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THE IMPACT OF SUBSTITUTE DIFFERENT RATIOS OF WATER FERN FROM SOYBEAN MEAL SOME OF THE PHYSIOLOGICAL TRAITS IN THE DIETS OF BROILER CHICKENS AT THE AGE OF 21 DAYS

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Abstract: This study was conducted on a poultry farm of the Department of Animal Production / College of Agriculture/University of Anbar. The experiment to see the effect of the use of *Azolla filiculoides* Lam in the diets of broiler chickens at the age of 21-42 days, using 300 Ross 308 broilers fed on added diets, *Azolla Filiculoides* Lam used at levels 5, 10, 20 and 30% for T2, T3, T4 and T5, respectively, and were compared with the control treatment T1 which is free of *Azolla Filiculoides* Lam. There were significant decrease (P≤0.05) in the economic viability characteristics (the cost of starter feed, the final one, the cost of the kilogram of the produced meat and the percentage of cost decrease per 100 kg feed) for all Azolla treatments compared to the control treatment. T5 (%30 Azolla replacement) was the most significantly decreased treatment in the percentage of feed cost compared to the control treatment and other experiment treatments. There were no significant differences between the control treatment and the experiment treatments in all the biochemical parameters of blood plasma, which included the concentration of uric acid, creatine, triglycerides and low-density lipoproteins (VLDL).

Keywords: Water Fern Azolla, Broilers, Economic Feasibility, Physiological Performance.

1. Introduction

In poultry projects, nutrition is one of the most crucial components. More than 75% of the entire cost of breeding meat broilers are incurred by this cost, making it the most expensive in the poultry industry. Dietary protein sources are the most expensive raw materials that make up diets. For example, soybean meal has become expensive and is now seen as a strategic crop that dominates the world market for breeding meat broilers, driving up import prices and driving up demand. [1]. For a farm to achieve optimal growth, a high return on investment, and a decrease in the cost of feed due to the use of strategic feed sources imported from outside, which in turn boosts profitability, new and high-value nutritious sources of feed should be sought out, Therefore, the search demands that meat broilers diets must be of a high protein content, because of this, the meals for meat broilers must have a lot of protein. [2].

Here comes the interest in the Azolla plant, the free-floating fern Azolla that belongs to the Azollaceae family, which is a good source of protein and its content is good of all essential amino acids and has a high content of minerals such as Iron,

calcium, magnesium, potassium, phosphorus, manganese et al, It also contains reasonable amounts of vitamin A, beta-carotene and vitamin B12 and also contains probiotics [3]. Azolla, which grows in association with blue-green algae Anabaena azollae, is a good source of protein and is easily cultivated, highly productive and has good nutritional value [4]. [3] observed that the use of 10% Azolla significantly improved the productive performance of the broilers and reduced feed consumption.

Therefore, the study aimed to cultivate and pro-duce Azolla and use it at different levels in the diet and to know its effect on the productive performance and biochemical characteristics of male plasma blood and reduce the cost of meat broilers diets. Due to the increase in the cost of production as a result of the increase in the prices of raw feed materials, especially the sources of protein (Soybean meal), which use 20-32% in broiler diets, which in turn raises the cost of produced feed due to importation from outside the country. So it required using cheap feed sources that can be produced and added as a protein source to reduce the cost of diets and the cost of production.

2. Materials and Methods

This study was conducted at the Poultry Research Station at Abu Ghraib, Department of Agricultural Research, Ministry of Agriculture, from 22/4/2018 to 13/5/2018. The study investigated the effect of using different levels of Azolla on the productive and physiological performance of male meat broilers. For the period of 1-42 days, 180 birds 21day old male broilers of Ross 308 were used in this study, with an initial average weight of 40.96 g. The chicks were raised in a closed hall of 15 boxes. The chicks were distributed randomly in the houses with 12 birds each. The birds were fed on five diets according to the table. Azolla was used in 5%, 10%, 20%, and 30% compared with control treatment which is free of Azolla. Feed and water were provided freely (ad libitum) throughout the duration of the experiment. The heat had been controlled using the gas incubators and the housing was provided with continuous lighting and turning off the lights for one hour to acclimate the birds to the dark in case of sudden power off.

Economic Feasibility: Calculation of the cost of feed consumed per treatment during the experiment period, the cost of one kilogram of chicken, calculating the percentage that Azolla has reduced from the cost of the diet, compared to the cost of control treatment's diets.

Physiological Performance: Blood samples were collected at the end of the sixth week of the experiment at the age of (42 days) by taking randomly 6 birds from each treatment and blood samples were collected by slaughtering birds and put these samples in test tubes containing anticoagulant (EDTA). The concentration of both uric acid and creatine was measured in blood plasma by a kit test produced by a Spanish company called Linear Chemicals. S.L. In addition, [5] method was used to measure cholesterol concentration and the [11] method was used to measure the concentration of triglycerides. [6] the method was used to estimate very low-density lipoproteins (VLDL).

Statistical analysis: The experiment data were analyzed using the completely randomized design (CRD) using the Statistical Analysis System [13] and the significant differences between the averages were measured using the Dunkin Multidimensional Test [7].

3. Results and Discussion

Economic Feasibility: It is observed from Table (1) that the experimental treatments that used Azolla in their diets reduced the cost of the processed feed. A significant decrease ($P \leq 0.05$) was observed in the cost of one kilogram of the final diet, all treatments of Azolla final diet coster reduced (586, 562, 504 and 469) IQD / kg Final feed (5, 10, 20 and 30%) Azolcomed to control treatment (609) IQD / kg final feed, in addition, a significant decrease was observed in the cost of final feed consumption (P 0.05) in the cost of one kilogram of the final consumed diet, so as all Azoll treatments were reduced of the consumed starter diet (1941, 1756, 1659 and 1564) IQD / kg consumed final feed (5, 10, 20 and 30%) Azolla compared to control treatment (2071) IQD / kg consumed final feed.

Also, the cost of a significant decrease of one kilogram of broiler meat was significantly reduced ($P \leq 0.05$) in the cost of one kilogram of broiler meat, where all the treatments of Azolla (651, 735, 717, 664) IQD/ kg meat (5, 10 and 30%) Azolla compared to control treatment (853) IQD / kg meat. In addition, the cost of the significant increase ($P \leq 0.05$) was observed in the percentage of reducing the cost of diet for 100 kg feed / IQD. The percentage of the decrease in all of the Azolla treatments was increased at the cost of the consumed starter diet (3.84, 7.77, 17.17 and 22.90%) (5, 10, 20 and 30%) Azolla compared with control treatment (0.00%).

The results of the study indicate that the manufactured broilers diets and the use of Azolla as an alternative source of protein has an important role in terms of low-cost and high nutritional value. This alternative, good and locally available source can improve production, decrease the cost of poultry feed production and achieve food safety [8]. In addition, [9]. noted that the addition of (5%) Azolla plant to meat broiler diets led to a decrease in total feed cost with control treatment and the rest of the treatments (of 10% and 15% Azolla).

Table 1. The effect of using different levels of Azolla in broilers' diets in economic feasibility characteristics ± standard error for the period (21-42) days.

Characteristics / IQD	Treatments					Mean	SEM*	Sg. level
	Control	Azolla						
		T2	T3	T4	T5			
		5%	10%	20%	30%			
Cost of 1 kg of final feed	609 a	586 b	562 c	504 d	469 e	546	1.00	0.0001
Cost of consumed final feed	2071 a	1941b	1756 c	1659 d	1564 e	1798	1.00	0.0001
Cost of 1 kg of meat	853 a	651 e	735 b	717c	664 d	724	1.00	0.0001
Reducing the percentage of diet's cost for each 100 kg feed / IQD	0.00 e	3.84 d	7.77 c	17.17 b	22.90 a	10.3	0.080	0.0001

***SEM: Refers to Standard Error of Mean**

c, b, a: The different letters within one row indicate significant differences between the treatments at a significant level (P≤0.05)

Physiological Performance: Table (2) shows the effect of adding Azolla plant in the meat broilers diets for the experiment (4-6) weeks to the significant increase ($P \leq 0.05$) was observed in uric acid at the age of 42 days. The second treatment, T2, exceeded the highest value (4.82) mg / 100 ml plasma compared with T1, T4 and T5, which had the lowest concentration (3.92 and 3.73 and 3.38) mg / 100 ml plasma respectively, while T3 treatment was not significantly different from the other treatments.

There were no significant differences in the concentration of creatinine between the treatments. Table (3) shows the effect of the use of Azolla in meat broilers diets in the concentration of cholesterol, which resulted in a significant decrease ($P \leq 0.05$) in the concentration of cholesterol as the control treatment T1, T2, T3 and T5 were significantly decreased which their concentration of cholesterol was (118.95 and 135 .92, 122.76, and 143.72) mg / 100 ml plasma compared to T4, with a cholesterol concentration of 186.72 mg / ml plasma respectively at the age of 42 days. While there were no significant differences in triglycerides and low-density lipoproteins (VLDL) between all treatments.

Table 2. The effect of adding different levels of Azolla to meat broilers diets in the concentration of biochemical characteristics of blood plasma ± Standard error at the age 42 days

The Studied Characteristics	Treatment					Mean	SEM*	Sg. level
	Control	Azolla						
		T2	T3	T4	T5			
		5%	10%	20%	30%			
Uric acid[1]	3.92 b	4.82 a	4.01 ab	3.73 b	3.38 b	3.97	0.456	0.0328
Creatinine[1]	0.320	0.346	0.293	0.293	0.346	0.320	0.037	N.S.
Cholesterol[1]	135 b	118 b	122 b	186 a	143 b	141	16.6	0.0039
Triglyceride[1]	87.0	72.9	92.5	95.7	71.5	83.9	20.7	N.S.
VLDL[1]	17.4	14.5	18.5	19.1	14.3	16.7	4.14	N.S.

***SEM :Refers to Standard Error of Mean**

**** N.S. : Refers to Not Significant at the level (P≤0.05).**

c, b, a: The different letters within one row indicate significant differences between the treatments at a significant level (P≤0.05) Unit: mg/100 ml plasma, International unit/ liter plasma.

4. Conclusions

In conclusion from this study, it is possible to add Azolla to the diet led to improved treatment of 30% Azolla had the most significant decrease (P≤0.05) in the percentage of feed cost compared to the control treatment and other experimental treatments, add Azolla to the diet by 5% feed to obtain a positive improvement in the productive performance of broilers and achieve the best economic feasibility.

Supplementary Materials:

No Supplementary Materials.

Author Contributions:

Y. S. Najim. and Th. T. Mohammed; methodology, writing—original draft preparation, F. M. Hussain; writing—review and editing. All authors have read and agreed to the published version of the manuscript.

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The study was conducted in accordance with the protocol authorized by the University of Anbar, Ethics Committee, Iraq. From a commercial farm, fertile eggs from Ross (308) strain broiler breeder hens were obtained.

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No Informed Consent Statement.

Data Availability Statement:

No Data Availability Statement.

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The authors declare no conflict of interest.

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