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Effect of dietary Panchagavya supplementation on growth and feed conversion efficiency of broilers

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ABSTRACT

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Panchagavya samples were prepared and analysed for its chemical and microbial qualities. The result revealed that the pH of the panchagavya sample was 4.52. The *Lactobacillus* count was 8.71 $\log_{10}$cfu/g. One hundred and fifty commercial, day-old broiler chicks were randomly allotted into five treatment groups with three replicates of ten chicks each and fed with basal diet (T_1), basal diet with virginiamycin-20 mg/kg (T_2), basal diet with panchagavya-5.0 g/kg (T_3), basal diet with panchagavya -7.5 g/kg (T_4), and basal diet with panchagavya -10.0 g/kg (T_5) for 42 days period. The body weight and weight gain were significantly ($P<0.01$) different amongst treatment groups at 4 weeks of age. However, no significant difference was observed at 5 and 6 weeks of age. The cumulative feed consumption and FCR were significantly ($P<0.05$) different amongst groups at 6 weeks of age. The livability did not differ amongst treatment groups during the entire study period of six weeks.

Key words: Panchagavya, antibiotic growth promoter, production parameters, broilers

INTRODUCTION

Panchagavya is a fermented product prepared with dung, urine, milk, curd and ghee obtained from indigenous cow. In ancient Indian system of medicine, Ayurveda, has mentioned about the importance of panchagavya in the treatment of various human diseases. All the five constituents of panchagavya possess medicinal properties and were used singly or in combination against many diseases. Cow dung can be used as pH balancer and purifier. The cow urine can be used as substance of appetizer and bioenhancer. Recently, Council for Scientific and Industrial Research (CSIR), India has obtained US patent (No.689690/and 6410059) for cow urine distillate, which claimed a novel pharmaceutical composition (Khanuja, 2002), and is effective as an antimicrobial and antifungal. Milk fat was reported to have antibacterial and fungicidal activity. Immunoglobulins, lactoferrin, lysozyme, lactoperoxidase and vitamin B_{12} binding protein present in milk possess antimicrobial effects. The curd prepared from cow milk is a good source of *Lactobacillus acidophilus,* which is used as probiotics to improve the intestinal environment to enhance production in animals. Ghee has been reported to improve the digestion and immunity without effect on blood cholesterol (Dhama *et al.*, 2005).

Panchagavya is claimed to be useful against liver disorders, fever and inflammations and has hepatoprotective effect in toxicity induced rats (Achliya *et al.*, 2003) and immunostimulant activity with herbs in rats (Fulzele *et al.*, 2003). Panchagavya also tried for its antibacterial activity (Subramaniam, 2005). Having several benefits, panchagavya have been used in many applications as growth promoter, bio-enhancer, immunostimulant, hepatoprotectives in plants and animals apart from human beings. However, very little works were reported on birds, which were also not directly related to growth promotion. Hence, the present study was undertaken to study the effect of panchagavya on production performance of broilers.

MATERIALS AND METHODS

The panchagavya samples were prepared by using dung (5 parts), urine (3 parts), milk (2 parts), curd (2 parts) and ghee (1 part) obtained from indigenous cow along with other ingredients viz. sugarcane juice (3 parts), tender coconut juice (3 parts), ripened banana (12 numbers) and toddy (2 parts) as per the methods of Natarajan (2003). The fresh dung was thoroughly mixed with ghee in a wide mouth mud or plastic container and kept for three days. The above mixture was

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thoroughly mixed once daily. On the fourth day, other ingredients were added to the container, mixed properly and covered with nylon net to prevent entry of flies into the container. The container was placed in shade and mixed thoroughly twice a day for 30 days.

The pH of the samples was assessed using digital pH meter. The total volatile fatty acids (TVFA) content of panchagavya was assessed by the method of using micro-Kjeldahl apparatus. Identification and quantification of individual volatile fatty acids were performed by using gas chromatograph (Chemito 8610 HR, India.). The panchagavya samples were serially diluted in 10 folds using sterile triple glass distilled water. The selective media used for microbial culture were MacConkey agar for coliforms and *Salmonella*, Kanamycine aesculine azide agar for *Streptococci*, Mannitol salt agar for *Staphylococci*, de Man Rogosa Sharpe (MRS) agar for *Lactobacilli*. The selective media for the microbial counts of coliforms, *Streptococci* and *Staphylococci* were incubated aerobically at 37°C for one day. The agar plates for the counts of *Lactobacilli* were incubated in aseptic anaerobic jars at 37°C for two days. Anaerobic environment was created in the jars using AnaeroGen (Himedia) sachets.

One hundred and fifty commercial day-old broiler chicks of a single hatch were purchased from a local hatchery, wing banded, weighed and randomly allotted into five treatment groups with three replicates of ten chicks each. The chicks were fed basal diet (T_1), basal diet with virginiamycin -20 mg/kg (T_2), basal diet with panchagavya - 5.0 g/kg (T_3), basal diet with panchagavya -7.5 g/kg (T_4), and basal diet with panchagavya -10.0 g/kg (T_5) for 42 days period. The chicks were reared in broiler cages in a gable roofed, open sided house. All the chicks were provided with uniform floor, feeder and waterer space and were reared under standard management conditions throughout the experimental period. The experimental diets were formulated according to the standards prescribed by Bureau of Indian Standards (BIS, 1992). The broiler starter and finisher diets were fed *ad libitum* to the birds from 1 to 28 and 29 to 42 days of age, respectively. Data on body weight and feed consumption were recorded every week and mortality was recorded at occurrence. From the above data body weight gain, feed efficiency and livability were calculated. The data collected on various parameters were subjected to standard statistical analysis (Snedecor and Cochran, 1989).

RESULTS AND DISCUSSION

The result revealed that the pH of the panchagavya sample was 4.52. The TVFA of panchagavya was 154.87 mmol/ litre. The acetate, propionate and butyrate levels in panchagavya were 60.76, 15.66 and 6.40 per cent, respectively. The *Lactobacillus* count was 8.71 $\log_{10}$ cfu/g. Coliforms, *Streptococci* and *Staphylococci* counts were not in detectable range.

The pH of the panchagavya was 4.52 at 30 days of fermentation. The lowered pH may be due to *Lactobacillus* bacteria in panchagavya, which produced more organic acids during fermentation. This value is in agreement with the report of Somasundaram (2003) who recorded a mean pH of 5.45 at 15 days of fermentation in panchagavya. However, the observed value is slightly higher than the report of Subramaniam (2003) who recorded the pH of 6.37 in panchagavya. The difference in pH might be due to variation in composition of ingredients and method of panchagavya preparation. The mean TVFA level of panchagavya was from 154.87 mmol/litre. This might be due to availability of nutrients for the growth of microorganisms, which produced organic acids during fermentation from the components of panchagavya.

The *Lactobacillus* count was 8.71 $\log_{10}$ cfu/g at 30 days of fermentation and this might be due to the presence of curd and milk in panchagavya as a source of *Lactobacillus acidophilus* (Dhama *et al.*, 2005) which lower the pH and favour the growth of beneficial organisms and inhibit the growth of pathogenic microorganisms (Ferd,1974). The coliforms, *Salmonella, Streptococci* and *Staphylococci* counts were not in the detectable range. This may be accomplished by lowered pH of panchagavya in later stage of fermentation as expressed by Ferd (1974) who reported that the pH level could affect the specific microbial population and most of pathogenic organisms grew at pH of 7 or slightly higher.

The mean body weight from 0 to 6 weeks and weight gain from 1 to 6 weeks of age of broilers as influenced by dietary inclusion of panchagavya are presented in Table 1. Analysis of data on body weight revealed a significant ($P<0.01$) difference between treatment groups at 4 weeks of age. Fourth week body weight was significantly ($P<0.01$) higher in panchagavya fed at 7.5 (T_4), 10.0 (T_5) g/kg and T_2 diet group as compared to basal diet, which did not differ significantly from T_3. Panchagavya fed at 7.5 g/kg recorded a higher body weight, followed by T_5, T_2 and T_3 with mean body weight of 1160.90, 1136.40, 1134.67 and 1118.53 g, respectively with no significant difference among them. However, no significant difference was observed at 5 and 6 weeks of age. The 6 weeks body weight values were ranged from 2004.03 to 2084.77 g. The body weight gain differed significantly ($P<0.01$) between treatments at 4 weeks of age but not at 5 and 6 weeks of age. The mean body weight gain was 2038.25, 1988.11, 1985.80, 1984.77 and 1957.50 g in T_4, T_3, T_5, T_2 and T_1, respectively at 6 weeks of age.

Table 1. Body weight and weight gain of broilers as influenced by dietary inclusion of panchagavya

Parameter	T_1	T_2	T_3	T_4	T_5
Body weight (g)					
Day old chick	46.53±0.64	46.53±0.64	46.52±0.64	46.52±0.62	46.53±0.61
I week	148.83±1.87	151.93±2.60	150.06±2.68	152.53±2.94	153.10±2.25
II week	387.73±5.41	391.37±5.19	382.77±6.24	392.43±5.62	389.43±5.41
III week	703.77±9.90	739.90±10.75	715.80±12.42	735.53±12.38	726.26±11.06
IV week	1066.27±13.59^{B}	1134.67^{A}±17.59	1118.53±14.47^{AB}	1160.90±16.79^{A}	1136.40±18.45^{A}
V week	1540.20±24.47	1583.60±25.19	1566.87±27.13	1631.93±25.82	1573.23±33.53
VI week	2004.03±38.55	2031.30±41.41	2034.63±36.08	2084.77±34.51	2032.33±42.93
Body weight gain (g)					
I week	102.30±2.27	105.40±1.96	103.54±2.36	106.01±2.21	106.57±1.97
II week	341.20±5.55	344.84±5.03	336.25±6.02	345.91±5.40	342.90±4.06
III week	657.24±9.89	693.37±10.69	669.28±12.32	689.01±12.21	679.73±11.09
IV week	1019.74±13.65^{B}	1088.14±17.58^{A}	1072.01±14.32^{AB}	1114.38±16.80^{A}	1089.87±18.42^{A}
V week	1493.67±24.50	1537.07±25.21	1520.35±27.03	1585.41±25.86	1526.70±33.47
VI week	1957.50±38.59	1984.77±41.43	1988.11±36.07	2038.25±34.36	1985.80±42.85

Means within a row with no common superscript differ significantly (P<0.01)

Higher body weight and weight gain (P<0.01) in panchagavya fed groups (7.5 and 10.0 g/kg) at 4 weeks of age may be due to its probiotic effect accomplished by the presence of *Lactobacillus* organism in the curd, as a component of panchagavya (Dhama *et al.*, 2005). However, no significant difference was observed between treatment groups at 6 weeks of age. This finding is in agreement with report of Gunal *et al.* (2006) who reported that feeding of antibiotic growth promoters and probiotics had no better effect on the live weight than control group. On the contrary, Kabir *et al.* (2004) reported that the live body weight and daily weight gain were significantly better in *Lactobacillus* treatment in broilers.

The mean cumulative feed consumption and feed conversion ratio of broilers from 1 to 6 weeks of age as influenced by dietary inclusion of panchagavya are furnished in Table 2. The cumulative feed consumption was significantly (P<0.05) different between treatment groups at 6 weeks of

Table 2. Feed consumption and feed conversion ratio of broilers as influenced by dietary inclusion of panchagavya

Parameter	T_1	T_2	T_3	T_4	T_5
Feed consumption (g/bird)					
I week	108.93±3.80	119.96±2.95	120.47±1.92	116.30±2.40	122.37±4.36
II week	482.97±4.62	464.30±7.43	463.80±8.11	480.16±4.12	480.87±8.40
III week	966.50±17.65	979.57±17.15	968.83±20.93	984.17±6.52	991.63±2.49
IV week	1687.96±19.59	1684.53±10.77	1658.83±20.00	1635.80±10.91	1688.80±9.75
V week	2541.77±33.29	2505.90±23.46	2553.13±19.56	2463.26±16.14	2528.33±20.20
VI week	3546.46±35.17^{b}	3455.40±18.13^{a}	3544.03±21.14^{b}	3425.63±23.38^{a}	3500.50±22.07^{ab}
Feed conversion ratio					
I week	1.06±0.04	1.14±0.04	1.16±0.01	1.09±0.02	1.15±0.05
II week	1.41±0.03	1.34±0.03	1.37±0.02	1.38±0.01	1.40±0.04
III week	1.47±0.05	1.41±0.03	1.44±1.02	1.42±0.02	1.46±0.03
IV week	1.65±0.07	1.54±0.8	1.57±0.04	1.46±0.07	1.55±0.03
V week	1.70±0.03	1.63±0.03	1.68±0.04	1.55±0.07	1.65±1.04
VI week	1.81±0.04^{b}	1.71±0.08^{a}	1.76±0.03^{ab}	1.68±0.02^{a}	1.76±0.03^{ab}

Means within a row with no common superscript differ significantly (P<0.05)

age. The feed consumption was higher in T_1 (3546.46 g/bird), which did not differ significantly from T_3 and T_5 groups and they have consumed 3544.03 and 3500.50 g/bird, respectively at 6 weeks of age. The FCR showed a significant difference between treatment groups at 6 weeks of age. The mean feed conversion ratio was significantly ($P<0.05$) superior in T_4 followed by T_2, T_3 and T_5, which recorded a FCR of 1.68, 1.71, 1.76 and 1.76, respectively at 6 weeks of age. However, T_1 recorded inferior FCR of 1.81. Livability was 100 per cent in all the treatment groups since no mortality was observed throughout the experimental period.

The feed consumption was significantly ($P<0.05$) different between treatment groups at 6 weeks of age. However, it did not differ between panchagavya and virginiamycin fed groups. This is in agreement with the findings of Sarkar *et al.* (1997) who observed a non-significant difference in feed intake between two groups of broilers fed diet supplemented with probiotics and antibiotics. However, feeding of panchagavya at 7.5 g/kg of feed had lower feed consumption than control group. On the contrary, Chitra (2000) observed a higher feed consumption in probiotics fed group than control.

Similarly, FCR also significantly ($P<0.05$) differed between treatment groups at 6 weeks of age. Supplementation of panchagavya at 7.5 g/kg of diet had significantly better FCR than control diet. This is in agreement with report of Garg *et al.* (2005) who reported that feeding of cow urine, a component of panchagavya improved the FCR in White Leghorn layers. The livability did not differ between treatment groups. Sun *et al.* (2005) also expressed similar opinion about the feeding of antibiotics, as feed supplement to broilers. Similarly, *Lactobacillus* in the feed did not affect the mortality pattern as reported by Chitra (2000). However, Manickam *et al.* (1994) reported an improved livability in broilers fed *L. sporogenes* and virginiamycin, respectively in the diet.

Based on this study it was concluded that panchagavya at 7.5 g/kg may be included as alternative to antibiotic growth promoter in the broiler diet.

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