Phytobiotics Habbatus Sauda and Garlic Meal: Are Still Efficacious during the Spread of Marek's Disease Outbreak

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ABSTRACT: When kept intensively in a closed-house poultry shed, additions of habbatus sauda (*Nigella sativa*; HSM) or garlic bulb meal (*Allium sativum;* GBM) in the diets were claimed to be efficacious used as growth promoter for broiler chickens. This study critically evaluated the effectiveness of both phytobiotics during the spread of Marek's disease outbreak. A hundred male New Lohmann day old broiler chicks were divided into 5 dietary treatments. One-way ANOVA treatment structure in a Complete Randomized Design was used in this experiment. The treatment diets were: basal diets that meet dietary requirements of the breeder, without phytobiotics supplementation (control; P1); basal diets + 1.0% HSM (P2); basal diets + 1.0% GBM (P3); basal diets + 1.0% HSM + 1.0% GBM (P4); and basal diets + 0.5% HSM + 0.5% GBM (P5). Each treatment was replicated 5 times, with 4 birds in each replicate pen. Response parameters that evaluated in this study were growth performance (average daily gain, final weight, feed intake, and feed conversion ratio) and protein-energy efficiency (protein and energy intake, protein and energy efficiency ratio), based on 5 weeks rearing period. Results showed that, when the birds were raised in tropical opened-system poultry shed during the spread of Marek's disease, dietary addition of 1.0% habbatus sauda and garlic bulb meal did not give any significant positive effects on all response variables that observed on growth performance and protein-energy efficiency parameters. It might be concluded that phytobiotics supplementation is only efficacious for improving productivity of broiler chickens when the birds are reared in closed-house poultry shed that free from disease outbreak.

Keywords: Phytobiotics eficacy, Marek's disease outbreak, Growth performance, Protein-energy efficiency

INTRODUCTION

Available studies suggest that traditional poultry farmers face serious problems in disease attacks, such as: infectious bursal disease (Berg, 2010), Newcastle disease, infectious bronchitis, avian influenza, and Marek's (Tabbu, 2000). Studies reported that development of the body self-defence might be depressed by low biosecurity level, poor sanitary condition, and low quality of feed stuffs (Gibbens *et al.,* 2001). Uncontrolled farm condition and non-intensive poultry managements seem to be responsible for this problem. Traditional farmers might use antibiotics to solve this problem. Antibiotics have been administered mostly during the grow-out period to control growth and proliferation of exogenous pathogens, promote growth, maintain health, facilitate better feed efficiency, and improve meat quality. In order to limit the spread and development of antibiotic resistant microflora, the authorization of several antibiotics as feed additives has been withdrawn in European Union since 1997 (Dibner and Richards, 2005). However, the removal of antibiotics authorization resulted in substantial increase in infection in poultry (Knarreborg *et al.,* 2002; Casewell *et al.,* 2003).

Some studies showed that garlic bulb meal (GBM) and habbatus sauda meal (HSM) have been known to be efficacious as sources of phytobiotics for poultry. Numerous studies reported that GBM improved the growth performance of poultry with non-antibiotics diets (Mahmood *et* *al.,* 2009). On the other hand, habbatus sauda was also reported to be good as growth promoter for broiler chickens (Abu-Dieyeh and Abu-Darwish, 2008; Al-Beitawi and El-Ghousein, 2008; Shewita and Taha, 2011).

However, these studies were done in intensive poultry management, using good quality feed stuffs and closed-housed poultry system. Therefore, the results did not draw the 'real' condition. Since there is no study to report the effects of dietary supplementations of garlic bulb and habbatus sauda on New Lohman broiler chickens during the outbreak of poultry diseases, this study is important to evaluate the factual effects of phytobiotics supplementations on real condition in traditional farmers.

MATERIALS AND METHODS

Birds, Diets, Housing, and Experimental Desain

A hundred male day old New Lohman broiler chicks from local commercial breeder were allocated to 5 treatments in a complete randomized fashion. Each treatment had 5 replicate pens with 4 birds per replicate pen. The treatment diets were: basal diets that meet dietary requirements of the breeder, without phytobiotics supplementation (control; P1); basal diets + 1.0% HSM (P2); basal diets + 1.0% GBM (P3); basal diets + 1.0% HSM + 1.0% GBM (P4); and basal diets + 0.5% HSM + 0.5% GBM (P5). These dose rates were based on the recommendation of the previous studies from the available literatures. The basal diets were composed of yellow corn, rice polished, soybean meal, meat bone meal, crude palm oil, Di-Calcium Phosphate, Calcium Carbonate, mineral-vitamin premix, methionine, salt, with garlic bulb meal and habbatus sauda meal added at different doses. All diets for starter and grower stages were prepared with the same batch of ingredients. The feeding program consisted of a single starter diet (from 0 – 14 days of age) and a layer diets (15 to 35 days of age). The diets were formulated to meet the recommendations of the National Research Council (1994) for broiler chickens. The ingredients and chemical compositions of the diets are presented in Table 1. Feed and drinking water were given for ad-libitum consumption. During the experiment, no enzymes or coccidiostat were added to the experimental diets. The chicks were vaccinated at the hatchery, and no additional vaccinations were administered during the study.

Sampling Procedures and Statistical Analyses

Response parameters that evaluated in this study were growth performance (average daily gain, final weight, feed intake, feed conversion ratio) and protein-energy efficiency (protein and energy intake, protein and energy efficiency ratio), based on 5 weeks rearing period. Body weight and feed intake data were taken on d 0 and 35 for calculation of average daily gain and feed conversion ratio. The protein and energy intake was based on the amount of feed intake, multiplied by protein and energy content in the feed. The protein efficiency ratio (PER) and energy efficiency ratio (EER) were calculated for each phase using the following formula:

$$\text{PER (g/g)} = \frac{\text{Body weight gain (g)}}{\text{Protein intake (g)}} \qquad \text{EER (g/100 kcal)} = \frac{\text{Body weight gain (g) x 100}}{\text{Gross energy intake (kcal)}}$$

Growth performance data, as well as nutrient and energy utilization data, were analyzed statistically by Analyses of Variance employing Complete Randomized Design (Steel and Torrie, 1993). Significance was declared for the probability of less than 5%. All statistical analyses were performed using Statistical Procedures for Social Science (SPSS) for Windows versi 16.0 (SPSS Inc., Chicago, IL) software.

Table 1. Composition of experimental starter and grower diets (%)

Items	Starter diets					Grower diets				
	P1	P2	P3	P4	P5	P1	P2	P3	P4	P5
Yellow corn	38.29	38.29	38.29	38.29	38.29	42.92	42.92	42.92	42.92	42.92
Rice polished	7.93	7.93	7.93	7.93	7.93	6.91	6.91	6.91	6.91	6.91
Soybean meal	41.10	41.10	41.10	41.10	41.10	37.89	37.89	37.89	37.89	37.89
Meat bone meal	7.25	7.25	7.25	7.25	7.25	5.15	5.15	5.15	5.15	5.15
Crude palm oil	3.14	3.14	3.14	3.14	3.14	4.66	4.66	4.66	4.66	4.66
Di-calcium phosphate	0.15	0.15	0.15	0.15	0.15	0.10	0.10	0.10	0.10	0.10
Calcium carbonate	0.09	0.09	0.09	0.09	0.09	0.27	0.27	0.27	0.27	0.27
Mineral-vitamin premix	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01
Methionine	0.00	1.00	0.00	1.00	0.50	0.04	0.04	0.04	0.04	0.04
Salt	0.00	0.00	1.00	1.00	0.50	0.05	0.05	0.05	0.05	0.05
Garlic bulb meal	2.00	1.00	1.00	0.00	1.00	0.00	1.00	0.00	1.00	0.50
Habbatus sauda meal	0.00	0.00	1.00	1.00	0.50	0.00	0.00	1.00	1.00	0.50
Filler	2.00	1.00	1.00	0.00	1.00	2.00	1.00	1.00	0.00	1.00
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 2. Growth performance response and nutrient – energy efficiency ratio of broiler chickens fed diets with phytobiotics supplementation[1]

Variables	Treatment diets[2]					Level of significance	
	P1	P2	P3	P4	P5	SEM	p-value
Growth Performance							
Feed intake. g/bird	748.77	752.00	778.59	726.44	746.67	10.83	0.713
Average daily gain. g/bird	296.90	334.49	318.94	314.99	330.08	11.76	0.896
Final weight. g/bird	333.90	371.49	355.94	351.99	367.08	11.76	0.896
Feed conversion	2.50	2.28	2.48	2.38	2.38	0.092	0.956
Nutrient and energy utilization							
Protein intake. g/bird	169.45	170.18	176.20	164.39	168.97	10.827	0.713
Protein efficiency ratio. g/kg	1.76	1.96	1.82	1.91	1.96	0.068	0.870
Energy intake. kcal/g	2175.3	2184.7	2262.0	2110.5	2169.2	11.760	0.896
Energy efficiency ratio	13.72	15.28	14.18	14.85	15.27	0.523	0.879

Note: [1]Means represent 5 pens of 4 bird each per treatment.
[2]P1= control; basal diets + 1.0% HSM (P2); basal diets + 1.0% GBM (P3); basal diets + 1.0% HSM + 1.0% GBM (P4); and basal diets + 0.5% HSM + 0.5% GBM (P5).

RESULTS AND DISCUSSION

The effects of low dose phytobiotics supplementation on growth performance of broiler chickens are summarized in Table 2. Feed intake. average daily gain. and final weight feed conversion of the male birds fed diets containing garlic bulb meal (GBM) or habbatus sauda meal (HSM) did not different with those of the birds fed control diets. Dietary supplementation with 1.0% HSM individually or in combination with 1.0% GBM did not stimulate growth performance of male broiler chickens. These results might be attributed to the adverse effects of Marek's disease on appetite and nutrients absorption. In a critical study with poultry, Tabbu (2000) showed that Marek's disease was associated with poor appetite, which in turn reduced the amount of micro nutrient that available to be absorbed for daily metabolism. On the other hand, reduction of the body immune system due to the occurrence of Marek's disease, initiated the body to maximally recover their health state. Consequently, available micro-nutrients in the intestine cannot be utilized to stimulate daily growth. Result in current study was in the line with the results of previous studies by Ashayerizadeh *et al.* (2009), Doley *et al.* (2009) and Dono (2012) where supplementation of 1.0% HSM did not stimulate growth performance in broiler chickens.

Results in Table 2 also showed that dietary supplementations with GBM or HSM did not stimulate nutrient and energy utilization. At the rate of 1.0% alone or in combination, supplementations of GBM and HSM did not influence nutrient and energy intake, as well as nutrient and energy efficiency ratio. This result might be attributed to the increase of competition for available micro-nutrients between pathogenic microbes and micro-villi in the intestinal wall (Dibner and Richards, 2004). Increase of the population of pathogenic microbes might stimulate production of intestinal mucous barrier and reduce micro-nutrients uptake, which in turn might interfere nutrients and energy utilities for daily metabolism. Result in this study was similar with result of Kirkpinar *et al.* (2010) that supplemented broiler diets with garlic essential oil.

CONCLUSIONS

It can be concluded from current study that when broiler chicken birds were kept in opened poultry-house research and raised during the spread of Marek's disease, dietary supplementation of phytobiotics garlic meal and habbatus sauda meal did not have any significant benefits on the growth performance or nutrient-energy utilization of broiler chickens.

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