Research Paper

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Effect of Garlic and Neem Leaf Powder Supplementation on Immune Response to NDV and Organoleptic Parameters of Meat in Broilers

Veterinary Science

KEYWORDS : garlic, neem leaf powder, immune response, organoleptic evaluation

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ABSTRACT

Present study was designed to evaluate the effect of supplementation of garlic and neem leaf powder on immune response to NDV and organoleptic parameters of meat in broilers. 210 male broiler chicks were distributed in to seven treatments, each treatment had six replicates with five chicks per each replicate. The chicks were divided into 7 dietary treatments and reared upto six weeks of age. The experimental design consists of T1 (control), T2 (GP @ 0.5g/kg), T3 (GP @ 1.0 g/kg), T4 (NLP @ 1.0g/kg), T5 (NLP @ 2.0g/kg), T6 (GP @ 0.5g/kg + NLP @ 1.0g/kg) and T7 (GP @ 1.0 g/kg + NLP @ 2g/kg). At 42nd day serum samples were collected for evaluation of immune response. Results showed that supplementation of garlic powder and neem leaf powder alone and their combination significantly (P<0.05) increased the antibody titers against NDV. Organoleptic evaluation of cooked breast meat samples revealed that quality of meat in all the groups is moderately good to good and no significant (P>0.05) difference was noticed in colour, flavor, juiciness, tenderness and overall acceptability.

INTRODUCTION

Neem leaves have been demonstrated to exhibit immunomodulatory and anti-inflammatory properties (Subapriya and Nagini, 2005). Garlic extracts had immunostimulatory function (Sumiyoshi, 1997). Some studies showed that treatment with aqueous mixed extract of medicinal plants (garlic and neem) in diets is better for immunomodulatory response against ND, IB, and IBD without affecting growth of broilers (Nidaullah *et al.* 2010**).** Neem leaves enhances the antibody titers against NDV antigen and also potentiates the inflammatory reactions to dinitrochlorobenzene in skin tests (Deepika Lather Mishra *et al.* 2002). Organoleptic evaluation of thigh meat displayed no abnormal odour or flavour in meat by supplementing garlic powder in broiler diets (Toghyani *et al*., 2011).

In the present study, the effect of supplementation of neem leaf powder alone and in combination with garlic on immune response to NDV and on organoleptic parameters were evaluated in broilers.

MATERIALS AND METHODS

210 day-old male broiler chicks were procured and distributed in to seven treatments, each treatment had six replicates with five chicks per each replicate. The chicks were reared in battery brooders upto six weeks of age. The experiment was conducted at Poultry Experimental Station, College of Veterinary Science, Hyderabad. The experimental design is shown in Table 1. During the experiment feed and water were offered ad libitum. The birds were immunized against NDV on 7th and 28th day of age with Lasato vaccine.

Immune response to NDV

Blood samples were collected from each replicate on 42nd day and serum sample was separated and stored at -20°C till use. Antibodies specific for NDV were detected in sera of chicks by Haemagglutination Inhibition (HI) test and were expressed as log2 titers.

Organoleptic evaluation of meat

The organoleptic attributes of cooked breast meat samples were assessed by subjecting to a sensory analysis for flavor, juiciness and tenderness by semi- trained five member taste panel drawn from the staff of the College of Veterinary Science, Hyderabad. Cooked cubes of approximately 1.5 cm cut from the breast muscle were served to the taste panel members as coded samples and the panelists were provided with Hedonic nine point score card to assess the colour, flavor, juiciness, tenderness and overall acceptability of the samples served. The score card is shown in Table 2.

Statistical analysis

The data were analyzed using General Linear Model procedure of statistical package for social sciences (SPSS) 15th version and comparison of means tested using Duncan's multiple range test (1955) and significance was considered at P<0.05.

RESULTS

Immune response to NDV

Statistical analysis of the data on mean log2 titer values revealed significant (P<0.05) differences among the treatments. Birds fed with 2g/kg NLP (T5) had highest antibody titer against NDV followed by T4, T6 and T7. Least antibody titer against NDV was seen control group. Among the garlic powder supplemented groups, the mean log2 titer values showed no differences in both the concentrations. The combined supplementation of garlic powder and neem leaf powder showed no differences in values of ND titers (Table 3).

Organoleptic evaluation of meat

Based on the score card for sensory evaluation, the quality of meat of all the groups judged to be moderately good to good. There is no significant (P>0.05) difference between the treatments for different parameters viz. colour, flavor, juiciness, tenderness and overall acceptability. The results of present study suggests that there was no bitter taste and pungent odour observed even after feeding garlic and neem leaf powders at high levels also (Table 4).

DISCUSSION

Immune response to NDV

The antibody titers value in neem leaf powder supplemented group was higher amongst all treatment groups. As opined by Sadekar *et al.* (1998) and Renu Sridhar Rakha *et al.* (2003) the immunopotentiating and immunomodulatory effects of neem leaf powder against New Castle and Infectious Bursal Disease viruses enhanced the antibody titers against NDV antigen. In Contrary, Landy *et al.* (2011) found that supplementation of neem fruit had no significant difference in the antibody titer

against NDV in all treatment groups.

The garlic powder supplementation showed no improvement in the ND titer values. The improvement in mean Log2 titer values of birds supplemented with combination of garlic powder and neem leaf powder was only due to immunopotentiating effects of neem leaf powder. Based on the results, garlic powder did not showed any immunomodulatory effect. Similar findings were observed by Jafari *et al.* (2008) and Pourali *et al.* (2010*)*. On the contrary, Daneshmand *et al. (*2012) reported that the inclusion of combination of garlic, oyster mushroom and propolis extract (GMP) to the diet improved antibody response to NDV when compared to control.

Organoleptic evaluation of meat

The birds fed with GP and NLP showed no significant (P<0.05) different values for colour, flavour, tenderness, juiciness and overall acceptability scores. The results indicated that the bitter taste of NLP and pungent odour of GP did not affect the overall acceptability of meat.

The results corroborates with Fadlalla *et al.*, (2011) who observed no significant differences among dietary treatments in colour, flavour, tenderness and juiciness. Toghyani *et al.* (2011) reported that sensory evaluation of thigh meat displayed no abnormal odour or flavour in meat by supplementing garlic powder in broiler diets.

In contrary to our findings, Bonsu *et al.* (2012) stated that mild bitter taste was sensed in the diets containing neem leaf meal @ 2.5% inclusion level. Similarly, Choi *et al.* (2010) reported that addition of garlic significantly influenced (P<0.05) color stability in thigh meat.

Conclusion

The supplementation of GP and NLP alone and their combination significantly (P<0.05) increased the antibody titers against NDV and no significant (P>0.05) difference was observed in colour, flavor, juiciness, tenderness and overall acceptability of meat.

Table 1: Experimental Design

TREATMENT	DIET
T1(control)	Basal diet
T2	Basal diet + 0.5g/kg GP
T3	Basal diet + 1.0g/kg GP
T4	Basal diet + 1.0g/kg NLP
T5	Basal diet + 2.0g/kg NLP
T6	Basal diet + 0.5g/kg GP+ 1.0g/kg NLP
T7	Basal diet + 1.0g/kg GP+ 2.0g/kg NLP

GP – Garlic Powder
NLP – Neem Leaf Powder

Table 2: Score card for organoleptic evaluation of meat

Points	Quality
9	Excellent
8	Good(improvement can be made)
7	Moderately good
6	Just good
5	Fair
4	Just poor
3	Moderately poor
2	Poor(undesirable)
1	Extremely poor(highly undesirable)

Sample No.	Colour	Flavor	Juiciness	Tenderness	Overall acceptability

Table 3: Effect of supplementing garlic and neem leaf powders and their combinations on immune response to NDV of broiler chicken

Treatments	NDV(log$_2$ titer) at 42nd day	
T1	5.33^{b}	
T2	6.00^{b}	
T3	5.66^{b}	
T4	7.33^{a}	
T5	7.50^{a}	
T6	7.16^{a}	
T7	7.16^{a}	
SEM	0.43	
ANALYSIS OF VARIANCE		
Source of Variance	df	MSS values of respective age groups
Between Treatments	6	4.82
Error	41	13.04
P- value		0.00

Values bearing different superscripts within a column are significantly (P<0.05) different

Table 4: Effect of supplementing garlic and neem leaf powders and their combinations on the organoleptic evaluation of broiler breast meat

Treatments	Organoleptic evaluation				
	Colour	Flavour	Juiciness	Tenderness	Overall acceptability
T1	7.6	7.8	7.6	7.6	7.8
T2	8.0	7.6	7.6	7.6	7.6
T3	8.0	7.6	7.6	7.6	7.4
T4	7.4	7.4	7.2	7.2	7.4
T5	7.6	7.2	7.4	7.2	7.2
T6	7.4	7.6	7.4	7.6	7.6
T7	7.2	7.4	7.4	7.4	7.4
SEM	0.10^{NS}	0.08^{NS}	0.08^{NS}	0.09^{NS}	0.50^{NS}
ANALYSIS OF VARIANCE					
Source of variance	df	MSS values of respective age groups			
Between Treatments	6	0.46	0.19	0.11	0.18	0.24
Error	34	12.40	8.74	8.68	10.68	8.68
P- value		0.26	0.65	0.87	0.78	0.46

Values bearing different superscripts within a column are significantly (P<0.05) different

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