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Effect of dietary Giloy and cinnamon powder incorporation on growth performance and carcass traits in broiler Chickens

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Abstract

A feeding trial of 42 days was conducted to discern the effect of dietary incorporation of giloy and cinnamon powder on growth performance, carcass traits in commercial broilers. A total of 120, day-old broiler chicks were divided randomly into 6 treatment groups with 2 replicates of 10 chicks each viz., T₁ (control) were fed basal diet whereas in treatment group T₂, T₃, T₄, T₅ and T₆, basal diet was incorporated with 1% giloy, 2% giloy, 1% cinnamon, 2% cinnamon and combination of 1% giloy and 1% cinnamon, respectively. During starter phase (0-21 days), the body weight gain was significantly ($P \leq 0.05$) higher in T₃ incorporated with 2% giloy. The feed conversion ratio was significantly ($P \leq 0.05$) improved in broiler chicks fed diet incorporated with 1% giloy (T₂). The performance index was significantly better in T₂ and T₃ compared to other groups. During finisher phase (22-42 days), the feed conversion ratio was significantly better in T₂ and T₆ compared to other groups. Performance index was significantly higher in T₂ incorporated with 1% giloy. During the whole experimental period (0-42 days), incorporation of 1% giloy improved broiler performance in terms of body weight, weight gain, feed conversion ratio and performance index. The average body weight gain of T₁, T₂, T₃, T₄, T₅ and T₆ were 1408.6, 1580.0, 1540.1, 1517.0, 1474.2 and 1551.0, respectively. The results of growth performance of broilers on incorporation of 1% giloy and 1% cinnamon in combination are also beneficial. Significant ($P \leq 0.05$) increase in dressing percentage with or without giblet was observed in T₂ and T₅, respectively. It is concluded that 1% giloy in the diet of broilers has better results in terms of growth, dressing percentage. The incorporation of 1% giloy and 1% cinnamon in combination in the basal diet of broilers could be recommended for producing designer meat.

Key words: Broiler chicks, giloy, cinnamon powder, growth performance, carcass traits

1. Introduction

The fast growing nature of broilers and their short generation interval has been associated with the use of antibiotic growth promoters in animal feeds. However, the use of antibiotics in the diet is restricted because of their residual effect on birds and in turn adverse effect on human health, environmental hazards and subsequent resistance to bacteria [15]. Now a day's current research is focused to improve feed conversion ratio and the growth rate of birds using useful herbs and herbal preparations as an alternative to antibiotics [7, 8]. Cinnamon (*Cinnamomum zeylanicum*), tropical tree having medicinal value, belongs to the Lauraceae family. Cinnamon primarily contains essential oils and other derivatives, such as cinnamaldehyde, cinnamic acid and cinnamate which impart characteristic fragrance so it is used in aroma and essence industries. In addition to being an antioxidant, anti-inflammatory, antidiabetic, antifungal, antimicrobial, anticancer, lipid-lowering and cardiovascular-disease-lowering compound, cinnamon also has activities against neurological disorders, such as Parkinson's and Alzheimer's diseases [22]. Cinnamon has also been used as antitermitic, nematicidal, mosquito larvicidal, insecticidal, antimycotic and anticancer agent. The presence of a wide range of constituents' like-cinnamyl acetate, eugenol, L-borneol, caryophyllene oxide, b-caryophyllene, L-bornyl acetate, E-nerolidol, α -cubebene, α -terpineol, terpinolene and α -thujene has been reported in cinnamon. Studies on cinnamon plant parts like bark along with its essential oils, phenolic compounds, flavonoids have played a key role in the advancement of human and animal health. Giloy is useful in getting rid of renal calculi and reduces blood urea level. The root of giloy is a strong emetic and used for bowel obstruction. It has anti-spasmodic, anti-inflammatory, anti-arthritic and anti-allergic properties [8].

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It has immunopotentiating activities and is anti-bacterial, anti-allergic, anti-diabetic, analgesic and diuretic. It enhances glutathione stimulating hormone (GSH) and Vitamin C and so function as an effective antioxidant [20]. Giloy leaves, barks and roots contain-various bioactive compounds such as alkaloids, glycosides, lactones, sesquiterpenoid, steroids, polysaccharides, -esse and reduces blood ntial oils, mixture of fatty acids and aliphatic compounds-havin reduces blood ntial oils g various medicinal properties such as immunomodulatory or immunostimulatory, antitumor, cognition, anti-neoplastic, anti-hyperglycemia, antihyperlipidemic, anti tuberculosis,, gastrointestinal, anti-osteoporotic, anti-angiogenic, anti-malarial and side effects prevention of the cancer chemotherapy.

2. Materials and Methods

A total of 120, day-old commercial broiler chicks (Ven Cobb 400 strain) were procured from R. K. poultry, Bajpur, Uttarakhand and randomly divided into 6 treatment groups with 2 replication having 10 chicks in each in a completely randomized design. The broilers chicks in group T₁, were fed basal diet (control) whereas in treatment group T₂, T₃, T₄, T₅ and T₆, basal diet was incorporated with 1% giloy, 2% giloy, 1% cinnamon, 2% cinnamon and combination of 1% giloy and 1% cinnamon, respectively. Standard broiler diets for starter(0-3 weeks) and finisher (3-6 weeks) phases of growth were prepared by mixing the different ingredients as shown in Table 1 and provided to all the broiler chicks so as to meet the nutrient requirements as per [6]. The feeds were analyzed for proximate principles as per standard methods [2]. Body weight of the chicks and feed intake were recorded weekly during the feeding trial and feed conversion ratio (FCR) and performance index were calculated. During the 6th weeks of the experiment, a metabolism trial following standard procedure was conducted for three days 2 chicks from each replicate in each treatment. The experimental data obtained during the study were analyzed statistically [27].

3. Result and Discussion

3.1 Growth Performance

The chemical composition of broilers starter and finisher diets are presented in Table 1. The growth performance of broiler chicks fed experimental diet is presented in Table 2. The average body weight at 21st day in broiler chicks of treatment groups T₂ and T₄ and also of T₅ and T₆ was statistically similar. The body weight of T₅ and T₆ significantly ($P \leq 0.05$) differ from T₁ and T₃. T₁ and T₃ also differ significantly ($P \leq 0.05$) among themselves. The average weight gain in broiler chicks of treatment groups T₂ and T₄, T₅ and T₆ were statistically similar. The average weight gain in T₅ and T₆ significantly ($P \leq 0.05$) differ from T₁ and T₃. T₁ also differ significantly ($P \leq 0.05$) from T₂, T₃ and T₄. However, the highest weight gain was observed in group T₃ (2% giloy). Feed intake during this phase did not differ significantly ($P \geq 0.05$) among different groups. However, the highest feed intake was observed in group T₃ (2% giloy). The feed conversion ratio in broiler chicks of treatment group T₃ and T₄ was statistically similar. The feed conversion ratio in T₁ was significantly ($P \leq 0.05$) different from T₂, T₃, T₄ and T₆ whereas T₂ differed significantly ($P \leq 0.05$) from T₅ and T₆. The feed conversion ratio in broiler chicks of treatment group T₂ (1% giloy) was significantly ($P \leq 0.05$) better compared to other groups. The performance index in broiler chicks of treatment group T₂ and T₃, T₅ and T₆ was statistically similar. The performance index in broiler chicks of treatment group T₁

differs significantly ($P \leq 0.05$) from rest all other groups. T₂ and T₃ group performance index differed significantly ($P \leq 0.05$) from T₅ and T₆. The highest performance index was found in the treatment group T₂ (1% giloy).

The average body weight gain was significantly ($P \leq 0.05$) higher in treatment groups of broiler chickens fed diets incorporated with giloy and cinnamon powder. There was improvement in body weight gain due to dietary incorporation of giloy and cinnamon powder; however, treatment groups T₂, T₃, T₄ and T₆ were statistically ($P \geq 0.05$) similar. The average weight gain in treatment group T₁ differed significantly from T₂, T₃, T₄ and T₆. The highest weight gain was observed in treatment group T₂ (1% giloy). The cumulative feed intake did not differ significantly ($P \geq 0.05$) among different groups. The feed conversion ratio varied from 1.76 in treatment T₂ (1% giloy) to 1.95 in treatment T₁ (control) of broiler chickens and differed significantly ($P \leq 0.05$) among different groups of broiler chickens. The better feed conversion ratio was observed in treatment groups T₂ followed by T₆ and T₃. The performance index during 0-42 days of feeding trial was significantly higher in treatment group T₂ followed by T₆ and T₃. The overall cumulative performance in terms of weight gain, feed conversion ratio and performance index was significantly improved due to incorporation of giloy and cinnamon powder in the broiler chicks compared to control. The result of the present study is corroborated with findings of [14, 4, 21, 5]. The present study results that use of giloy also increases feed intake, corroborate well with the findings of (24) and (10) who recorded increase in feed intake due to inclusion of giloy in the diet of broiler chicks. The inclusion of giloy improves feed conversion ratio and it increases with increase in level of giloy inclusion which corroborate with the results of the study of (24).

3.2 Carcass Traits

Carcass characteristics *viz.*, dressing percentage with or without giblet significantly ($P \leq 0.05$) differed among the broilers of different treatment groups. The dressing percentage without giblet was maximum in treatment group T₅ (63.94%) and minimum in T₆ (57.99%). The treatment groups T₂ and T₃; T₄ and T₅; T₃ and T₆ differed significantly ($P \leq 0.05$). The dressing percentage with giblet was maximum in treatment group T₂ (69.34%) and minimum in T₆ (63.50%). The dressing percentage with giblet in treatment group T₁, T₃ and T₆ and in groups T₂, T₄ and T₅ was statistically ($P \geq 0.05$) similar. The cut-up parts *viz.*, neck, back, wing, breast, thigh and drumstick (Table 3.) and organs such as heart, liver, gizzard and spleen weights (Table 3) were found to be statistically ($P \geq 0.05$) similar among the broilers of different treatment groups. However, the data showed increase in the liver and gizzard weight but fall in heart weight in broilers of the supplemented groups compared to control group. These results are in agreement with the findings of [16, 11, 3, 31, 12, 28] who reported that cinnamon powder or cinnamon extract or cinnamaldehyde or oil extract from cinnamon had no significant effect on internal organs weight. However, increase in the liver weight was observed in response of feeding the diet containing cinnamon, curcuma, ginger or ascorbic acid [30] which is in line with the present study. The increased liver weight could be related to less hepatic lipid mobilization since liver is the major site of lipogenesis in poultry [17]. Another possibility of increased liver weight might be related to shifting in lipids uptake from the circulation to hepatic tissue since plasma concentrations of triglycerides and total cholesterol were decreased. On the

contrary, [25] found decreased liver weight due to reduction in the secretion of some enzymes.

The dressing percentage of the present study was significantly ($P \leq 0.05$) different. [17] reported increase in dressing out percentage on feeding diets supplemented with cinnamon, curcuma, ginger or ascorbic acid which is in line with the result of our study [23]. also reported significantly higher dressing percentage in broilers fed cinnamon powder supplemented diet. The increased dressing out percentage might be due to the stimulating effect of their bioactive compounds on protein and fat metabolism [19,32]. The results are in agreement with the findings of [1] who observed an

improvement on carcass efficiency of broilers when in the diet of animal essential oil was mixed. A possible reason for promoting an increase on carcass yield could be more intensive amino acids anabolism [29]. On the contrary, [13] revealed that the supplementation of cinnamon powder at dose rate of 250 to 2000mg/kg in broiler diets did not have any influence on the carcass parameters. Similarly, [31] also did not observe any significant impact of diets supplemented with 2 and 4g/kg of cinnamon on carcass parameters in broilers [26]. also reported that supplementation of giloy has no significant effect on carcass characteristics and these findings corroborate well with the findings of [9].

Table 1: Ingredient and chemical composition (%) of basal diet of broiler starter and finisher diets

Feed ingredients	Broiler starter diet (0-3 wks)	Broiler finisher diet (4-6 wks)
Maize	55.00	60.00
Deoiled soyabean meal	36.00	32.00
Rice polish	4.60	3.10
Soyabean oil	0.50	1.00
Marble stone	1.00	1.00
Dicalcium phosphate	2.00	2.00
DL- Methionine	0.10	0.10
Cocciostat (Meduramycin)	0.05	0.05
Copper sulphate	0.01	0.01
Common salt	0.30	0.30
Merivite -100 (Vitamin B12)	0.02	0.02
Phosphoric acid	0.10	0.10
Lipocare (choline chloride)	0.05	0.05
Hepatocare	0.10	0.10
Vitamin mixture	0.03	0.03
Trace minerals	0.14	0.14
Proximate Analysis (% DM basis)		
Dry matter	93.97	94.06
Crude protein	22.89	19.23
Ether extract	3.85	3.60
Crude fibre	4.11	4.17
Total ash	10.24	9.46
Nitrogen free extract	58.91	63.54

Table 2: Average growth performance of broiler chicks from 0-42 days fed diets incorporated with giloy and cinnamon powder

Parameters	Treatments					
	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
	Body weight at (0-21 days)					
Initial body weight (g)	44.30±1.20	44.00±1.20	41.95±0.55	44.10±1.10	44.60±0.60	43.20±0.20
Body weight at 21 st day* (g)	532.35±8.40	594.90±3.25	605.55±7.93	589.70±0.83	583.92±0.23	585.77±2.87
Weight gain* (g)	487.00±9.60	549.95±4.45	562.64±7.38	544.65±0.27	538.37±0.37	541.62±3.07
Feed intake (g)	931±26.37	922.66±26.40	988.79±16.53	948.68±5.10	977.47±0.72	979.09±24.75
Feed conversion ratio*	1.90±0.02	1.66±0.03	1.74 ^{bc} ±0.01	1.73 ^{bc} ±0.01	1.80 ^{ab} ±0.00	1.79 ^b ±0.06
Performance index*	255.80±2.82	329.12±4.11	321.30±3.03	313.84 ^{ab} ±1.38	297.62 ^b ±0.18	301.01 ^b ±11.01
	Body weight at (0-42 days)					
Body weight at 42 nd day* (g)	1452.2 ^b ±65.85	1623.2 ^a ±3.85	1581.2 ^a ±1.46	1560.4 ^a ±17.95	1518.0 ^{ab} ±20.06	1593.2 ^a ±8.75
Weight gain* (g)	1408.6 ^b ±67.05	1580.0 ^a ±2.65	1540.1 ^a ±0.91	1517.0 ^a ±16.85	1474.2 ^{ab} ±19.46	1551.0 ^a ±8.55
Feed intake (g)	2747.9±143.93	2774.1±57.47	2830.8±3.74	2832.0±27.20	2784.6±44.83	2817.0±36.37
Feed conversion ratio*	1.95 ^a ±0.01	1.76 ^d ±0.04	1.84 ^{bc} ±0.00	1.87 ^{bc} ±0.00	1.89 ^b ±0.01	1.82 ^{cd} ±0.01
Performance index*	722.23 ^d ±30.92	900.52 ^a ±21.67	838.10 ^{bc} ±0.12	812.87 ^{bc} ±10.25	780.73 ^c ±8.04	853.95 ^{ab} ±1.61

^{abc}values bearing different superscripts in a row differ significantly from each other, * $P \leq 0.05$

Table 3: Average values for dressing percentage with and without giblet (per cent of live weight) and cut up parts of finisher broilers fed diets incorporated with giloy and cinnamon powder

Parameters	Treatments					
	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆
Dressing% without giblet*	59.64 ^{cd} ±0.08	63.71 ^{ab} ±0.60	60.15 ^c ±0.63	62.06 ^b ±0.40	63.94 ^a ±0.61	57.99 ^d ±0.37
Dressing% with giblet*	64.37 ^b ±0.54	69.34 ^a ±0.81	64.98 ^b ±0.93	67.58 ^a ±0.40	69.30 ^a ±0.63	63.50 ^b ±0.88
Neck	3.20±0.01	3.19±0.01	3.20±0.01	3.18±0.01	3.19±0.02	3.19±0.00
Wing	5.73±0.01	5.72±0.01	5.73±0.02	5.73±0.01	5.72±0.02	5.72±0.01
Back	11.34±0.58	10.62±0.44	10.66±0.55	11.61±0.32	12.60±0.41	11.00±0.98
Breast	19.53±1.01	18.94±1.16	19.55±0.42	18.69±0.50	19.59±0.45	16.99±0.18
Thigh	11.30±1.45	11.03±0.53	11.03±0.50	11.20±0.36	11.35±0.12	9.55±0.27
Drumstick	8.43±0.71	8.13±0.23	7.77±0.19	8.59±0.15	8.10±0.36	7.72±0.44

^{abcd}values bearing different superscripts in a row differ significantly from each other, * $P \leq 0.05$

4. Conclusion

In the view of the aforesaid findings, it can be concluded that dietary incorporation of giloy powder at a level of 1% alone in the diet (starter and finisher) of broiler chicks can be used to improve growth performance and dressing percentage. The results obtained by the combination of giloy and cinnamon powder at 1% each also indicated improved growth performance so it can be recommended for feeding of broilers and producing the designer meat.

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