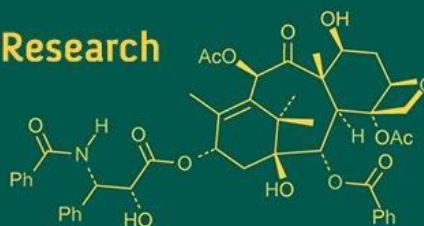


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Assessment of efficacy of phytobiotic mixture as an alternative of antibiotic growth promoters in broiler production

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Abstract

In order to determine the impact of supplementing phytobiotics on the growth and economy of broiler chickens, zero day old broiler chicks were split into two groups in farmers poultry farm. During the seven-week trial, control group was reared on the basal diet (no supplements) whereas treatment group was supplemented with 2.0% herbal powder. The purpose of this experiment was to examine how supplementing phytobiotics to broiler chicks affected their growth, FCR, mortality and economy. According to the findings, adding phytobiotic powder significantly ($p < 0.05$) increased body weight gain in treatment group in comparison of control group. Average daily gain of treatment group (55.24 ± 0.46) was significantly higher ($p < 0.05$) than the control group (52.38 ± 0.48 gm). Phytobiotic supplementation also had a positive impact on economy. The present results confirmed 2% herb supplementation improved performance of broilers and could be used as alternative of antibiotic growth promoters.

Keywords: Broilers, growth, phytobiotics

Introduction

One of the biggest challenges is ensuring protein supply in the face of growing population expansion. Broiler meat is the most affordable animal protein source and is essential for fulfilling protein needs. Consequently, during the past three decades, commercial broiler farming has become more industrialized (Yatao *et al.*, 2018) [33]. Numerous issues, including decreased immunity, slower development, faster disease spread and a greater death rate, are brought on by the growing industrialization of broiler farming (Salim *et al.*, 2018) [26]. In order to address these issues and increase the productivity of meat production, India has employed antibiotic growth promoters, or AGPs. Increasing antimicrobial resistance in certain bacterial strains, such as *Escherichia coli*, *Staphylococcus* and *Enterococcus*, can be passed from poultry to humans through the food chain and ultimately cause life-threatening harm to human health, regardless of their efficient and cost-effective role as production enhancers (Ripon *et al.*, 2019) [24]. Because of the adverse effects on human and animal health, the use of physiologically active substances in lieu of antibiotics has been a hot subject for a while. In order to maintain health and welfare and lessen the negative effects of environmental stress on the immune systems and productivity outcomes of farm animals in intensive production, modern animal feed manufacturing aims to employ bioactive substances rather than antibiotics and other medications.

Phytobiotics have been found to have better potential than many other regularly used additives to improve animal performance, feed quality and animal product quality (Krauze *et al.*, 2021; Selim *et al.*, 2021) [16, 27]. Secondary metabolites of plants that have demonstrated antimicrobial effects are known as phytobiotics (phytogenic additives) (Lawrence and Reynolds, 1984; Windisch *et al.*, 2008) [17, 31]. Maintaining and keeping eubiosis between microbes in the digestive system is the foundation for the beneficial effects of phytobiotics (Bakkali *et al.*, 2008 and Stojkovic *et al.*, 2013) [3, 29]. Maintaining eubiosis requires good diet and hygienic conditions. According to Platel and Srinivasan (2004) [21], Giannenas *et al.* (2005) [6], Kirkpinar *et al.* (2010) [15] and Gregacevic *et al.* (2014) [7] adding phytobiotics to poultry feed reduces immune stress in poultry (anti-inflammatory and antioxidant activity, antimicrobial, antiviral and anticoccidial effects) and increases intestinal availability for

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absorption of essential nutrients (enhancing food intake and flavor, stimulating digestive enzyme secretion, and increasing motility of the stomach and intestine). According to Hashemi and Davoodi (2010) [8], phytobiotics may be regarded as natural growth stimulants because of their ability to improve production performance and influence on productivity. In the small intestine, turmeric can suppress harmful microbial flora that compete with the host for nutrients and increase digestive enzymes (Dieumou *et al.*, 2009) [4]. Phytobiotics are natural, have been shown to be less harmful, and leave no residues when compared to inorganic chemicals and antibiotics that are synthesized. Thus, they might effectively substitute antibiotics as food growth boosters and turn into perfect feed additives (Hashemi *et al.*, 2008; Gregacevic *et al.*, 2014) [9, 7]. Therefore, the current experiment was conducted to evaluate the potential of a phytobiotic combination on the growth performance and economics of broiler chickens, taking into account the drawbacks of antibiotic growth boosters in broilers and the advantages of phytobiotics.

Materials and Methods

In the Chandauli district of Uttar Pradesh, India, this experiment was conducted on one day old market broilers as part of an on-farm trial. For the study, five farmers were chosen. 500 chicks were divided into two groups, treatment and control, fed as per specification of Bureau of Indian Standards. Chicks in the treatment group received 2% herbal powder, whereas chicks in the control group received no supplements. Birds were reared in deep litter system and given feed and water *ad libitum*. Strict biosecurity measures were followed during the trial period. The shed area beneath the building was thoroughly cleaned and disinfected using appropriate disinfectants before the chicks were brought to poultry farm. This was followed by fumigation with formalin and potassium permanganate (KMnO₄). All equipment was also thoroughly cleaned, disinfected, and sterilized before use. The feeders and waterers were sanitized with 0.02% KMnO₄ solution every day. Lime powder was available 24/7 before the entrance to the poultry house. Determining the impact of phyto-genic additives in broiler feed on the production performance of broilers was the aim of this study. The data were analysed by Statistical Package for Social Science (SPSS) software version 16.

Results and Discussion

Average initial body weight (gm) of the broilers in the control (40.00±0.53) and treatment group (42.00±0.72) was similar whereas at the end of trial body weight of treatment group (2200±20.20 gm) was significantly higher ($p<0.05$)

than the control group (2320±19.36 gm). Average daily gain of control group (52.38±0.48 gm) was significantly lower ($p<0.05$) than the treatment group (55.24±0.46). Mortality rate of treatment group (3.00±0.31) was lower than the control group (3.20±0.20). FCR was used as feed efficiency measures which was significantly ($p<0.05$) lower in phytobiotics supplemented groups in comparison to control group

Javed *et al.* (2009) [12] found that the group treated with ashwagandha and other herbs saw substantially greater weight increase, dressing percentage, breast weight and leg weight. Similarly, Srivastva *et al.* (2013) [28] found that ashwagandha supplementation improved the dressing percentage. The increased digestive activities, nutrient absorption and assimilation, free radical scavenging activity and antipathogenic activity of herbal ingredients may be the biological cause of the increased live weights in broilers of herbal fed groups (Prajapat *et al.*, 2018, Nagar *et al.*, 2021, Ayalew *et al.*, 2022) [22, 20, 2]. Aloe vera supplementation reduced broiler mortality rates as compared to the control group, according to Eevuri and Putturu (2013) [5]. Antibacterial, antioxidant, immune-modulatory, antiviral and anti-inflammatory qualities of phytobiotics may be the cause of lower death rates, which have been linked to improved immunity in supplemented groups. According to Mphamed *et al.* (2012) [18], nutritional supplements containing 0.1% and 0.2% turmeric considerably boosted the weight gain of broiler chickens. The findings concur with other researchers who found that adding ginger powder to broiler diets significantly increased feed intake (Herawati and Marjuki, 2011 and Mohamed *et al.*, 2012) [10, 18]. Khan *et al.* (2018) [13] discovered that broiler growth performance was enhanced when a 2% polyherbal combination was added to their diet. The findings align with those of Sadeghi *et al.* (2011) [27] and Arshad *et al.* (2012) [1], who reported that adding ginger to broiler diets significantly ($p<0.05$) increased body weight gain when compared to the control group. According to Jahejo *et al.* (2019) [11], adding 5 g of basil to the diet per kilogram of feed resulted in considerably ($p<0.05$) higher BWG. In 2017, Urusan and Bolukbas found that broilers fed 2 g/kg of turmeric powder had a considerably ($p<0.05$) higher FCR. When compared to broilers in the control group, better economic performance was noted when phytobiotics and/or organic acids were supplemented (Rawat *et al.*, 2016) [23]. In contrary Yarru *et al.* (2009) [32] found adding 0.5% turmeric powder to broiler feed reduced their weight gain. Similarly, many researchers have shown no discernible impact of supplementing broiler feed with garlic.

Table 1: Effect of phytobiotic mixture supplementation on performance and economics of broiler chicken

S. No.	Parameters	Control group (T ₁)	Treated Group (T ₂)
1.	Average initial body weight (gm)	40.00±0.53	42.00±0.72
2.	Average Daily gain (gm)	52.38 ^b ±0.48	55.24 ^a ±0.46
3.	Average total weight gain	2200 ^b ±20.20	2320 ^a ±19.36
4.	Increase in avg. body weight (%)	-	5.45
5.	Mortality rate	3.20±0.20	3.00±0.31
6.	FCR (Feed Conversion Ratio)	1.59 ^a ±0.01	1.55 ^b ±0.01
7.	B:C Ratio	1.59 ^a ±0.01	1.55 ^b ±0.01

a, b Means with different superscripts in a row differ significantly ($p<0.05$)

Conclusions

Based on current research, it was concluded that adding 2% phytobiotics to broiler diets enhanced bird performance and also had a positive impact on the economy. Therefore, due to the adverse effects of antibiotic growth promoters on consumer health, the use of phytobiotic mixtures is recommended as a safer alternative for promoting growth in broiler production.

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