



Effects of Dietary Supplementation of Marigold Flower (*Tagetes erecta*) Powder on Performance of Commercial Broiler Chicken

R. Sapkota¹, Reema Saikia¹, D. Sapkota¹, S. Tamuly², K.B. Devchoudhury³

10.18805/ag.D-6240

ABSTRACT

Background: In recent times, emphasis has been given on the use of non-antibiotic growth promoters in poultry diets, especially the phytobiotics possessing anti-microbial, anti-oxidant, anti-inflammatory and growth enhancing properties augmenting poultry health and performance. Marigold (*Tagetes erecta*) flower is reported to have immunogenic and antioxidant properties containing high levels of flavonoids, carotenoids, lutein, lycopene so as to improve the quality of broiler meat.

Methods: The present study was conducted to evaluate the effect of feeding Marigold flower powder (MFP) as a natural feed additive on the performance of broiler chicken. A total of 120 day-old identical commercial broiler chicks were randomly distributed into four groups viz, C (standard basal diet as control), T₁ (C +0.3% MFP), T₂ (C +0.6 % MFP), T₃ (C +0.9 % MFP), comprising of 30 chicks in each group. The feeding trial was continued for a period of 42 days under uniform managerial conditions.

Result: The final body weight (g) was highest in T₂ group (2410.83) followed by T₁ (2367.23), T₃ (2127.73) and C (2008.73) groups. There was significant (P<0.01) difference between the control and MFP fed groups. The T₂ group demonstrated the best Feed Conversion Ratio (FCR) of 1.70 followed by T₁ (1.72), T₃ (1.75) and C (1.77). Further, there was significant increase body weight, improve FCR and increased gross profit per broiler in birds offered 0.6% MFP as a natural feed additive growth promoter. Further, no adverse effect on feeding MFP was observed among the birds.

Key words: Broiler chicken, Marigold flower powder, Performance.

INTRODUCTION

In recent times emphasis has been given on the use of non-antibiotic growth promoters in poultry rearing with a focus on phytobiotics, usually derived from herbs, spices and essential oils. Being natural they are devoid of residual and toxic effects in the body. Marigold (*Tagetes erecta*) flower is reported to have immunogenic and antioxidant properties (Wang *et al.*, 2017); contribute carotenoid and flavonoid pigments (Rajput *et al.*, 2012) possess essential oils for improved immune function and nutrient absorption leading to better growth and feed efficiency. The plant also stimulate the digestive enzymes enhancing liver function, also decreases duodenal crypt depth for protecting intestinal mucosa against pathogenic bacteria and toxic substances, thus may act as promising feed additive for poultry ration. Therefore, the present study was carried out to evaluate the effect of Marigold flower powder (MFP), a natural feed additive, at different doses on the growth performance and economy of broiler chickens.

MATERIALS AND METHODS

One hundred and twenty day-old Cobb-430 Y strain broiler chicks having similar body weight from a single hatch were randomly distributed into four groups viz, C, T₁, T₂ and T₃ comprising of 30 chicks, each. Each group was further subdivided into 3 replicates of 10 chicks. The chicks were wing banded and reared under deep-litter system of management in the Instructional Poultry Farm of the CVSc, AAU, Khanapara. The control group (C) was fed with basal diet without MFP supplementation, whereas the treatment

¹Department of Poultry Science, College of Veterinary Science, Guwahati-781 022, Assam, India.

²Department of Animal Physiology and Biochemistry, College of Veterinary Science, Guwahati-781 022, Assam, India.

³Department of Anatomy and Histology, College of Veterinary Science, Guwahati-781 022, Assam, India.

Corresponding Author: Reema Saikia, Department of Poultry Science, College of Veterinary Science, Guwahati-781 022, Assam, India. Email: reemasaikia@gmail.com

ORCID: 0008-3818-7946, 0000-0002-0751-2629, 0000-0003-4097-621, 0000-0002-3767-3255, 0000-0002-0753-9979.

How to cite this article: Sapkota, R., Saikia, R., Sapkota, D., Tamuly, S. and Devchoudhury, K.B. (2025). Effects of Dietary Supplementation of Marigold Flower (*Tagetes erecta*) Powder on Performance of Commercial Broiler Chicken. *Agricultural Science Digest*. 1-4. doi: 10.18805/ag.D-6240.

Submitted: 05-11-2024 **Accepted:** 03-05-2025 **Online:** 13-03-2026

groups T₁, T₂ and T₃ were supplemented with MFP at the rate of 0.3%, 0.6% and 0.9%, respectively. The MFP was prepared by separating the petals from the flowers after cleaning thoroughly with tap water. The petals were dried in hot air oven at 50°C for 6-8 hours till become crisp and then ground to fine powder using kitchen grade mixer-grinder, hermetically sealed and stored in a cool, dark place. The chemicals present in marigold flower powder were determined through outsourcing Vimta Labs Ltd., Life Sciences Campus, Hyderabad (Table 1).

The birds were fed as per recommendation of ICAR (2013) feeding standards to meet the energy and protein requirements during pre-starter (0-14 days), starter (15-21 days) and finisher (22-42 days) phases. The ingredient and nutrient compositions of pre-starter, starter and finisher diets have been presented in (Table 2). All the birds under control and treatment groups were offered *ad libitum* drinking water and feed throughout the experimental period of six weeks from 17th Jan. to 28th Feb./2022 under uniform managemental condition. The performance of broiler in respect of weekly feed intake, weekly body weight, feed conversion ratio (FCR) and economics of production were calculated as per

standard methods. A Completely Randomized Design was used for statistical analysis with established technique.

RESULTS AND DISCUSSION

The data showed that all the marigold fed groups consumed higher feed as compared to the control group (Table 3). Among the marigold fed groups the T₂ group with 0.6 % MFP consumed the highest feed followed by T₁ group with 0.3 % marigold addition, whereas T₃ group with 0.9 % dietary MFP consumed the lowest amount. This phenomenon might be because of the preference of poultry for yellow or orange colour contributed by the carotenoids from MFP. This is in accordance with the finding of Khosravinia (2007) who revealed that inherent orange colour of MFP is known to attract chicken. Also, the smell of marigold due to its carotenoids, volatile oils (Table 1) and aromatic compounds might have added for more attraction to the feed, leading to higher feed consumption in the marigold treated groups.

Table 1: Chemicals present in marigold flower powder (dm basis).

Chemicals	Content (%)
Carotenoids	77.91
Volatile Oil	<0.10

*Outsourced laboratory: Vimta Labs Ltd., Life Sciences Campus, Hyderabad-500 101, Telangana, India.

Table 2: Ingredient and nutrient compositions of basal diets (pre-starter, starter and finisher) as per ICAR, 2013.

Ingredients (Kg)	Pre-starter (0-14 days)	Starter (15-21 days)	Finisher (22-42 days)
Rice polish	7.24	6.84	5.48
Yellow maize	51.98	55.2	55.96
Soybean meal	22.48	21.98	22.96
Ground nut cake	14.80	11.98	11.10
Common salt	0.5	0.5	0.5
Mineral mixture	2	2	2
Vegetable oil	1	1.5	2
Total	100	100	100
Nutrient composition			
Dry matter (%)	88.24	87.65	86.78
Ether extract (%)	3.49	4.55	5.08
Crude protein (%)	22.00	21.98	19.80
Total ash (%)	6.95	7.05	6.56
Crude fibre (%)	3.93	3.94	4.03
Nitrogen free extract (%)	65.31	64.43	62.22
Metabolizable energy (Kcal/kg)*	3002.80	3098.00	3196.00

*Calculated value

Vitamin premix was added @ 20 g per quintal in all categories rations with the following compositions (per g): Vitamin K (10 mg), Vitamin B₂ (50 mg), Vitamin D₃ (12,000 I.U) and Vitamin A (28,500 I.U).

Table 3: Mean weekly feed intake (g/bird) as-well-as feed conversion ratio (in parenthesis) of broiler chickens in different treatment groups.

Groups	C (0%)	T ₁ (0.3%)	T ₂ (0.6%)	T ₃ (0.9%)
Weeks				
First	112.02 (1.41)	111.13 (1.37)	113.46 (1.42)	109.52 (1.40)
Second	266.43 (1.52)	280.55 (1.58)	282.19 (1.57)	267.69 (1.50)
Third	450.62 (1.64)	446.24 (1.52)	466.84 (1.52)	448.80 (1.61)
Fourth	642.05 (1.73)	972.50 (1.68)	965.46 (1.65)	721.92 (1.70)
Fifth	881.15 (1.83)	1059.65 (1.77)	1051.40 (1.75)	972.48 (1.81)
Sixth	1123.71 (1.94)	1114.10 (1.89)	1136.79 (1.86)	1118.28 (1.92)
Total feed intake	3475.98 (1.77)	3984.17 (1.72)	4016.14 (1.70)	3638.69 (1.75)
(Overall FCR)				

The mean weekly body weight value (Table 4) revealed that the body weight of control group remained lower as compared to the marigold fed groups after 1st week. However, significant ($P \leq 0.01$) change was noticed at the end of 4th week and beyond. This development might be due to the exposure time needed for the biochemical elements present in marigold to exert appreciable physiological changes. The T_1 , T_2 and T_3 groups had achieved 17.84%, 20.01% and 5.92% more live body weight than the control group, respectively. This phenomenon could be attributed to better digestion and absorption of feed nutrients due to improved gut health because of the development of increased absorptive area of the duodenum and jejunum in MFP fed groups. El-Wahab *et al.* (2021) also found that supplementation of Marigold flower extract (MFE) and MFP in diet reflected in the best body weight gain in growing Japanese quail. Similarly, Rajput *et al.* (2012) showed that dietary supplementation with MFE in broiler diet significantly improved live body weight. In the contrary, Wang *et al.* (2017) found no significant difference in the growth performance due to the dietary supplementation of MFE in broiler chickens.

The overall feed conversion ratio was found to be improved, in the MFP fed broilers, justifying the better feed efficiency (Table 3). This result falls in line with the observations of Pirman *et al.* (2020) who also found lower FCR due to the dietary MFE in the broilers. These results are corresponding to the works done by Agiang *et al.* (2011) who found that dietary inclusion of bush marigold (*Aspilia africana*) leaf up to 5% aqueous extract of growing and laying quails significantly improved FCR.

The production cost per live broiler was found to be (₹) 252.00, 282.60, 284.50 and 261.86 for the C, T_1 , T_2 and T_3 groups, respectively (Table 5). Thus, comparing with the control group the cost of production per broiler was higher by about (₹) 30.60, 32.50 and 9.86 in T_1 , T_2 and T_3 groups, respectively. Accordingly, T_2 group showed the best gross profit among all. Such profitability might be attributed to the fact that the marigold fed groups had better FCR due to increased absorptive intestinal area leading to higher metabolic demand and increased protective function of the intestinal mucosa against pathogenic bacteria and toxic substances as reported by Pirman *et al.* (2020).

Table 4: Mean ($\pm$ se) weekly body weight(g) of broiler chickens in different treatment groups.

Groups Weeks	C (0%)	T_1 (0.3%)	T_2 (0.6%)	T_3 (0.9%)
First	126.80a $\pm$ 1.74	128.23a $\pm$ 1.30	127.07a $\pm$ 1.13	126.10a $\pm$ 1.34
Second	302.10a $\pm$ 5.04	306.07a $\pm$ 5.23	307.03a $\pm$ 5.15	304.53a $\pm$ 5.30
Third	576.87a $\pm$ 16.43	600.23a $\pm$ 17.34	613.70a $\pm$ 11.52	583.33a $\pm$ 15.31
Fourth	948.00a $\pm$ 18.53	1179.10c $\pm$ 20.05	1198.83c $\pm$ 12.68	1007.97b $\pm$ 16.04
Fifth	1429.50a $\pm$ 34.46	1777.77c $\pm$ 41.27	1799.63c $\pm$ 21.34	1545.27b $\pm$ 22.41
Sixth	2008.73a $\pm$ 31.24	2367.23c $\pm$ 39.48	2410.83c $\pm$ 22.06	2127.73b $\pm$ 23.18

Means with at least one common superscript in a row do not differ significantly ($P \leq 0.01$).

Table 5: Production cost of broilers in different treatment groups.

Group Parameters	C (0%)	T_1 (0.3%)	T_2 (0.6%)	T_3 (0.9%)
I. Expenditure				
1. Chick cost (A) = 1.05 $\times$ cost of one day-old chick (₹): 1.05 $\times$ 36	37.80	37.80	37.80	37.80
2. Feed cost (B) = Live Weight in Kg $\times$ FCR $\times$ Cost per kg of feed* (₹)	181.33	207.65	209.02	189.90
3. Miscellaneous expenditure (C) = Add 15% of (A+B) (₹)	32.87	36.82	37.02	34.16
4. Additional cost of marigold (D) (₹)	-	0.33	0.66	0.98
5. Production cost per live broiler (A+B+C+D) (₹)	252.00	282.60	284.50	261.86
II. Return				
1. Sale of one live broiler @ ₹ 130/-per kg	261.13	307.74	313.41	276.60
2. Gross profit per broiler (₹)	9.13	25.14	28.91	14.74
3. Gross profit per kg (₹)	4.54	10.62	11.99	6.92

CONCLUSION

From the above study it can be concluded that Marigold flower powder has beneficial effects on growth, feed conversion ratio and gross profit per broiler chickens. Thus, the MFP at the level of 0.6% can be safely used as a natural feed additive in the diet of broiler chickens.

ACKNOWLEDGEMENT

The present study was supported by the Faculty of Veterinary Science, AAU, Khanapara.

Disclaimers

The views and conclusions expressed in this article are solely those of the authors and do not necessarily represent the views of their affiliated institutions. The authors are responsible for the accuracy and completeness of the information provided, but do not accept any liability for any direct or indirect losses resulting from the use of this content.

Informed consent

All animal procedures for experiments were approved by the Committee of Experimental Animal care and handling techniques were approved by the University of Animal Care Committee.

Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No funding or sponsorship influenced the design of the study, data collection, analysis, decision to publish, or preparation of the manuscript.

REFERENCES

- Agiang, E.A., Oko, O.O.K. and Essien, G.E. (2011). Quails Response to Aqueous Extract of Bush Marigold (*Aspilia africana*) Leaf. *American Journal of Animal and Veterinary Sciences*. 6: 130-134.
- El-Wahab, A.E.A.E., Mahmoud, M.M.A., Mohamed, S.B. and Ramadan, A.S.A. (2021). Influence of dietary supplementation of marigold flower powder and extract (*Calendula officinalis* L.) on performance, nutrient digestibility, serum biochemistry, antioxidant parameters and immune responses of growing Japanese quail. *Journal of Animal Nutrition and Animal Physiology*. <https://doi.org/10.1111/JPN.13611>.
- ICAR (2013). *Nutrient Requirements of Poultry*, Indian Council of Agricultural Research, New Delhi. 12.
- Khosravinia, H. (2007). Preference of broiler chicks for color of lighting and feed. *Journal of Poultry Science*. 44: 213-219.
- Pirman, T., Vida, R., Milka, V., Janez, S., Alenka, L. (2020). effect of olive leaves or marigold petal extract on oxidative stress, gut fermentative activity and mucosa morphology in broiler chickens fed a diet rich in n-3 polyunsaturated fats. *Journal of Poultry Science*. 58: 119-130.
- Rajput, N., Naeem, M., Ali, S., Rui, Y. and Tian, W. (2012). Effect of dietary supplementation of marigold pigment on immunity, skin and meat color and growth performance of broiler chickens. *Brazilian Journal of Poultry Science*. 14: 233-304.
- Wang, S., Zhang, L., Jiaolong, L., Jiahui, C., Gao, F. and Guanghong, Z. (2017). Effects of dietary marigold extract supplementation on growth performance, pigmentation, antioxidant capacity and meat quality in broiler chickens. *Asian-Australasian Journal of Animal Science*. 30: 71-77.