International Journal of Veterinary Sciences and Animal Husbandry 2025; 10(9): 297-302

ISSN: 2456-2912
NAAS Rating (2025): 4.61
VET 2025; 10(9): 297-302

www.veterinarypaper.com
Received: 09-06-2025
Accepted: 11-07-2025

Ashok Dindor
M.Sc. Scholar, Department of Animal Production, RCA, MPUAT, Udaipur, Rajasthan, India

JL Choudhary
ICAR- Emeritus Professor, Department of Animal Production, RCA, MPUAT, Udaipur, Rajasthan, India

Siddhartha Mishra
Professor and Head, Department of Animal Production, RCA, MPUAT, Udaipur, Rajasthan, India

Ram Hari Meena
Professor, Department of Soil Science & Agriculture Chemistry, RCA, MPUAT, Udaipur, Rajasthan, India

Heera Lal Bairwa
Associate Professor, Department of Horticulture, RCA, MPUAT, Udaipur, Rajasthan, India

Manoj Jat
Ph.D. Scholar, Department of Animal Production, RCA, MPUAT, Udaipur, Rajasthan, India

Corresponding Author:
Ashok Dindor
M.Sc. Scholar, Department of Animal Production, RCA, MPUAT, Udaipur, Rajasthan, India

Effect of turmeric powder and vitamin C supplementation on growth performance of Japanese quail (*Coturnix japonica*)

Ashok Dindor, JL Choudhary, Siddhartha Mishra, Ram Hari Meena, Heera Lal Bairwa and Manoj Jat

DOI: https://www.doi.org/10.22271/veterinary.2025.v10.i9e.2568

Abstract
The current study was planned to assess the "Effect of Turmeric Powder and Vitamin C Supplementation on Performance and Carcass Traits of Japanese Quail (*Coturnix japonica*)". One hundred 60 day-old Japanese quail chicks were used in a completely randomized design with 4 treatments and 4 replications, each consisting of 10 Japanese quail chicks. They were reared under a cage system for six weeks with identical standard management practices. The treatments included basal diet T_1 (Control) feeding without Turmeric powder and Vitamin C, T_2 (T_1 +Turmeric powder @ 0.5%), T_3 (T_1 +Vitamin C 300mg/kg) and T_4 (T_1 +Turmeric Powder @ 0.5% +Vitamin C 300mg/kg). In this experiment, body weight, body weight gain, feed intake and FCR were measured to assess the effects of different treatments in Japanese quail. The overall feed intake was significantly highest in group T_4 (467.37±10.76 g), followed by T_2 (446.39±0.22 g) and T_3 (444.46±0.06 g), while the lowest feed intake was recorded in the group T_1 (440.25±0.45 g). The difference between T_2 and T_4 was found statistically non-significant. The overall feed conversion ratio (FCR) was significantly lowest in group T_3 (2.24±0.003 g) and highest in the control group T_1 (2.34±0.003 g). At the 6th week of age, body weight was significantly highest in group T_4 (210.70±0.15 g), followed by T_2 (207.59±0.08 g) and T_3 (202.61±0.10 g), while the lowest body weight was recorded in the control group T_1 (196.55±0.12 g). The overall body weight gain was significantly highest in group T_4 (201.94±0.22 g), followed by T_2 (198.88±0.21 g) and T_3 (193.97±0.12 g), with the lowest gain recorded in the control group T_1 (187.89±0.02 g). However, the difference in body weight gain between T_2 and T_4 was statistically non-significant. Turmeric powder and Vitamin C supplementation impacted feed intake, FCR and growth performance in Japanese quail (*Coturnix japonica*). The findings suggest the potential of these supplements to enhance the overall performance of poultry.

Keywords: Japanese quail chicks, turmeric powder, vitamin C and performance

Introduction
Poultry production is a vital component of livestock farming, making a significant contribution to human food supply. In recent years, poultry products have gained popularity as a preferred source of protein among the non-vegetarian population. According to the 20th Livestock Census (2019), the total poultry population in India stood at 851.81 million, marking a 16.8% increase compared to the previous census. Of this, backyard poultry accounted for 317.07 million, showing a remarkable growth of 45.8%, while commercial poultry numbered 534.74 million, reflecting a 4.5% increase over the previous census.

Quail, commonly known as "Batter" in India, belong to the pheasant family and are part of the order Galliformes, family Phasianidae, genus Coturnix and species japonica. The two main species found in India are the Japanese quail (*Coturnix japonica*) and the black- breasted quail (*Coturnix coromandelica*). Quail are small body size (average 120-150 g), fast-growing birds widely used in egg and meat production. They are hardy, adaptable to diverse climates and reach sexual maturity early, usually within 6-7 weeks. Their high egg- laying capacity, efficient feed conversion and resistance for many diseases, often referred to as backyard

poultry and like other domesticated animals, they originated from the wild. The domestication of quail began in Japan in 1595 and there are now over 50 species of quail worldwide, with around 70 breeds of domestic quail. In India, quail farming started in 1974 at Izatnagar, following the introduction of Japanese quail from California.

Turmeric (*Curcuma longa*), a perennial plant of the Zingiberaceae family, possesses antimicrobial, antioxidant, anti-diabetic, antibacterial, antifungal, antiviral and hypocholesterolemic properties. Its key bioactive compound, curcumin, improves digestion, immunity and reduces inflammation, while turmeric itself provides protein, carbohydrates, fiber, vitamin B6, iron, potassium and magnesium. In quails, supplementation with nano-curcumin enhanced growth, carcass yield, lipid profile, antioxidant status and immunity, while reducing pathogenic bacteria (Reda *et al.* 2020) [16]. It is also reported that turmeric improves digestion and nutrient metabolism (Kilany *et al.* 2014) [12].

Vitamin C (ascorbic acid) plays a vital role in immune function, health and antioxidant defense. For Japanese quails, vitamin C supplementation is particularly beneficial boosts immunity and improves overall health. Additionally, it helps birds cope with environmental and heat stress by reducing oxidative damage. Vitamin C supplement protect hematological parameters, growth performance, antioxidant defense systems and humoral immune parameters (Dosoky *et al.* 2024) [4]. The supplementation of vitamin C in quail feed leads to an improvement in haematological parameters: erythrocyte count, haemoglobin and haematocrit, the increases being statistically significant (Raduta *et al.* 2024) [15].

Materials and Methods

Experimental Site

The experiment was carried out at the Poultry Farm, Department of Animal Production, Rajasthan College of Agriculture, MPUAT, Udaipur. The site is situated in the sub-humid southern plain region at a latitude of 24.57°N and longitude of 73.70°E, with an elevation of 598 meters above mean sea level. The climatic data of the last decade indicate a mean maximum temperature of 38.3°C, a mean minimum temperature of 11.6°C and an average annual rainfall of 646.7 mm.

Plan of Work

In the present study, One hundred sixty, day-old Japanese quail chicks of either sex were taken from the hatchery unit of poultry farm, Department of Animal Production, Rajasthan College of Agriculture, MPUAT. The experimental birds were randomly divided into four treatments with four replications with ten Japanese quail chicks in each replication. All the birds were reared under cage system for six weeks with identical standard management practices. Birds were provided free access to food and water during the entire experimental period.

Experimental details

1.	Birds:	Japanese Quail
2.	Period:	6 weeks
3.	Total treatments:	4
4.	Replications:	4
5.	No. of birds / treatment:	40
6.	No. of birds / Replications:	10
7.	Total number of birds:	160
8.	Experimental design:	CRD
9.	Housing:	Cage system
9.	Location:	Department of Animal Production, Rajasthan
		College of Agriculture, Udaipur (Raj.)

Housing, feeding and watering management

All chicks were reared under a cage system, maintained within the comfort zone by providing optimum temperature, humidity, ventilation, floor space, lighting, feeders and water as per standard guidelines for better growth. The experimental birds were kept under continuous observation and managed uniformly with identical standard management practices throughout the study period.

Experimental feed and treatments

During the six-week experimental period, Japanese quail chicks were fed a grower ration formulated using Maize, Dicalcium phosphate (DCP), Soybean de-oiled cake (soya DOC), Turmeric powder and Vitamin C. Four different experimental diets were prepared for the Japanese quail, assigned to separate dietary treatment groups. The treatments included basal diet T_1 (Control) feeding without Turmeric powder and Vitamin C, T_2 (T_1 +Turmeric powder @ 0.5%), T_3 (T_1 +Vitamin C 300mg/kg) and T_4 (T_1 +Turmeric Powder @ 0.5% +Vitamin C 300mg/kg). Table-1clearly diffracts the characteristics of experimental feed in various treatments groups.

Table 1: Characteristics of experimental feed in various treatments

Treatment	Treatment Groups	No. of chicks
T_1	Basal diet-Maize, Soya-doc, Dicalcium phosphate	40
	(Control)	
T_2	Basal diet supplemented with 0.5% Turmeric Powder	40
T_3	Basal diet supplemented with 300mg/kg Vitamin C	40
T_4	Basal diet supplemented with 0.5% Turmeric Powder + 300mg/kg Vitamin C	40

Ingredient composition of ration

Ingredient and nutrient composition of ration in different treatments are presented in Table-2, respectively.

Table 2: Ingredient and nutrient composition of ration

Ingredient Composition				
Feed Ingredients	**Treatments**			
	T_1	**T_2**	**T_3**	**T_4**
Maize (kg)	60	60	60	60
Soya-doc (kg)	39	38.5	38.7	38.2
Dicalcium phosphate (kg)	1	1	1	1
Turmeric Powder (kg)	0	0.5	0	0.5
Vitamin C (kg)	0	0	0.3	0.3
Total	100	100	100	100
Nutrient Composition				
Dry Matter (%)	89.68	89.12	89.95	90.12
Crude Protein (%)	22.5	22.28	22.37	22.14
Crude Fibre (%)	3.83	3.80	3.82	3.78
Ether Extract (%)	3.09	3.08	3.09	3.09
Total Ash (%)	3.71	3.68	3.69	3.65
Nitrogen Free Extract (%)	66.87	67.16	67.03	67.34
Metabolizable Energy (Kcal/kg)	2930	2918	2923	2910

Statistical Analysis

The research was carried out in completely randomized design (CRD) and the data collected for various parameters in the present study were subjected to analysis of variance, as per the procedure prescribed by Snedecor and Cochran (1994) [20].

Results and Discussion

Mean values of weekly live body weight, body weight gain, feed intake and FCR used to determine the effects of different level of turmeric powder and vitamin c supplementation on the growth performance Japanese quail are presented in the Table-3, 4, 5 and 6 respectively.

Table 3: Effect of turmeric powder and vitamin C supplementation on weekly feed intake (g) of Japanese quail.

Week	Treatments groups					
	T_1	**T_2**	**T_3**	**T_4**	**SEm±**	**CD**
1	33.22±0.11d	34.38±0.07b	33.94±0.08c	35.27±0.08a	0.07	0.22
2	55.99±0.08b	57.09±0.07b	56.72±0.08b	59.41±1.94a	0.64	1.93
3	74.14±0.11b	75.26±0.05b	74.86±0.07b	79.56±2.62a	0.88	2.65
4	83.23±0.11b	84.35±0.07b	83.90±0.08b	89.25±2.95a	0.99	2.97
5	92.07±0.05d	93.22±0.10b	92.53±0.06c	96.93±0.11a	0.04	0.12
6	101.60±0.08b	102.53±0.06b	102.06±0.08b	106.95±3.43a	1.13	3.42
Cumulative Feed Intake	440.25±0.45b	446.39±0.22b	444.46±0.06b	467.37±10.76a	3.61	10.88

The data on weekly feed intake (Table-3) of Japanese quail the overall feed intake from the 1st to the 6th week of age ranged from 440.25±0.45 g to 467.37±10.76 g per chick across the different treatment groups. The highest total feed intake was observed in T_4 (467.37±10.76 g), followed by T_2 (446.39±0.22 g) and T_3 (444.46±0.06 g), while T_1 (440.25±0.45 g) showed the lowest intake. However, the difference in feed intake between T_2 and T_4 was non-significant.

The results of the present study are consistent with the effect of turmeric powder supplementation on feed intake in Japanese quail. Eko *et al*. (2020) [5] who reported that four dietary levels of turmeric powder (0, 1.5, 3.0 and 4.5%, denoted as T_1-T_4) were evaluated for their effect on feed intake. The highest feed intake was observed in birds fed 1.5% turmeric powder (T_2). These results suggest that moderate inclusion of turmeric powder optimizes feed intake and can be effectively used as a natural feed additive in broiler diets.

Feed intake of Japanese quail was significantly improved in birds supplemented with 130 mg/kg vitamin C compared to both the control and higher supplementation groups. This finding is consistent with Sahin and Kucuk (2001) [17], who reported that dietary supplementation of vitamin C enhanced feed intake and nutrient digestibility in Japanese quails under chronic heat stress. Similarly, Kutlu and Forbes (1993) [13] observed that broiler chicks under heat stress self-selected diets containing higher levels of ascorbic acid, highlighting the role of vitamin C in alleviating stress-induced appetite suppression. In addition, Elagib and Omer (2012) [6] reported that vitamin C supplementation in broiler diets improved feed intake by reducing oxidative stress and enhancing metabolic efficiency

Table 4: Effect of turmeric powder and vitamin C supplementation on FCR (g) of Japanese quail.

Week	Treatments groups					
	T_1	**T_2**	**T_3**	**T_4**	**SEm±**	**CD**
1	1.94±0.02a	1.64±0.01c	1.88±0.02b	1.55±0.02d	0.01	0.04
2	1.94±0.01a	1.73±0.01b	1.78±0.01b	1.56±0.06c	0.02	0.06
3	2.24±0.02a	1.89±0.01c	2.14±0.01b	1.80±0.07d	0.03	0.08
4	2.38±0.01a	2.22±0.02b	2.09±0.02c	2.03±0.06c	0.02	0.06
5	2.43±0.02d	2.50±0.01c	2.67±0.02b	3.46±0.03a	0.01	0.04
6	2.82±0.01d	3.00±0.01c	3.41±0.02b	4.25±0.12a	0.04	0.12
Cumulative FCR	2.34±0.003a	2.29±0.001bc	2.24±0.003c	2.31±0.05ab	0.02	0.05

Means with the same in a particular row do not differ significantly ($P<0.05$) from each other.

The overall feed conversion ratio (FCR) recorded from the 1st to the 6th week of age was 2.34±0.003, 2.29±0.001, 2.24±0.003 and 2.31±0.05 in T_1, T_2, T_3 and T_4. The highest FCR was observed in the T_1 group, followed by T_4 and T_2, while the T_3 group showed a significantly lower FCR compared to the others. However, the difference in FCR between T_1 and T_4 was found to be non-significant.

The results of the present study are consistent with the effects of herbal additives on feed efficiency in Japanese quail. Suwarta *et al.* (2018) [21] reported that a mixture of turmeric powder and cinnamon at graded levels T_1 (control), T_2 (10+10 g/kg), T_3 (20+20 g/kg) and T_4 (40+40 g/kg) resulted in a significant improvement in feed conversion ratio in all supplemented groups compared with the control. The highest improvement in FCR was observed at the highest inclusion level (40 g turmeric + 40 g cinnamon/kg feed) indicating that dietary supplementation with this herbal mixture can enhance nutrient utilization efficiency in quail. Similarly, Choudhury *et al.* (2018) [3] who reported the feed conversion ratio improved with the inclusion of 0.75% turmeric powder in the diet. Hossen *et al.* (2018) [9] also reported that quails receiving 2.5% turmeric paste exhibited significantly better FCR compared to controls, reinforcing the positive effect of turmeric on feed efficiency.

Al-Muhammadawi *et al.* (2022) [1] who reported that turmeric powder supplementation can enhance feed efficiency in broiler chickens. The inclusion of turmeric powder at levels of 0.3% to 1.8% has been shown to improve feed conversion ratio (FCR), indicating more efficient utilization of nutrients. Improved FCR with turmeric powder supplementation suggests its role as a natural feed additive that promotes better metabolic efficiency. Overall, turmeric powder appears to support poultry production by enhancing feed utilization without adverse effects on bird health.

Quails supplemented with 300 mg/kg vitamin C achieved the best FCR in the present study, suggesting improved efficiency of feed utilization. Similar improvements have been reported by Gursu *et al.* (2004) [8] in poultry under intensive production systems, as well as by Elagib and Omer (2012) [6], who found that moderate vitamin C supplementation improved FCR compared to non-supplemented groups. However, higher doses (260-520 mg/kg) were less effective, indicating diminishing returns beyond the optimum level.

Table 5: Effect of turmeric powder and vitamin C supplementation on weekly body weights (g)/chick of Japanese quail.

Week	Treatments groups					
	T_1	**T_2**	**T_3**	**T_4**	**SEm±**	**CD**
Day old	8.66±0.13	8.71±0.16	8.64±0.07	8.76±0.14	0.09	N/S
1	25.75±0.10d	29.70±0.04b	26.69±0.07c	31.52±0.15a	0.07	0.20
2	54.55±0.11d	62.74±0.09b	58.50±0.11c	69.57±0.13a	0.11	0.34
3	87.62±0.13d	102.54±0.12b	93.55±0.18c	113.67±0.13a	0.11	0.33
4	122.58±0.08d	142.64±0.15b	131.53±0.11c	157.56±0.12a	0.08	0.23
5	160.54±0.19d	177.56±0.11b	168.53±0.17c	185.55±0.11a	0.10	0.29
6	196.55±0.12d	207.59±0.08b	202.61±0.10c	210.70±0.15a	0.05	0.16

Table 6: Effect of turmeric powder and vitamin C supplementation on weekly body weights gain (g) of Japanese quail.

Week	Treatments groups					
	T_1	**T_2**	**T_3**	**T_4**	**SEm±**	**CD**
Day old	17.10±0.12d	20.99±0.14b	18.05±0.14c	22.77±0.24a	0.13	0.40
1	28.79±0.19d	33.03±0.07b	31.81±0.18c	38.05±0.10a	0.13	0.38
2	33.07±0.23d	39.81±0.21b	35.05±0.19c	44.09±0.19a	0.18	0.55
3	34.96±0.20d	40.09±0.27b	37.98±0.29c	43.90±0.18a	0.17	0.51
4	27.99±0.24d	37.00±0.17b	34.92±0.20c	37.96±0.25a	0.14	0.43
5	25.15±0.24d	34.08±0.09b	30.03±0.16c	36.01±0.08a	0.11	0.35
6	187.89±0.02d	198.88±0.21b	193.97±0.12c	201.94±0.22a	0.12	0.36
Cumulative BWG	17.10±0.12d	20.99±0.14b	18.05±0.14c	22.77±0.24a	0.13	0.40

In the present study, the body weight of day-old Japanese quail ranged between 8.66±0.13 g and 8.76±0.14 g among the different treatment groups. These differences were small and statistically non-significant. However, as the Japanese quail aged, their body weight increased progressively in all treatment groups. From the 1st to the 6th week of age, significant differences in body weight were observed among the different treatments.

At the 6th week of age, the mean body weights of Japanese quail were recorded as 196.55±0.12, 207.59±0.08, 202.61±0.10 and 210.70±0.15 g in T_1, T_2, T_3 and T_4. The overall body weight gain from day-old to the 6th week was 187.89±0.02 g, 198.88±0.21, 193.97±0.12 and 201.94±0.22 g in T_1, T_2, T_3 and T_4. Among the treatment groups, the T_4 (210.70±0.15 g) group showed a significantly higher final body weight, followed by T_2 (207.59±0.08 g), T_3 (202.61±0.10 g) and the lowest in T_1 (196.55±0.12 g). Similarly, the overall body weight gain was significantly highest in T_4 (201.94±0.22 g), followed by T_2 (198.88±0.21 g) and T_3 (193.97±0.12 g), with the lowest gain observed in the T_1 (187.89±0.02 g) group.

In the present trial, supplementation of 1.0% cinnamon and 1.0% turmeric powder significantly increased body weight and body weight gain in broiler chickens. These results are consistent with the findings of Khan *et al.* (2025) [10], who reported that dietary inclusion of cinnamon powder and turmeric powder enhanced weight gain due to improved diet palatability. Similarly, Al-Sanjary *et al.* (2023) [2] who reported the body weight gain with the inclusion of 0.05% turmeric powder and vitamin C 300mg in the diet. Overall, the present findings demonstrate that dietary supplementation of 0.05, 1.0% turmeric powder and vitamin C 300mg can enhance growth performance in broiler chickens, supporting the potential of these phytogenic additives as natural growth promoters and health enhancers in poultry production systems.

Maulod *et al.* (2022) [14] also reported that dietary turmeric (5 g/kg), alone or in combination with ginger, significantly

increased live body weight and body weight gain. In the present study, vitamin C supplementation at 600 mg/kg did not significantly affect carcass traits or blood cortisol levels, although improvements in weight gain were recorded. These findings are comparable to Sahin *et al.* (2002) [18], who reported that vitamin C supplementation improved growth in poultry. Taken together, the results indicate that turmeric and vitamin C supplementation can enhance growth performance in Japanese quail, though effects may vary depending on the level of inclusion and physiological conditions.

Furthermore, turmeric supplementation in our trial demonstrated beneficial effects on growth performance, which are in line with Emadi and Kermanshahi (2007) [7], who found that turmeric powder improved growth in broilers. Body weight and weight gain were significantly higher in quails supplemented with 130 mg/kg vitamin C compared to both the control and higher-dose groups. This is consistent with Khan *et al.* (2012) [11], who observed that moderate vitamin C supplementation supported growth by reducing oxidative stress and enhancing nutrient absorption. In contrast, higher doses (260-520 mg/kg) failed to improve growth, possibly due to metabolic imbalances, which agree with Sahin *et al.* (2002) [18], who noted that excessive supplementation may impair performance. Similar observations were made by Sahin and Kucuk (2001) [17] and Gursu *et al.* (2004) [8], who reported improved growth performance in Japanese quails receiving moderate vitamin C supplementation under heat stress.

Conclusion

Supplementation of turmeric powder and vitamin C proved beneficial for Japanese quail rearing, showing positive effects on growth performance. The better overall performance and economic returns were observed in birds supplemented with 0.5% turmeric powder + 300 mg/kg vitamin C (T_4), followed by 0.5% turmeric powder (T_2), 300 mg/kg vitamin C (T_3) and control group (T_1).

Supplementation of 0.5% turmeric powder and 0.5% turmeric powder + 300 mg/kg vitamin C in the diet of Japanese quail up to 6 weeks of age resulted in higher total feed consumption and improved feed conversion ratio. In Japanese quail, dietary inclusion of 0.5% turmeric powder and 0.5% turmeric powder + 300 mg/kg vitamin C also led to increased body weight and weight gain.

Acknowledgments

The authors express their gratitude to Dr. J.L. Choudhary, Dr. Siddhartha Mishra, Dr. Ram Hari Meena and Ashok Dindor who made his immense contribution in my research work.

Conflict of Interest

Not available

Financial Support

Not available

References

1. Al-Muhammadawi NA. Effect of adding different levels of therapeutic curcuma on productive traits in broiler chickens. Archives of Razi Institute. 2022;77(6):2059-2064.
2. Al-Sanjary AK, Ibrahim AM, Hamid SM. Effect of adding turmeric powder and vitamin C on the productive performance of broilers. IOP Conference Series: Earth and Environmental Science. 2023;1158(5):1-5.
3. Choudhury D, Mahanta J, Sapcota D, Saikia B, Islam R. Effect of dietary supplementation of turmeric (*Curcuma longa*) powder on the performance of commercial broiler chicken. International Journal of Livestock Research. 2018;8(7):182-191.
4. Dosoky WM, Farag SA, Almuraee AA, Youssef IM, Awlya OF, Abusudah WF, *et al*. Vitamin C and/or garlic can antagonize the toxic effects of cadmium on growth performance, hematological and immunological parameters of growing Japanese quail. Poultry Science. 2024;103(3):103-457.
5. Eko PM, Afolabi KD, Enyenihi GE. Growth Performance, Carcass Quality, Organ Weights and Haematology of Broilers Fed Graded Dietary Levels of Turmeric (*Curcuma longa* L.) Powder as Feed Additive. Animal and Veterinary Science Research. 2020;8(3):65-70.
6. Elagib HAA, Omer HM. Effect of dietary ascorbic acid on performance and immune response of heat-stressed broiler chicks. Pakistan Journal of Nutrition. 2012;11(3):216-220.
7. Emadi M, Kermanshahi H. Effect of turmeric rhizome powder on the activity of some blood enzymes in broiler chickens. Int J Poult Sci. 2007;6(1):48-51.
8. Gursu MF, Onderci M, Gulcu F, Sahin K. Effects of vitamin C and folic acid supplementation on serum paraoxonase activity and metabolites induced by heat stress *in vivo*. Nutrition Research. 2004;24(2):157-164.
9. Hossen S, Islam R, Aziz FB, Hasan MM, Parvez MM. Effects of Turmeric paste on Growth Performance, Immune response and Blood characteristics in Japanese Quail. International Journal of Science and Business. 2018;2(3):306-317.
10. Khan K, Al-Khalaifah H, Ahmad N, Khan MT, Alonaizan R, Khan RU, *et al*. Dietary supplementation of cinnamon and turmeric powder enhances growth performance, nutrient digestibility, immune response and renal function in broiler chickens. Poultry Science. 2025;104(10):105-5.
11. Khan RU, Naz S, Nikousefat Z, Selvaggi M, Laudadio V, Tufarelli V. Effect of ascorbic acid in heat-stressed poultry. World's Poultry Science Journal. 2012;68(3):477-490.
12. Kilany OE, Mahmoud MM. Turmeric and exogenous enzyme supplementation improve growth performance and immune status of Japanese quail. World's Veterinary Journal. 2014;4(3):20-29.
13. Kutlu HR, Forbes JM. Self-selection of ascorbic acid in coloured foods by heat-stressed broiler chicks. Physiology & Behavior. 1993;53(1):103-110.
14. Maulod AKD, Ahmed SM. Effect of dietary supplement ginger and turmeric powder on Japanese quail (*Coturnix japonica*) performance, carcass traits and blood parameters. Anbar Journal of Agricultural Sciences. 2022;20(2):450-463.
15. Raduta A, Mihai OD, Nicolae S, Reu IN, Cotor G. Investigations on the effect of vitamin supplements on body weight, haematological and biochemical indices in quail. Scientific Papers. Series D. Animal Science. 2024;67(2):144-150.
16. Reda FM, El-Saadony MT, Elnesr SS, Alagawany M, Tufarelli V. Effect of dietary supplementation of biological curcumin nanoparticles on growth and carcass traits, antioxidant status, immunity and caecal microbiota of Japanese quails. Animals. 2020;10(5):754.

17. Sahin K, Kucuk O. Effects of vitamin C and vitamin E on performance, digestion of nutrients and carcass characteristics of Japanese quails reared under chronic heat stress (34°C). Journal of Animal Physiology and Animal Nutrition. 2001;85(11-12):335-341.
18. Sahin K, Kucuk O, Sahin N, Sari M. Effects of vitamin C and vitamin E on lipid peroxidation status, serum hormone, metabolite and mineral concentrations of Japanese quails reared under heat stress (34°C). International Journal for Vitamin and Nutrition Research. 2002;72(2):91-100.
19. Sahin K, Onderci M, Sahin N, Gursu MF, Kucuk O. Dietary vitamin C and folic acid supplementation ameliorates the detrimental effects of heat stress in Japanese quail. J Nutr. 2003;133(6):1882-1886.
20. Snedecor GW, Cochran WG. Statistical Methods. 8th ed. Ames, Iowa: Iowa State University Press; 1994.
21. Suwarta FX, Suryani CL. The effects of supplementation of cinnamon and turmeric powder mixture in ration of quail on performance and quality of eggs. World's Veterinary Journal. 2018;9(4):249-254.

How to Cite This Article
Dindor A, Choudhary JL, MishraS, Meena RH, Bairwa HL, Jat M. Effect of turmeric powder and vitamin C supplementation on growth performance of Japanese quail (*Coturnix japonica*). International Journal of Veterinary Sciences and Animal Husbandry. 2025;10(9):297-302.