

***Aloe vera* and *Azadirachta indica* (Neem) as antibiotic replacers and immune enhancers in brooding management of Nicobari fowl**

T Sujatha*, J Sunder and A Kundu

ICAR-Central Inland Agricultural Research Institute, Port Blair, Andaman & Nicobar Islands, 744105

*E-mail: drsujathaars@rediffmail.com

Abstract

Aloe vera and *Azadirachta indica* (Neem) were explored as antibiotic (Oxytetracyclin) replacers and immune enhancers during pre starter age (0-2 weeks) in indigenous Nicobari fowl. A total of 192 day old Nicobari chicks were randomly assigned to one of four herbal water treatments viz., T1: Control with regular antibiotic supplement; T2: 3 ml *Aloe* juice per chick per day; T3: 3 ml Neem extract per chick per day; T4: 1.5 ml *Aloe* and 1.5 ml neem per chick per day. Growth performance and immunity of Nicobari fowl were evaluated. Higher body weight and better feed conversion efficiency were observed during the period of supplementation. The improved antibody titre was seen in treated groups till 3rd week of post-inoculation as compared to control. *Aloe vera* and Neem could be potent alternatives to antibiotic growth promoters during brooding period of birds. Further, the feeding of neem leaves and aloe to immune-suppressed birds could increase their humoral responses in field condition.

Key words: *Aloe vera*, *Azadirachta indica*, growth and immune enhancers, brooding stage, rural poultry

Introduction

Commercial chicks are forced to consume antibiotics, either growth promoters or preventive medicine, from zero days onwards. This trend is in recent past applied also in rural poultry as evidenced by screening on antibiotic residue in desi birds are given importance in the present epidemiological studies. This might be due to rising interest among rural farmers on application of improved farming practices in rural poultry production. Practice of medicinal plants as alternatives to antibiotics in commercial poultry production is practically, though long-term goal, in Ethno-veterinary medicine, its application is quite feasible in rural poultry production also. Since ancient times, plants and/or its parts have an indispensable source of medicine for indigenous poultry production systems. Even today, upto 80% of people still rely on traditional remedies such as herbs for their medicine as per WHO estimates (Arunkumar and Muthuselvam, 2009). Hence, it is an hour of critical need to exploit medicinal plants for the treatment and control infectious diseases in rural poultry. *Aloe vera* and *Azadirachta indica* (Neem) are the two herbs used for various functions and ailments from since long time.

Several studies revealed that properties of *A. vera*, including immune-modulatory and antibacterial properties is due to polysaccharide *acemannan* (Antonisamy *et al.* 2012). Similarly, *A. indica* (Neem) is used in traditional medicine as a source of many therapeutic agents in the Indian culture and grows well in the tropical countries. *A. indica* leaves also contain compounds with proven antimicrobial activity (Hema *et al.* 2013). This antimicrobial activity of extracts of neem leaves against micro-organisms such as bacterial (*Staphylococcus spp.*, *Streptococcus spp.*, *Pseudomonas spp.* and *Escherichia coli*) and some fungal strains have been reported (Koona and Budida, 2011). Effects of neem on poultry production have also been reported (Nayaka *et al.* 2012) in broiler and layers. Hence, Aloe and neem juice were thought as growth enhancers during brooding management. Keeping this in view, the present study was aimed to record the effect of aloe and neem in the indigenous Nicobari fowl chicks in the post-hatch period for 1-14 days of age.

Materials and Methods

Juice of *Aloe vera* was prepared by peeling off outer coating of Aloe and then grinding the pulp without water.

It was then filtered and mixed with water in 1:1 ratio. Extract of *Azadirachta indica* (Neem) was prepared by soaking two hundred gram of neem leaves in one liter of water for overnight and was then filtered in morning. All experimental chicks were fed *ad-libitum* with 20 % CP and 2800 kcal ME/kg as per BIS (2007) recommendation and a total of 192 day old chicks were randomly assigned to one of four herbal water treatments throughout the experimental pre-starter stage (0-2 weeks) in a completely randomized design. The water treatments comprised of T1: Control with regular antibiotic (Oxytetracyclin) supplement; T2: 3ml Aloe juice per chick per day; T3: 3 ml Neem extract per chick per day; T4: 1.5 ml Aloe and 1.5 ml neem per chick per day. Each treatment consists of four replicates with 12 chicks in each replicate.

The parameters such as body weight, feed consumption and feed efficiency of chick were recorded. All the experimental chicks were provided pre-weighed *ad-libitum* chick feed during the experimental period and the left-over feed weighed at weekly interval. The feed consumption and feed efficiency for body weight was calculated. Humoral immune response was assessed against Goat Red Blood Cells (GRBCs) as per the method by Seigel and Gross (1980) with slight modification. The suspension of goat RBC used as an antigen was prepared (2% v/v) in Phosphate Buffer Saline (pH-7.2) and

injected into wing vein of the birds (a) 0.25 ml per bird at 2nd week of age. Blood was collected from Nicobari fowl chicks before and after injection at weekly intervals for 2 weeks. The sera were separated and assessed for presence of anti GRBC antibodies by Haemagglutination (HA) test using 96 well U shaped microtitre plate. HA plates were prepared with sterile condition. 50 μ l of Phosphate Buffer Saline was added in all wells. 50 μ l of test serum were added in that wells and mixed well. Two fold serial dilution methods were followed and final 50 μ l was discarded. 50 μ l of 2% RBC was added in all the wells and incubated at 37°C for an hour. The plate was read for formation of button formation and mat formation. The titer was expressed as the log₂ of the reciprocal of the highest dilution giving visual agglutination (button formation).

Results and Discussion

Effect of herbal supplementation on growth performance of Nicobari fowl chick is given in Table 1. Significantly ($p < 0.05$) higher body weight and better feed conversion efficiency was observed during the period of supplementation. However, there was no significant variation in feed intake. Among the treatment groups, body weight and feed efficiency was better with aloe supplemented group.

Table 1. Growth performance of Nicobari fowl fed with herbal juice supplementation

Duration of supplementation	Weekly body weight (g)			
	<i>Aloe vera</i>	Neem	Aloe + Neem	Control
Before	31.91 \pm 0.64	33.08 \pm 0.82	34.25 \pm 1.05	33.58 \pm 1.11
1 wk	64.5 ^a \pm 2.03	53.4 ^{ab} \pm 1.56	46.3 ^{ab} \pm 2.37	40.5 \pm 2.27 ^b
2 wk	87.16 \pm 6.70 ^a	77.75 ^{ab} \pm 3.83	75.25 ^{ab} \pm 3.88	67.27 ^b \pm 4.19
Duration of supplementation	Cumulative Feed intake (g) per bird NS			
	<i>Aloe vera</i>	Neem	Aloe + Neem	Control
1 wk	320.0	290.3	290.5	298.0
2 wk	550.0	434.3	436.9	500.6
Feed conversion efficiency for weekly body weight gain				

Duration of supplementation	<i>Aloe vera</i>	Necm	Aloe + Necm	Control
1 wk	0.10 ± 0.15 ^a	0.07 ± 0.19 ^b	0.04 ± 0.26 ^b	0.02 ± 0.36 ^b
2 wk	0.04 ± 0.75 ^a	0.06 ± 0.62 ^b	0.07 ± 0.45 ^b	0.05 ± 0.86 ^b

Aloe and neem water additives improved the antibody titre at 1st week of post inoculation of GRBC as compared

to chicks fed without herbs (Table 2). The improved antibody titre was seen in treated groups till 3rd week of post inoculation as compared to control.

Table 2. Haemagglutination titre (log 2) value of Nicobari fowl fed with herbal juice

Treatments	1 st week	2 nd week	3 rd week
Aloe	3.0 ± 8.26	2.37 ± 4.82	3.55 ± 6.44
Neem	3.2 ± 5.43	2.75 ± 6.56	7.0 ± 6.48
Aloe + Neem	3.12 ± 6.64	2.6 ± 8.65	5.33 ± 2.58
Control	2.71 ± 4.52	2.0 ± 4.26	2.0 ± 7.56

The improved body weight and better feed efficiency is due to the innate growth enhancing properties of medicinal plants. The whole leaf of aloe contains approximately 200 compounds including aloesin, anthraquinone, acemannan, sterols, amino acids and vitamins (Prashar *et al.* 2011) which might have stimulated the body for better utilization of feed nutrients that in turn was reflected in better body weight and feed efficiency. The significantly higher humoral immunity with herbal supplementation might have been attributed to the immuno-modulatory properties of aloe and neem. The most important components of *Aloe vera* gel are acemannan, anthraquinones and lectins and they have immune-modulatory effects and have potential to act against viral infections (Mehala and Moorthy, 2008). Significant rise in titre value against Newcastle disease has also been reported when Aloe vera was included separately at 0.1 and 0.2% level in broiler diet (Mehala and Moorthy, 2008). Similarly, higher immunity with neem supplements might be attributed to higher antibody production of IgM and IgG. These antibodies exerts immune stimulant effect and also creates an enhanced response to any future challenges occurred by disease organisms.

Conclusion

Aloe vera and Neem could be potent alternatives to antibiotic growth promoters during brooding period of

rural poultry. Further, the supplementation feeding of neem leaves and aloe to immuno-suppressed desi birds could increase their humoral responses in field condition.

References

- Arunkumar, S. & Muthuselvam, K. (2009). Analysis of phytochemical constituents and antimicrobial activities of *Aloe vera* L. against clinical pathogens. *World Journal of Agricultural Sciences* 5: 572-576.
- Antonisamy, J. M. A. N., Beulah, R. & Laju, R.N. (2012). Anti-bacterial and antigungal activity of Aloe vera gel extract. *International Journal of Biomedical and Advance Research* 3: 184-187.
- Hema, T. A. A., Arya, S., Suseelan, S., John Celestial, R. K. & Divya, P. V. (2013). Antimicrobial activity of five South Indian medicinal plants against clinical pathogens. *International Journal of Pharma and Bio Sciences* 4: 70-80.
- Koona, S.J. & Budida, S. (2011). Antimicrobial potential of the extracts of the leaves of *Azadirachta indica* Linn. *Natural Science and Biology* 3: 65-69.
- Nayaka, H. B. S., Umakantha, B., Ruban, S. W., Murthy, H. N. N. & Narayanaswamy, H. D. (2012). Effect of neem, turmeric, vitamin E and their combinations on immune response in broilers. *Global Veterinary* 9: 486-489.



Siegel, P. B. & Gross, W. B. (1980). Production and persistence of antibodies in chickens to sheep erythrocytes. I. Directional selection. *Poultry Science* 59: 1-5.

Prashar, G. S., Koul, P. V. & Sehgal. S. (2011). In vitro antimicrobial activity of ethanolic extract of *Aloe vera*

against some bacterial and fungal species. *Advanced Biotechnology* 11: 32-33.

Mehala, C. & Moorthy, M. (2008). Production Performance of Broilers fed with Aloe vera and Curcuma longa (Turmeric). *International Journal of Poultry Science* 7: 852- 856.