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Production performance of broiler chicken fed with panchagavya and phytogenic feed additives

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Abstract

An experiment was conducted with two hundred and forty day old broiler chicks which were randomly allotted into six treatment groups with five replicates of eight chicks each and consisted of control-basal diet (T₁) and other treatment groups consisted of basal diet with oxytetracycline- 50 ppm (T₂), panchagavya -7.5 g/kg (T₃), panchagavya - 7.5 g/kg and *Andrographis paniculata* - 2 g/kg (T₄), panchagavya -7.5 g/kg and garlic -1 g/kg (T₅) and panchagavya -7.5 g/kg and turmeric-1 g/kg (T₆). All the birds were reared in deep litter under standard management practices throughout the study period. The results on supplementation of panchagavya and phytogenic feed additives in commercial broiler chicken at 5 weeks of age revealed significant ($P<0.01$) difference in mean body weight (g) and body weight gain (g). The body weight (1797, 1728.40 and 1719.35 g) and body weight gain (1748.95, 1681.61 and 1671.98 g) were significantly ($P<0.01$) higher in T₂ (antibiotic fed group) followed by T₆ (PG and turmeric fed group) and T₃ (PG fed group) than all other groups. The results revealed that T₃ (PG alone) and T₆ (PG and turmeric) recorded significantly ($P<0.05$) better feed conversion ratio (1.46 and 1.49) than the other phytogenic feed additive groups (PG and *A. paniculata* -1.52, PG and Garlic - 1.54) as compared to T₂ (antibiotic fed group- 1.41) and T₁ (control group -1.46).

Keywords: panchagavya, andrographis paniculata, garlic, turmeric, carcass characteristics, phytogenic feed additives

Introduction

Panchagavya, an organic product has the potential to play the role of promoting growth and providing immunity. Cow urine as described in Sushrita Sumhita and Ashtanga Sangraha has unique place in Ayurvedha with innumerable therapeutic values, as water of life or Amrita (the nectar of the God) (Sivakumar, 2014) [18]. Cow urine acts as immune booster, anti-aging factor, effective in treating various ailments (Dhama *et al.*, 2005) [4]. Hepatoprotective effect of panchagavya demonstrated by Achliya *et al.* (2003) [2] was comparable with silymarin treated group. *Andrographis paniculata* (Nilavembu) is well known as “king of bitters” and has wide range of medicinal pharmacological application (Dhiman Anju *et al.* 2012) [5], which has been used either single or in combination with other drugs in various Indian traditional systems of medicine. It exhibits anti-inflammatory, anti-viral, anti-bacterial, anti-oxidant, nematocidal actions. Garlic (*Allium sativum*) has been used as a spice and a native medicine for many years (Puvaca *et al.* 2016) [15]. It has possessed antibacterial, antifungal, antiparasitic, antiviral, antioxidant, anticholesteremic, anti-cancerous, and vasodilator characteristics. Turmeric (*Curcuma longa*), a tropical herb of *Zingiberaceae* family, is widely used in indigenous medicine in Asia as an antimicrobial, endogenous stimulant, anti-flatulent and anti-inflammatory agent (Nouzarian *et al.* 2011) [13]. Nowadays, the knowledge on use of herbs is increasing in widespread with greater usage and thereby causing depletion of the resources. Since cow products such as cow urine, panchagavya act as bioenhancer and thus it may be used along with the medicinal plants to enhance its properties.

Hence, this present research work was undertaken to evaluate the production performance of commercial broiler chicken by dietary supplementation of panchagavya and phytogenic feed additives.

Materials and Methods

Preparation of Panchagavya

Panchagavya was prepared by using the following ingredients such as urine, dung, milk, curd and ghee collected from the indigenous cows and mixed along with the sugarcane juice, tender

coconut and ripened banana as prescribed by Natarajan (2003) [12]. The ingredients used for preparation of panchagavya were cow dung -5 kg, cow urine-3 litre, milk-2 litre, curd -2 litre, ghee -1 litre, sugarcane juice-3 litre, tender coconut water-3 litre, ripened banana-12 numbers and toddy or fermented tender coconut water-2 litre. The fresh cow dung was thoroughly mixed with ghee in a plastic container then covered by muslin cloth and kept for three days and stirred daily once. On fourth day, the other ingredients were added individually to the above mixture and mixed well. Finally, ripened banana was mixed thoroughly with the prepared mixture and covered with the muslin cloth to prevent the entry of flies and mosquitoes into it. The plastic container was kept under shade and mixed thoroughly in a uniform direction for few cycles and this procedure was carried out twice in a day till its usage. The above mixture was allowed to undergo fermentation for 30 days and then it was used as feed additive.

Preparation of phytogetic feed additives

The leaves of *Andrographis paniculata* were obtained from the herbal garden located at Veterinary College and Research Institute, Orathanadu. The garlic bulbs and dry turmeric rhizomes were purchased from the local market. The

taxonomical identification of the plant, turmeric rhizomes and garlic bulb were authenticated by the Botanical Survey of India, Southern Regional Centre, Coimbatore. These were shade dried, broken down into small pieces, then powdered using blender. The powdered materials were stored in air tight containers separately.

Biological experiment

Two hundred and forty commercial sex separated, day-old Vencobb broiler chicks belonging to a single hatch were purchased from the local hatchery, wing banded, weighed and randomly allotted into six treatment groups with five replicates of eight chicks each. The broiler chicks were reared under deep litter in a gable roofed, open sided house. The chicks were provided with uniform floor, feeder and waterer space and were reared under standard management conditions throughout the experimental period of five weeks of age. The basal broiler feed was formulated according to the Vencobb standards and the experimental feeds were formulated as per the experimental design. Panchagavya and phytogetic feed additives were included in the basal diet and the experimental groups were formed and presented in Table 1.

Table 1: Experimental groups with respective experimental diet

Treatments	Experimental diets
T ₁	Control (Basal diet)
T ₂	Basal diet + Oxytetracycline (50 ppm)
T ₃	Basal diet + Panchagavya (7.5g/kg)
T ₄	Basal diet + Panchagavya (7.5g/kg) and <i>Andrographis paniculata</i> (2g/kg)
T ₅	Basal diet + Panchagavya (7.5g/kg) and garlic powder (1g/kg)
T ₆	Basal diet + Panchagavya (7.5g/kg) and turmeric powder (1g/kg)

Collection of data

Data on body weight, feed consumption were recorded at weekly intervals and from the data observed body weight gain, feed efficiency and livability were calculated.

The broiler pre starter, starter and finisher diets were fed *ad libitum* to the birds from 1 to 12, 13 to 24 and 25 to 35 days of age, respectively. The ingredients and nutrient composition of the experimental broiler pre-starter, starter and finisher ration for the experiment are presented in Table 2.

Statistical analysis

All the data obtained in this study on various parameters were subjected to statistical analyses as per the methods suggested by Snedecor and Cochran (1994) [19]. All data were analyzed by ANOVA and the mean of different experimental groups were tested for statistical significance by Duncan's multiple range test (Duncan, 1955) [6]. The analysis was carried out by IBM SPSS (20.0). Angular transformation was applied to percentages wherever needed.

Table 2: Ingredients and nutrient composition (%) of experimental broiler ration

Ingredients	Pre-starter (kg)	Starter (kg)	Finisher (kg)
Maize	51.60	54.30	57.40
Soya	40.40	36.50	32.70
Salt	0.418	0.367	0.367
Calcite	0.850	1.100	1.000
Di-calcium phosphate	1.920	1.800	1.700
Oil	3.900	5.100	6.000
DL-Methionine	0.304	0.310	0.270
Lysine	0.200	0.140	0.120
Vitamin AB ₂ D ₃ K mix ¹	0.050	0.050	0.050
Vitamin B-complex ²	0.050	0.050	0.050
Trace mineral mixture ³	0.100	0.100	0.100
Choline chloride	0.050	0.050	0.100
Toxin binder	0.100	0.100	0.100
Liver tonic	0.025	0.025	0.025
Total	100	100	100
Nutrient composition * (on dry matter basis)			
Crude Protein (%)	22.56	21.03	19.59
ME (kcal/Kg)	2971	3090	3180
Crude Fibre (%)	3.00	3.27	3.11
Calcium (%)	0.93	0.98	0.91
Total phosphorous (%)	0.72	0.68	0.65

Available phosphorous (%)	0.45	0.42	0.40
Lysine (%)	1.23	1.10	1.00
DL-Methionine (%)	0.84	0.82	0.75

* Calculated values

1 One gram of Vitamin AB2D3K supplement contained 82500 IU of Vitamin-A, 50 mg of Vitamin-B2, 16500 IU of Vitamin-D3 and 10 mg of Vitamin-K.

2 One gram of B-complex supplement contained 8 mg of Vitamin-B1, 16 mg of Vitamin-B6, 8 mcg of Vitamin-B12, 80 mg of Vitamin-E, 120 mg of Niacin, 8 mg of Folic acid, 80 mg of Calcium -D-pantothenate and 86 mg of Calcium. One gram of Trace mineral mixture contained 54 mg of Manganese, 52 mg of Zinc, 20 mg of Iron, 2 mg of Iodine and 1 mg of Cobalt.

Results and Discussion

The results on supplementation of panchagavya and phytogetic feed additives in commercial broiler chicken at 5 weeks of age revealed significant ($P<0.01$) difference in mean body weight (g) and body weight gain (g). The body weight (1797, 1728.40 and 1719.35 g) and body weight gain (1748.95, 1681.61 and 1671.98 g) at the end of fifth week was significantly ($P<0.01$) higher in T₂ (antibiotic fed group) followed by T₆ (PG and turmeric fed group) and T₃ (PG fed group) than all other groups. The mean (\pm S.E.) of body weight (g) and body weight gain (g) of commercial broiler chicken from 1 to 5 weeks of age as influenced by panchagavya and phytogetic feed additives are presented in Table 3 and 4, respectively.

The effect of dietary supplementation of panchagavya and

phytogetic feed additives in broiler chicken revealed that panchagavya and turmeric fed group had significantly ($P<0.01$) higher body weight (1728.40 g) and body weight gain (1681.61 g) at 5 weeks of age as compared to other phytogetic feed additive groups.

Dietary supplementation of panchagavya in combination with phytogetic feed additives such as *A. paniculata* and garlic powder in broiler chicken revealed significantly ($P<0.01$) lower body weight gain (1585.64 and 1614.26 g) at 5 weeks of age as compared to panchagavya and turmeric fed group (1681.61 g). The lower body weight gain may be attributed to marked reduction in feed intake which might be due to bitterness of *A. paniculata* and pungent odor of garlic in the feed.

Table 3: Mean (\pm S.E.) Body weight (g) of broilers from 1 to 5 weeks of age as influenced by supplementation of panchagavya and phytogetic feed additives

Treatment groups	Hatch weight	Age in weeks				
		1	2	3	4	5
T ₁ -Basal diet	47.73 \pm 0.45	159.03 \pm 1.98	406.85 \pm 5.66	804.33 \pm 12.48	1268.48 \pm 21.39	1682.20 ^B \pm 28.90
T ₂ -Basal diet + OTC 50 ppm	48.08 \pm 0.50	162.30 \pm 2.02	413.18 \pm 6.76	832.20 \pm 11.55	1354.25 \pm 23.60	1797.00 ^A \pm 32.35
T ₃ -Basal diet + PG -7.5 g/kg	47.55 \pm 0.41	160.05 \pm 2.34	414.53 \pm 5.13	802.58 \pm 10.50	1302.43 \pm 21.13	1719.35 ^{AB} \pm 30.70
T ₄ -Basal diet + PG-7.5 g/kg + <i>A. paniculata</i> -2g/kg	47.75 \pm 0.66	155.88 \pm 2.21	392.70 \pm 5.20	783.98 \pm 11.05	1267.80 \pm 19.05	1633.30 ^B \pm 28.64
T ₅ -Basal diet + PG-7.5 g/kg + Garlic-1g/kg	48.23 \pm 0.50	157.13 \pm 2.06	408.38 \pm 5.29	799.75 \pm 11.12	1283.75 \pm 23.49	1662.33 ^B \pm 33.57
T ₆ -Basal diet + PG-7.5g/kg +Turmeric-1g/kg	46.78 \pm 0.53	159.25 \pm 2.37	406.48 \pm 5.73	817.65 \pm 11.10	1311.28 \pm 22.14	1728.40 ^{AB} \pm 29.56
F value	0.942 ^{NS}	1.073 ^{NS}	1.884 ^{NS}	2.122 ^{NS}	2.239 ^{NS}	3.548 ^{**}

The results of the study are in comparable with the earlier findings of Priya *et al.* (2020) [14] who reported significantly higher body weight in broiler chickens with 10 ml of panchagavya and 1 g of triphala fed in combination. Similarly, Fallah and Mirzaei (2016) [7] recorded higher body weight in turmeric and thyme powder combination each at 2.5 g/kg as comparable to turmeric alone (5 g/kg) fed group. Supplementation of turmeric showed significant increase in

body weight of broilers revealed in earlier reports (Rajput *et al.*, 2013; Sethy *et al.*, 2016; Urusan and Bolukbasi, 2017; Parveen Kumar Ahlawat *et al.*, 2018 and Choudhury *et al.*, 2018) [16, 17, 20] which is comparable with this study. On the contrary, Nouzarian *et al.* (2011) [13], Kassu *et al.* (2016) [9] and Attia *et al.* (2017) [3] recorded non-significant effect of turmeric supplementation on body weight and body weight gain in broilers.

Table 4: Mean (\pm S.E.) body weight gain (g) of broilers from 1 to 5 weeks of age as influenced by supplementation of panchagavya and phytogetic feed additives

Treatment groups	Age in weeks				
	1	2	3	4	5
T ₁ -Basal diet	111.33 \pm 0.92	359.15 \pm 5.46	756.66 \pm 8.07	1220.85 ^b \pm 16.19	1634.54 ^{BC} \pm 19.65
T ₂ -Basal diet + OTC 50 ppm	114.29 \pm 1.61	365.04 \pm 2.38	784.16 \pm 8.44	1306.26 ^a \pm 22.51	1748.95 ^A \pm 29.12
T ₃ -Basal diet + PG -7.5 g/kg	112.61 \pm 1.40	367.05 \pm 3.69	755.05 \pm 14.96	1255.00 ^{ab} \pm 15.90	1671.98 ^{ABC} \pm 27.81
T ₄ -Basal diet + PG-7.5 g/kg + <i>A. paniculata</i> -2g/kg	108.17 \pm 1.80	344.95 \pm 4.06	736.29 \pm 18.23	1220.03 ^b \pm 9.68	1585.64 ^C \pm 23.07
T ₅ -Basal diet + PG-7.5 g/kg +Garlic-1g/kg	109.01 \pm 3.00	360.21 \pm 5.62	751.57 \pm 17.28	1235.50 ^b \pm 26.58	1614.26 ^{BC} \pm 42.44
T ₆ -Basal diet + PG-7.5 g/kg +Turmeric-1g/kg	112.48 \pm 2.07	359.67 \pm 6.02	770.94 \pm 15.40	1264.44 ^{ab} \pm 24.92	1681.61 ^{AB} \pm 24.01
F value	1.475 ^{NS}	2.694 ^{NS}	1.336 ^{NS}	2.631 [*]	4.075 ^{**}

Value given in each cell is the mean of 40 observations

NS- Non significant, * - Significant ($P<0.05$) and ** - Highly significant ($P<0.01$)

The results of data on cumulative feed consumption (g) in broiler chicken revealed a highly significant ($P<0.01$) difference between the treatment groups from 1 to 4 weeks of age, but had no significant difference in feed consumption at 5 weeks of age as influenced by dietary supplementation of

panchagavya and phytogetic feed additives. The mean (\pm S.E.) of cumulative feed consumption (g/ bird) and feed conversion ratio of commercial broiler chicken at 5 weeks of age as influenced by panchagavya and phytogetic feed additives is presented in Table 5.

Table 5: Mean (\pm S.E.) cumulative feed consumption (g/bird) and feed conversion ratio of broilers at 5 weeks of age as influenced by supplementation of panchagavya and phytogetic feed additives

Treatment groups	Cumulative Feed consumption (g/bird)	Feed conversion ratio
T ₁ -Basal diet	2390.39 \pm 42.52	1.46 ^{abc} \pm 0.03
T ₂ -Basal diet + OTC 50 ppm	2458.84 \pm 56.75	1.41 ^a \pm 0.03
T ₃ -Basal diet + PG -7.5 g/kg	2432.64 \pm 56.85	1.46 ^{ab} \pm 0.03
T ₄ -Basal diet + PG-7.5 g/kg +A. <i>paniculata</i> -2g/kg	2405.23 \pm 14.68	1.52 ^{bc} \pm 0.03
T ₅ -Basal diet + PG-7.5 g/kg +Garlic-1g/kg	2482.72 \pm 19.89	1.54 ^c \pm 0.03
T ₆ -Basal diet + PG-7.5 g/kg +Turmeric-1g/kg	2513.27 \pm 19.83	1.49 ^{bc} \pm 0.02
F value	1.439 ^{NS}	3.343*

Value given in each cell is the mean of 5 observations

NS- Non significant and * - Significant ($P < 0.05$)

At the end of fifth week of age, T₆ (PG and turmeric fed group) recorded higher feed consumption (2513.27 g) whereas lower feed consumption (2390.39 g) was noticed in T₁ (basal diet). But among the phytogetic feed additive groups, lower feed consumption (2405.23 g) was noticed in T₄ (PG and *A. paniculata*) which might be due to bitterness taste of feed. The influence of supplementation of panchagavya and phytogetic feed additives in broiler chicken showed significant difference ($P < 0.05$) on feed conversion ratio among the treatment groups at 5th week of age. The results revealed that T₃ (PG alone) and T₆ (PG and turmeric) recorded significantly ($P < 0.05$) better feed conversion ratio (1.46 and 1.49) than the other phytogetic feed additive groups (PG and *A. paniculata* -1.52, PG and Garlic -1.54) as compared to T₂ (antibiotic fed group- 1.41) and T₁ (control group -1.46).

Mathivanan *et al.* (2006) [11] and Malahubban *et al.* (2013) [10] reported inclusion of *A. paniculata* (2g/kg) in the feed of broiler chicken had no significant difference in feed consumption. Similarly, Abdullah *et al.* (2010) [1], Nouzarian *et al.* (2011) [13] and Parveen Kumar Ahlawat *et al.* (2018) recorded no significant difference in feed consumption in broilers as influenced by supplementation of garlic and turmeric which is in accordance with the results of this study.

Conclusion

Supplementation of panchagavya (7.5 g/kg) and phytogetic feed additive (turmeric 1 g/kg) in broilers produced comparable body weight gain, better feed conversion ratio as compared to antibiotic supplemented group.

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