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Mohamed Abujradah
Department of Animal Husbandry and Dairying, Sam Higginbottom Institute of Agriculture, Technology & Science, Allahabad, Uttar Pradesh, India

Dr. Neeraj
Professor, Department of Animal Husbandry and Dairying, Sam Higginbottom Institute of Agriculture, Technology & Science, Allahabad, Uttar Pradesh, India

Dr. Ramesh Pandey
Department of Animal Husbandry and Dairying, Sam Higginbottom Institute of Agriculture, Technology & Science, Allahabad, Uttar Pradesh, India

Aron Limboo
Department of Animal Husbandry and Dairying, Sam Higginbottom Institute of Agriculture, Technology & Science, Allahabad, Uttar Pradesh, India

Correspondence
Mohamed Abujradah
Department of Animal Husbandry and Dairying, Sam Higginbottom Institute of Agriculture, Technology & Science, Allahabad, Uttar Pradesh, India

Effect of dietary supplementation of probiotics, garlic and neem leaf powder on growth performance in caged broiler

Mohamed Abujradah, Dr. Neeraj, Dr. Ramesh Pandey and Aron Limboo

Abstract
An experiment was conducted at the Department of Animal Husbandry and Dairying Sam Higginbottom Institute of Agriculture, Technology & Science, Allahabad, India, during year 2016-2017 to Effect of dietary supplementation of probiotics, garlic and neem leaf powder on growth performance and haematobiochemical parameters in caged broiler. The experiment was laid out in Completely Randomized factorial Design (RBD). 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), In the view of present investigation the most effective Combined supplements of basal diet + probiotic + garlic + neem leaf @ 1 kg per ton of feed), proved best in respect of growth and performance related parameters like feed consumption, body weight, feed conversion ration (FCR) were evaluated in parameters. Polyherbal formulation not only improved growth and performance in birds. It was concluded that the positive effects of herbal plants on broilers. Their antibiotic potential, hypocholestrolemic effects, growth promoting and availability are the most beneficial parts of herbs, which have drawn the attention themselves.

Keywords: Probiotics, garlic and neem leaf powder, body weight and gain in weight

Introduction
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) [10].
The poultry industry has developed in several areas such as nutrition, genetics, management to maximizing the efficiency of growth performance and meat yield. The economics of production is very important criteria for broiler production and feed is the major important factor affecting the productive performance and economics of broiler production, next to genetic potential. The efficiency of feed utilization depends on the efficacy of digestion, which depends on the quantity of feed provided and overall health of the digestive tract.
Broiler production in India has continuously faced challenges of providing optimum environment for maximum growth, production, disease control and finally the cost benefit ratio involved for a successful poultry husbandry practices. It is estimated that 25 per cent of the world's meat supply is derived from poultry. In order to sustain growth and profitability, it is becoming essential to create new innovative ways to stay competitive within the industry and decrease the cost of production as much as possible and at the same time to produce high quality products for consumers.
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 oil, 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 an fat-soluble vitamins due to to deconjugating effects of bile acids (Engberg *et al.*, 2000) [4].
In Libya, there are plenty of public poultry production projects which are supported by the government. In edition to this private sector has also started poultry farming as a business enteaprase both of these poultry farming activities help income generation and nutritional food security of the country.
Safe broiler meat production always requires maintaining good health, reducing disease outbreak and improving immunity of broilers, because the first growing broilers are mostly susceptible to invasion of pathogenic microorganisms. Antibiotics are known as health care

miracle. They are widely used in veterinary field for reducing the incidence of disease caused by microorganisms. The routine uses 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) [5].

It has therefore become a crying need of the time to immediate stop haphazard 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 alternative to AGP.

Probiotics are very beneficial to overall health, but they are especially good for the digestive system. Probiotics may help replenish the good bacteria in the gut after taking medication such as antibiotics, and they may also help lower the amount of bad bacteria, which can cause infections. Probiotics are specific chemical agents produced by microorganism containing Lactobacillus acidophilus, lactobacillus casi, Bifidobacterium bifidum, Aspergillus oryazae and Torulopsis (Mohna *et al.*, 1996) [7].

Garlic (Allium sativum) is considered as a plant with antibiotic, anticancer, antioxidant, immunomodulatory anti-inflammatory, hypoglycemic and cardiovascular- protecting effects (Reuter *et al.*, 1996) [11]. Garlic has played important dietary and medicinal roles throughout the history. Garlic is well known as a spice and herbal medicine for the prevention and treatment of a variety of disease.

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 broiler without having any residual effect on edible meat (Hashemi & Davoodi, 2010) [6].

Neem leaves (Azadirachta indica) and its constituents have been demonstrated to exhibit immunomodulatory, anti-inflammatory, antihyperglycemia, antifungal, antiviral, antioxidant, properties (Subapriya and Nagini, 2005) [12].

Material and Methods

The experiment was carried out crop research farm at Department of Animal Husbandry and Dairying Sam Higginbottom Institute of Agriculture, Technology &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, nNo. 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 were collected.

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:

T_1 - (control) – basal diet without probiotics, garlic and neem leaf powder.
T_2 - basal diet + probiotic @1 kg per ton of feed.
T_3 - basal diet + garlic @ 1 kg per ton of feed.
T_4 - basal diet + neem leaf @ 1 kg per ton feed.
T_5 - basal diet + probiotic + garlic @ 1kg per ton of feed.
T_6 - basal diet + probiotic + neem leaf @ 1 kg per ton of feed.
T_7 - basal diet + probiotic + garlic + neem leaf @ 1 kg per ton of feed.

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

Table 1

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

Results and Discussion

Body weight (g)

The data regarding body weight of the chicks randomly distributed into control (T_0) and seven different treatments (T_0,T_1, T_2, T_3, T_4 T_5 and T_6) are presented in the Tables 1. From the perusal of data on weekly body weight of broilers, it may be noted that body weight of broilers, irrespective of treatments at one, two, three, four and five weeks of age was 126.57, 386.51, 729.81, 1091.42 and 1546.65 g, respectively. And the differences in these were significant, indicating thereby a significant effect of age on the body weight of broilers in all treatments. The results were expected, because under normal condition the increase of body weight with the intake of feed is what one would expect with the increase in age of birds. when treatments –wise body weight of broilers was recorded at g was found highest in T_6(687.85g), followed by T_5(669.59g), T_4(650.21g), T_3(647.91g), T_2(64.04g), T_1(617.75g), T_0(609.43g). The differences in these values of treatments were found significant, indicating thereby a significant effect of treatments on body weight of broilers. Results showed that supplementation of probiotics, garlic and neem leaf in ration caused significant increased in growth in higher body growth. Similar findings with respect to improvement in body weight gain was observed by earlier researchers [Zanu, *et al.* (2011) [14] and Adeyemo, *et al.* (2013)] [1]. 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)] [13]. 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)] [3]. While some earlier reports showed no significant variations in weight gain of broilers [Nidaullah, *et al.* (2010) [8], Nnenna, and A.A. (2013)] [9].

Table 1: Average weekly mean body weight of broiler chicks (g) in different treatments

Week	Treatments							
	T_0	T_1	T_2	T_3	T_4	T_5	T_6	Mean
W1	121.15	122.07	127.15	124.36	127.68	127.33	136.23	126.57*
W2	356.65	379.14	381.80	394.73	379.26	401.32	412.65	386.51*
W3	693.09	702.20	720.67	734.83	743.36	756.83	757.68	729.81*
W4	1035.42	1039.50	1108.63	1106.17	1071.49	1118.60	1160.16	1091.42*
W5	1450.25	1463.60	1531.99	1527.35	1579.49	1613.47	1660.39	1546.65*
Mean	609.43	617.75	645.04	647.91	650.21	669.59	687.85	

*= significant

Gain in weight (g)

The data regarding gain weight of the chicks randomly distributed into control (T_0) and seven different treatments (T_0,T_1, T_2, T_3, T_4 T_5 and T_6) are presented in the Tables 2. From the perusal of data on weekly gain in weight of chicks per broiler, contained in Table 2, it may be noted that gain in weight per broiler, irrespective of treatments at first, second, third, fourth and fifth week of age was 89.48g, 259.94, 343.30g, 361.61g and 455.23g, respectively. and the differences in these were significant, indicating thereby significant effect of age on the gain in weight of broilers in all treatments the results were expected,because under normal phenomenon. With increase of age, feed intake in also increase and this is what are world expected. when treatment were feed intake was recorded, the highest gain in weight was observed T_6(324.38g), followed by T_5(315.28g), T_4(308.70g), T_2(298.19g), T_3(299.05g), T_1(285.12g) and T_0(282.68g). Similar findings with respect to improvement in body weight gain was observed by earlier researchers [Zanu, *et al.* (2011) [14] and Adeyemo, *et al.* (2013)] [1]. 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)] [13]. 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)] [3]. While some earlier reports showed no significant variations in weight gain of broilers [Nidaullah, *et al.* (2010) [8], Nnenna, and A.A. (2013)] [9].

Table 2: Average weekly mean gain in weight (g) per broiler of different treatments.

Treatments	T0	T1	T2	T3	T4	T5	T6	Mean
W1	84.28	84.08	90.39	87.94	91.68	90.29	97.74	89.48*
W2	235.50	257.07	254.66	270.37	251.58	273.99	276.42	259.94*
W3	336.44	323.07	338.87	340.11	364.10	355.51	345.03	343.30*
W4	342.33	337.29	387.96	371.34	328.13	361.77	402.48	361.61*
W5	414.83	424.11	423.37	421.19	508.01	494.87	500.23	455.23*
Mean	282.68	285.12	299.05	298.19	308.70	315.28	324.38	

*= significant

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