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The Effect of Adding Azolla Plant Powder in Quail Diets on The Carcass Traits and Some Blood Traits

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Abstract

THIS STUDY was done to evaluate adding different levels of Azolla to the diet of Japanese quail, and study its effects on the carcass traits, and some serum blood characteristics. The experiment was carried out in the poultry farm of the animal production department/college of agriculture/ Kirkuk university from (18th Feb to 18th April, 2022). Twenty male and sixty females at age 40 days were randomly allocated to five treatments (0% , 4% , 8% azolla, 4% azolla + Enzyme, and 8% azolla + Enzyme), each treatment consist of four replications that contain 1 male and 3 females. The birds were kept in a battery system with ad libitum water and diet. At the end of the experimental period, five birds (1 male: 4 female) were randomly taken from each treatment; the birds were weighed by using digital scale (0.01 g), and slaughtered to complete bleeding, followed by plucking the feather and then reweighed. The main, and the secondary parts were all record. And the blood was taken to exam the level of some serum blood characteristics (total protein, Glucose, cholesterol, albumin, globulin, and uric acid). Our result indicates that adding Azolla for 4% increase the body weight and carcass weight significantly comparing with the other treatments. Moreover, adding the Azolla with enzyme enhance the parts weight compare with other treatments. Also, all the serum blood traits were affected significantly by adding azolla powder.

Keywords: Azolla, quail, carcass, blood.

Introduction

Poultry production in the world, including our country, Iraq, has production determinants, including the food used in poultry feed, which constitutes the greatest cost of the production process Many of the traditional materials used as raw materials in the formulation of poultry feeds include soybean meal, which has become very expensive and requires hard currency to import, in addition to the fact that obtaining it depends on merchants and transportation operations [1]. One of the administrative proposals to solve this problem is the need to search for protein sources such as unconventional currency [2, 3, 4]. It is available locally as an alternative to imported and high-priced feed. One of these plants is Azolla, which has recently been used in feeding broiler chickens, in addition to its use in feeding fish and ducks, laying hens, rabbits, and large animals, whether green or after drying, due to its nutritional content [5, 6]. As the digestibility of protein and fiber from the feed is not affected by the addition of Azolla to be feed and could be considered a protein supplement and a source of amino acids such as lysine, methionine, histidine, beneficial minerals, and abundant amounts of vitamin A, and B12 [7, 8, 9]. The Azolla plant also contains probiotics, carotenoids, biopolymers, and glutamate [10]. In addition, it can be used as an antibacterial and antioxidant agent due to its high content of phenol [11]. Azolla is a floating aquatic fern that lives floating on the surfaces of waterways and in rice

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fields Submerged in water, it is not alone, as it is associated with a type of algae that carries out a type of symbiotic living Azolla (Azolla) is one of the plants with semi-roots. It works to stabilize atmospheric nitrogen and contains a high percentage of protein, ranging between 30 and 25% of its dry weight. Therefore, it has been used in rations of poultry by up to 20% [12].

Material and Methods

The experiment was carried out in the poultry farm of the animal production department /college of agriculture/ Kirkuk university form (18th Feb, 2022 until 18th April 2022). Twenty male and sixty females at age 40 days were randomly allocated to five treatments (0%, 4%, 8% azolla, 4% azolla + Enzyme, and 8% azolla + Enzyme), each treatment consist of four replications that contain 1 male and 3 females. The birds were breeding in a battery system with *ad libitum* water and diet (Table 1).

At the end of the experimental period, five birds (1 male: 4 female) were randomly taken from each treatment; the birds were weighed by using digital scale (0.01 g), and slaughtered to complete bleeding, followed by plucking the feather and then reweighed. The main and the secondary parts were all measured. Five ml of blood was taken to exam the level of some serum blood characteristics (total protein, Glucose, cholesterol, albumin, globulin, and uric acid).

General linear model (GLM) within SAS program [13] was used to calculate mean, standard error, and the significance. Duncan multiple range test was used to test the differences between the means [14].

TABLE 1. The percentage and chemical composition of fed materials fed to experiment birds

Ingredients	Control	Azolla 4%	Azolla 8%	Azolla 4% + Enzyme	Azolla 8% + Enzyme
Wheat	34.72	43.05	44.12	43.05	44.12
Corn	24.70	14.50	11.00	14.50	11.00
Oil	3.50	4.20	4.50	4.20	4.50
Soybean meal 44%	30.00	27.00	25.00	27.00	25.00
Azolla	0.00	4.00	8.00	4.00	8.00
Lysin	0.08	0.15	0.20	0.15	0.20
Methionine	0.20	0.20	0.23	0.20	0.23
DCP	0.60	0.70	0.75	0.70	0.75
Limestone	6.00	6.00	6.00	6.00	6.00
T. Salt	0.10	0.10	0.10	0.10	0.10
Colin clorid	0.10	0.10	0.10	0.10	0.10
Total	100.00	100.00	100.00	100.00	100.00
Energy Kcal/Kg	2897	2908	2905	2908	2905
Protein %	20.2	20	20.01	20	20.01
Lysin %	1.05	1.045	1.034	1.045	1.034
Methionin %	0.48	0.46	0.47	0.46	0.47
Ca %	2.511	2.526	2.533	2.526	2.533
Avialable phosphorous %	0.303	0.302	0.298	0.302	0.298

- Enzyme mixture consist of (Phytase, Amylase, Xylanase, B-glucanase, a-protease.

Results and Discussion

The mean and standard error for the carcass main parts that effected by different levels of Azolla are shown in table 2. There were significant differences ($p<0.05$) among the treatments for all the traits. The higher body weight (201.51 g) recorded when the Azolla level was 4%, while the lower body weight (179.40 g) found when the Azolla was 8%. The carcass weight was significantly higher in both 4% and 8% with enzyme (149.65, and 149.85 g), respectively, comparing with their values recorded in 8% without enzyme (131.15 g). The chest was high in the control treatment and low in 8% without enzyme (40.86, and 32.06 g), respectively. Higher weight of thigh (25.15) g was measured in 4% azolla, while the lower (18.93 g) measured in control

treatment and the differences among them were significant. The wings were high in both 8% azolla, and 8% azolla with enzyme (6.37, and 6.38 g) respectively, and low in both 4% azolla and 4% azolla with enzyme (4.14, and 4.12 g), respectively. The back weight was high significant in 4% azolla with enzyme, and low in both azolla 8%, and 8% with enzyme (23.19, 17.70, and 17.81 g), respectively. Our result was contrary to that of [15], who found non-significant differences among the treatments for the breast, and thigh. But for the back weight the 3% azolla was the high significant compare with 6% azolla.

TABLE 2. Means, and standard error for the different levels of azolla affecting carcass main parts weight of the Japanese quail

Traits (g)	Control 0%	Azola 4%	Azola 8%	Azola 4%+Enzyme	Azola 8%+Enzume
Bird weight	182.67±0.86 ^{c}	201.51±1.06 ^{a}	179.40±0.72 ^{d}	191.29±0.57 ^{b}	192.61±0.95 ^{b}
Carcass weight	138.92±0.65 ^{c}	149.65±0.79 ^{a}	131.15±0.52 ^{d}	145.34±0.44 ^{b}	149.85±0.73 ^{a}
Chest	40.86±0.19 ^{a}	37.06±0.20 ^{c}	32.06±0.13 ^{d}	38.38±0.12 ^{b}	37.95±0.19 ^{b}
Thigh	18.93±0.09 ^{d}	25.15±0.13 ^{a}	22.90±0.09 ^{b}	20.56±0.06 ^{c}	20.69±0.10 ^{c}
Wings	4.35±0.02 ^{b}	4.14±0.02 ^{c}	6.37±0.03 ^{a}	4.12±0.01 ^{c}	6.38±0.03 ^{a}
Back	18.72±0.09 ^{c}	22.70±0.12 ^{b}	17.70±0.07 ^{d}	23.19±0.07 ^{a}	17.81±0.09 ^{d}

Different letters in the same row indicate that the differences are significant

The mean and standard error for the carcass secondary parts traits that effected by different levels of azolla are presented in table 3. There were significant differences ($p<0.05$) among the treatments for all the traits. The heart weight was high when the azolla level was 4% and low when the level of azolla was 4% with enzyme (1.55, and 1.13 g), respectively. The liver weight was high when the azolla was 8%, and the low when the azolla was 8% with enzyme (3.45, and 2.13 g), respectively. The feet weight was high when the azolla level was 4%, and low in azolla 4% with enzyme (3.40, and 2.85 g), respectively. The neck weight was high when the level of azolla 4%, and low in azolla 4% with enzyme (5.09, and 4.35 g), respectively. The gizzard weight was high when the azolla level was 8% with enzyme and low in azolla 8% without enzyme (6.43, and 3.89 g), respectively. The head weight was high when the azolla level was 4%, and low when the azolla was 4% with enzyme (8.75, and 7.31 g), respectively. Our result was contrary to what [15], which found non-significant differences among the treatments for the head, legs and wings.

TABLE 3. Means, and standard error for the different levels of azolla affecting carcass secondary parts of the Japanese quail

Traits (g)	Control 0%	Azola 4%	Azola 8%	Azola 4%+Enzyme	Azola 8%+Enzume
Heart	1.53±0.01 ^{b}	1.55±0.01 ^{a}	1.47±0.03 ^{c}	1.13±0.03 ^{e}	1.43±0.01 ^{d}
Liver	2.59±0.01 ^{c}	2.28±0.03 ^{d}	3.45±0.01 ^{a}	2.64±0.02 ^{b}	2.13±0.01 ^{e}
Feet	3.21±0.01 ^{c}	3.40±0.02 ^{a}	3.26±0.01 ^{b}	2.85±0.01 ^{d}	3.23±0.02 ^{bc}
Neck	4.19±0.02 ^{e}	5.09±0.03 ^{a}	4.62±0.02 ^{c}	4.35±0.01 ^{d}	4.72±0.02 ^{b}
Gizzard	4.14±0.02 ^{d}	4.33±0.02 ^{c}	6.03±0.02 ^{b}	3.89±0.01 ^{e}	6.43±0.03 ^{a}
Head	7.50±0.03 ^{b}	8.75±0.05 ^{a}	7.44±0.03 ^{b}	7.31±0.02 ^{c}	7.43±0.04 ^{b}

Different letters in the same row indicate that the differences are significant

The mean and standard error for the blood traits that effected by different levels of azolla are shown in table 4. There were significant differences ($p<0.05$) among the treatments for all the traits. The glucose was high significant when the azolla level was 8%, and low in azolla level 4% with enzyme (2.38, and 2.05), respectively. The cholesterol was high significant when the azolla level was 4%, and low in both 4%, and 8% with enzyme (151.89, 138.11, and 135.08), respectively. The total protein was high significant when the azolla level was 8% with enzyme, and low in 4% (3.96, and 3.2), respectively. The albumin was high significant when the azolla level was 4%, and low in 8% (1.63, and 1.46), respectively. The globulin was high significant when the azolla level was in both 4%, and 8% both with enzyme (2.36, and 2.39), respectively, and low in azolla 4% without enzyme (1.88). The uric acid was high significant when the azolla level was 8% with enzyme and low when the azolla was 4% with

enzyme (2.49, and 2.16) respectively. Our result was agreed with [16], who found the total protein, albumin, and globulin were increase with increase the level of the azolla in the diet. But the cholesterol and glucose was decrease by increasing the azolla level. The uric acid in our result was contrary to what [17] found, which uric acid was decrease by using 5% of azolla in his study.

TABLE 4. Means, and standard error for the different levels of azolla affecting blood serum parameters for the Japanese quail.

Traits	Control 0%	Azola 4%	Azola 8%	Azola 4%+Enzyme	Azola 8%+Enzume
Glucose	2.13±0.01 ^{d}	2.18±0.01 ^{b}	2.38±0.02 ^{a}	2.05±0.01^{e}	2.16±0.02 ^{c}
Cholesterol	147.21±1.18 ^{b}	138.11±0.89 ^{c}	151.89±0.84 ^{a}	144.66±2.04 ^{b}	135.08±1.75 ^{c}
Total Protein	3.84±0.04 ^{b}	3.52±0.01 ^{d}	3.66±0.03 ^{c}	3.91±0.02 ^{ab}	3.96±0.01 ^{a}
Albumin	1.58±0.01 ^{b}	1.63±0.02 ^{a}	1.46±0.01 ^{d}	1.54±0.01 ^{c}	1.57±0.01 ^{bc}
Globulin	2.24±0.01 ^{b}	1.88±0.03 ^{c}	2.22±0.02 ^{b}	2.36±0.02 ^{a}	2.39±0.00 ^{a}
Uric Acid	2.26±0.03 ^{c}	2.40±0.01 ^{b}	2.28±0.02 ^{c}	2.16±0.01 ^{d}	2.49±0.01 ^{a}

$^{a-c}$ indicate significant differences in the same row

Conclusions

We can conclude that adding azolla powder by 4% affect significantly some important traits of carcass and serum blood characteristics, moreover increasing the ratio of azolla to be 8%, it will be better with using enzyme.

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تأثير إضافة مسحوق نبات الأزولا لعلائق طائر السمان في صفات الذبيحة وبعض صفات الدم

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أجريت هذه الدراسة لتقييم إضافة مستويات مختلفة من الأزولا إلى علف طائر السمان الياباني ودراسة تأثيره على صفات الذبيحة وبعض صفات الدم. نفذت التجربة في حقل الدواجن التابعة لقسم الإنتاج الحيواني/كلية الزراعة/جامعة كركوك للفترة من (8 شباط إلى 18 نيسان 2022). تم توزيع عشرين ذكراً وستون أنثى بعمر 40 يوماً عشوائياً على خمس معاملات (0% أزولا، 4% أزولا، 8% أزولا، 4% أزولا + إنزيم، 8% أزولا + إنزيم)، تتكون كل معاملة من أربع مكررات تحتوي على 1 ذكر و 3 إناث. ربيت الطيور في نظام بطارية مع الماء والعلف بصورة مفتوحة. وفي نهاية الفترة التجريبية، تم أخذ خمسة طيور عشوائياً من كل معاملة؛ تم وزن الطيور باستخدام الميزان الرقمي (0.01) غم، وتم ذبحها حتى نزفت تماماً، ثم نتف الريش ثم إعادة وزنها. تم تسجيل الأجزاء الرئيسية والثانوية كلها. وتم سحب الدم لفحص مستوى بعض صفات الدم في الدم (البروتين الكلي، الجلوكوز، الكولسترول، الألبومين، الجلوبيولين، وحمض البوليك). تشير نتائجنا إلى أن إضافة الأزولا بنسبة 4% أدى إلى زيادة وزن الجسم ووزن الذبيحة معنوياً مقارنة بالمعاملات الأخرى. كما أن إضافة الأزولا مع الإنزيم يؤدي إلى تحسين وزن الأجزاء مقارنة بالمعاملات الأخرى. كما أن جميع صفات الدم المدروسة تأثرت معنويا بإضافة مسحوق الأزولا.

الكلمات الدالة: الازولا ، طائر السمان ، الذبيحة، الدم.