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Effect of dietary inclusion of fenugreek seed and guduchi stem on meat quality of broilers in Konkan region of Maharashtra, India

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Abstract
The several herbal phyto-additives have been used to improve meat quality of broilers. During the past some years, phyto-additives in animal nutrition have attracted attention for their important role as alternatives to antibiotic growth promoter. The goal of this paper to assess the effect of dietary inclusion of fenugreek (*Trigonella faenum-graecum* L.) seed powder (FSP) and guduchi (*Tinospora cordifolia*) stem powder (GSP) as herbal phyto-additive on meat quality of broilers in Konkan climatic conditions. The 'Vencobb-400' a day old broiler chicks were individually weighed dived into nine treatment groups including control. Each treatment replicates three times with 6 birds per replicates. The total of 18 birds per treatment were treated. The treatments were supplemented with 0.1 and 0.2 per cent FSP and GSP alone and combination of both FSP and GSP. In order to evaluate the seasonal impact on dietary inclusions of herbal phyto-additives (FSP and GSP), the research was conducted in three different seasons of Konkan region *viz*. summer, rainy and winter. The finding indicated that meat quality was improved with inclusion of the FSP and GSP in broiler diet during winter season. It was concluded that dietary inclusion of 0.2 per cent of FSP and GSP in broiler diet could be improved the meat quality of broilers in Konkan climatic conditions. The sensory test scores revealed that quality of meat in respect to appearance, color, odor/flavor, tenderness, juiciness and overall acceptability was differed significantly (P<0.05) among the treatment groups.

Keywords: Broilers, fenugreek seed and guduchi stem powder, sensory attributes

Introduction
Antibiotics are used to control the disease and infection effect in the poultry industry. The commercial broilers are genetic engineering birds, and it can attain maximum body weight (above 2 kg) during its short growing period (35 days). The commercial broilers faced so much stress during its growing period, due to attain higher body weight in shorter period. The poultry nutritionists are making efforts on stress relieving medicines to ease stress from broilers and gain the higher body weight. The laboratories derived anti-stress medicines and growth promoters are available in the market to increase the body weight of broilers within a short period. However, the use of chemical products especially hormones and antibiotics may cause the residual effect in the meat of broilers. The attempts have been made to use the herbal resources such as medicinal plant as alternatives to antibiotics growth promoters. It will be improve the efficiency of feed utilization and productive performance in broiler industry. Many medicinal plants, herbs and their products are used in broiler production because of their advantages over antibiotic growth promoters like herbs have no residual effect and maximum herbs have no toxicity on the body (Tipu *et al*., 2006) [14]. Scientific evidences exist that herbs and medicinal plant extracts stimulate the growth of beneficial bacteria and minimize pathogenic bacterial activity in the gastrointestinal tract of broilers (Langhout, 2000) [7]. Moreover, plants can stimulate the functions of animal digestive enzymes through enhance liver function and therefore could be effectively used in poultry diet as phytogenic feed additives (Hernandez *et al*., 2004) [4].

The portion of fenugreek and guduchi plants contain beneficial phyto-additive like diosgenin, trigoneline and levamisole. The efficiency and economic feasibility of beneficial phyto-additive are need to be judge on the basis of different levels of diet in to broilers. The some studies were reported the addition of fenugreek powder and extract in to the diet was improved the body weight in broilers (Duru *et al.,* 2013) [2]. Similarly guduchi (*Tinospora cordifoila*) benefited the digestive system as a hepatoprotective, anti-hepatoxic, immunomodulatory,

antioxidant performance enhancing and growth promoting properties (Dwivedi *et al.*, 1985). Further it was reported that phyto-additives are used as an antibiotic alternatives in poultry industry. In the present manuscript, combination of fenugreek seed powder and guduchi stem powder were added in the broiler diet during different seasons of Konkan region, Maharashtra, India to evaluate the effect of these phyto-additives on meat quality of broilers.

Materials and Methods

The study was conducted at Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli, Maharashtra, India (18° 37′ 22.62″ N, 73° 53′ 14.43″ E). The study determined the effect of dietary inclusion of fenugreek seed and guduchi stem on meat quality of broilers under different seasonal condition. One hundred sixty two (162) day-old broiler chicks (Vencobb-400) were individually weighted and divided randomly assigned to nine dietary treatments. Three replicates were randomly assigned to each of the nine treatments. Six chicks were allotted to each of the replicates. The broilers chicks were reared in deep litter system under uniform managemental conditions under three seasons like summer (S_1), rainy (S_2) and winter (S_3) of Konkan region. The broilers were vaccinated with Lassota Strain and Gumboro on the end of 1st week and 2nd week, respectively. All the birds were fed *ad libitum*. The experimental diets (treatments) are showed in Table 1.

The birds sacrificed for carcass characteristics were used for organoleptic tests by ten member experienced panel of Department of Animal Husbandry and Dairy Science, DBSKKV, Dapoli. The panelist were evaluated the meat samples appearance, color, odour, tenderness, juiciness and overall acceptability using 9 point hedonic scale (Cross, 1978), where 9 = extremely desirable and 1 = extremely undesirable. The protein of meat tasted was from thigh region in all the groups in order to avoid organ to organ variation of organoleptic qualities. The meat was cooked in salt and water as per standard procedure for approximately fifteen minutes till the internal temperature reached to 72^0 C. This full done meat samples was coded and approximately 40-50 g was served warm to the each panelist. Taste breaker and water was provided in between samples to cleanse the mouth palate. The sensory evaluation data were subjected to test of significance using factorial randomized block design (Snedecor and Cochran, 1994). The experimental diets on broiler chickens were analyzed using the General Linear Model (GLM) procedure of the statistical analysis of variance (SAS 2010) [11] Least significance difference test for multiple comparisons was used to test the significance of difference between treatment means (P<0.05).

Table 1: Experimental diets details

Treatment	Dietary treatments	No. of replicates	No. of birds/replicate	Total
T_0	Control- Basal diet	3	6	18
T_1	Control + 0.1% FSP of basal diet	3	6	18
T_2	Control + 0.2% FSP of basal diet	3	6	18
T_3	Control + 0.1% GSP of basal diet	3	6	18
T_4	Control + 0.2% GSP of basal diet	3	6	18
T_5	Control + 0.1% FSP + 0.1% GSP of basal diet	3	6	18
T_6	Control + 0.1% FSP + 0.2% GSP of basal diet	3	6	18
T_7	Control + 0.2% FSP + 0.1% GSP of basal diet	3	6	18
T_8	Control + 0.2% FSP + 0.2% GSP of basal diet	3	6	18
Total				162

Results and Discussion

The organoleptic test scores with respect to different test characters of meat have been presented in Table 2. The observation scores of meat revealed that quality of meat in respect to appearance, color, flavour, juiciness, tenderness and overall acceptability of broiler chicks differ significantly (P<0.05) among the seasons and different dietary treatments. However, the data revealed that significantly improved the sensory attributes of broiler meat in winter season than the other seasons of Konkan region. The findings indicated that meat quality was improved due to dietary inclusion of FSP and GSP in the broilers diet during different seasons of Konkan region. Similar finding was reported by Puvaca *et al.* (2013) [10] that the beneficial effect of phytogenic compounds on meat quality and safety which may be due to presence of antimicrobial and antioxidants properties in phytogenic feed additive. These findings were also in line with Toghyani *et al.* (2011) [15].

The results showed that significant (P<0.05) effect of dietary treatments on color and appearance of broiler meat. The color and appearance score was highest in T_8 group than other dietary treatments in winter season. The present findings are in agreement with Park *et al.* (2008) [9] reported the dietary inclusion of herbal feed additives may be useful to improved sensory quality of broiler meat. The score of flavour of broiler meat in T_1, T_3, T_4 and T_8 did not differ significantly. However, It was observed that significant lowest score of flavour was found in T_8 (6.70) than other dietary treatments and control.

The juiciness score was highest in T_8 (7.62) followed by T_2 (7.27), T_7 (7.25), T_1 (7.12), T_6 (7.10), T_3 (7.04), T_6 (6.98), T4 (6.93) and T_0 (6.76), respectively. The data indicated that higher juiciness score in broiler meat with increase level of FSP and GSP in broiler diet. The average tenderness score was significantly highest (7.85) in meat of broiler fed with 0.2 per cent of FSP and GSP as compared to rest of the treatments and control (6.82). The findings revealed that the meat of broiler fed with basal diet showed minimum score for tenderness. Similar results were found and reported by Odoemelam *et al.* (2017) [8] that significant improvement in score for tenderness and juiciness of meat of broiler fed with scent leaf meal and garlic meal than the control. From the Table 2, it was observed that the highest overall acceptability score was found in T_8 (7.62) than rest of the treatments combinations including control treatment (6.70). Similarly, Khursheed *et al.*, (2017) [5] reported that beneficial effect of phyto-additive compounds on meat quality and safety which may be due to presence of antimicrobial and anti-oxidant properties (Kulkarni *et al.*, 2011) [6].

The interaction of season *vs* treatment was found non-significant in appearance and flavor score. It was observed that the effect of seasons and dietary treatments in respect to

score of appearance and flavour was independent. However, interaction effect of season's *vs* treatments was significant in respect to color, juiciness, tenderness and overall acceptability of broiler meat. The highest score for color, juiciness tenderness and over acceptability was 8.10, 8.02, 7.96 and 7.94 in interaction of S_3T_8 (0.2% FSP and GSP) during winter season than rest of the interactions. The data revealed that sensory attributes of broiler meat was improved significantly in broilers fed with 0.2 per cent FSP and GSP as phytogenic feed additives. The present findings are in agreement with Singh *et al.,* (2014) [12].

Table 2: Effect of dietary inclusion of fenugreek seed and guduchi stem powder on meat quality of broilers

Treatments	Appearance	Color	Flavour	Juiciness	Tenderness	Overall acceptability
Seasons						
S_1 (Summer)	6.95^{b}	6.75^{c}	6.89^{b}	6.93^{c}	7.16^{b}	6.94^{c}
S_2 (Rainy)	6.99^{b}	6.84^{b}	6.93^{b}	7.04^{b}	7.06^{c}	6.97^{b}
S_3 (Winter)	7.28^{a}	7.31^{a}	7.31^{a}	7.39^{a}	7.41^{a}	7.34^{a}
SEM±	0.03	0.01	0.04	0.02	0.01	0.01
CD	0.08	0.04	0.11	0.05	0.03	0.03
Treatments						
T_0 (Control)	6.69^{d}	6.54^{f}	7.53^{a}	6.76^{f}	6.82^{f}	6.70^{g}
T_1	7.02^{c}	6.73^{e}	6.84^{de}	7.12^{c}	7.21^{c}	6.99^{de}
T_2	7.31^{b}	7.29^{b}	7.28^{b}	7.27^{b}	7.55^{b}	7.34^{b}
T_3	6.93^{c}	6.79^{de}	6.78^{de}	7.04^{cd}	7.11^{d}	6.93^{ef}
T_4	6.92^{c}	6.74^{e}	$6.85d^{e}$	6.93^{e}	7.13^{d}	6.91^{f}
T_5	6.94^{c}	6.85^{d}	6.95^{cd}	6.98^{de}	6.95^{e}	6.93^{ef}
T_6	7.00^{c}	6.93^{c}	7.13^{bc}	7.10^{c}	7.00^{e}	7.03^{d}
T_7	7.27^{b}	7.29^{b}	7.31^{b}	7.25^{b}	7.26^{c}	7.28^{c}
T_8	7.57^{a}	7.54^{a}	6.70^{e}	7.62^{a}	7.85^{a}	7.62^{a}
SEM±	0.05	0.02	0.07	0.03	0.02	0.02
CD	0.14	0.06	0.19	0.09	0.06	0.06
Seasons *Dietary treatments interaction						
S_1T_0	6.70	6.52	6.64	6.70	6.94	6.70
S_1T_1	6.81	6.55	6.69	6.90	7.05	6.80
S_1T_2	7.14	7.06	7.14	6.89	7.48	7.14
S_1T_3	6.89	6.50	6.70	6.90	6.97	6.79
S_1T_4	6.70	6.31	6.67	6.84	7.06	6.72
S_1T_5	6.78	6.85	6.81	6.97	6.80	6.84
S_1T_6	6.98	6.78	6.89	6.84	6.90	6.88
S_1T_7	7.16	7.01	7.21	7.10	7.25	7.15
S_1T_8	7.42	7.15	7.31	7.20	7.99	7.41
S_2T_0	6.68	6.44	6.66	6.80	6.80	6.68
S_2T_1	7.00	6.51	6.78	7.21	7.00	6.90
S_2T_2	7.15	6.95	7.05	7.25	7.53	7.19
S_2T_3	6.80	6.70	6.53	6.90	6.84	6.76
S_2T_4	6.90	6.85	6.88	6.80	6.92	6.87
S_2T_5	6.95	6.75	6.87	6.80	6.95	6.86
S_2T_6	6.84	6.90	6.95	6.94	6.78	6.88
S_2T_7	7.09	7.12	7.13	7.04	7.12	7.10
S_2T_8	7.50	7.35	7.48	7.65	7.60	7.52
S_3T_0	6.70	6.65	6.81	6.78	6.72	6.73
S_3T_1	7.27	7.15	7.06	7.25	7.57	7.26
S_3T_2	7.64	7.85	7.66	7.67	7.65	7.69
S_3T_3	7.10	7.18	7.11	7.31	7.53	7.25
S_3T_4	7.15	7.05	6.99	7.15	7.40	7.15
S_3T_5	7.10	6.94	7.17	7.18	7.10	7.10
S_3T_6	7.20	7.10	7.56	7.52	7.32	7.34
S_3T_7	7.56	7.74	7.60	7.60	7.40	7.58
S_3T_8	7.80	8.10	7.79	8.02	7.96	7.94
SEM±	0.08	0.04	0.12	0.05	0.03	0.04
CD	NS	0.11	NS	0.15	0.10	0.10

[abcd] Means in column with different superscripts differ significantly (P<0.05), NS-Non- significant (P>0.05)

Conclusion

The overall results obtained revealed that the inclusion of FSP and GSP at 0.2 per cent significantly improved the meat quality of broiler in winter season. However, if FSP and GSP in combination commercially added in broiler diet on large scale, fenugreek seed and guduchi stem powder can be a suitable alternative to antibiotic growth promoters.

References

1. Cross HR, Moen R, Stafield MS. Training and testing of judges from sensory evaluation of meat quality. Food tech. 1978; 32:48-52.
2. Duru M, Zeynep E, Asuman Duru A, Alpaslan Kaya D, Ahmet Şahin. Effect of seed powder of herbal legume fenugreek (*Trigonella foenum-graceum* L.) on growth performance, body components, digestive parts, and

blood parameters of broiler chicks. Pakistan J. Zool. 2013: 45(4):1007-1014.
3. Dwivedi A. Effect of feeding shatavari (*Asparagus racemosus*) and yeast (*Saccharomyces cervisiae*) alone and in combinations on performance of broilers. Vet. Agric. Sci. 2013; 1(2):12-16.
4. Hernandez F, Madrid J, Garcia V, Orengo J, Megias MD. Influence of two plant extract on broiler performance, digestibility and digestive organ size. Poult. Sci. 2004; 83:169-174.
5. Khursheed A, Banday MT, Khan AA, Adil S, Ganai AM, Sheikh IV *et al*. Effect of mint leaves with or without enzyme supplementation on blood biochemistry, carcass characteristics and sensory attributes of broiler chickens. Adv. Anim. Vet. Sci. 2017; 5(11):449-455.
6. Kulkarni RC, Mandal AB, Munj CP, Dan A, Saxena A, Tyagi PK. Response of colored broilers to dietary addition of geloi during extreme summer. Indian J Poult. Sci. 2011; 46(1):70-74.
7. Langhout P. New additives for broiler chicken. World Poult. Elesevier. 2000; 16:22-27.
8. Odoemelam VU, Unamba-oparah IC, Irondi JI, Anyanmu NJ. Performance and carcass quality of broiler fed dietary scent leaf, garlic and antibiotic. Nigerian J Agric. Sci. 2017; 13(3):188-193.
9. Park BS. Effect of dietary cinnamon powder on savor and quality of chickens meat in broiler chickens. J Korian Soci. Food Sci. Nutr. 2008; 37:618-624.
10. Puvaca N, Glamocic D, Levis I, Peric I, Mili D. Beneficial effect of phyto additives in broilers nutrition. World's Poult. Sci. J. 2013; 69:27-34.
11. SAS. Statistical Analysis software Version 9.3, SAS Institute Inc. Cary, North Carolina, USA, 2010.
12. Singh A, Kaushik PK, Yadav PK, Yadav Poonam. Effect of bael (*Aegale maarmelos*) and giloy (*Tinospora cordifolia*) alone and in combination on growth and feed conversion of broiler chicks. Global J for Res. Anal. 2014; 3(11):96-99.
13. Snedecor GW, Cochran WG. Statistical Methods. 8th edn. Iowa State University Press, Ames, Iowa, 1989.
14. Tipu MA, Akhtar MS, Anjum MI, Raj ML. New dimensions of medicinal plants as animal feed. Pak. Vet. J. 2006; 26:144-148.
15. Toghyani M, Toghyani M, Mohammadrezaei M, Tabeidian SA, Ghalamkari G. Effect of cocoa and thyme powder alone or in combination on humoral immunity and serum biochemical metabolites of broiler chicks. International Proceedings of Chemical, Biological and Environmental Engineering. 2011; 22:114-118.