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Economic aspect of neem leaves powder and cinnamon oil supplementation in broiler chicken's diet

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Abstract
A study was conducted in 420 day-old commercial Vencobb 400 broiler chickens to estimate the economic aspect of neem leaves powder (NLP) and cinnamon oil (CNO) supplementation in their diet. Chicks were randomly distributed into 6 groups of 7 replicates each by following Randomized Block Design. Dietary treatment groups were; T0 (Control: basal diet), T1 (basal diet + 2 g NLP/kg), T2 (basal diet + 4 g NLP/kg), T3 (basal diet + 100 mg CNO/kg), T4 (basal diet + 200 mg CNO/kg) and T5 (basal diet + 2 g NLP/kg + 100 mg CNO/kg). It was observed that T3 followed by T1, T2, T5 and T4 groups showed better net profit value per bird than control group. Thus, supplementation of CNO, NLP and their combination can be recommended in broiler diet in terms of economics. However, supplementing CNO @ 100 mg/kg in broiler rations could be a better feed additive in respect of cost effectiveness.

Keywords: Neem leaves powder, cinnamon oil, broiler chickens, economic

Introduction
India's poultry production has progressed from highly unorganized and amateurish farming techniques to commercialized assembly line with slashing technological breakthroughs with due course of time [1]. Nutrition and diseases have been identified as the key limiting variables in poultry sector. Feed is a critical component in poultry production, contributing about 60-70 percent of production costs [2]. The sub-therapeutic use of antibiotics as growth promoters in poultry feeds has been prohibited due to their adverse effects, such as residues in meat products and development of antibiotic-resistant bacteria populations [3, 4]. As a result, research works on supplementation of feed additives such as phytogenic substances and essential oils have attracted considerable attention in an attempt to enhance meat and egg production [5, 6, 7].
It is necessary to obtain a scientific understanding of the use of low-cost locally available agro-industrial by-products in poultry feed to reduce feed costs. With the steep rise in meat demand over the coming years, low-cost poultry rearing is a gold mine for small-scale farmers. Traditional feed ingredients for poultry feeding are always in high demand. Use of these ingredients in poultry feed has elevated the production costs [8]. Strategies should be made to use locally accessible cheap byproducts that can help to minimize feed prices, lower total cost of meat production, and thus make it more affordable in rural areas [2]. Conventional sources of protein, vitamin, and mineral used in poultry diets, such as fish meal, meat and bone meal, soybean meal, groundnut cake etc., are becoming costlier with passage of time in developing countries and their accessibility is limited due to the rising cost of raw materials and fierce competition with humans for the same food products. Hence, the search for alternative feed sources has become inevitable in order to reduce feed prices without jeopardizing poultry health and palatability [9].
In light of the public's preference for natural products, natural feed additives such as herbal powders and essential oils are used in poultry nutrition. Neem leaves, seeds, and barks have antimicrobial activity along with immunomodulatory, anti-inflammatory, antifungal, and antioxidant properties [10, 11]. Beneficial influences of neem leaves on growth performance [12], carcass characteristics [13], hematological parameters [14], and immune responses [15] were also reported in broiler chickens. Cinnamon species contains numerous essential oils, cinnamic acid, cinnamaldehyde, caryophyllene oxide, eugenol, L-borneol, and many other valuable biologically active substances [16]. The main compounds in cinnamon are polyphenols and volatile phenols. Among polyphenols, cinnamon contains mainly vanillic, caffeic, gallic, protocatechuic, *p*-coumaric, and ferulic acids [17]. Cinnamon oil (CNO) can regulate digestion, increase immunity, and exert detoxifying, hypoglycaemic, and anti-inflammatory effects [18, 19], antimicrobial activity against bacteria, pathogenic fungi, and molds [20], antioxidant activity,

antiparasitic and anti-allergenic effects [18].

Therefore, the present study was carried out to investigate the economic impact of supplementing a phytogenic compound (neem leaves powder), an essential oil (cinnamon oil) and their combination in the diet of broiler chickens.

Materials and Methods

The experiment was conducted in the Poultry Farm Complex of Odisha University of Agriculture and Technology (OUAT), Bhubaneswar, Odisha – 751003, India. Feeding trial was conducted during the month of April and May, 2022 with an average temperature ranging from 25 to 38 ^{o}C and relative humidity from 66 to 72 percent. Four hundred twenty (N=420) day old commercial Vencobb 400 broiler chicks were procured from Venkateshwara Hatcheries Pvt. Ltd., Nayapalli, Bhubaneswar - 751012. Chicks were kept in brooder for three days and offered *ad libitum* pre-starter crumbles for the first 7 days of age. On 7th day, chicks were randomly distributed into 6 treatment groups with 7 replicates of 10 chicks in each replicate by following Randomised Block Design. Experimental diets were formulated as per ICAR (2013) [21] using commonly available ingredients. Control group (T0) was fed with basal diet; whereas, other treatment groups were fed basal diet along with 2 g NLP/kg (T1), 4 g NLP/kg (T2), 100 mg CNO/kg (T3), 200 mg CNO/kg (T4) and 2 g NLP/kg + 100 mg CNO/kg (T5).

Neem leaves powder was procured from Bhubaneswar, Odisha – 751003 and cinnamon oil from Allinpro Industries Pvt. Ltd., Noida, Uttar Pradesh - 201301. Net profit (Rs.) per bird under each treatment group was calculated considering the cost of chick, feed intake and miscellaneous expenses.

Result and Discussion

The economics of supplementing NLP, CNO and their combination in broiler chickens in different experimental groups have been presented in Table 1. Supplementation of 100 mg/kg CNO (T3 = Rs. 22.92) was found to be the most cost effective followed by 2 g/kg NLP fed group (T1 = Rs. 16.14), 4 g/kg NLP (T2 = Rs. 14.85), 2 g/kg NLP + 100 mg/kg CNO (T5 = Rs. 14.01), 200 mg/kg CNO (T4 = Rs. 2.08) and basal diet fed groups (T0 = Rs. 1.31).

Result was in alignment with the findings of Durrani *et al.* (2009) that feed cost was significantly ($P<0.05$) higher in control, whereas, gross return for 4% concentrated neem leaves infusion (NLI) @ 50 ml/l supplemented group was significantly ($P<0.05$) higher than 30 and 40 ml/l NLI groups [22]. Onyimonyi *et al.* (2009) also found that there was highest profit in broiler chickens on 0.5% sun dried neem leaf meal (NLM) group than 1.0, 1.5 and 2% NLM groups. Obikaonu (2012) observed that feed cost decreased as the level of NLM (2.5, 5, 7.5 and 10%) increased, with 10% NLM recording the least cost [23]. Paul *et al.* (2020) reported that maximum profit per kg live weight broiler was in neem leaf extracts (NLE) treated group compared to control and antibiotic treated groups [24]. This was probably due to easy availability of neem, thus being cost effective. Result was in disagreement with Chowlu *et al.* (2019) who reported that the net profit per kg live weight was high in the control group as compared to cinnamon powder (CNP @ 2.5, 5.0 and 7.5 g/kg) supplemented groups [25]. Singh *et al.* (2014) also observed reduced benefit cost ratio (BCR) in broilers when higher doses of CNP @ 1 and 1.5% were included in the diet [26]. Whereas; Hossain *et al.* (2014) found that 1% CNP resulted in significant ($P<0.05$) higher BCR than control group [27].

Table 1: Economics of NLP and CNO Supplementation in Broiler chickens in Different Experimental Groups

Sl. No.	Attributes	Dietary Treatment*					
		T0	T1	T2	T3	T4	T5
1.	Cost of day-old chick (Rs.) = A	42	42	42	42	42	42
2.	Total feed consumed/ bird (kg) = B	3.471	3.394	3.281	3.352	3.308	3.253
3.	Basal Feed cost/kg (Rs.) = C	32	32	32	32	32	32
4.	Supplement Cost /bird (Rs.) = D	0	0	0	6.25	12.50	6.25
5.	Total Feed Cost/ bird (Rs.) = E, (B x C)	111.07	108.70	108.20	113.84	119.00	113.55
6.	Miscellaneous Cost (Rs.) = F, 12% of (A+E)	18.37	18.08	18.02	18.70	19.32	18.67
7.	Total cost/ bird (Rs.) = G, (A+E+F)	171.44	168.79	168.22	174.54	180.33	174.22
8.	Average BW/bird (Kg) = H	1.76	1.89	1.87	2.01	1.86	1.92
9.	Market price of bird/kg (Rs.) = I	98.00	98.00	98.00	98.00	98.00	98.00
10.	Total earning/ bird (Rs.) = J, (H x I)	172.75	184.93	183.07	197.46	182.40	188.22
11.	Net profit/ bird (Rs.) = K, (J-G)	1.31	16.14	14.85	22.92	2.08	14.01

*T0 = Control (basal diet), T1 = Basal diet + NLP (2 g/kg), T2 = Basal diet + NLP (4 g/kg), T3 = Basal diet + CNO (100 mg/kg), T4 = Basal diet +CNO (200 mg/kg), T5=Basal diet + NLP (2 g/kg) + CNO (100 mg/kg)

Conclusion

The study suggested that broiler farming can be more profitable when incorporated with CNO @ 100 mg/kg followed by NLP @ 2 and 4 g/kg and combination of 100 mg/kg CNO and 2 g/kg NLP in broiler chicken's diet and thus, CNO and NLP can be used as a feed additive in terms of better economic impact.

References

1. Tiwari S, Kushwah N. Advances in poultry production system. Epashupalan; c2022. https://epashupalan.com/11686/animal-husbandry/advances-in-poultry-production-system/
2. Thirumalaisamy G, Muralidharan J, Senthilkumar S, Sayee RH, Priyadharsini M. Cost-effective feeding of poultry. International Journal of Science, Environment and Technology. 2016;5(6):3997-4005.
3. Salim HM, Huque KS, Kamaruddin KM, Beg AH. Global restriction of using antibiotic growth promoters and alternative strategies in poultry production. Science progress. 2018;101(1):52-75.
4. Selaledi LA, Hassan ZM, Manyelo TG, Mabelebele M. The current status of the alternative use to antibiotics in poultry production: An African perspective. Antibiotics (Basel). 2020;9(9):594.
5. Ayalew H, Zhang H, Wang J, Wu S, Qiu K, Qi G, *et al.* Potential feed additives as antibiotic alternatives in broiler production. Frontiers in Veterinary Science; c2022, 9. DOI 10.3389/fvets.2022.916473
6. Shehata AA, Yalçın S, Latorre JD, Basiouni S, Attia YA,

Abd El-Wahab A, *et al*. Probiotics, prebiotics, and phytogenic substances for optimizing gut health in poultry. Microorganisms. 2022;10(2):395.
7. Attia Y, Al-Harthi M, El-Kelawy M. Utilisation of essential oils as a natural growth promoter for broiler chickens. Italian Journal of Animal Science. 2019;18:1005-1012.
8. Kapri C. Poultry farming: a cost effective way of doubling farmers income. Just Agriculture; c2021. https://justagriculture.in/blog/poultry-farming-a-cost-effective-way-of-doubling-farmers-income/
9. Swain BK, Naik PK, Singh NP. Unconventional feed resources for efficient poultry production. Technical bulletin No. 47, ICAR – ICAR research complex for Goa; c2014. https://ccari.icar.gov.in/Technical%20Bulletin%20No.%2047.pdf
10. Susmitha S, Vidyamol KK, Ranganayaki P, Vijayaragavan R. Phytochemical extraction and antimicrobial properties of *Azadirachta indica* (Neem). Global journal of pharmacology. 2013;7:316-320.
11. Pandey G, Verma KK, Singh M. Evaluation of phytochemical, antibacterial and free radical scavenging properties of *Azadirachta indica* (neem) leaves. International Journal of Pharmacy and Pharmaceutical Sciences. 2014;6:444-447.
12. Nodu MB, Okpeku M, Akpoveta ZA, Iroegbu DO. Evaluation of *Azadirachta indica* leave extract on hematology and biochemical profiles, organs weight and growth parameters of broiler chickens. Journal of New Sciences; c2016. p. 32.
13. Landy N, Ghalamkari GH, Toghyani M. Performance, carcass characteristics, and immunity in broiler chickens fed dietary neem (*Azadirachta indica*) as alternative for an antibiotic growth promoter. Livestock Science. 2011;142:305-309.
14. Nayaka HBS, Umakantha B, Ruban SW, Murthy HNN, Narayanaswamy HD. Performance and hematological parameters of broilers fed neem, turmeric, vitamin e and their combinations. Emirates Journal of Food and Agriculture. 2013;25:483-488.
15. Sharma V, Jakhar KK, Dahiya S. Immuno-pathological studies on broiler chicken experimentally infected with Escherichia coli and supplemented with neem (*Azadirachta indica*) leaf extract. Veterinary World. 2016;9:735.
16. Tung YT, Chua MT, Wang SY, Chang ST. Anti-inflammatory activities of essential oil and its constituents from indigenous cinnamon (*Cinnamon osmophloeum*) twigs. Bioresource Technology. 2008;99:3908-3913.
17. Muchuweti M, Kativu E, Mupure CH, Chidewe C, Ndhlala AR, Benhura MAN. Phenolic composition and antioxidant properties of some spices. American Journal of Food Technology. 2007;2:414-420.
18. Jakhetia V, Patel R, Khatri P, Pahuja N, Garg S, Pandey A, *et al*. Cinnamon: a pharmacological review. Journal of advanced scientific research. 2010;1:19-23.
19. Koochaksaraie RR, Irani M, Gharavysi S. The effects of cinnamon powder feeding on some blood metabolites in broiler chicks. Brazilian journal of poultry science. 2011;13:197-202.
20. El-Hack A, Mohamed E, Alagawany M, Abdel-Moneim AME, Mohammed NG, Khafaga AF, *et al*. Cinnamon (*Cinnamomum zeylanicum*) oil as a potential alternative to antibiotics in poultry. Antibiotics. 2020;9:210.
21. ICAR. Nutrient Requirements of Poultry. Indian Council of Agricultural Research, New Delhi, India, 2013
22. Durrani FR, Sultan A, Jan M, Chand N, Durrani Z. Immunomodulatory and growth promoting effects of Neem (*Azadirachta indica*) leaves infusion in broiler chicks. Sarhad Journal of Agriculture. 2008;24(4):655-659.
23. Obikaonu HO. Evaluation of the nutritional value of neem (*Azadirachta indica*) leaf meal on the performance of finisher broilers. International Journal of Agriculture and Rural Development. 2012;15:1235-1239.
24. Paul TK, Hasan MM, Haque MA, Talukder S, Sarker YA, Sikder MH, *et al*. Dietary supplementation of Neem (*Azadirachta indica*) leaf extracts improved growth performance and reduced production cost in broilers. Veterinary World. 2020;13:1050.
25. Chowlu H, Vidyarthi V, Zuyie R, Maiti C. Effect of dietary supplementation of cinnamon on the performance of broiler chicken. Livestock Research International. 2019;7:83-87.
26. Singh J, Sethi APS, Sikka SS, Chatli MK, Kumar P. Effect of cinnamon (*Cinnamomum cassia*) powder as a phytobiotic growth promoter in commercial broiler chickens. Animal Nutrition and Feed Technology. 2014;14(3):471-479.
27. Hossain MM, Howlader AJ, Islam MN, Beg MAH. Evaluation of locally available herbs and spices on physical, biochemical and economical parameters on broiler production. International Journal of Plant, Animal and Environment Sciences. 2014;4:317-323.