

Original Research Article

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Effect of Probiotics, Garlic and Neem Leaf Powder Supplementation on Feed Efficiency in Caged Broiler

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ABSTRACT

An experiment which lasted for 84 days was carried out to investigate the growth performance, haematological and serum biochemical response of caged broiler to probiotics, garlic and neem leaf powder. Eighty day-old commercial broiler chickens were used for the experiment. There were six treatments including control, 4 sub groups with 3 chicks in each to serve as replications with variable proportions of (basal diet + probiotic @ 1 kg per ton of feed, basal diet + garlic @ 1 kg per ton of feed, basal diet + neem leaf @ 1 kg per ton feed, basal diet + probiotic + garlic @ 1kg per ton of feed, basal diet + probiotic + neem leaf @ 1 kg per ton of feed and basal diet + probiotic + garlic + neem leaf @ 1 kg per ton of feed). Combined supplements T6 basal diet + probiotic + garlic + neem leaf @ 1 kg per ton of feed gave the best performance ($p < 0.05$) in all growth performance traits – final body weight, weekly weight gain, weekly feed intake and feed conversion ratio and T0 the least. Administration of probiotics, garlic and neem leaf powder to broiler chickens increased their performance, boosted their immunity as well as improved their general well-being. It is, thus, recommended in broiler chicken production.

Keywords

Probiotics, Garlic and neem leaf powder, Feed intake, and FCR

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Introduction

India being in tropical region of the world, the prevailing macro climatic conditions is mostly congenial to poultry production. Among the many subsectors of agriculture, livestock sector is gaining momentum in India and within the livestock sector, poultry occupies premium position. The contribution of livestock sectors to the country's GDP is \$47.33 billion. The value of output from poultry sector is \$ 8.26 billion during 2010-11. The organized sector of poultry industry is contributing 70% of its total output. India

ranked 4th largest meat producer in the world and producing about 2.337 million tones of chicken meat annually. Poultry industry in India is growing at the rate of 8 to 15 per cent annum. The per capita availability of poultry meat is 2.15 kg as against the recommendation of the National Institute of Nutrition at 11 kg of meat per annum (Prabakaran, 2012).

However, nowadays, the poultry industry has focused more attention towards addressing public concern for environmental and food safety. Animal including poultry are vulnerable to potentially pathogenic

microorganisms such as *Escherichia coli*, *Salmonella spp.*, *Clostridium perfringens* and *Campylobacter sputorum*. Pathogenic microbial flora in the small intestine compete with the host for nutrients and also reduce the digestion of fat and fat-soluble vitamins due to deconjugating effects of bile acids (Engberg *et al.*, 2000). This leads to depressed growth performance and to increased incidence of disease. Certain feed additives incorporated in poultry feed can create favorable conditions in the intestine for the efficient digestion of feed. These feed additives are the biotechnological tools that play a very important role in modifying the feed,

Safe broiler meat production always requires maintaining good health, reducing disease outbreaks and improving immunity of broilers, because the first growing broilers are mostly susceptible to invasion of pathogenic microorganisms. Antibiotics are known as health care miracles. They are widely used in the veterinary field for reducing the incidence of disease caused by microorganisms.

The routine use of low-doses or subtherapeutic-levels of antibiotics often referred to as Antibiotic Growth Promoter (AGP) in broiler feed have been a common practice for more than 50 years to prevent potential disease as well as to robust gut health, increase meat yield and improve feed efficiency of broilers (Gaskins *et al.*, 2002).

However, a large number of studies have provided clear evidence that haphazard use of AGP in broiler feed throughout the production cycle contributes to the accumulation of antibiotic residues in edible meat entering the human food chain, thereby hastening the emergence of antibiotic-resistant bacteria, which poses a dire risk to consumer health (e.g. erosion of the effectiveness of life-saving drugs, persistence of infections and treatment failure) (Nisha, 2008 and Jallailudeen, 2015).

In response to consumer concerns about the safety and ethics of poultry production, the European Union has banned the use of antibiotics in animal production since 2006. Other developed countries have also limited the antibiotic use in poultry production and most of the feed industries in the developed countries removed all types of antibiotics from poultry feeds and launched the antibiotic-free labeled feed (Cogliani, 2011 and Tavernise, 2013). However, the scenario of indiscriminate practice of AGP in poultry feed is still existing in developing countries.

It has therefore become a crying need of the time to immediately stop haphazardly practicing AGP and start searching for cost-effective and health-promoting alternatives to antibiotics. In the recent years, there has been an increasing trend towards using safe, nontoxic and residue-free herbal feed additives (HFA) as potential alternatives to AGP.

Probiotics are specific chemical agents produced by microorganisms containing *Lactobacillus acidophilus*, *Lactobacillus casei*, *Bifidobacterium bifidum*, *Aspergillus oryzae* and *Torulopsis* (Mohna *et al.*, 1996).

Garlic (*Allium sativum*) is considered as a plant with antibiotic, anticancer, antioxidant, immunomodulatory, anti-inflammatory, hypoglycemic and cardiovascular-protecting effects (Reuter *et al.*, 1996).

Garlic and neem leaf powder are used as an alternative to those antibiotics. Several studies have shown that inclusion of HFA in broiler diet improves performance, enhances feed utilization and promotes gut health of broilers without having any residual effect on edible meat (Hashemi and Davoodi, 2010).

Neem leaves (*Azadirachta indica*) and its constituents have been demonstrated to exhibit immunomodulatory, anti-inflammatory,

antihyperglycemia, antifungal, antiviral, antioxidant, properties (Subapriya and Nagini, 2005).

Materials and Methods

The experiment was carried out crop research farm at Department of Animal Husbandry and Dairying Sam Higginbottom Institute of Agriculture, Technology and Science, Allahabad, India, during year 2016-2017. The experimental technical programme with Commercial Broilers., 5 weeks of study, no. of treatments: 07, no. of birds: 84, no. of replications per treatment: 4 and no. of birds in each replication: 3. The data on various parameters viz, body weight of day old chicks, weekly body weight, gain in weight, weekly feed consumption and feed efficiency was given as per treatment as basal application.

Experimental design

A total of 84 day old broiler chicks of same hatch will be procured and will be randomly divided into 7 groups as per following dietary regimens:

T₁.(control) – basal diet without probiotics, garlic and neem leaf powder.

T₂.basal diet + probiotic @1 kg per ton of feed.

T₃. basal diet + garlic @ 1 kg per ton of feed.

T₄. basal diet + neem leaf @ 1 kg per ton feed.

T₅. basal diet + probiotic + garlic @ 1kg per ton of feed.

T₆. basal diet + probiotic + neem leaf @ 1 kg per ton of feed.

T₇. basal diet + probiotic + garlic + neem leaf @ 1 kg per ton of feed.

Results and Discussion

Feed intake (g)

The data regarding feed intake of the chicks randomly distributed into control (T₀) and seven different treatments (T₀, T₁, T₂, T₃, T₄, T₅ and T₆) are presented in the w 1. From the perusal of data on weekly feed intake of broilers, contained in Table 1, it may be noted that feed intake of broilers, irrespective of treatments at one, two, three, four and five weeks of age was d115.83, 428.78, 574.46, 604.49 and 900.21g, respectively. And the differences in these were significant, indicating thereby a significant effect of age on the feed intake of broilers in all treatments. The results were expected, because under normal phenomenon. The increase in feed intake with increased age, is what are world expected with increase of age. When treatment were feed intake was recorded, the mean highest feed intake was significant in broilers of T₀ (564.54g), followed by T₁ (546.61g), T₄ (528.89g), T₂ (516.88g), T₃ (516.16g), T₅ (502.85g) and T₆ (497.35g). And the differences in this volume were found significant.

This indicate that supplementation of probiotics, garlic and neem leaf powder did not influence the feed intake of broilers. However feed intake was recorded higher in treatment groups compared to control. Results showed that supplementation of probiotics, garlic and neem leaf in ration caused significant increase in growth in higher body growth. Similar findings with respect to improvement in body weight gain were observed by earlier researchers (Zanu *et al.*, 2011 and Adeyemo *et al.*, 2013). The improvement in weight gain might be due to anti-protozoal and immunostimulatory properties of neem leave that help to reduce the microbial load and improved the performance (Wankar *et al.*, 2009).

Ingredient and nutrient composition (%) of experimental diets (on dry matter basis)

Ingredients	Broiler starter (0 – 21 days)	Broiler finisher (22 – 35 days)
Maize	60.00	63.00
Ground nut cake	23.14	18.00
Fish meal	12.50	14.67
Premix (Vitamin)	2.50	2.50
Trace minerals	0.125	0.125
Common salt	0.30	0.30
Methionine	0.10	0.09
Lysine	0.10	0.09
D.C.P	1.20	1.20
Lincomycin	0.004	0.004
Diclazuril (CMP – 200)	0.020	0.020
	100	100
Nutrient composition		
Moisture (%)	6.29	6.22
Crude protein (%)	23.29	21.28
Total ash (%)	8.02	9.34
Cruds protein	22	19
ME (Kcal/kg)	2900	3000

Table.1 Average weekly mean feed intake of broiler chicks (g) of different treatments

Week	Treatments							Mean
	T0	T1	T2	T3	T4	T5	T6	
W1	143.29	131.29	109.76	111.35	118.00	99.35	97.76	115.83*
W2	462.29	450.29	422.70	424.18	426.67	414.67	400.70	428.78*
W3	605.54	593.54	565.95	574.43	569.92	557.92	553.95	574.46*
W4	644.29	626.29	593.70	597.67	602.18	585.67	581.65	604.49*
W5	967.29	931.67	892.29	873.18	927.70	856.67	852.66	900.21*
Mean	564.54	546.61	516.88	516.16	528.89	502.85	497.35	

*=Significant

Table.2 Average weekly mean (FCR) or feed efficiency per broiler in different treatments

Week	Treatments							Mean
	T0	T1	T2	T3	T4	T5	T6	
W1	1.70	1.56	1.22	1.27	1.29	1.10	1.00	1.31*
W2	1.96	1.75	1.66	1.57	1.70	1.51	1.45	1.66*
W3	1.80	1.84	1.67	1.69	1.57	1.57	1.61	1.68*
W4	1.88	1.86	1.54	1.61	1.86	1.62	1.45	1.69*
W5	2.33	2.20	2.12	2.09	1.83	1.73	1.71	2.00*
Mean	1.94	1.84	1.64	1.65	1.65	1.51	1.44	

*=Significant

In the contrary to our findings, there is also some reports in which birds exhibited poor performance and lower body weights in all treatment groups (Deore *et al.*, 2005). While some earlier reports showed no significant variations in weight gain of broilers (Nidaullah *et al.*, 2010; Nnenna and Okey, 2013).

FCR (g)

The data regarding the feed conversion ratio of chicks randomly distributed into control (T₀) and seven different treatments (T₀, T₁, T₂, T₃, T₄, T₅ and T₆) are presented in the Table 2. From the perusal of data on weekly FCR per broiler, contained in Table 2, it may be noted that FCR per broiler, irrespective of treatments at first, second, third, fourth and fifth weeks of age was 1.31, 1.66, 1.68, 1.69 and 2.00g, respectively, and the differences in these were significant, indicating thereby significant effect of age on the FCR of broilers in all treatments. When treatment wise FCR was recorded highest FCR observed in followed by T₀ (1.94g), followed by T₁ (1.84g), T₃ (1.65g), T₄ (1.65g), T₂ (1.64g), T₅ (1.51g) and T₆ (1.44g). However these in accordance with the results on feed on feed intake and gain in weight of broilers. Similar findings with respect to improvement in body weight gain were observed by earlier researchers (Zanu, *et al.*, (2011) and Adeyemo, *et al.*, (2013)). The improvement in weight gain might be due to anti-protozoal and immunostimulatory properties of neem leaves that help to reduce the microbial load and improved the performance (Wankar, *et al.*, (2009)). In the contrary to our findings, there is also some reports in which birds exhibited poor performance and lower body weights in all treatment groups (Deore, *et al.*, (2005)). While some earlier reports showed no significant variations in weight gain of broilers (Nidaullah *et al.*, 2010; Nnenna and Okey, 2013).

It may be concluded that there was a beneficial effect of effect of supplementation of Probiotics, garlic and neem leaf powder in ration of boilers supplementation in diet of broilers on body weight, gain in weight and feed conversion ratio of broilers. For economic point of ration supplemented with basal diet + probiotic + garlic + neem leaf @ 1 kg per ton of feed was found the best compared to all the treatments.

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