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THE EFFECT OF SUPPLEMENTAL DIFFERENT LEVEL OF ROSELLE FLOWER IN DIET ON JAPANESE QUAIL PERFORMANCE

Sunbul Jassim Hamodi[1], Firas Mozahim Al-Khilani[2]

[1]Department of Animal Resources, College of Agriculture, University of Baghdad, Iraq, sunbulj.hamodi@yahoo.com
[2]Agricultural Research, Ministry of Agriculture, Baghdad, Iraq

Abstract

This experiment was conducted at the Poultry Farm, Poultry Research Station, State Board of Agriculture Research, Ministry of Agriculture, to study the effect of supplemental Roselle (Hibiscus sabdariffa) to Japanese quail diets on productive performance. A total of 360 Japanese quail (Coturnix coturnix japonica) female 60 days old were used in this study. They were randomly distributed to 3 treatments. Roselle flowers were supplemented at the levels of 0.2, 0.4% and compared with the control group for 140 days. The result showed a significant increase (P<0.05) in egg production percentage , accumulative egg number, egg weight and egg mass, while feed consumption increased significantly and feed conversion ratio improved significantly by supplementing 0.4% Roselle flower compared with supplementing 0.2% Roselle flower and control groups. Significant decrease in mortality percentage in Roselle treatments compared with control group. There were significant increase (P<0.05) in some egg interior quality by supplementing Roselle flower at two levels 0.2, 0.4% compared with control group.

Keywords*: Roselle flower, Japanese quail, Productive performance, egg quality.*

INTRODUCTION

In recent years the science has started paying attention to the properties of spice (Chaudhry and Tariq, 2006). Due to the side effects of medicine, the use of natural products as an alternative to conventional medicine and antibiotics has been rise in the last few decades (Ansari et al., 2006).

Many medicinal plants and their extracts are used widely in poultry diets because the herbs have biological activities and served as antioxidants (Chithra and Leelamma, 1999), stimulate the digestive system (Jamroz and Kamel, 2002), increase the production of digestive enzymes and improve utilization of digestive products through enhanced liver functions (Hernandez et al., 2004).

Roselle plant (*Hibiscus sabdariffa*) is one of medicinal plants related to Malvaceae family (Norman, 1992). Flowers are part from the plant that used, the active ingredient concentrated in sepal leaves of flowers such as phenolic compounds, glycosides and hydrochloride hibisine (Resendiz et al., 1998).

Roselle is a herb which was used to lower blood pressure to the normal levels (Faraji and Hagi Tarkhani, 1999), also AL-Obeidy (2008) reported that Roselle flower contain vitamin C about 45-50 mg/100 ml solution, in addition it contain citric acid, tartaric acid from 3 to 4% which play an important role on gut flora and then enhance nutrient absorption (Mazza and Miniti, 1993), on the other hand there were colour pigments in sepal leaves of flower like anthocyanine pigments (Kowalczgk et al., 2003; Marco et al., 2005). However, no reports to my knowledge is available on the effect of supplementing Roselle flower on Japanese Quail, wherefore the objective of this study is to investigate the effect of Roselle flower on Japanese Quail performance and egg quality during summer month in Iraq.

MATERIALS AND METHODS

An experiment was conducted at Poultry Research Station, State Board of Agricultural Research, Ministry of Agriculture. A total of 360 Japanese Quail female 60 days old were used during summer season.

The quail birds were randomly distributed to three treatments by supplemented Roselle flower (*Hibiscus sabdariffa*) to diet at levels 0.2 and 0.4% and compared with control group for 140 days, each treatment content four replicates 30 birds per replicate.

Experimental diet and calculated chemical composition is presented in Table 1. The diets

were isocaloric and isonitrogenous. Diets and water given *ad libitum*.

Table 1. Composition of experimental diet and chemical composition

Ingredient	%
Yellow corn	56
Wheat	3
Soybean meal (44%cp)	29
Protein concentrate *	5
Corn oil	2
Limestone	4.7
Salt	0.3
Total	100
** Calculated Chemical Composition	
Crude protein %	20
ME, kcal/kg feed	2902
Calcium %	2.4
Phosphorus %	0.4
Lysine %	1.12
Methionine %	0.4
Methionine + cystine %	0.75

* Protein concentrate type COLOM contains 40% CP and 2100 kcal ME

** Calculated composition according to NRC, 1994

Birds were raised in environmentally controlled poultry house. The performance and the egg quality were measured, which included Hen Day egg production percentage, accumulative egg number (egg/bird), egg weight (g) egg mass (g), feed consumption (g), feed conversion ratio (g feed/g egg) and mortality rate (%). While egg quality parameters include yolk weight, shell weight and thickness also albumin and yolk height were measured.

The data were subjected to analysis of variance Utilizing Complete Randomizes Design (CRD) according to SAS (2001) and significant means were separated by Duncan's multiple range test (1955).

RESULTS AND DISCUSSIONS

Results indicated that Hen–Day egg production was significantly ($P<0.05$), higher by increasing Roselle flower supplementation in the diet. The egg production was 74 and 79% for treatments 0.2 and 0.4%, respectively compared with 70% for control group (Table 2).

Table 2. Effect of supplementing different levels of Roselle flower in Quail diet egg production %, accumulative egg production (egg/hen), egg weight (g), egg mass (g) during 140 days

Treatment	Egg production %	Accumulative egg number (egg/bird)	Egg weight (g)	Egg mass (g)
Control	*70±1.10 b	98.0±0.52b	10.5±0.20b	1029.0±21.3c
Roselle flower 0.2%	74±0.32 a	103.6±1.08a	10.8±0.10a	1118.8±15.2b
Roselle flower 0.4%	79±0.64a	110.6±0.34a	11.2±0.08a	1238.7±20.6a

* Means in the same column with different super scripts are significantly different ($P<0.05$)

The accumulative egg number (egg/bird) and the egg weight(g) follow similar trends as egg production during the experimental period (140 days), they were recorded 103.6, 110.6 (egg/bird) and 10.8, 11.2 g for 0.2 and 0.4% Roselle flower respectively compared with 98.0 (egg/bird) and 10.5 g for control treatment. The egg mass (g) for treatment 0.4% Roselle flower had significant ($P<0.05$) higher 1238.7 g followed by treatment 0.2% Roselle flower 1118.8 g, finally control group 1029.0 g. The improvement in egg production, the accumulative egg number and the egg weight as supplementing two levels of Roselle flower was increased as compared to control group could be due to containment ascorbic acid levels in Roselle (45-50 mg/100 ml juice) (Al-Obeidy, 2008), and the important role of ascorbic acid in Lowering body temperature and stimulate thyroid gland especially during high ambient temperature, synthesis of vitamin for physiological action was enough during optimum temperature, but when ambient temperature raised from 21°C to 31°C, it leads to decrease the level of vitamin C in blood because of their endogenous partial attrition then decrease vitamin synthesis (Pardue and Thaxton, 1989) and reflected on productivity of birds. Also vitamin C play an important role in increasing estrogen which support the synthesis of yolk precursor and Lipoproteins and their transport to the liver then to the ovary, which resulted in improvement in egg production, accumulative egg numbers and egg weight (Whitehead et. al., 1990; Keshavarzr, 1996).

The significant increase in egg mass due to the increase in average eggs weight and accumulative egg production for quails supplemented with 0.2 and 0.4% Roselle flower.

Table 3. Effect of supplementing different levels of Roselle flower in Quail diet of feed consumption (g/day), feed conversion ratio (g feed/g egg) , feed conversion ratio (g feed/g eggs) and mortality (%) during 140 days

Treatment	Feed consumption (g/day)	Feed conversion (g feed/g eggs)	Feed conversion (g feed/g egg)	Mortality (%)
Control	*20.2±0.68b	2.7±0.04a	28.9±0.11a	4.2±0.30a
Roselle flower 0.2%	20.8±0.01b	2.6±0.10a	28.1±0.15a	1.6±0.02b
Roselle flower 0.4%	21.4±0.20a	2.4±0.01b	27.0±0.08b	0.0±0.00c

* Means in the same column with different super scripts are significantly different (P<0.05)

There was a significant increase (P<0.05) in feed consumption (g/day) in Roselle flower 0.4% treatment (21.4 g) compared with Roselle flower 0.2% (20.8 g) and control (20.2 g) treatments.

The feed conversion ratio (g feed/g egg) and (g feed/g egg) are presented in Table 3 for quail birds that were supplemented with different levels from Roselle flower.

The quails that were supplemented with 0.4% Roselle flower improved significantly (P<0.05) recorded (2.4 g feed/g eggs and 27.0 g feed/g egg), respectively compared with other treatments.

The mortality rate was significantly (P<0.05) decrease by increase Roselle flowers in quail diets. The supplementation of 0.4% Roselle flower determined lowest mortality (0.0%), while 0.2% Roselle and control treatments recorded 1.6 and 4.2% respectively.

The improvement in Roselle flower treatments could be attributed to the active material that have stimulating effect on animal digestive systems (Langhout, 2000; Williams and Losa, 2001) they explained that these effects could be due to the increased production of digestive enzymes and the improved utilization of digestives products through enhanced liver functions, also the content of Roselle flower of vitamin C which may improve the utilization of feed nutrient despite the increase in ambient temperature. This finding were supported by Hai et al. (2003), who defined that supplementation of vitamin C for layer diets improve feed conversion, also vitamin C is important to cellular metabolism and digestion and utilization of nutrients (Lohakare et al., 2005).

Whitehead and Keller (2003) confirm our result and stated that supplementation of vitamin C resulted in improvement in egg production, feed conversion ratio through lower the negative effect of heat stress and protect the liver and other vital organs from oxidative damage.

Table 4. Effect of supplementing different levels of Roselle flowers in Quail diet on Yolk diameter (mm),Yolk height (mm), Yolk weight (gm), Albumen height (mm), shell weight (gm) and shell thickness (mm) during 140 days

Treatments	yolk diameter (mm)	yolk height (mm)	yolk weight (g)	Albumen height (mm)	Shell weight (g)	Shell thickness (mm)
Control	*22.5±0.16	9.1±0.02b	3.1±0.01b	2.9±0.12b	0.84±0.06b	0.15±0.04b
Roselle flower 0.2%	22.2±0.20	9.8±0.01a	3.2±0.03b	3.4±0.33a	0.90±0.01a	0.18±0.02a
Roselle flower0.4%	23.8±0.72	10.4±0.80a	3.5±0.10a	3.8±0.11a	0.93±0.02a	0.20±0.01a

* Means in the same column with different super scripts are significantly different (P<0.05)

About the effect of supplemental Roselle flower on some egg quality parameters Table 4 explained that no significant difference between treatments in yolk diameter, but there were significant (P<0.05) higher in 0.2 and 0.4% Roselle flower treatments in yolk and albumen height and in weight and thickness shell compared with control group, while yolk weight increase significantly just in 0.4% Roselle flower treatment compared with other two treatments.

It could be noted from the results of Table 4 that most egg quality parameters were improved in supplemented groups as compared to the control. The improvement in most egg quality parameters could be due to the presence of vitamin C in Roselle which play an important role in Ca absorption and reabsorption from the bone and improve shell thickness and interior egg quality (Tollba et al., 2006). These results confirm the role of vitamin C in Roselle flower which lowest heat stress

effect during summer months, through lowering body temperature of the birds and the increase in PCo_2 and bicarbonate in the blood. The increase bicarbonate which is considered the major constituent of egg shell (Cheng et al., 1990) and the role of vitamin C in the estrogen synthesis increase Ca^{++} in the blood through increased its absorption from the intestine (Mahmoud et al., 1996), also Whitehead and Keller (2003) explained that vitamin C increase the metabolism and increase total protein which resulted in providing more protein from albumin formation.

It could be concluded that the inclusion 0.2 and 0.4% Roselle flower in quail diets could be used as growth promoter and reduce the effect of heat stress especially on mortality and shell thickness that composed the most problem in quail bird.

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