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Bioscience Research

Print ISSN: 1811-9506 Online ISSN: 2218-3973

Journal by Innovative Scientific Information & Services Network

RESEARCH ARTICLE BIOSCIENCE RESEARCH, 2019 16(1):459-464. **OPEN ACCESS**

Effect of adding white tea powder (*camellia sinensis*) to the ration in the qualitative traits of Japanese quail eggs (*Coturnix coturnix japonica*)

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The experiment was conducted in the animal production field that is following to College of Agriculture, University of Tikrit and for 8 weeks to study the effect of adding the white tea powder *Camellia sinensis* to the ration in the qualitative traits to the eggs of Japanese quail bird *Coturnix coturnix japonica*, the 45 females were used with age of 24 weeks. Birds were randomly distributed to three treatments, each treatment consists of five cages, where in each cage was placed 3 female quail and treatments were as follows: The first treatment: (T1) standard ration without addition, the second treatment: (T2) standard ration added 1 g white tea powder / g feed, and the third treatment: (T3) standard ration added 1.5 g white tea powder / kg feed. The experiment included the study of the following traits: egg weight, albumen weight, albumen height, Haugh unit, yolk weight, yolk height, yolk diameter, yolk index, shell thickness and shell weight. The results showed significant improvement ($p < 0.05$) in white tea treatments in egg weight, white weight, white height, Haugh unit, yolk weight, yolk index, yolk height, shell thickness and shell weight compared with control treatment. The current experience suggests that the addition of white tea in the ration can improve some of the qualitative traits of eggs.

Keywords: white tea, qualitative traits, eggs, quail.

INTRODUCTION

Medicinal plants currently have a great place in industrial production by considering as a major source of medicinal drugs from a plant source, which is used in the preparation of the medicine in the form of extracts or active substances or used as raw material to produce some of the primary chemical compounds for the pharmaceutical industry, which gives the medical action such as flavins, glycosides, Polyphenole, turbophenes and Saponins (Tipu et al., 2006).The World Health Organization (WHO) has identified 80% of medicinal plants as having medicinal benefits and most of those benefits from the use of plant extracts or the activity of their constituents as catalysts for growth (Cabuk et al., 2003; Hermandez et al., 2004), Antibacterial and fungi (Saeed and Tariq, 2007), and as antioxidants (Wangensteen et al., 2004) as well as stimulating digestive functions by increasing the production of digestive enzymes, enhancing the effectiveness of liver, pancreas and small intestine, forming the bile and activating its secretion. It also helps reduce serum lipid levels and improve immune state (Rahman and Lowe, 2006).From this, trends have increased markedly to the addition of medicinal plants to animals in the form of powder or oil or water extracts in order to improve the pattern of human nutrition through increased production and improve the health of agricultural

animals. White tea is one of the most common teas in developed countries; White tea is now occurring the first rank in terms of interest. Japan and China are the most prolific producing countries for white tea. It is one of the rarest tea varieties and is produced by picking small buds and small leaves for tea before turned into a green color.It is carefully cared for after the cut, drying it very carefully, This is what makes it the rarest of tea types and has the ability to revitalize the body and alert the mind and the heat-softening and resistant to thirst and is used in the treatment because it contains many chemical compounds effective such as compounds Flavonoids, Catechin form a higher proportion of them and It is also an effective antioxidant (Antan and Shella, 2003, Saffari and Sadrzadeh, 2004). White tea contains Fluoride, and many antioxidants such as Polyphenols, Methylxanthine, Theobromine, Caffeine, Tannic acid, and many important compounds (Gargi Saha et al., 2017). Manganese is one of the most abundant minerals in white tea, which plays an important role as an adjuvant in the digestion of proteins and is very necessary for bone tissues and connective tissues (Costa et al., 2002; Wang and Ho, 2009). As well as it contains a good level of vitamins, especially vitamin E and C (Unachukwu et al., 2010). Since there is no research on the effect of white tea on poultry, the aim of this study was to find out the effect of adding the white tea powder *Camellia sinensis* to the ration in the qualitative traits to the eggs of the Japanese quail bird (*Coturnix coturnix japonica*). This study is the first of its kind in Iraq on this type of plant Medical.

MATERIALS AND METHODS

The experiment was conducted in the quail field that is following to the animal production department, College of Agriculture, University of Tikrit for 12/3/2018 until 6/5/2018 to study the effect of adding the white tea powder to the ration of Japanese quail bird in the qualitative traits, the 45 females were used with age of 24 weeks, equipped with a hatchery / Salah Ad-Din Governorate. Birds were randomly distributed to three treatments, each treatment consists of five cages made of iron clasp with three floors (measuring the cage 40 × 40 × 40 cm, where in each cage was placed 3 female quail and treatments were as follows: The first treatment: (T1) standard ration without addition, the second treatment: (T2) standard ration added 1 g white tea powder / g feed, and the third treatment: (T3) standard ration added 1.5 g white tea powder / kg feed. The white tea was added to the feed manually. Table (1) shows active compounds in white tea. The hall was provided with 16 hours of lighting daily. Water and feed were freely provided throughout the study period. The internal and external traits of the egg were measured starting from the fourth week of the experiment, One each 28 days, three eggs took of each repeater and adopted the weight of the eggs taken from each repeater and broke it on a glass surface and extracted the following traits: egg weight, albumen weight, albumen height, Haugh unit, yolk weight, yolk height, yolk diameter, yolk index, shell thickness and shell weight. Table (2) shows the feed material used and the calculated chemical composition during the experiment period.

(BROMIX-2.5W) from the Dutch company WAFI contain of 1.6% Lysine, 6% methionine, 6% methionine + cystine, 23.2% calcium, 9.3% phosphorus, 4.9% sodium, 440000 IU / kg vitamin A, 120000 IU / kg vitamin D3, 1200 mg / kg vitamin E, 100 mg / kg vitamin K3, 120 mg / kg vitamin B1, 280, mg / kg vitamin B2, 160 mg vitamin B6, 1400 mg / kg vitamin B12, 600 mg / kg, 40 mg / kg Folic acid , 4 µg / kg bayutin, 2000 µg / kg iron, 400 microgram / kg copper, 3200 µg / kg magnesium, 2400 µg / kg zinc, 10 µg / kg selenium, 1200 mg / kg chlorine chloride.

Table 1: Assessment of Biochemical components of White tea

Biochemical Components	White tea(Methanolic)	White tea (Aqueous)
Total Polyphenols (%)	35□.01	29□.01
Catechins (%)	19□.01	13□.01
Total Flavonoids (gm/100gm)	5□.001	1□.001
Caffeine (gm/100gm)	4.8□.01	3.9□.01
Tannins (%w/w)	11□.001	9□.001

(GargiSaha et al., 2017)

Table 2: Primary feed materials used in the ration of Japanese quail bird during the experiment period with calculated chemical composition.

Primary feed materials	Percentage (%)
Yellow corn grinded	53.10
Soybeans (48.5% protein)	33.10
Plant oil (sunflower)	4.00
Premix[1]	2.50
Limestone	7.00
Salt	0.30
Total	100
The calculated chemical analysis[2]	
Representative energy (kCal / kg)	2832.73
Raw protein (%)	20.50
Raw fiber (%)	3.62
Calcium (%)	2.89
Phosphorus availability (%)	0.40
Lysine (%)	1.12
Methionine (%)	0.47
Methionine + Cicin (%)	0.80

According to the chemical composition according to the analysis of feed materials in NRC (1994).

Completely Randomized Design was used to study the effect of different treatments in the studied traits, the differences between the averages were compared using the Duncan multidimensional Test (Duncan, 1955), and the statistical program SAS (SAS, 2010) was used for data analysis.

RESULTS AND DISCUSSION

Table (3) indicates the results of the statistical analysis of the effect of adding white tea to the ration in the egg weight (g), albumen weight (g), albumen height (mm) of egg produced for the Japanese quail bird for period of 26 to 34 weeks, which showed significant excelling ($p < 0.05$) for white tea treatments compared to the first treatment (control). The third treatment (1.5 g white tea / kg feed) recorded the highest egg weight, albumen weight and albumen height for the period from 26 to 30 weeks and from 30 to 34 weeks, which reached (13.006, 12.830 g, 7.476, 7.476 g, 4.536, 4.273 mm), respectively, followed by the second treatment (1 g white tea / kg feed), which recorded the egg weight and the albumen height for the period of 30 - 34 weeks (12.466 g and 4.013 mm) respectively and with significant difference ($p < 0.05$) from the first treatment (control) (12.093, 12.120 g, 7.063, 7.003 g, 3.873, 3.633 mm), respectively. The second treatment did not record any significant differences between them and the control treatment on the one hand and the third treatment on the other hand in the trait of albumen weight (g).

Table (4) shows the results of the statistical analysis of the effect of the addition of white tea to the ration in the Haugh unit, yolk weight (g) and yolk height (mm) of eggs produced for the Japanese quail bird for period of 26 to 34 weeks, which showed significant excelling ($p < 0.05$) for white tea treatments compared to the first treatment (control), where the third treatment (1.5 g white tea / kg feed) recorded the highest Haugh unit, yolk weight and yolk height for the period of 26 - 30 week and from 30 - 34 week, which was (89.337, 88.620, 4.210, 4.230 g, 12.780, 12.753 mm) respectively, followed by the second treatment (1 g white tea / kg feed), which recorded Haugh unit (86.643) for the period from 30 - 34, The yolk height reached (12.536 mm) for the period from 26 to 30 weeks, with a significant difference from the first treatment (control), which recorded the lowest Haugh unit and reached (84.336) for the period of 30 - 34 week and the lowest the yolk height (11.923 and 11.850 mm) for the period of 26 - 30 week and from 30 - 34 week, while the second treatment did not recorded any significant differences between them and the first treatment (control) on the one hand and the third treatment on the other hand in the yolk weight (g) for the period of 26 - 30 week and from 30 to 34 weeks as well as in the yolk height (mm) for the period from 30 to 34 weeks.

Table 3: Effect of the addition of white tea in the egg weight (g), albumen weight (g), albumen height (mm) of eggs for a period of 26 to 34 weeks.

Age / Treatments	26-30 Weeks	30-34 Weeks
Egg weight (g)		
First treatment (control)	12.093 ± 0.138c	12.120 ± 0.015c
Second treatment (1 g white tea)	12.460 ± 0.137bc	12.466 ± 0.087b
Third treatment (1.5 g white tea)	13.006 ± 0.064a	12.830 ± 0.104a
Albumen weight (g)		
First treatment (control)	7.063 ± 0.179 b	7.003 ± 0.054 b
Second treatment (1 g white tea)	7.166 ± 0.012 ab	7.213 ± 0.057 ab
Third treatment (1.5 g white tea)	7.476 ± 0.037 a	7.476 ± 0.126 a
Albumen height (mm)		
First treatment (control)	3.873± 0.184 b	3.633± 0.073 b
Second treatment (1 g white tea)	4.226± 0.113 ab	4.013± 0.112 a
Third treatment (1.5 g white tea)	4.536± 0.130 a	4.273± 0.091 a

* The different characters in each column indicate significant differences between the average of the treatments at ($p < 0.05$)

Table 4: Effect of the addition of white tea in the Haugh unit, yolk weight (g) and yolk height (mm) of eggs produced for a period of 26 to 34 weeks.

Age / Treatments	26-30 Weeks	30-34 Weeks
Haugh unit		
First treatment (control)	85.940 ± 0.789 a	84.336 ±0.139 b
Second treatment (1 g white tea)	87.120 ± 1.169 a	86.643± 0.782 a
Third treatment (1.5 g white tea)	89.337 ± 1.016 a	88.620 ± 0.228 a
Yolk weight (g)		
First treatment (control)	3.920 ±0.043 b	3.976 ± 0.014 b
Second treatment (1 g white tea)	4.133 ± 0.056 ab	4.16 ± 0.092 ab
Third treatment (1.5 g white tea)	4.210 ± 0.070 a	4.230 ± 0.064 a
Yolk height (mm)		
First treatment (control)	11.923± 0.051 b	11.850± 0.123 b
Second treatment (1 g white tea)	12.536± 0.163 a	12.350± 0.086 ab
Third treatment (1.5 g white tea)	12.780± 0.037 a	12.753± 0.195 a

* The different characters in each column indicate significant differences between the average of the treatments at ($p < 0.05$)

Table (4) shows the results of the statistical analysis of the effect of the addition of white tea to the ration in the yolk diameter (mm), yolk index, shell thickness (mm) and shell weight (g) of eggs produced for the Japanese quail bird for period of 26 to 34 weeks, There was no significant difference between all treatments in the trait of the yolk diameter. As for the yolk index, the table showed significant superiority ($p < 0.05$) for the white tea treatments compared to the first treatment (control). The second treatment and the third treatment recorded the following averages (0.517 and 0.537) respectively for the period of 26-30 weeks and 0.511 and 0.536 respectively for the period from 30 to 34 weeks while The first treatment (control) recorded the following values (0.489 and 0.495), respectively. The shell weight and shell thickness showed the superiority of the third treatment (1.5 g white tea / kg feed) significantly ($p < 0.05$) on the treatment of control during the period of 26-30 weeks and from 30 to 34 weeks, which amounted to (1.156 and 1.156 g) (0.256 and 0.256 mm) respectively. The first treatment (control) recorded the lowest shell weight and shell thickness (1.020 and 1.026 g) and 0.223 and 0.210 mm respectively. The second treatment (1 g white tea / kg feed) recorded the shell weight and shell thickness (1.080 and 1.113 g) and (0.243 and 0.246 mm) respectively for the period of 26-30 weeks and from 30 to 34 weeks without significant differences from the Control treatment on the one hand and the third treatment on the other.

Table 5: Effect of the addition of white tea in the yolk diameter (mm), yolk index, shell thickness (mm) and shell weight (g)of eggs for a period of 26 to 34 weeks.

Age / Treatments	26-30 Weeks	30-34 Weeks
Yolk diameter (mm)		
First treatment (control)	24.900 ± 0.030 a	24.333 ± 0.003 a
Second treatment (1 g white tea)	24.366 ± 0.014 ab	24.033± 0.027 a
Third treatment (1.5 g white tea)	24.133 ± 0.012 ab	24.200 ±0.017 a
Yolk index		
First treatment (control)	0.489 ± 0.055 c	0.495 ± 0.017 b
Second treatment (1 g white tea)	0.517 ±0.115 a	0.511 ± 0.066 a
Third treatment (1.5 g white tea)	0.537 ± 0.040 a	0.536 ± 0.085 a
Shell weight (g)		
First treatment (control)	1.020 ± 0.035 b	1.026 ± 0.017 b
Second treatment (1 g white tea)	1.080± 0.040 ab	1.113 ± 0.006 ab
Third treatment (1.5 g white tea)	1.156 ± 0.028 a	1.156± 0.029 a
Shell thickness (mm)		
First treatment (control)	0.223 ± 0.003 b	0.210 ± 0.012 b
Second treatment (1 g white tea)	0.243 ± 0.003 ab	0.246 ±0.010 ab
Third treatment (1.5 g white tea)	0.256 ± 0.008 a	0.256 ± 0.003 a

* The different characters in each column indicate significant differences between the average of the treatments at ($p < 0.05$)

The significant improvement in egg weight for white tea treatments may be due to the presence of active chemical compounds in tea, which play an important role in improving the average weight of egg by increasing the action of digestive enzymes of carbohydrates, proteins and fats and increasing the availability of the body to meet the necessary needs (McKay and Blumberg, 2002) and to enhance liver, pancreatic, small intestinal and bile function and activate its secretion to benefit from nutrient elements (Sarinivasan, 2005).As for the other qualitative traits of the eggs, the improvement may be indicating a significant positive correlation between estrogen concentration in blood plasma and egg weight, yolk weight and shell weight. Sturkie (2000) states that estrogen promotes the growth of the egg channel and increases the secretion of the ovary tubular glands and also helps in the production of special proteins in the egg channel such as ovalbumin, conlbumin, lysozyme, yolk protein precursor and vitellogenin. It can also modify the progesterone receptors found in Cytoplasm of genital canal cells. Estrogen generally stimulates the production of vitellogenesis through direct action on the liver, and deposition of calcium within the long bone, where these bones act as a reserve source of calcium during the high egg production period .

CONCLUSION

The addition of white tea in the ration can improve some of the qualitative traits of eggs.

CONFLICT OF INTEREST

This research is a personal non-profit work and there is no conflict of interest.

ACKNOWLEGEMENT

We would like to thank The College of Agriculture, University of Tikrit for giving us this opportunity to express our science.

AUTHOR CONTRIBUTIONS

Both of Ammar Salahaldeen and Nihad Abdul-Lateef Ali are responsible for animal work and samples collection. Fadhil Rasul Abbas and Imad Abdul-Jabar, is responsible for data analysis, writing correction and proof reading.

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