

Effect of adding spirulina on productive performance of broiler chickens .

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Abstract :

An applied study was conducted in the field of description of the University of Mosul University for 35 days period with the aim of assessing the effect of adding Spirulina moss in ration on the performance of the Ross₃₀₈ breed. This study included 192 unconditional chicks which were randomly distributed into four experimental groups, with each group contained 48 chicks distributed over three replicates. The experiment is designed using complete random design (CRD) and the transactions were: control group (basal feed without additions), second group (basal feed with addition of 2.5 g/kg of spirulina throughout the darkening period), third group (basal feed with the addition of 2.5 g/kg of spirulina for the starter phase for 21 days and the fourth group (basal feed with the addition of 2.5 g/kg of spirulina in the finished phase for 14 days. The results showed a remarkable improvement on the production performance of the groups added to them spirulina compared to control group. Where their groups recorded a moral increase in weight of the live body and overall weight increase especially for the last weeks of the prohibition. It was noted that the efficiency of fodder consumption was improved as the third group exceeded of the total consumer feed. While the second and fourth groups showed an improvement in the feed conversion coefficient. Finally, these productive and health improvements were reflected on economic efficiency, as the productive guide increased significantly for the second and third groups indicates the feasibility of adding Spirulina especially when adding it throughout the fattening period.

Keywords: spirulina, Ross₃₀₈, basal ration, productive guide, sacrifice pieces.

Introduction

The breast is raising meat is one of the basic (may reach 60-70% of the dry matter). In addition elements of global food security, so that breedersto being a source are constantly seeking to improve the efficiency of production and product quality and given global trend to reduce using of antibiotics as a catalyst for growth in poultry feed due to its dangers in resisting microbial diseases, so the search for natural, effective and safe alternatives has become a research priority in poultry feeding (1). Among prominent of these alternatives is spirulina such as a adding of feed multiple benefits and spirulina is (brink green algae) known as its high nutritional values as it contains very high levels of raw protein

rich in vitamins (such as vitamins B composite, vitamin A, vitamin D) and acids Essential sebaceous (such as gamma-linninic), natural dyes (such as carotenoids, vicusianin), mineral elements and antioxidants which this composition contributes to improving the nutritional value of the ration which enhances general health and production of poultry performance (2). Several recent studies have shown that adding spirulina may positively

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affect the characteristics of growth and production. As the study (3) has shown. The replacement of a portion of soybeans or yellow corn with Speolina powder with rates ranging from 1% to 3% in the relationships of fattening the meat broiler led to moral improvement in the rate of daily weight increases and food conversion laboratories. This may be due to the high increase in the content of Spirulina of proteins and the ease of digestion and high improvement in the balance of amino acids of the diet, which was reflected positively on Tissue and body growth (4). In addition, spirulina plays a fundamental role in promoting the health and immunity of the bird as chlorophyll, vicusianin, and carotenoids (such as beta-carotene) works as effective antioxidants that have the ability to restrict free radicals, and this limits the oxidative stress that chickens are exposed to, especially in thermal stress periods (5). Zeweil et.al.,(6) said that Spirulina has immunosuppressive properties, which increase the production of antibodies and improve the response of the cellular immune system, which was reflected in the decrease in the rate of sweeteners in the breeding herd and increasing the bird's resistance to epidemiological diseases in addition to that, the Spirulina has a positive effect on the quality of the meat, as well Unsaturated fatty and reduce cholesterol in most studies. spirulina represents a natural alternative with nutritional value in bright chicken, as it contributes integrated to improving productive performance, promoting healthy and immune condition and improving meat quality. Scientific research continues to explore the accurate mechanisms of its effectiveness and the optimum rates of addition to maximum economic and nutritional benefit.

The aim of the study: This study aims to evaluate the addition of the spirulina used in the manufacture of meat's chicken feed to the productive performance of chickens in pursuit

of food alternatives that enter poultry feed to support growth and improve productive efficiency and healthy poultry raising methods in order to reach modern scientific recommendations that greatly help in improving the dietary program for poultry.

Materials and methods

The experiment was conducted in the Poultry Research Hall, Department of Animal Production, College of Agriculture and Forests, Mosul University. The period included from November 5, 2024 to December 26, 2024. In this study the chicks were used as Ross₃₀₈ meat and with a number of (192) chickens and a preliminary weight rate (42.73) g for one chick where chicks were placed in pre -equipped incubators, each according to his treatment and at a temperature of 34 C° and the chickens were distributed randomly to 4 transactions at a rate of (48 chickens/ transaction) and for three replicate/ transaction and by 16 chickens per repetition and the transactions were as follows: T1 basal feed without additives, T2 continuous addition: feed with 2.5 g/ kg spirulina from start to end of T3 an early addition: feed and spirulina from a day to 21 days, T4 late addition: feed and spirulina from 22 days to end. The feed was presented to chickens according to a specific diet program consisting of two main stages: the first stage (1-15) days during which a dietary with a food specifications of 3012 K_{cal}/kg for energy and 22% for protein. The second stage (16 days-marketing) presented a prohibited diet that reached the value of the energy of 3122 K_{cal} of calories/kg and a protein content of 20%. The detailed composition and nutritional specifications of the basic feed and the additions used in Table (1) associated with this study which provides a complete analysis of the main food components and nutritional values of the reasons used in various study groups.

Table (1): Components and chemical composition of the starter and finisher rations were using in fattening of broiler chickens

Feedstuffs	Starter ration	Finisher ration
Yellow corn	46	47
Wheat	16	10
Soybean meal	30	36
Food oils	4	3
primix	2.5	2.5
Limestone	0.25	0.25
Salts	0.25	0.25
Calcium diphosphate	1	1
Total	100%	100%
Chemical composition		
Crude protein	20	22
Crude fiber	3.64	3.90
Lysine	1.07	1.22
Methionine	0.36	0.39
Methionine + cysteine	0.96	0.75
Calcium	0.59	0.61
Phosphate	0.37	0.37
Linolenic acid	2.13	1.94
Metabolic Energy	3122	2012

The chemical analysis of feedstuffs according by reported of NRC, (7).

Production traits studied as follow stages:

1. Average weekly weight gain of broiler chickens .

The weekly weight gain was calculated based on the difference between the weight at the end of the week and the weight at the beginning of the week according to the equation mentioned by (8), as follows:

The rate of weight gain (g) = Average body weight at the end of the week - Average live body weight at the beginning of the week.

2. Feed intake:

The amount of feed consumed per week was determined for each replicate by calculating the difference between the amount of feed remaining at the end of each week and the amount of feed provided at the beginning of the week (9). In replicates where

deaths occurred, the amount of feed consumed by chicks was taken into account (10).

3. Feed conversion ratio:

The feed conversion ratio was calculated based on the amount of feed consumed per kilograms required to achieve one kilogram of growth.

4. Mortality Percentage:

The mortality was recorded daily, with the frequency, number, time, and day of death specified in a special register. It was calculated as a percentage (9).

Production Index:

The production index is a production indicator used to compare broiler breeds based on meat

production. The measures were using to evaluate process at 5 weeks of age. Evaluation efficiency is primarily based on maximizing this index. The purpose of calculating the production index is to evaluate the efficiency of breeds and hybrids in production and marketing process (11).

Percentage of dressing and relative edible organ weights (%):

At 35 days of age the chickens were cut off from feed 6 hours before slaughter. Six chickens from each treatment (2 chickens/replicate) were slaughtered. The chickens were weighed before slaughter then slaughtered, carcasses were cleaned and their weights and the weights of the edible organs (heart, liver and gizzard) were recorded using a sensitive Chinese-made balance (8).

Relative weight of carcass cuts:

After slaughtering and preparation and cleaning carcass was cutting into major cuts (breast, thighs) and minor cuts (wings, neck, back). The cuts for each carcass were weighed separately by using an electronic balance with a sensitivity of (± 0.05) g (8).

Results and Discussion:

Table (2) shows the effect of adding spirulina powder for treatments at different ages of broiler chickens on average body weight. No significant differences were observed in the initial body weight between all study groups. However, the first and second weeks was observed a significant increase in weight of chicks for the second and third treatments compared to the chicks of the control and fourth treatments. As for the third and fourth weeks, the second treatment continued to outperform of control treatment. Once again, we observed a continued increase in live body weight where adding of the spirulina feed treatments compared to the control group.

Table (2). Effect of adding spirulina powder on the body weight of broiler chickens to 35 days of age

Treatments	Broiler ages					
	Initial weight (g).	First week (g)	Second week (g)	Third week (g)	Fourth week (g)	Final weight at 35 days (g)
First	0.33 ± 2.39a	157.97±1.15 c	± 384.10.46 b	780.89± 4.52 bc	1580.00±22.00 c	2110 ± 2.30 d
Second	42.74± 0.00a	176.2±0.75 a	1.19 397.78± a	799.26± 7.96 a	1684.67± 1.85a	2214 ±0.33a
Third	42.06± 0.33 a	166.06±0.84 b	400.31± 0.31a	791.66±4.59 ab	1629.67±11.28 b	2161 ± 5.03 b
Fourth	42.73± 0.03 a	158.41± 1.12 c	380.31± 0.37 c	772.91 ±3.37 c	1620.33±10.58 bc	2136± 2.64c

Different letters within a column indicate significant differences at level of ($P \leq 0.05$)

From observing of the results (Table 3) regarding of the weekly and total weight gain of broiler chickens we find highly significant differences in favor of the second and third treatments compared to the control in the first

week, as well as significant differences in favor of the third treatment at the second week. We find significant differences in favor of the second and fourth treatments compared to the first (control) treatment for the fourth

week and we did not find any significant differences in the third and fifth weeks for all treatments. As for the total weight gain rate we

find significant differences in favor of the last three treatments compared to the control treatment.

Table (3). Effect of adding spirulina powder on the body weight of broiler chickens to 35 days of age

Treatments	Weekly weight gains (g)					
	First week (g)	Second week (g).	Third week (g)	Fourth week (g)	Fifth week (g)	Total weight at 35 days (g)
First	115.58± 0.97c	226.14± 0.77 b	396.77± 4.33 a	799.11± 17.94 c	520.00± 4.00 a	2067.60± 2.02 d
Second	133.50± 0.77 a	221.54 ± 1.94 c	401.48± 7.58a	885.40± 6.11 a	530.00± 2.00a	2171.93± 0.33 a
Third	123.99± 0.77b	234.25± 1.21a	391.35± 4.28 a	838.00± 14.87bc	531.33± 6.38 a	2118.93 ± 4.83b
Fourth	115.68± 1.12 c	221.89± 0.81c	± 392.60 3.22a	847.42± 8.20 ab	515.66± 7.96 a	2093.27± 2.64 c

Different letters within a column indicate significant differences at level of ($P \leq 0.05$)

To know the effect of spirulina powder on the weekly feed consumption quantity and from discussing the results of Table (4), we find a significant decrease in favor of the fourth treatment compared to the first (control) for the first week. As for the second week, we find a significant increase in favor of the last three treatments compared to the control. In the third week, we find a significant increase in favor of the third treatment compared to the first. As for the fourth week was noticed a significant

decrease in favor of the second treatment compared to the first. In the fifth and final week. We find a significant increase in favor of the third and fourth treatments compared to the first and second. As for studying the characteristic of the total feed consumption quantity, we note a highly significant increase in favor of the third treatment compared to the rest of the treatments.

Table (4). Effect of adding spirulina powder on the weekly feed intake of broiler chickens to 35 days of age

Treatments	Feed intake (g/week)					
	First week (g)	Second week (g).	Third week (g)	Fourth week (g)	Fifth week (g)	Total feed intake at 35 days (g)
First	167.48± 3.46 ab	± 403.16 4.66 c	554.52± 0.51 b	1040.74 ± 4.15 ab	832.50 ± 1.29c	± 2998.42 10.49b
Second	173.17± 3.60a	± 436.50 0.00 a	567.02 ± 0.98 ab	986.33± 1.29 c	829.73 ± 1.31 c	2992.82 ± 10.91b
Third	157.40± 2.89 bc	428.50 ± 0.00 b	586.43± 15.15 a	1050.17± 1.11 a	± 882.45 2.61 a	3104.95± 17.82 a
Fourth	± 151.32 3.49c	421.16 ± 1.20 b	565.77 ± 0.70ab	1029.17± 1.22 b	839.54 ± 2.87 b	± 3006.98 10.72 b

Different letters within a column indicate significant differences at level of ($P \leq 0.05$).

To study the weekly and total feed conversion factor we note a significant decrease of this results (Table 5) in favor of the last three treatments compared to the control. As for the second week we find a significant increase in favor of the second and fourth treatments compared to the first and third treatments. In the fourth week we find a

significant decrease in favor of the second and fourth treatments compared to the first. As for the last week (the fifth) we find a significant increase in favor of the third treatment compared to the first. We did not find any significant differences in the third week, as well as the total feed conversion factor.

Table (5):Effect of adding spirulina powder at different ages on total feed conversion of broiler chickens to 35 days of age

Treatments	Feed intake (g/week)					
	First week (g)	Second week (g).	Third week (g)	Fourth week (g)	Fifth week (g)	Feed conversion at 35 days (g)
First	1.44 ± 0.04 a	1.10 ± 0.01 c	1.39± 0.01a	1.30± 0.03 a	1.57 ± 0.02 b	1.50 ± 0.06 ab
Second	1.29± 0.03	± 1.970.01 a	1.41± 0.02 a	1.11± 0.08 c	1.56± 0.06 b	1.47 ± 0.04 b
Third	1.26 ± 0.02 b	1.82 ± 0.09 c	1.49 ± 0.05 a	1.25 ± 0.02 ab	1.66± 0.02 a	1.50± 0.01 ab
Fourth	1.30 ± 0.02 b	1.89± 0.01 b	1.44± 0.01 a	1.21± 0.01 b	1.62± 0.02 ab	1.49 ± 0.06 ab

Different letters within a column indicate significant differences at level of (P≤0.05).

To know the effect of adding spirulina on the live body weight, carcass weight, dressing percentage and edible entrails of broiler chickens, we find of the results of Table (6) the presence of significant differences in favor of the second and third treatments compared to the

first and fourth for the live body weight and carcass weight. Moreover, we did not find any significant differences between four treatments for the dressing percentage and percentage of the liver, heart and gizzard.

Table (6):Effect of adding spirulina powder at different ages on live body weight, carcass weight, dressing dressing ratio and percentage of edible viscera of broiler chickens at age of 35 days

Treatments	Carcass characteristics					
	Body weight (g)	Carcass weight (g).	Dressing Ratio (%)	Liver (%)	Heart (%)	Gizzard (%)
First	43.68±2131 b	1558.33± 29.27 b	77.44± 1.69 a	1.88± 0.11 a	0.53± 0.03 a	1.84 ± 0.11 a
Second	2361.50 ± 35.01 a	1716.50 ± 32.78a	77.05± 1.15 a	1.98± 0.10 a	0.54± 0.03 a	1.82 ± 0.12 a
Third	2332.33± 37.90 a	1726.67 ± 13.65 a	78.66± 0.91 a	2.01± 0.11 a	0.58± 0.04 a	1.95 ± 0.22 a
Fourth	2116.50± 41.34 b	1538.17± 16.54b	77.03 ± 1.03 a	1.90 ± 0.87 a	0.52± 0.03 a	1.85 ± 0.12 a

Different letters within a column indicate significant differences at level of (P≤0.05)

Conclusions

Based of the results of this study we noticed increasing by improved production performance , weights and level of spirulina levels in broiler diets which led to percentages of some edible parts of broiler meat .compared to the control group

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