Indian J. Anim. Nutr. 2023. 40 (3): 354-363
doi:10.5958/2231-6744.2023.00044.0

Indian Journal of Animal Nutrition

Effect of Dietary Incorporation of Red Chilli (*Capsicum annuum*) Pedicle Powder on Serum Biochemical and Carcass Traits of Japanese Quails.

S. Jaya Surya, D. Narendranath*, K. Naga Raja Kumari and D. Srinivas Kumar
Department of Poultry Science,
NTR College of Veterinary Science, Gannavaram-521102.
Sri Venkateswara Veterinary University, Andhra Pradesh, India
*Correspondence: dnnath70@gmail.com

ABSTRACT

The present study was carried out to assess the effect of dietary incorporation of red chilli pedicle powder (RCPP) on performance of quails. Day old Japanese quails (N=150) were distributed randomly to five dietary groups each with three replicates of 10 birds. Diets were prepared with incorporation of RCPP at 0, 0.5, 1.0, 1.5 and 2.0 percent and were provided *adlibitum* from 0-5 weeks. Blood was collected from two birds per replicate at the end of 5th week for serum biochemical analysis. Two birds per replicate were slaughtered at the end of the trial. Serum total protein, serum albumin, globulin, albumin globulin ratio, serum calcium and serum phosphorus were not affected by various levels of RCPP. However, serum total cholesterol, serum LDL-C, serum VLDL-C, serum triglycerides, SGPT, BUN, creatinine and serum glucose ($P<0.01$) and SGOT ($P<0.05$) were significantly decreased with increasing levels of RCPP. Serum HDL-C values were increased significantly ($P<0.01$) with increase in RCPP level in diets. Mean dressing percentage, per cent weights of gizzard, giblets ($P<0.01$), heart and carcass weight ($P<0.05$) were significantly increased with increasing levels of RCPP in diets. Mean scores of sensory evaluation for colour and flavour of meat were increased significantly ($P<0.05$) at 2.0 per cent RCPP when compared with the other treatment groups. It was concluded that RCPP can be incorporated up to 2.0% level in the Japanese quail diet for the production of designer meat with better organoleptic characters.

KEY WORDS: Japanese Quail, Meat quality, Red chilli pedicle powder,Serum biochemical parameters

Article received: 09 May 2023; Article accepted: 02 August 2023

INTRODUCTION

Hot red pepper (*Capsicum annum*) is one of the most important spices and it application as an ingredient in animal diets have shown an effect in fat, cholesterol and triglycerides reduction in the body. It was reported having bacteriostatic effect against *Clostridium perfringens*, having stimulant effects in the digestive tract which increase the absorption capacity of nutrients at the intestinal level (Abd El-Hack et al., 2022). Capsaicin had potentiated the activities of pancreatic and intestinal enzymes (Platel and Srinivasan, 2004), increase in bile acid secretion (Abdel Salam et al., 2005) and increased body weight gain in broiler chickens (Puvaèa et al., 2015). Capsaicin had been shown to have a protective function in the gastric mucosa as a stimulant of afferent nerve endings. Capsaicin also increases the appetite in poultry, which influences feed consumption of the broilers (Yoshioka et al., 2001) whereas Al-Kassie et al. (2012) and Yoshioka et al. (2001) explained that hot red pepper is rich in vitamin C, improves production by reduction of heat stress. However, literature on utilization of red chilli pedicle powder (RCPP) in quail diets is scanty. Therefore, research efforts had geared towards the use of locally available agro-industrial by-product i.e. red chilli pedicle powder in diets of quails and its impact on serum biochemical profile and on carcass traits of Japanese quails.

MATERIALS AND METHODS

Test ingredient

Red chilli pedicle was procured from surrounding areas of Guntur, Andhra Pradesh. The pedicles was made into powder and stored in air tight container.

The sample was analysed for proximate principles as per AOAC (2005).

Preparation of basal diets

Experimental diets were prepared with incorporation of RCPP at 0, 0.5, 1.0, 1.5 and 2.0 per cent in T1, T2, T3, T4 and T5, respectively by marginal adjustment of other feed ingredients. All the rations were made iso-caloric and iso-nitrogenous (Table 1).

Table 1. Ingredient and nutrient composition of experimental diet (kg/100kg) fed to Japanese quail

Feed ingredients (kg)	T1 (0.0)	T2 (0.5)	T3 (1.0)	T4 (1.5)	T5 (2.0)
Maize	52.0	51.8	51.6	51.3	51.1
Soya bean meal	42.0	41.8	41.6	41.4	41.3
Red chilli pedicle powder	0	0.5	1	1.5	2
Di-calcium phosphate	1.0	1.0	1.0	1.0	1.0
Limestone	1.3	1.3	1.3	1.3	1.3
Common salt	0.3	0.3	0.3	0.3	0.3
Trace minerals*	0.1	0.1	0.1	0.1	0.1
DL-methionine	0.1	0.1	0.1	0.1	0.1
Vit AB2D3	0.01	0.01	0.01	0.01	0.01
Palm oil	3.1	3.0	2.9	2.9	2.7
Liver tonic	0.1	0.1	0.1	0.1	0.1
Vitamins[#]	0.01	0.01	0.01	0.01	0.01
Coccidiostat	0.1	0.1	0.1	0.1	0.1
Total	100	100	100	100	100
Nutrient composition (Analysed)					
CP (%)	24.11	23.98	24.19	24.03	24.09
ME(Kcal/kg)[$]	2902.00	2899.00	2896.00	2898.00	2889.00
Calcium (%)	0.81	0.83	0.84	0.83	0.84
Total phosphorus(%)	0.45	0.41	0.52	0.48	0.43

* Trace minerals contains - Manganese sulphate 55000 mg, Ferrous sulphate 50000 mg, Zinc sulphate 50000 mg, Cobalt sulphate 500 mg, Cop per sulphate 3000 mg, Potassium iodide 3000 mg, Sodium selenite 500 mg in 1kg.

[#]Vitamin A-12.50 MIU, D_3-2.50 MIU, E-8G, K-1.50g, B_1-1g, B_2-5g, B_5-1.50g, B_{12}-0.02g, Calcium D Pantothenate-5g, Folic acid-0.25g, Niacin-12g in a 250g pack

^ calculated value

Experimental birds and their management

One hundred and fifty day-old Japanese quail chicks were weighed individually, wing banded and randomly divided into five equal groups of three replicates each with 10 chicks. Each group was allotted to one of the dietary treatments at random. The experiment was conducted from 0-5 weeks of age. All the quail chicks were housed in 5-tier battery cages throughout the experiment. Feed and water were provided *ad libitum*. Experiment was carried out under uniform management practices for a period of five weeks. The experiment was carried out as per institute animal ethical committee guidelines.

Data collection

Serum biochemical profile: Blood samples were collected from two birds/ replicate at the end of the experiment into anticoagulant free vials and allowed to clot so that the serum got separated. The

separated serum was then made clear by centrifugation at 3000 rpm for 10 minutes and stored in a refrigerator at -20°C for estimation of serum parameters.

Carcass characteristics

At the end of the trial period (5th week), two birds per replicate and thus a total of six birds per treatment were randomly selected, weighed and slaughtered. The data on carcass yield, dressing percentage, ready-to-cook yield, and weight of heart, liver and gizzard were collected, weighed and recorded. Thus relative weights (% of live body weight at slaughter) of carcass yield plus total edible organs were calculated.

Estimation of meat quality parameter

pH

pH of the meat sample was determined by following the method of Trout et al. (1992) using deluxe digital pH meter (model 101E).

Water holding capacity (WHC)

The water holding capacity of the meat samples were measured according to the method as described by Wardlaw et al., (1973).

Sensory evaluation of meat: The meat samples were cooked and subjected to ten member taste panel for sensory evaluation of colour, appearance, flavour, juiciness, tenderness and overall acceptability on a nine point Hedonic scale.

Statistical analysis

Statistical analysis of the data was carried out according to the procedures suggested by Snedecor and Cochran (1989). The data obtained were subjected to one-way ANOVA. Differences between means were tested at the 5% probability level using Duncan (1955) LSD test.

RESULTS AND DISCUSSION

Serum biochemical profile

Japanese quail were fed with diets containing RCPP at 0, 0.5, 1.0, 1.5, 2.0 per cent from 0-5 weeks of age. Mean serum total protein did not show any significant difference among the treatment groups in this study (Table 2). Similarly, Elamin et al. (2015) reported that hot red pepper at 1.5 per cent had no significant effect on serum total protein in broilers. In contrast, Tayeb et al. (2015) and Reda et al. (2019) in quails reported that red pepper crush at 5g/kg ration and red pepper oil at 1.6g/kg, respectively, had significantly ($P<0.05$) decreased serum total protein. While, Tripathi et al. (2017) reported that serum total protein had significantly ($P<0.05$) increased at 0.5 per cent hot red pepper in quail diets.

Table 2. Mean (± S.E) serum biochemical profile of Japanese quail fed with varying levels of RCPP from day old to five weeks

Treatment/ RCPP (%)	Serum Total protein(g/dl)	Serum albumin(g/dl)	Serum globulin(g/dl)	A/G ratio
T1 (0.0%)	5.83±0.26	2.53±0.08	3.29±0.31	0.81±0.09
T2 (0.5%)	5.29±0.15	2.32±0.15	2.96±0.30	0.79±0.07
T3 (1.0%)	5.54±0.25	2.27±0.11	3.27±0.27	0.72±0.08
T4 (1.5%)	5.69±0.21	2.30±0.13	3.38±0.24	0.70±0.08
T5 (2.0%)	5.30±0.20	2.48±0.17	2.82±0.14	0.89±0.08
SEM	0.100	0.605	0.104	0.037
P-value	0.833	0.797	0.902	0.874

Values in column bearing different super scripts differ significantly ** ($P<0.01$), NS ($P>0.05$)

The mean serum albumin did not show any significant difference among the treatment groups in this study (Table 2). Similarly, Reda et al. (2019) reported that red pep per oil at 1.6g/kg had no significant effect on serum albumin in quail diets. In contrary, Tayeb et al. (2015) concluded that serum albumin was significantly (P<0.05) decreased at 5g/kg ration red pepper crush in quails. While, Tripathi et al. (2017) reported that serum albumin was significantly (P<0.05) increased at 0.5 per cent hot red pepper in quail diets.

The mean serum globulin did not show any significant difference among the treatment groups in this study (Table 2). Similarly, Tayeb et al. (2015) and Tripathi et al. (2017) reported that red pepper crush at 5g/kg ration and hot red pep per at 0.5 per cent, respectively, had no significant effect on serum globulin in Japanese quails. In contrary, Reda et al. (2019) reported that red pepper oil at 1.6g/kg had significantly (P<0.05) lowered the serum globulin. The albumin globulin ratio did not show any significant difference among the treatment groups in this study (Table 2). The present study values ranged between 0.70 to 0.89. The values are within the normal range as reported by Agina et al. (2017).

Serum lipid profile

The present study indicated that the serum cholesterol levels were decreased significantly (P<0.01) with increased level of incorporation of RCPP from 0 to 2.0 per cent in the diet (Table. 3). In support of the present findings, Atapattu and Belpagodagamage (2011); Shahverdi et al. (2013); Elamin et al. (2015); Hossain and Howlader (2016); Munglang and Vidyarthi (2020) and Maric et al. (2021) in broilers and Tripathi et al. (2017) in quails reported that hot red pep per at various levels in the diets resulted in significant (P<0.05) decrease in serum total cholesterol content (mg/dl) as compared to the control. In contrary, El-Deek et al. (2012) in broilers and Tayeb et al. (2015) in quails concluded that hot red pepper at 1.5 per cent and red pepper crush at 5g/kg ration, respectively, had no significant effect on serum total cholesterol. Srinivasan (2005) stated that red pepper could encourage the conversion of cholesterol to bile acids, which represents an important pathway of excretion of cholesterol.

The results showed that serum HDL-C levels increased significantly (P<0.05) with increased level of incorporation of RCPP from 0 to 2.0 percent in the diet (Table 3). In accordance with the present findings, Puvaca et al. (2015); Munglang and Vidyarthi (2020) and Maric et al. (2021) in broilers reported that hot red pepper at various levels in the diets resulted in significant increase in (P<0.05) serum HDL-C content (mg/dl) as compared to the control. Similarly, Tripathi et al. (2017) and Reda et al. (2019) in quails reported that hot red pepper and red pepper oil, respectively, at various levels in the diets resulted in significant increase in (P<0.05) serum HDL-C content (mg/dl) as compared to the control.

Table 3. Mean (± S.E) serum lipid profile of Japanese quail fed with varying levels of RCPP from day old to five weeks

Treatment/ RCPP (%)	Serum Triglycerides (mg/dl)	Serum Total Cholesterol (mg/dl)	Serum HDL Cholesterol (mg/dl)	Serum LDL Cholesterol (mg/dl)	Serum VLDL Cholesterol(mg/dl)
T1 (0.0%)	143^{a}±0.38	200^{a}±0.62	98.4^{e}±0.54	73.6^{a}±0.46	28.7^{a}±0.08
T2 (0.5%)	136^{b}±1.73	195^{b}±1.34	101^{d}±0.44	67.2^{b}±1.48	27.2^{b}±0.35
T3 (1.0%)	131^{c}±1.82	190^{c}±1.25	104^{c}±0.64	60.3^{c}±1.24	26.4^{c}±0.36
T4 (1.5%)	129^{cd}±0.72	183^{d}±1.22	106^{b}±1.03	51.0^{d}±0.96	25.9^{cd}±0.14
T5 (2.0%)	127^{d}±1.26	178^{e}±1.05	110^{a}±0.67	42.8^{e}±0.98	25.4^{d}±0.25
SEM	1.20	1.55	0.83	2.09	0.24
P	0.01	0.01	0.01	0.01	0.01

Values in column bearing different su per scripts differ significantly ** (P<0.01), NS (P>0.05)

The results showed that serum LDL-C and VLDL-C levels decreased significantly (P<0.05) with increased level of incorporation of RCPP from 0 to 2.0 per cent in the diet (Table. 3). In support of the present findings, Puvaca et al. (2015); Munglang and Vidyarthi (2020) and Maric et al. (2021) in broilers reported that hot red pepper at various levels in the diets resulted in decreased (P<0.05) serum LDL-C content (mg/dl) as compared to the control. Similarly, Tripathi et al. (2017) in quails reported that hot red pepper in diets resulted in significant decrease in (P<0.05) serum LDL-C content (mg/dl). However, Reda et al. (2019) in quails concluded that red pep per oil had no significant effect on serum LDL-C content (mg/dl). Kim et al. (2009) reported that the effect of decreased LDL-C can be explained by the possible mechanism of antioxidant and anti- peroxide lowering action on LDL or the decrease in hepatic production of very low density lipoprotein (VLDL) which serves as the precursor of LDL in the blood circulation.

The serum triglyceride levels were decreased significantly (P<0.01) with increased level of incorporation of RCPP from 0 to 2.0 per cent in the diet (Table 3). In accordance with the present findings, El-Deek et al. (2012); Shahverdi et al. (2013); Puvaca et al. (2015) and Maric et al. (2021) reported significant decrease in (P<0.05) serum triglyceride concentration in broiler chicken with supplementation of hot red pepper at various levels. Similarly, Tayeb et al. (2015); Tripathi et al. (2017) and Reda et al. (2019) in quails reported that red pepper crush, hot red pepper and red pepper oil, respectively, had significantly decreased the serum triglyceride concentration. However, Munglang and Vidyarthi (2020) in broilers concluded that hot red pepper at 10 per cent had no significant effect on serum triglycerides. Puvaca et al. (2015) reported that reduction in triglycerides may be due to decrease in lipid absorption or the inhibition of acetyl CoA synthase, an enzyme necessary for fatty acid biosynthesis by hot red pepper.

Liver enzymes

The SGPT decreased significantly (P>0.05) with increased level of incorporation of RCPP from 0 to 2.0 per cent in the diet (Table.4). Contrary to the present study, Reda et al. (2019) in quails concluded that supplementation of red pepper oil up to 1.6 g/kg had significantly increased ALT values. The liver is reported to contain enzymes like SGOT and SGPT, it releases these enzymes into blood stream when damaged (Sherwin, 2003). Elevation of serum SGOT and SGPT can occur with states of altered hepatocellular membrane permeability either due to circulatory hypoxia, exposure to toxins and toxemia, inflammation, metabolic disorders or proliferation of the hepatocyte. Further, in the stunting syndrome of broiler chickens, increased activities of SGOT and SGPT were also associated with liver and intestinal damage (Rani et al., 2011).

Minerals

The present study revealed that dietary incorporation of RCPP at graded levels in the diet of quails had no significant effect on serum calcium and phosphorus among the treatments (Table 4). Similarly, Elamin et al. (2015) in broilers concluded that supplementation of hot red pepper up to 1.5 per cent had no significant effect on serum calcium and phosphorus concentration when compared to those in control group. The results concluded that the serum glucose levels decreased significantly (P<0.01) with increased level of incorporation of RCPP from 0 to 2.0 per cent in the diet (Table 4). These results were in corroboration with Shahverdi et al. (2013); Hossain and Howlader (2016) and Munglang and Vidyarthi (2020) who fed broilers with red pepper at 0.02 percent, 3.0 percent and 10 percent respectively. In contrast, Tayeb et al. (2015) in quails who fed red pepper crush at 5g/kg and reported a significant increase in serum glucose when compared to control group However, Elamin et al. (2015) in broilers reported that supplementation of hot red pepper up to 1.5 per cent had no significant effect on serum glucose concentration when compared to those in control group. Al-Kassie et al. (2012) stated that

Capsaicin which is the main component of chilli inhibits the intestinal absorption of glucose which may be the reason for hypoglycemic effect of chilli.

Kidney function

The serum creatinine and BUN contents were decreased significantly (P<0.01) with increase in the level of incorporation of RCPP from 0 to 2.0 per cent in the diet (Table. 4). However, Reda et al. (2019) in quails conclude that red pepper oil at 1.6g/kg had no significant effect on serum creatinine levels. Creatinine is a waste molecule that is generated from protein metabolism. Normal values of creatinine suggest a good function of nephrons. Significant increases in serum creatinine levels are indicative of nephrotoxicity in broiler chickens (Huff et al., 1988). According to Aslam et al. (2010) increase in serum creatinine is indicative of poor renal function. So, red pepper may have beneficial effects on renal function.

Table 4. Mean (± S.E) serum enzymes and minerals of Japanese quail fed with varying levels of RCPP from day old to five weeks

Treatment/ RCPP (%)	SGOT (AST) (IU/L)	SGPT (ALT) (IU/L)	Serum Calcium (mg/dl)	Serum Phosphorus (mg/dl)	Serum Glucose (mg/dl)	Serum BUN (mg/dl)	Serum creatinine (mg/dl)
T1 (0.0%)	250^{a}±1.06	24.3^{a}±0.08	10.2±0.24	6.12±0.37	211^{a}±2.47	2.47^{a}±0.09	0.48^{a}±0.04
T2 (0.5%)	250^{a}±0.46	23.8^{ab}±0.16	10.1±0.36	6.05±0.42	207^{ab}±1.32	2.43^{a}±0.05	0.44^{b}±0.02
T3 (1.0%)	248^{ab}±0.63	23.3^{bc}±0.30	10.3±0.21	6.03±0.36	202^{bc}±1.25	2.14^{b}±0.13	0.44^{b}±0.05
T4 (1.5%)	248^{ab}±0.89	23.1^{c}±0.20	10.3±0.21	6.01±0.48	198^{cd}±1.42	1.99^{c}±0.03	0.43^{b}±0.02
T5 (2.0%)	247^{b}±0.56	22.8^{c}±0.35	10.3±0.27	6.05±0.38	193^{d}±1.39	1.85^{d}±0.08	0.39^{c}±0.03
SEM	0.39	0.14	0.11	0.07	1.36	0.01	0.05
P-value	0.023	0.001	0.953	0.993	0.001	0.001	0.001

Values in column bearing different super scripts differ significantly ** (P<0.01), * (P<0.05).

Carcass traits

Significantly higher (P<0.05) carcass weights were observed in groups fed with 2% level and lowest in control group (Table.05). The results were similar with those of Abd EL-Haliem (2017) and Tayeb et al. (2015) who fed quails with 0.2% hot red pepper and 5g/kg red pepper crush respectively. However, Afolabi et al. (2017) and Munglang and Vidyarthi (2020) in broilers reported no significant impact of hot red pepper at 0.3% and 10% respectively, on carcass weights. Similarly, feeding varying levels (0, 0.50, 1.0, 1.5 and 2.0%) of RCPP showed significantly increased effect (P<0.05) on dressing percentage in quails (Table 5). The results were similar with observations of Al-kassie et al. (2011); Shahverdi et al. (2013) and Elamin et al. (2015) in broilers who reported significant increase in dressing percentages when fed with hot red pepper at 1%, 0.02%, and 1.5% respectively. Similar result was obtained with Abd EL-Haliem (2017) in quails when fed with hot red pepper at 0.4%. However, Atapattu and Belpagodagamage (2011); El-Deek et al. (2012) and Hossain and Howlader (2016) in broilers reported no significant effect of hot red pepper at 5% and 3g/kg, respectively. Similarly, Tripathi et al. (2017) and Reda et al. (2019) in quails reported no significant effect on dressing percentages when fed with hot red pepper at 5% and red pepper oil at 1.6g/kg, respectively.

Table: 5. Mean (±S.E) carcass traits of Japanese quail fed with varying levels of RCPP from day old to five weeks

Treatment/ (RCPP %)	Pre slaughter live weight (%)	Liver weight (%)	Heart weight (%)	Gizzard weight (%)	Giblet weight (%)	Carcass weight (g)	Dressing percentage (%)
T_1 (0.00%)	187^{d}±1.74	3.13±0.04	1.08^{b}±0.03	2.64^{b}±0.09	6.89^{b}±0.12	121^{d}±2.11	70.5^{b}±0.53
T_2 (0.50%)	198^{c}±1.65	3.20±0.05	1.14^{b}±0.08	2.95^{a}±0.07	7.30^{a}±0.07	130^{c}±1.07	70.5^{b}±0.68
T_3 (1.00%)	200^{c}±1.42	3.21±0.08	1.19^{b}±0.06	2.78^{ab}±0.08	7.18^{a}±0.15	132^{c}±1.14	70.8^{b}±0.52
T_4 (1.50%)	206^{b}±0.56	3.34±0.04	1.30^{a}±0.02	2.72^{b}±0.04	7.37^{a}±0.05	138^{b}±1.11	72.1^{ab}±0.50
T_5 (2.00%)	210^{a}±0.57	3.25±0.03	1.31^{a}±0.05	2.70^{b}±0.05	7.27^{a}±0.08	142^{a}±0.97	72.8^{a}±0.33
SEM	1.56	0.03	0.02	0.04	0.06	1.41	0.28
P-value	0.001	0.079	0.001	0.033	0.012	0.001	0.013

Values in column bearing different su per scripts differ significantly ** (P<0.01), NS (P>0.05)

In the present study, feeding varying levels (0, 0.50, 1.0, 1.5 and 2.0%) of RCPP showed no significant effect (P>0.05) on percent liver weights in quails (Table 5). These findings corroborated with those of Atapattu and Belpagodagamage (2011); El-Deek et al. (2012) who fed broilers with hot red pepper at 5% and 3g/kg respectively. Similarly, Tayeb et al. (2015) and Reda et al. (2019) who fed quails with hot red pepper at 0.5% and red pepper oil at 1.6g/kg, respectively had no significant effect on liver weights. However, Al-kassie et al. (2011) and Shahverdi et al. (2013) who fed broilers with hot red pepper at 1% and 0.02%, respectively had concluded higher liver weights when compared to control group. Contrary, Tripathi et al. (2017) in quails reported significantly lower liver weight when fed with 0.5% hot red pepper.

In the present study, feeding varying levels (0, 0.50, 1.0, 1.5 and 2.0%) of RCPP showed a significant (P< 0.05) increase on percent heart weights in quails (Table 5). These findings corroborated with those of Shahverdi et al. (2013) in broilers and Tripathi et al. (2017) in quails reported significantly higher heart weights when fed with hot red pepper at 0.02% and 0.5% respectively. Contrary, Tayeb et al. (2015) in quails reported significantly lower heart weight when fed with 5g/kg red pepper crush. Whereas, Atapattu and Belpagodagamage (2011); Al-kassie et al. (2011); El-Deek et al. (2012); Munglang and Vidyarthi (2020) and Awodola-Peters et al. (2021) who fed broilers with hot red pepper at 5%, 1%, 3.0g/kg, 10% and 0.3%, respectively did not find any variation in heart weight.

In the present study, feeding varying levels (0, 0.50, 1.0, 1.5 and 2.0%) of RCPP showed a significant (P<0.05) increase on percent gizzard weights in quails (Table.5) than control. These findings corroborated with those of Al-kassie et al. (2011) and Shahverdi et al. (2013) in broilers who reported significantly higher gizzard weights when fed with hot red pepper at 1% and 0.02%, respectively. Whereas, Atapattu and Belpagodagamage (2011) and Awodola-Peters et al. (2021) who fed broilers with hot red pepper at 5% and 3%, respectively reported that no significant variation on gizzard weight. Similar findings were observed by Tayeb et al. (2015) and Reda et al. (2019) who fed quails with red pepper crush at 5g/kg and red pepper oil at 1.6g/kg respectively. In contrary, El-Deek et al. (2012) and Munglang and Vidyarthi (2020) in broilers concluded significantly lower gizzard weights when fed with hot red pepper at 3.0g/kg and 10%, respectively. Increased levels of inclusion of RCPP from 0 to 2% in the diet of quails increased the goblet weights significantly (P<0.05).

Meat quality

Parameters like pH, extract release volume (ERV) and water holding capacity (WHC) of meat

of quails were not affected on incorporation of RCPP up to 2.0% (Table 6). The results were similar with the findings of Li et al. (2022) who reported dietary capsaicin (CAP) in broiler feed had no significant effect on pH of meat.

Table 6. Mean (±S.E) meat pH, ERV and WHC of Japanese quail fed with varying levels of RCPP from day old to five weeks

Treatment/ RCPP (%)	pH	Extract release volume (ml)	Water holding capacity (%)
T1 (0.00%)	5.40±0.01	10.1±0.30	21.3±0.54
T2 (0.50%)	5.41±0.02	10.3±0.35	21.2±0.31
T3 (1.00%)	5.39±0.03	11.6±0.24	20.4±0.41
T4 (1.50%)	5.39±0.01	10.3±0.33	20.9±0.37
T5 (2.00%)	5.40±0.02	10.8±0.47	20.3±0.23
SEM	0.01	0.18	0.17
P-value	0.255	0.076	0.318

Values in column bearing different super scripts differ significantly ** (P<0.01), NS (P>0.05)

Sensory evaluation

Mean scores of sensory evaluation for colour and flavour of meat were increased significantly (P<0.05) at 2.0% RCPP when compared with the other treatment groups. On other hand, incorporation of RCPP from 0 to 2.0% in diet had no significant effect on juiciness, tenderness and overall acceptability (Table 7). Similarly, El-Deek et al. (2012) in broilers and Tripathi et al. (2017) in quails reported hot red pepper at 3.0g/kg and 0.5%, respectively, had significantly maximum sensory evaluation scores. El-Deek et al. (2012) stated that the increase in meat color and taste could be attributed to capsanthin of Hot red pepper.

Table 7. Mean (± S. E) sensory evaluation score of meat of Japanese quail fed with RCPP at different levels from 0-5 weeks of age

Treatment/ RCPP (%)	Colour	Flavour	Juiciness	Tenderness	Overall acceptability
T1(0.00%)	7.40^{c}±0.37	7.30^{c}±0.21	7.80±0.25	7.70±0.30	7.60±0.15
T2(0.50%)	7.50^{bc}±0.22	7.60^{bc}±0.26	7.70±0.26	7.80±0.25	7.70±0.17
T3(1.00%)	7.80^{abc}±0.24	7.90^{abc}±0.23	7.60±0.22	7.90±0.23	7.90±0.46
T4(1.50%)	8.20^{ab}±0.20	8.10^{ab}±0.23	7.80±0.25	8.00±0.24	8.00±0.21
T5(2.00%)	8.40^{a}±0.16	8.40^{a}±0.26	8.20±0.20	8.20±0.10	7.90±0.17
SEM	0.122	0.117	0.106	0.371	0.839
N	10	10	10	10	10
P	0.029	0.025	0.458	0.93	0.862

Values in column bearing different su per scripts differ significantly ** (P<0.01), NS (P>0.05)

CONCLUSION

It can be concluded that incorporation of RCPP upto 2.0% in Japanese quail diet improved the dressing percentage and had significantly better mean scores of sensory evaluation for taste and flavor of meat.

ACKNOWLEDGEMENTS

The authors are thankful to Sri Venkateswara Veterinary University for the financial assistance and facilities for successful completion.

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