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USE OF SUBSTITUTE DIFFERENT RATIOS OF PLANT PROTEIN FROM SOYBEAN MEAL IN SOME OF THE PRODUCTION TRAITS IN OF BROILER CHICKENS AT THE AGE OF 21 DAYS

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Abstract: This study was conducted in 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. Significant increase (P≤0.05) in average body weight, weight increase, food intake rate, improved food conversion ratio, and production index for the birds of the treatment 5% *Azolla Filiculoides* Lam compared with control treatment and other treatments. There were no significant differences between the control treatment and experimental treatments in all biochemical characteristics of blood plasma, which included the concentration of glucose, protein, albumin, and globulin, the activity of the liver enzymes ALT and AST. In conclusion from this study, it is possible to add Azolla Filiculoides Lam to the diet by 5% feed to obtain a positive improvement in the productive performance of broilers and achieve the best economic feasibility.

Keywords: Plant Protein, Azolla, Broilers, Productive Performance

1. Introduction

One of the most crucial aspects of poultry ventures is nutrition. Additionally, it represents more than 75% of the entire cost of breeding meat broilers, making it the most expensive in the poultry industry. The most expensive raw materials that makeup diets are the sources of protein. For example, soybean meal has become expensive and is now seen as a strategic crop that dominates the global market for raising meat broilers, which has increased demand and driven up import prices. [1]. In order 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 abroad, which in turn lowers the cost of feed and boosts profitability, new and highly valuable nutritious sources of feed should be searched out [2].

The feeds of meat broilers must therefore contain a lot of protein in order to satisfy the search. The Azolla Filiculoides Lam plant, a free-floating fern in the Azollaceae family that is a good source of protein and contains all nine essential amino acids, as well as its high concentration of minerals like iron, calcium, magnesium, potassium, phosphorus, manganese, and others, is what has sparked interest in it.

Along with probiotics, it also has enough levels of vitamin B12, beta-carotene, and vitamin A [3]. The Azolla plant is a plant that co-occurs with the blue-green algae Anabaena azollae and is an excellent source of protein, is simple to produce, very productive, and has a high nutritional value [4]. [3] noticed that the broilers' productive performance greatly enhanced and their feed consumption decreased when 10% Azolla was used.

With the goal to know how Azolla affects the productive performance and biochemical properties of plasma blood as well as lower the cost of meat broilers diets, the study set out to cultivate, produce, and use Azolla at various levels in the diet. Due to the rise in the price of raw feed materials, particularly the sources of protein (soybean meal), which account for 20–32% of the protein in broiler diets, which in turn drives up the price of domestically produced feed due to imports from abroad. As a result, it was necessary to use inexpensive feed materials and can be created and used as a protein source to lower the price of diets and the cost of manufacturing.

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 in the productive and physiological performance of meat broilers. For the period of 1-42 days, 180 birds 21day old 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 box. The chicks were distributed randomly on 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.

Productive Performance: The cumulative productivity characteristic, which included body weight, weight gain, feed consumption, food conversion ratio, relative weight, productive index and economic indicator were measured for the period 21-42 days.

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 glucose in blood plasma was measured as the mentioned in [5]. The concentration of total protein was measured by [6] and albumin concentration by [7] were also measured, in addition of the concentration of globulin as was reported by [8]. The activity of liver enzymes ALT, AST was also evaluated in blood plasma based on the method of [9].

Statistical analysis: The experiment data were analyzed using the complete randomized design (CRD) using the Statistical Analysis System [10] and the significant differences between the averages were measured using the Dunkin Multidimensional Test [11]

3. Results and Discussion

Production Performance: Table (1) shows the effect of using different levels of Azolla in the average body weight, weight gain, feed intake rate, food conversion factor, relative growth rate, production index and economic indicator for the period (21-42). There were no significant differences be-tween the control treatment and the treatments 10% and 30% Azolla respectively in the body weight ratio between the Azolla treatments (10, 20 and 30%, respectively) and the control treatment. In addition, there were no significant differences in the rate of weight increase between the control treatment and the treatments 10, 20 and 30% Azolla respectively, the results indicated that there were no significant differences in feed intake rate between Azolla treatments 5, 20 and 30%, respectively, compared to control treatment. In addition, there were no significant differences in the feed conversion factor between Azolla treatments (10, 20 and 30%, respectively) and control treatment. As for the relative growth rate, there were no significant differences between the Azolla treatments (10, 20 and 30% respectively) and the control treatment, as for the production index and the economic indicator, there were no significant differences between the Az-olla treatments (10, 20 and 30%, respectively) and control treatment.

A significant increase ($P < 0.05$) was observed in the body weight ratio, the treatment 5% Azolla was surpassed and reached 2979 g compared with control treatment and the other levels (10, 20 and 30%) Azolla (2426, 2387, 2312 and 2355) respectively. In addition, there was significant increase ($P \leq 0.05$) in the average of the

cumulative weight of the control treatment compared with the treatment of 20%. The results of the experiment showed a significant increase in the total cumulative weight increase for the period of breeding (21-42 days). The treatment of 5% was significantly higher (P≤0.05) which recorded (2117) g compared to control treatment and other levels (10, 20 and 30%) Azolla, (1606, 1573, 1543 and 1541) g respectively. As for cumulative feed intake during the experiment period, a significant increase was observed in feed intake rate, so control treatment and Azolla treatments (5, 20 and 30%) (3398, 3312, 3287 and 3328 g) respectively have surpassed compared to the 10% Azolla (3124) g.

The results of the experiment shows a significant improvement of the cumulative food conversion ratio for the total breeding period (21 - 42 days) so a significant decrease was recorded (P ≤ 0.05) in the treatment 5% Azolla (1.56) g feed /g weight increase compared to control treatment and the treatments (10, 20 and 30%) Azolla , which recorded (2.12, 1.98, 2.13 and 2.15) g feed/ g weight increase respectively, In addition, a significant improvement (P ≤ 0.05) was observed in the 10% Azolla treatment compared to the 30% Azolla treatment. Also the results showed a significant increase (P≤0.05) in the relative growth rate during the total period of the experiment (1-42) days, the treatment of 5% Azolla (110%) respectively was higher compared to control treatment (99%), in addition, the treatment of 5% Azolla was higher in relative growth rate compared with the other treatments of Azolla (10, 20 and 30%), respectively.

The results are also shown in the values of the production index and the economic indicator for the experiments treatments a significant increase (P≤0.05) was found in the values of the production index and the economic indicator for the treatment of 5% Azolla compared to the control treatment and Azolla treatments (10, 20 and 30%) at the age of (21- 42 days). [12] showed that the production index is one of the important measures that reflect the efficiency of breeding and quality of production and successful field management since these important measures depend on the average live weight in marketing and the percentage of losses and the efficiency of feed conversion. Currently, international companies compete to produce races achieve high values of this scale, This is done through the production of races with high marketing weights and low percentage of losses during the period of breeding, which we observe that the treatment 5% Azolla is the best in the quality of breeding, and the values of the production index and the economic indicator at the age of 42 days in Table (8) for the meat broilers birds Ross308 match with what has been referred to by [13].

Table 1. Effect of Adding Different Levels of Azolla to Broiler Diets in the Cumulative Production Performance of Meat Broilers ± Standard Error at age (21-42) days.

The Studied Characteristics	Treatments					Mean	SEM*	Sg. level
	Control	Azolla						
		T2	T3	T4	T5			
		5%	10%	20%	30%			
Average body weight (g)	2426 b	2979 a	2139 bc	2312 c	2355 bc	2492	217	0.0001
Average gain (g)	1606 b	2117 a	1573 b	1543	1541 b	1676	61.8	0.0001
Average feed intake (g)	339 a	3312 a	3124 b	3287 a	3328 a	3290	80.6	0.0001
Feed Conversion Ratio	2.12 ab	1.56 c	1.98 b	2.13 ab	2.15 a	1.99	0.085	0.0001
Relative Growth Average %	99.0 b	110 a	98.4 b	100 b	97.3 b	101	2.97	0.0022
Production Index	548 b	907 a	572 b	516 b	519 b	613	44.3	0.0001
Economic Indicator	548 b	907 a	572 b	516 b	519 b	613	44.3	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).

The improvement in production performance in the experiment (21-42) may be due to the use of Azolla in meat broilers diets, because in the early days of the bird's life the digestive system is unable to digest certain food compounds, especially fibers in the incubation stage, but after 21 days of breeding the growth process has been completed, so after this age the microbial digestion of the beneficial microorganisms in the intestines of the birds is activated, which increases the metabolic rates, which is reflected in growth rates increase and birds' weights, which clearly improves the production performance of the birds that fed on the Azolla [13].

Physiological Performance: Table (2) shows the effect of adding Azolla plant in the meat broilers diets for the experiment (4-6) weeks to the concentration of glucose, total protein, albumin, and globulin in the blood plasma of meat broilers at the age of 42 days. A significant increase ($P \leq 0.05$) was observed in glucose concentration in blood plasma at age 42 days. T1 and T3, had a higher concentration (217 and 226) mg / 100 ml plasma, compared to T2 with less concentration, 196 Mg / 100 ml plasma. T4 and T5 did not differ significantly from the other treatments. No significant differences ($P \leq 0.05$) were observed in the concentration of total protein, albumin, globulin and liver enzymes (ALT and AST) at the age of 42 days in the second experiment. A 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.

Table 2. The effect of adding different levels of Azolla to 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%			
Glucose[1]	217 a	196 b	226 a	207 ab	210 ab	211	10.0	0.0452
Protein[1]	3.40	3.42	3.21	3.87	4.16	3.61	0.388	N.S.
Albumin[1]	1.15	1.15	1.16	1.32	1.27	1.21	0.079	N.S.
Globulin[1]	2.25	2.27	2.05	2.54	2.88	2.40	0.348	N.S.
ALT[2]	6.10	9.96	7.72	7.50	5.76	7.41	1.67	N.S.
AST[2]	87.2	95.7	90.5	87.5	86.0	89.4	4.40	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 by 5% feed to obtain a positive improvement in the productive performance of broilers and achieve the best economic feasibility and improved in body weight, weight increase, food intake rate, improved food conver-sion ratio, and production index for the birds of the treatment 5% Azolla compared with control treatment and other treatments.

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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The authors declare no conflict of interest.

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