliams and Damron, 1998) and turmeric (AL-Sultan, 2003). Who concluded that the organo-leptic test revealed that turmeric did not induce any abnormal flavour in chicken meat. But other materials were found to effect chicken meat composition and consumer acceptability. Supplementation of chicken diet with all-rac-tocopheryl acetate increased the tocopherol content in meat. On the same time the fatty acid composition of the meat found to be affected by the amount of fish oil in the diet (Buo *et al*., 2004). It is well known that the use of alfalfa in monogastric animals is limited for its high fiber content. However it is well established that alfalfa is a natural source of xanthophylls, giving the poultry carcases a desirable yellow color, although broiler chicks performance was significantly depressed. Carcases from birds with higher alfalfa intakes were more deeply pigmented with an increase in yellowness of the broiler skin (Ponte *et al*., 2004). Feeding 5.5% and 2.8% marine algae reduced flavour scores significantly, compared to samples from control fed birds (Mooney *et al*., 1998). 10% cull onion bulbs used in the ration had lowered ($p<0.05$) the flavour desirability and overall palatability scores of the lamb chops (Cannon *et al*., 1995). Medicinal flavouring crops have long been used in human diets to improve food acceptability. Habek mint was used by AL-Ankari *et al*. (2004), to investigate the effect of its incorporating in basal diet of broilers on overall performance and immunity of the birds. The results of the study showed that including 150 g habek/kg broiler diet make a significant improvement in the mean body weight, daily average gain, feed intake and food conversion.

The objectives of current research were:

- To evaluate the effect of three dietary medicinal flavouring crops on the performance and carcase flavour of broilers at market age.
- To determine the residual effect of flavouring agents and the optimal feeding period required for the assessed flavour.

MATERIALS AND METHODS

Broiler chicks of ross 308 strain were used in this experiment. Two hundred day-old chicks were raised on a regular broiler starter diet (NRC, 1994) as given in

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Table 1: Compositions of the experimental diets

Ingredients (%)	Starters	Finisher*
Yellow corn	59.92	61.35
Salt	0.47	0.42
Limestone	1.35	1.50
Di-Cal	1.73	1.49
Dl-Methionine	0.33	0.25
Lysine	0.16	0.11
Soybean oil	2.69	3.89
Vit. and mineral mix	0.25	0.25
Soybean meal 44%	33.00	30.69
Coccidiostat	0.10	0.05

*At the expense of yellow corn, 2% dried leaves of mint (*Mentha spicata*) and thyme (*Origenum syriacum*) and ground cardamom (*Amonum cardamomum*) seeds

(Table 1). Body weights, feed intake and mortality were recorded during a 24-day period. Veterinary supervision was applied on for all the chicks. Twenty four day old chicks were weighed and distributed in to 48 pens in rearing cages with 4 birds (2 male and 2 female) of similar body weight per pen. Birds were fed a finisher diet (NRC, 1994) containing 2% dried leaves of mint (*Menthe spicata*), or thyme (*Origenum syriacum*) or ground cardamom seeds (*Amonum cardamomum*) at the expense of yellow corn (Table 1) for four feeding levels 18, 12, 6 and 0 days before Slaughtering at market age of 42 days. Feed and Water were provided *ad labitum* and a 16-h lighting program was applied. Feed conversion, live body weights, ready to cook carcase and giblet weights were recorded at the end of the experimental period. Body weight gains and feed conversion rate were calculated.

A total of ninety six birds representing all the study groups were slaughtered. Blood samples were taken from the slaughtered birds for the biochemical test. Low Density Lipoprotein (LDL), High Density Lipoprotein (HDL), Cholesterol (CHO), Trigleserol (TG) and Cholesterol/High Density Lipoprotein (COH) were determined in the hospital laboratory. Ready to Cook (RTC) carcases were stored for two weeks in a sealed plastic bags at -22°C.

The frozen carcases of six days medicinal fed broiler were thawed at room temperature overnight prior to cooking representing the short period medicinal feeding crops. A chosen breasts were deboned and cut to small pieces (2*2 cm) to be prepared for sensory attributes. The first cut of the anterior-most strip was drawn along the line represented from the point of the wing insertion to that of the keel. All other cuts were made paralleled to this line (Lyon, 1993). Every individual sample was rolled and perfectly sealed using the aluminum foil. One capped container was used to roast samples from similar treatment at 150°C for 25 min and served hot to each panel member. Three test sessions were hold by thirteen panelists to asses the flavour of the roasted samples. The samples were served to the panelists using the triangle test (Herbert Stone and Joel Sidel, 1993) in which all three samples are coded and the subject task is to determine which two are most similar or which one is most different from the other two.

Two way ANOVA method was used to determine whether any significant effects were produced by the type of medicinal crops used in the diets or the level of feeding period of these crops on the performance and slaughter character. Means were separated by Duncan's multiple range test were appropriate (SAS, 1992). While the flavour assessment data was examined significantly using the critical Number of correct are responses in a triangle test Table (Meilgaard *et al*., 1999).

RESULTS AND DISCUSSION

Means of initial body weight, body weight gain, final body weight and feed conversion rate, are given in Table 2. A significant ($p<0.05$) increase (625 g) in body weight gain of cardamom fed group in stage 3 was concluded compared to the mint fed group (547 g), with intermediate value for thyme fed group (599 g). These result reflected in a similar significant ($p<0.05$) order in final body weight for the cardamom (2298 g), mint (2171 g) and thyme (2270 g) fed groups. Mint fed group in current study showed 270 g higher body weight at 36 days old broiler than that found by AL-Ankari *et al*. (2004). No significant differences were detected in final body weight between the four level medicinal crop feeding groups (0, 6, 12 and 18 days). The highest increase (6%) in final body weight was found for the 12 days feeding level, which was a same as that reported by AL-Sultan (2003). Feed conversion rate values for the cardamom (1.953), mint (1.973) and Thyme (1.931) fed broiler groups did not differ significantly from each other. Birds received medicinal crops for 6, 12 and 18 days before slaughter improved their feed conversion rate 3.5, 3.9 and 5.6% compared to the control group birds respectively. The above results are in agreement with that of AL-Ankari *et al*. (2004) and AL-Sultan (2003). The current results were in agreement with the results mentioned by Asai and Miyazawa (2001) and Okada *et al*. (2001) that turmeric and curcumin had no negative effect on weight gain and feed intake of broiler chickens. Any improvement in performance of broilers fed medicinal crops in current results supported an earlier hypothesis suggests that the herbs are valued for their beneficial effect and the digestion (Grieve, 1981; Chopra *et al*., 1992).

Mortality was very few and not important to be mention. Ready to cook carcase produced for male and female birds fed cardamom, mint and thyme showed insignificant differences in values, when they gave 72.4, 72.1, 73.0% and 72.4, 73.4, 73.7% respectively. Increasing the medicinal crop feeding period from 0 to 6, 12 and even 18 days before slaughter to enhance meat flavouring chance seemed to have no negative effect on ready to cook carcase yields and averaged 72.8, 73.2, 72.0, 72.0% and 72.7, 73.0, 73.1, 73.9% for male and female birds respectively. Percentage of liver, Gizzard and heart for both sexes were on a same evaluation as above (Table 3).

Table 2: Live weight and feed conversion rate for trial birds

Crop	Initial body wt. at 24 days (g)	Stage (day)+ WG1	FC1	WG2	FC2	WG3	FC3	Final Wt.	CFC
Cardamom	855	346	2.052	472	1.921	625a	1.977	2298a	1.935
Mint	849	322	2.057	463	1.907	547b	2.064	2171b	1.973
Thyme	871	347	1.942	454	1.944	599ab	1.930	2270a	1.931
SEM	7.4	9.4	0.086	11.8	0.033	22.7	0.094	30.3	0.035
Level									
0	864	349	2.133	464	1.922	550	2.113	2213	2.015
6	858	325	2.070	461	1.912	598	1.935	2241	1.947
12	864	347	1.950	472	1.958	624	1.978	2306	1.939
18	848	332	1.916	455	1.904	590	1.936	2225	1.909
SEM	8.5	10.8	0.099	13.6	0.038	26.3	0.108	35.0	0.040
Probability values									
Crop	0.113	0.127	0.568	0.566	0.731	0.053*	0.590	0.014*	0.686
Level	0.554	0.332	0.378	0.840	0.759	0.269	0.614	0.259	0.304
Crop x level	0.449	0.626	0.422	0.519	0.403	0.519	0.796	0.444	0.818

Means in the same row with a deferent letters are differ at 5% level. *p<0.05; +Stage 1, 2, 3, = 6 days each

Table 3: Carcase and offal means for trial birds

	Male					Female				
Crop	Final Wt. (g)	RTC (%)	Liver (%)	Gizzard (%)	Heart (%)	Final Wt.(g)	RTC (%)	Liver (%)	Gizzard (%)	Heart (%)
Cardamom	2421	72.4	1.63	1.47	0.544	2160	73.4	1.65	1.48	0.511
Mint	2434	72.2	1.58	1.35	0.507	2123	73.4	1.77	1.46	0.539
Thyme	2443	73.0	1.64	1.45	0.531	2136	73.7	1.66	1.40	0.504
SEM	43.20	0.530	0.032	0.034	0.018	37.00	0.670	0.042	0.033	0.018
Level										
0	2428	72.8	1.60	1.44	0.527	2150	72.7	1.68	1.46	0.532
6	2423	73.2	1.67	1.41	0.520	2083	73.0	1.73	1.41	0.531
12	2414	72.0	1.60	1.44	0.517	2183	73.1	1.66	1.48	0.500
18	2464	72.0	1.58	1.41	0.545	2144	73.9	1.71	1.45	0.510
SEM	49.90	0.61	0.037	0.039	0.021	42.7	0.79	0.048	0.038	0.021
Probability values										
Crop	0.937	0.594	0.391	0.065	0.373	0.777	0.425	0.775	0.220	0.350
Level	0.904	0.499	0.310	0.877	0.770	0.432	0.742	0.723	0.670	0.615
Crop x level	0.596	0.436	0.602	0.068	0.853	0.755	0.059	0.904	0.151	0.272

The insignificant variation in heart percentage means for the medicinal fed and control groups were not as that found by Emadi and Kermanshahi (2006) who reported that using the turmeric rhizome powder as a feed additive into the diets of broilers was decreased relative heart weight ($p<0.05$) to live body weight.

A significant ($p<0.01$) foundation was noticed for the flavour scores of the tasted meat samples (Table 4). Samples of the three groups fed mint, thyme or cardamom crops gave highly significant ($p<0.01$) flavour assessment compared with the control samples. Mint flavor was detected in 72.72% of the tasted samples chosen from the mint fed chickens and a positive thyme flavour was marked in 69.23 % by the panelist when they tasted cooked samples from chickens fed thyme supplemented diet. While the highest recognized flavour percentage (76.91) was found when samples from cardamom fed chickens were tasted. These results can support those published by the other researchers emphasizing that the flavour of the meat may be affected by the contents of the diet as that found by Gbenga *et al.* (2009) who reported that there was a significant ($p<0.001$) garlic aroma score in the meat of the chickens fed 5 g garlic/kg diet and similar to results that meat of birds grown on garlic supplemented diet achieved the highest sensory score (Schleicher *et al.*, 1996). On a same base the unpleasant flavour may transport from the diet to the chicken meat as mentioned by Hargis and Van Elswyk (1993) that the use of fish oils at concentrations above 2% in poultry diets may entail several sensory problems that compromise meat quality, which may lead to off flavours and consequently, lower consumer acceptability and the dose of the fish oil seemed to have a negative and significant ($p<0.01$) effect on acceptability. On the other hand the current results were on contrast with those found by Al-Sultan (2003) that the turmeric did not induce any abnormal flavour in the cooked broiler meat and a same finding was reported for the habek by AL-Ankari *et al.* (2004) and rendered spent hen meal had no adverse effect ($p<0.05$) on the flavour chicken meat (Wiliams and Damron, 1998).

Table 4: Flavour assessment in broiler groups fed medicinal crops

Crop	Sig p<0.01	Panelist	Positive sensory	%
Cardamom	*	13	10	76.91
Mint	*	11	8	72.72
Thyme	*	13	9	69.23

Table 5: Birds blood parameters fed the medicinal crops for 18 days before slaughters

Crop	LDL	CHO	HDL	COH	TG
Cardamom	31.0	123	85.7	1.440	31.7
Mint	38.0	138	93.7	1.473	31.3
Thyme	36.0	141	99.0	1.430	29.3
Control	39.7	128	84.3	1.523	30.3
SEM	3.97	6.7	5.39	0.056	3.22
Probability values	0.598	0.265	0.953	0.656	0.953

Serum LDL, CHO, HDL, COH and TG means are shown in Table 5. Statistical analysis of data on serum biochemical parameters revealed no significant deference among the treatment groups by dietary inclusion of medicinal crops and the control. LDL means was numerically 17.8 and 4.5% low in cardamom and thyme groups compared to control respectively. Broiler diet included cardamom crop had decreased cholesterol in serum by 3.91%, while diets included mint and thyme crops had increased cholesterol by 7.8 and 10.2% respectively. Diets supplied with the above three medicinal crops had notable, but non-significant increase in HDL levels by 1.7, 11.2 and 17.4% respectively. These results led to reduce COH mean in cardamom fed group 5.4% and mint fed group 3.3% and finally the thyme fed group 6.1%. Medicinal crops had no significant effect on blood Triglycerides between treatment groups and control. This finding was consistent with Mehala and Moorthy (2008), using the curcuma longs in broiler diet and Namagirilakshmi (2005) who stated that suppling the broiler chicken diet with four levels of turmeric had no significant effect on blood glucose, total cholesterol, HDL, LDL and triglycerides between treatment groups and control. Current results are similar to that reported by Gbenga *et al*. (2009) that lipid contents of meat was non-significantly influenced by garlic supplementation in broiler feed. On the contrary, Ademola *et al*. (2009) concluded that using Garlic, Ginger and their mixtures decreased the serum total cholesterol significantly ($p<0.001$) 21, 19 and 23% compared to the control respectively and corresponding decreases of 51, 61 and 76% in serum LDL cholesterol and a significant ($p<0.001$) decreases of 34, 34 and 50% were observed in serum triacylglycerol of chickens compared to the control.

Conclusion: 1- Dried medicinal crops had no negative affect on broiler body performance and carcase traits. 2- A significant ($p<0.01$) positive flavour was assessed for the broilers fed cardamom, mint and thyme crops compared to the control. 3- LDL means were numerically 17.8 and 4.5% low in cardamom and thyme fed broilers serum, while the HDL means increased insignificantly 1.7, 11.2 and 17.4% in cardamom, mint and thyme crop fed broilers serum.

REFERENCES

Ademola, S.G., G.O. Farinu and G.M. Babaunde, 2009. Serum Lipid, Growth and Hematological parameters of Broiler Fed Garlic, Ginger and Their mixtures. World. J. Agri. Sci., 5: 99-104.

AL-Ankari, A.S., M.M. Zaki and S.I. AL-Sultan, 2004. Use of Habek Mint (*Mentha longifolia*) in broiler chicken Dirts. Int. J. Poult. Sci., 3: 629-634.

AL-Sultan, S.I., 2003. The effect of *Curcuma longa* (Tumeric) on overall performance of broiler chickens. Int. J. Poult. Sci., 2: 351-353.

Asai, A. and T. Miyazawa, 2001. Dietary curcuminodoids prevent high-fat diet-induced lipid accumulation in rat liver and epididymal adipose tissue. J. Nutr., 131: 2932-2935.

Buo, R., F. Guadriola, A. Tres, A.C. Barroetat and R. Condony, 2004. Effect of dietary fish oil, a-togopheryl Acetate and zinc supplementation on the composition and consumer acceptability of checken meat. Poult. Sci., 83: 282-292.

Cannon, S.B.L., J.B. Morgan Tom McBride, M. Eisenach, J.D. Tatum and G.C. Smith, 1995. Efforts of feeding Cull Onions and Carrots on growth Rate, Carcass Traits and Meat palatability Attributes in Laambs. Sheep reserch highlights, Department of Animal Sciences, Colorado State University.

Channon, H.N., R. Lyons and H. Bruce, 2003. Sheep meat flavour and odour. Food. Sci. Australia final report from Sheep CRC project 1. 3. 2.

Chopra, R., S. Nayar and I. Chopar, 1992. Second glossary of Indian medicinal plants. Publication and information directorate, New Delhi, Indian, pp: 414.

Dahal, I.M., 1987. Effect of stocking rate and pasture type on growth characteristics and carcase composition of lambs. Ph.D. thesis, Department of Agriculture, University College of Norht wales, Bangor, U.K.

Emadi, M. and H. Kermanshahi, 2006. Effect of Tumeric Rihzome powder on performance and carcase characteristics of broiler chicken. Int. J. Poult. Sci., 5: 1069-1072.

Gbenga Onibi, E., O.E. Adebisi, A.N. Fajemisin and A.V. Adetunji, 2009. Response of broiler chickens in trims of performance and meat quality of garlic (*Allium sativum*) supplementation. Afr. J. Agric. Res., 4: 511-517.

Grieve, M., 1981. A modern herbal. Penguin, UK., pp: 902.

Hargis, P.S. and M.E. Van Elswyk, 1993. Manipulating the fatty acid composition of poultry meat and eggs for the health conscious consumer. Worlds Poult. Sci., 49: 251-264.

Herbert Stone and Joel Sidel, 1993. Sensory Evaluation practices, 2nd Edition.

Lyon, B.G., 1993. Sensory Profile changes in broiler tissues due to cooking storage and reheating. Poult. Sci., 72: 1981-1988.

Mehala, C. and M. Moorhty, 2008. Effect of aloe vera and *Curcuma longa* (Turmeric) on carcase characteristics and biochemical parameters of broilers. Int. J. Poult. Sci., 7: 857-861.

Meilgaard, M., G.V. Civille and B.T. Carr, 1999. Sensory Evaluation Techniques 3rd Edition.

Mooney, J.W., E.M. Hirschler, A.K. Kenendy, A.R. Sams and M.E. Van Elswyk, 1998. Lipid and flavour quality of stpred meat from broilers fed marine algae. Department of poultry Science, Texas Agricultural Experment Station, Texas A and M University, College Station TX 77843-2472, USA.

Namagirilakshmi, S., 2005. Turmeric (*Curcuma longa*) as nutraceutical to improve broiler performance. M.V.Sc., thesis submitted to tamil nadu veterinary and animal sciences university, Chennai, India.

National Research Council, 1994. Nutrint Riquirments of poultry. 9th Rev. Edn., National Academy Press, Washington, DC.

Okada, K., C. Wangpongtrakul, T. Tanaka, S. Toyouni, K. Uchida and T. Osawa, 2001. Curcumin and especially tetrahydrocurcumin ameliorate stress induced renal injury in mice. J. Nutr., 131: 2090-2095.

Ponte, P.I.P., L.M.A. Ferreira, M.A.C. Soares, M.A.N. Aguiar, J.P.C. Lemos, I. Mendes and C.M.G.A. Fontes, 2004. Use of Celluases and Xylanases to supplement diets containing Alfalfa for broiler chickes: Effect on bird performance and skin color. J. Appl. Poult. Res., 13: 412-420.

SAS Institute, 1992. SAS Users Guide: Statistics. Version 5 ed. SAS Institute Inc., Cary, NC.

Schleicher, A., Z. Fritz and S. Kinal, 1996. The influence of herbs and garlic supplements to feed mixtures on the productive and post-slaughter performance of broiler chickens. Zesz. Nauk. AR Wroc. Zootech., 41: 181-189 (in Polish).

Wiliams, S.K. and B.L. Damron, 1998. Sensory and objective characteristics of broiler meat from commercial broilers fed randerd Spnt hen meal. Poult. Sci., 77: 1441-1445.

Wood, J.D., 1982. Factors controlling fat deposition in meat animals. NZ. Soc. Anim. Prod., 42: 113-116.