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Effect of Neem, Ginger and Garlic Powder on Gut Health of Commercial Layers

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A B S T R A C T

An experiment was conducted to study the effect of neem, ginger and garlic powder on gut health in commercial layers. Five hundred layer birds of twenty eight weeks age were distributed into 25 replicates of 20 birds each. Basal diet (T_1) and the experimental diets were prepared by incorporating garlic powder@ 0.5% (T2), neem powder @ 0.5% (T3), ginger powder @ 1% (T4) and garlic @ 0.5%, neem @ 0.5% and ginger powder @ 1% in combination (T5). The duration of the experiment was 20 weeks divided into 5 phases of 4 weeks each. At peak production stage (45th week) of the experiment, two birds from each replicate in different treatment groups respectively was sacrificed and intestinal contents from small intestine were taken aseptically. Samples were used for enumeration of bacteria as per spread plate method. Specific media such as MacConkey agar was used for *E.coli* count, whereas *Lactobacillus* spp. was assessed on Brain Heart Infusion agar. The bacterial counts were expressed as log_{10}cfu/gm of sample. Feeding of neem, ginger and garlic powder revealed significant reduction ($P \leq 0.05$)in *E. Coli* count and significant increase in *Lactobacillus* count. It was concluded that feeding neem, ginger and garlic powder was beneficial in improving gut health.

Introduction

There has been a great interest in improving poultry health by using environmentally-friendly products (Onu, 2010). Commonly, under intensive production systems chickens are stressed mainly due to sudden changes in the environments (chilling or overheating), parasites, transportation and vaccination. The combination of these factors negatively affects productive efficiency and carcass characteristics promoting permanent changes in intestinal microbiota and leading to immune system disequilibrium (Lan *et al.*, 2004). Antibiotics and synthetic agents generally used as feed additives in livestock are controversial due to their potential toxicological effects. Moreover, there is an increasing trend for natural products in order to reduce the use of synthetic substances. Thus, medicinal plants and probiotics are currently considered safe and offer a possible

alternative to satisfy customer demands and current market challenges (Onu. 2010).

The methanol extract of *A. indica* leaves shows antibacterial activity against *Bacillus subtilis, Staphylococcus aureus, Proteus vulgaris, Salmonella typhi* and *Pseudomonas aeruginosa* (Grover *et al.*, 2011). Ginger used as a substitute for antibiotic growth promoters is desirable for greater productivity in poultry, increased palatability of feed, nutrient utilization, appetite stimulation, increased gastric juice flow (Owen and Amakiri, 2012). Garlic (*Allium sativum*) is one of the most recognized plant species used for organic poultry production. It has anti-bacterial, anti-viral, anti-fungal, and anti-parasitic properties.

Thus, the objective of this study was to investigate the effects of neem, ginger and garlic on gut health of commercial layers.

Materials and Methods

A total of five hundred layer birds of twenty-eight weeks' age were selected and the birds were reared by feeding the basal diet for 2 weeks for acclimatization. The birds were allocated into five treatment groups with 20 birds per replicate and 100 birds per treatment. The birds are fed in two phases, layer phase I and layer phase II diets as per BIS (2007). From 31st week the birds were fed with the respective experimental diet till the completion of the experiment at 50th week. The trial duration was for 20 weeks (31st week to 50th week) and this duration was divided into five phases of 4 weeks each. The basal diet (control–T1) was formulated as per the standard recommendations of BIS (2007) nutrient requirements. The treatment group T2, T3 and T4 was supplemented with garlic powder 0.5 per cent, neem powder 0.5per cent and ginger powder 1per cent respectively. The treatment group T5 was supplemented with garlic powder 0.5per cent + neem powder 0.5per cent + ginger powder 1per cent.

Gut microbial count

At 45th week of experiment (peak stage of production), two birds from each replicate in all treatment groups were sacrificed. Intestinal content from small intestine were taken aseptically for microbial count. Samples were subjected for enumeration of bacteria as per spread plate method (Postgate, 1969). Specific media such as MacCankey agar was used for *E.coli* count, whereas *Lactobacillus* was assessed on Brain heart infusion agar by pour plate method (Mackie and Mccartey, 1996).

Results and Discussion

Gut microbial count

E. coli count

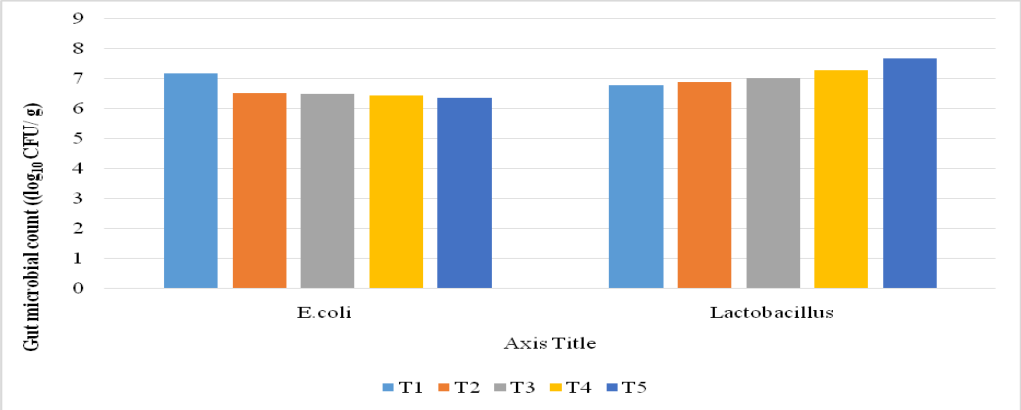
The *E. coli* count (log_{10} CFU/ g) was significantly lower ($P \leq 0.05$) in the groups which received garlic (T2 - 6.51), neem (T3-6.48), ginger (T4 - 6.44) and in combination (T5 - 6.37) compared to the control (T1 - 7.19). There was no significant difference ($p > 0.05$) in the *E. coli* count among the groups which received garlic, neem, ginger and in combination (Table 1).

Lactobacillus count

The *Lactobacillus* count (log_{10} CFU/ g) was significantly ($P \leq 0.05$) highest (7.68) in the group which received garlic, neem, ginger in combination (T5) compared to the groups which received garlic (T2 - 6.89), neem (T3 - 7.01), ginger (T4 - 7.29) and control (T1 - 6.78). There was no significant difference ($p > 0.05$) in the *Lactobacillus* count among the groups which received garlic, neem, ginger and control.

Table.1 Effect of feeding neem, ginger and garlic powder on gut microbial counts (log_{10} CFU/ g) of commercial layers

Experimental group	Description of the treatment	*E. coli* count (log_{10} CFU/ g)	*Lactobacillus* count (log_{10} CFU/ g)
T_1	Control	7.19 ± 0.042^a	6.78 ± 0.049^b
T_2	Control + Garlic powder 0.5%	6.51 ± 0.011^b	6.89 ± 0.021^b
T_3	Control + Neem powder 0.5%	6.48 ± 0.029^b	7.01 ± 0.016^b
T_4	Control + Ginger powder 1%	6.44 ± 0.055^b	7.29 ± 0.013^b
T_5	Control + Garlic 0.5% + neem 0.5%+ ginger powder 1%	6.37 ± 0.059^b	7.68 ± 0.022^a



The results are in agreement with Dieumou *et al.*, (2009) who supplemented ginger and garlic oil at the rate of 10, 20 and 30 mg/ kg/ day and observed significant decrease ($P \leq 0.05$) in the colony forming units of *Escherichia coli* and other enterobacteria in the digesta of ileo- caecum of broiler chicken.They attributed the reason that Plants can produce a wide variety of antimicrobial agents derived from their specific bioactive components, mostly secondary metabolites. like plants including ginger exerted a weak antimicrobial activity. Ginger extract showed in vitro antibacterial activity against *Pseudomonas aeruginosa, Salmonella typhimurium. Escherichia coli* and *Candida albicans.* The findings are in disagreement with Qorbanpour *et al.*, (2018) who supplemented with ginger and multi strain probiotic and observed no significant difference ($P > 0.05$) in the coliforms and *Lactobacillus* count in all the treatment groups compared to the control.

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