IMPROVING THE NUTRITIONAL VALUE OF WATER HYACINTH LEAVES (WHL) AND ADDING IT TO PROILER DIETS DURING DIFFERENT PERIODS AGE AND ITS EFFECTS ON THE PRODUCTIVE PERFORMANCE

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ABSTRACT

This study was conducted at the poultry farm, the Department of Animal Production, Shatrah Technical Institute , Southern Technical University for the period from 19/2/2021 to 1/4/2021 for (42 days), according to the results Prevous part of the study the best treatment for (WHL) powder was chosen and the replacement was level 6% instead for Wheat, and the best treatment for (WHL) powder treated with yeast (*Saccharomyces cerevisiae*) at level 12% instead of wheat, and the best treatment for (WHL) powder treated with Iraqi probiotics at level 12% instead of wheat. In two periods of 1-21 days and 22-42 days, the chicks were fed on a starter diets for 1-21 days of age and a finisher diets for 22-42 days of age for the purpose of determining the best rearing period and its impact on the productive performance for broilers. Seven treatments were used with Three replicates per treatment (10 bird's for replicate) in a floor hen house divided into enclosures of 1.25 x 1 m dimensions. The treatments were as follows: T1:Control without any replacement, T2: replacement (WHL) powder at a level 6% instead of wheat and for the period from 1-21 Day, T3 : replacement (WHL) powder treated with (Sc) yeast at a level 12% instead of wheat for a period of 1-21 days, T4: replacement (WHL) powder treated with Iraqi probiotics at a level 12% instead of wheat and for a period of 1-21 days, T5: replacement (WHL) powder at a level 6% instead of wheat and for the period from 22-42 days, T6: replacement (WHL) powder treated with (Sc) yeast at a level 12% instead of wheat and for the period from 22-42 days and T7: replacement (WHL) powder treated with Iraqi probiotics at a level 12% instead of wheat and for the period of 22-42 days. The results showed an improvement in live body weight, weight gain, feed consumption and food conversion ratio for all addition treatments compared with control also treatments T5,T6 and T7 recorded the best results in productive characteristics.

Keywords: water hyacinth. value improvement. productive performance. broilers. yeast. your probiotic
*** This paper is a paot of Ph.D dissertation Submittal by the 1st auther.**

مجلة العلوم الزراعية العراقية -2023 :54(6):1487-1496 **عبد الحسين وحمودي**

تحسين القيمة الغذائية لأوراق زهرة النيل (*Eichhornia crassipes*) واضافتها لعلائق فروج اللحم خلال فترات زمنية مختلفة وتأثيرها في الاداء الانتاجي.

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المستخلص

أجريت هذه الدراسة في حقل الدواجن التابع لقسم الانتاج الحيواني / المعهد التقني الشطرة / الجامعة التقنية الجنوبية للمدة من 2021/2/19 إلى 2021/4/1 لمدة 42 يوماً, على ضوء نتائج التجربة (1) اختيرت افضل معاملة لمسحوق الاوراق وكانت الاحلال بدل الحنطة بالنسبة 6% وافضل معاملة لمسحوق الاوراق المعامل بالخميرة الاحلال بدل الحنطة بالنسبة 12% وافضل معاملة لمسحوق الاوراق المعامل بالبروبايتك العراقي الاحلال بدل الحنطة بالنسبة 12% , ربي 210 فرخ غير مجنس من سلالة Ross 308 بعمر يوم واحد وبوزن ابتدائي 40–41 غم ربيت على فترتين من 1–21 يوم ومن 22–42 يوما غذيت الافراخ على عليقة بادئ لمدة 1–21 يوم من عمر الطير وعليقة نمو لمدة 22–42 يوماً من عمر الطير لغرض تحديد افضل فترة تربية وتأثيرها في الاداء الانتاجي لفروج اللحم اذ استخدمت سبعة معاملات بواقع ثلاث مكررات للمعاملة الواحدة وبعشرة افراخ للمكرر الواحد في قاعة تربية ارضية مقسمة الى اكنان ابعاد الواحد 1.25X 1 م, وكانت المعاملات كالاتي T1 Control خالية من اي احلال , 2T : احلال مسحوق اوراق زهرة النيل بالنسبة 6 % بدلا من الحنطة وللفترة من 1–21 يوم, 3T : احلال مسحوق اوراق زهرة النيل المعامل بخميرة الخبز بالنسبة 12 % بدلا من الحنطة وللفترة من 1–21 يوم , 4T : احلال مسحوق اوراق زهرة النيل المعامل بالبروبايوتك العراقي بالنسبة 12 % بدلا من الحنطة وللفترة من 1–21 يوم , 5T : احلال مسحوق اوراق زهرة النيل بالنسبة 6 % بدلا من الحنطة وللفترة من 22– 42 يوم , 6T : احلال مسحوق اوراق زهرة النيل المعامل بخميرة الخبز بالنسبة 12 % بدلا من الحنطة وللفترة من 22–42 يوم و 7T : احلال مسحوق اوراق زهرة النيل المعامل بالبروبايوتك العراقي بالنسبة 12% بدلا من الحنطة وللفترة من 22–42 يوم. اظهرت النتائج حصول تحسنا في وزن الجسم الحي, الزيادة الوزنية. استهلاك العلف ومعامل التحويل الغذائي لجميع معاملات الاضافة مقارنة بمعاملة السيطرة وسجلت المعاملات 2T و 6Tو 7Tافضل النتائج في الصفات الانتاجية .

الكلمات المفتاحية: زهرة النيل. تحسين القيمة. اداء انتاجي. فروج لحم. خميرة. بروبايوتك.
*** البحث جزء من اطروحة دكتوراه للباحث الاول .**

Received:2/12/2021 Accepted:2/3/2022

INTRODUCTION

Nutrition is an essential pillar of the poultry industry, as all the nutrients that the bird needs for its growth, production and reproduction are obtained from the balanced diet, which is one of the main factors for the success of this industry References. There are different primary feed materials that can be relied upon in providing various nutrients for the birds, but it is necessary to take into account their abundance in the local market on the one hand and the economic aspect on the other hand, taking into account the nutritional value of the ration (33). Given the large costs posed by nutrition in the production process of the poultry sector from an early age, researchers resorted to searching for alternative feed materials that are unconventional, available and cheap in order to reduce the cost of production to the minimum possible without causing negative effects on the growth and production of birds (8, 26, 38). Therefore, the use of alternatives to imported and high-priced materials, such as yellow corn and fodder wheat, will reduce the costs of diets Among these alternatives are the water hyacinth leaves (WHL), from which large quantities are available. The invasion of Iraqi waters has recently begun Reference, Which can be used in poultry feed after improving its nutritional value and making its components more available in addition to reducing the anti-nutrients present in it by treating it biologically by the fermentation process using both *Saccharomyces cerevisiae* and the Iraqi Probiotic. The water hycinth plant, *Eichhornia crassipes* (Mart.) Solms is considered an intruder on the Iraqi aquatic environment. The first appearance of this plant was recorded in Iraq in the mid-eighties of the last century on the basis of its use as an ornamental plant as it floats freely on the surface of the water, and is characterized by the beauty of its flowers, as this spread the plant is in several nurseries located on the banks of the Army Canal located in the east of Baghdad governorate, which flows into the nearby Diyala River, which flows into the Tigris River, and from this channel it gradually spread to the Diyala River and then the southern column of the Tigris River (4,17).What has helped the spread of this plant in Iraqi waters in recent years is the low water level for rivers and water bodies and the stagnation of water in Iraq, as the low water level and the lack of water movement help the expansion and spread of this plant in large areas and at a high growth rate (6). In view of the abundance of aquatic plants in the southern region and the lack of studies related to their use as alternatives in the ingredients of poultry diets, the current study aimed to know the efficiency of replacing the powder of the water hyacinth leaves and the powder fermented with (Sc) yeast and fermented with the Iraqi probiotic as non-traditional feed sources instead of the amount of fodder wheat in feeding broilers and during periods of time different, and its effect on the productive characteristics of broilers.

MATERIALS AND METHODS

This experiment was conducted at the poultry farm, Department of Animal Production , Shatrah Technical Institute , Southern Technical University for the period from 19/2/2021 to 1/4/2021. In this experiment 210 unsexed day old Ross 308 chicks . All the vaccinations were given to birds during the period from one day old to 42 day. The birds were housed in a house divided into pens, an area of each pen(1.25 x 1 m) and the replicates were distributed equally over the rooms. The house was ventilated using fans to air intake and was prepared the house was continuously lit for 23 hours/day and the water was available *ad libitum*. but the ration was weight and offered to the birds, as in experimental treatments to calculated feed consumption, live body weight, weight gain and feed conversion ratio, experiment treatments were as follow: T1:Control without any replacement, T2: replacement (WHL) powder at a level 6% instead of wheat and for the period from 1-21 Day, T3 : replacement (WHL) powder treated with (Sc) yeast at a level 12% instead of wheat for a period of 1-21 days, T4: replacement (WHL) powder treated with Iraqi probiotics at a level 12% instead of wheat and for a period of 1-21 days, T5: replacement (WHL) powder at a level 6% instead of wheat and for the period from 22-42 days, T6: replacement (WHL) powder treated with (Sc) yeast at a level 12% instead of wheat and for the period from 22-42 days and T7: replacement (WHL)

powder treated with Iraqi probiotics at a level 12% instead of wheat and for the period of 22-42 days. The birds were fed nutritional diets as shown in Tables 1 the experiment was carried out using a completely random design (CRD) and the averages were compared using Duncan's test(12).

Table 1. The ingredients and chemical composition of diets during starter and finisher period

Ingredients	(21-1) starter diets				(42-22) grower diets			
	T1	T2	T3	T4	T1	T5	T6	T7
Corn	47.80	47.80	47.80	47.80	53.00	53.00	53.00	53.00
Wheat	10.00	9.40	8.80	8.80	10.00	9.40	8.80	8.80
Soybean meal (48% C.P)	35.50	35.50	35.50	35.50	28.00	28.00	28.00	28.00
pure protein *	2.50	2.50	2.10	2.10	2.50	2.50	2.00	2.50
Corn oil	2.10	2.10	2.40	2.50	4.20	4.20	4.70	4.20
Di Calcium Phosphate**	0.60	0.60	0.70	0.60	1.00	1.00	1.00	1.00
limestone	0.90	0.90	0.90	0.90	0.60	0.60	0.60	0.60
Mixture of vitamins and minerals	0.30	0.30	0.30	0.30	0.50	0.50	0.50	0.50
salt	0.30	0.30	0.30	0.30	0.20	0.20	0.20	0.20
(WHL) powder	0	0.60	0	0	0	0.60	0	0
(WHL) with (Sc) yeast	0	0	1.2	0	0	0	1.2	0
(WHL) with Iraqi probiotic	0	0	0	1.2	0	0	0	1.2
Total	100	100	100	100	100	100	100	100
Calculated chemical composition ***								
Crude Protein%	23.25	23.27	23.46	23.42	20.33	20.11	20.26	20.40
ME Kcal/Kg feed	3021	3033	2020	3029	3200	3194	3216	3200
Lysine%	1.30	1.30	1.30	1.30	1.09	1.09	1.09	1.09
% Methionine	0.43	0.43	0.43	0.43	0.39	0.39	0.39	0.39
Cysteine%	0.37	0.37	0.37	0.37	0.35	0.35	0.35	0.35
Cysteine %+ Methionine	0.80	0.80	0.80	0.80	0.74	0.74	0.74	0.74
% Calcium	0.72	0.72	0.72	0.72	0.81	0.81	0.81	0.81
% Available phosphorous	0.32	0.32	0.32	0.32	0.41	0.41	0.41	0.41

*** Protein concentrate of Dutch origin Brocon-5 Special W contains 40% crude protein, represented energy 2107 kcal, lysine 3.85%, methionine 3.7%, methionine and cysteine 9.5%, crude fat 5%, crude fiber 2.2%, calcium 4.2%, phosphorous Available 4.68%.**

****Dicalcium phosphate contained 21.8% calcium and 18% phosphorous**

*****According to the chemical composition of the diet components, according to what was reported by the NRC for the year 1994.(27).**

RESULTS AND DISCUSSIONS

Chemical analysis of water hyacinth leaves (WHL).: The results of the laboratory analysis shown in Table (3) of (WHL) powder samples before and after fermentation by using 3 gm of (Sc) yeast /kg powdered (WHL) and 10gm of the Iraqi probiotic/kg powdered (WHL) showed a significant improvement in the nutritional value of the fermented leaf powder treatments compared to the raw powder, as it was found that there were high differences in the ratios of crude protein and ether extract in favor of the fermentation treatments. A high percentage of crude protein was observed in the treatment of fermented (WHL) with (Sc) yeast and Iraqi probiotics. The protein percentage was 41.7 and 39.1%, respectively. with unfermented (WHL) was 13.73%, as it was noted that the fermentation treatments with (Sc) yeast and Iraqi probiotics had the highest levels in the ether extract, recording 7.0 and 8.1%, respectively, compared to the unfermented powder 2.37%. The increase in the percentage of ash in the fermentation treatments of (Sc) yeast and Iraqi probiotic, which amounted to 9.2 and 10.3%, respectively, and this indicates the high mineral elements present in both treatments. While the unfermented raw (WHL) treatment recorded 6.63%. The results showed

a decrease in crude fiber percentage in the (Sc) yeast and Iraqi probiotic fermentation treatments, as it recorded 2.8 and 3.58%, respectively compared to 9.60% for raw leaf powder treatments compare. It was also found that the percentage of starch decreased for the

fermentation treatments with Iraqi probiotic and (Sc) yeast, and the percentages were 35.0 and 34.17%, respectively, when compared with the treatment of raw, unfermented (WHL) 60.48%. The microscopic used and produced as a result of fermentation processes consumes the carbohydrates (fibers) present in the (WHL) and converts them into nitrogenous compounds due to metabolic processes. Therefore, the percentage of protein in them increases while the level of fibers decreases in the fermented material (5).

Table 2. Chemical analysis of (WHL) powder before and after fermentation with (Sc) yeast and Iraq Probiotics on the basis of dry matter %.

Treatment	moisture %	Protein %	Ether extract%	Ash %	raw fiber%	NFE %	Total
water hyacinth leaves (WHL) powder	7.33	13.73	2.37	6.63	9.60	60.34	100
(WHL) powder fermented with (Sc) yeast	4.3	41.7	7.0	9.2	2.8	35.0	100
(WHL) powder fermented with Iraqi probiotics	4.75	39.1	8.1	10.3	3.58	34.17	100

*** The chemical analysis was carried out in the Environmental Laboratory of the Shatrah Technical Institute**

Productive and economic traits

1 –Live body weight

Table 3 indicates the effect of improving the nutritional value of the (WHL) added to the diets on the average weekly live body weight (gm), there were no significant differences between the experimental treatments in the first and second weeks, in the third week differences significant ($P\leq0.05$) in live body weight in favor of T3 transactivation and T4 compared to the rest of the treatments, In the fourth week, we notice that all addition treatments were significantly ($P\leq0.05$) superior to the control treatment that gave the lowest significant body weight compared to other treatments. In the fifth and sixth week treatment T6 recorded highest significant ($P\leq0.05$) in live body weight then T7 and T5 Compared to other treatments.

Table 3. Effect of improving the nutritional value of (WHL) added to diet at different periods on the average weekly live body weight for broilers during 1-6 weeks old

T	body weight					
	first week	second week	third week	fourth week	fifth week	sixth week
T_1	1.69 ± 164.33	0.90 ± 505.20	1033.23 ± 3.41 d	1650.33 ± 6.06 b	2310.66 ± 3.38 d	2981.10 ± 1.49 e
T_2	3.32 ± 162.83	6.04 ± 512.13	1126.66 ± 1.85 b	1759.66 ± 1.20 a	2393.56 ± 1.94 c	3050.20 ± 5.77 d
T_3	1.74 ± 161.16	5.95± 514.40	1151.06 ± 3.22 a	1761.36 ± 0.87 a	2403.33 ± 8.81 c	3083.03 ± 2.53 c
T_4	1.42 ± 161.66	3.82± 513.53	1140.46 ± 2.92 a	1760.10 ± 1.46 a	2397.00 ± 1.73 c	3068.80 ± 5.77 cd
T_5	0.86 ± 160.50	2.48± 510.63	1040.53 ± 6.24 cd	1762.66 ± 1.45 a	2481.46 ± 1.77 b	3191.06 ± 2.01 b
T_6	2.57 ± 163.90	1.11 ± 511.20	1045.33 ± 3.84 c	1763.90 ± 0.66 a	2501.53 ± 4.51 a	3240.66 ± 1.76 a
T_7	0.28 ± 162.50	1.04 ± 509.50	1043.26 ± 0.93 cd	1762.13 ± 1.93 a	2490.56 ± 1.44 ab	3210.16 ± 15.16 b
Sig	N.S	N.S	*	*	*	*

T1:Control without any replacement, T2: replacement (WHL) powder at a level 6% instead of wheat and for the period from 1-21 Day, T3 : replacement (WHL) powder treated with (Sc) yeast at a level 12% instead of wheat for a period of 1-21 days, T4: replacement (WHL) powder treated with Iraqi probiotics at a level 12% instead of wheat and for a period of 1-21 days, T5: replacement (WHL) powder at a level 6% instead of wheat and for the period from 22-42 days, T6: replacement (WHL) powder treated with (Sc) yeast at a level 12% instead of wheat and for the period from 22-42 days and T7: replacement (WHL) powder treated with Iraqi probiotics at a level 12% instead of wheat and for the period of 22-42 days.

***N.S indicates that there are no significant differences between the averages of the transactions. * The different letters within the same column indicate that there are significant differences between the treatments at the 0.05 . probability level**

2- Weight gain

Table 4 indicate the effect of improving the nutritional value of (WHL) added to the diet at different periods in the weekly and cumulative weight gain rate there were no significant differences between the treatments in the first week, while in the second week, all treatments were significantly(P≤0.05)overlapped, while in the third week significant increase (P≤0.05) occurred for the treatments T3, T4 and T2 in comparison with the experimental treatments,. The treatments T5,T6 and T7 recorded significant increase(P≤0.05) in weight gain compared with other treatments during the fourth , fifth , sixth weeks and in cumulative period treatment T6 recorded highest significant (P≤0.05) in weight gain then T7 and T2 Compared to other treatments.,

Table 4. Effect of improving the nutritional value of (WHL) added to diet at different periods on the average weekly of weight gain for broilers during 1-6 weeks old

T	weight gain						
	first week	second week	third week	fourth week	fifth week	sixth week	Cumulative 0 - 6
T_1	± 124.20 1.21	± 340.862.38 b	±528.03 4.23 c	± 617.106.60 c	660.33± 7.35 c	±670.433.56 c	±2940.96 1.97 e
T_2	± 122.43 3.72	± 349.304.22 ab	± 614.536.53 b	± 633.003.05 b	± 633.83 3.13 d	± 656.634.81 c	± 3009.805.37 d
T_3	± 120.931.27	4 ±353.23 .41 a	3± 636.66.14 a	± 610.302.41 c	642.96± 9.64 d	± 679.707.37 c	± 3042.802.75 c
T_4	± 121.601.45	± 351.862.96 a	± 627.935.54 ab	3± 620.63.24 bc	637.90± 3.02 d	671.80± 6.85 c	± 3028.735.94 cd
T_5	± 120.801.40	350.13± 2.16 ab	± 530.905.27 c	±722.13 6.89 a	± 718.802.04 b	± 709.60 2.21 b	3151.36± 1.29 b
T_6	± 123.502.56	± 347.30 2.22 ab	534.13 ± 4.06 c	± 718.563.74 a	737.63 ± 5.17 a	± 739.134.56 a	3200.26 ± 1.84 a
T_7	122.20 ±0.26	347.00± 1.15 ab	533.76± 0.39 c	± 719.862.31 a	1± 728.43.14 ab	± 719.6014.90 ab	± 3169.8626.99 b
Sig	N.S	*	*	*	*	*	*

T1:Control without any replacement, T2: replacement (WHL) powder at a level 6% instead of wheat and for the period from 1-21 Day, T3 : replacement (WHL) powder treated with (Sc) yeast at a level 12% instead of wheat for a period of 1-21 days, T4: replacement (WHL) powder treated with Iraqi probiotics at a level 12% instead of wheat and for a period of 1-21 days, T5: replacement (WHL) powder at a level 6% instead of wheat and for the period from 22-42 days, T6: replacement (WHL) powder treated with (Sc) yeast at a level 12% instead of wheat and for the period from 22-42 days and T7: replacement (WHL) powder treated with Iraqi probiotics at a level 12% instead of wheat and for the period of 22-42 days.

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3- Weekly feed consumption

Table 5 indicate the effect of improving the nutritional value of (WHL) added to the diet at different periods on the average weekly and total feed consumption at the age (1-6) weeks. there were no significant differences between the experimental treatments in the first and second weeks, In the third week, treatments T2, T3 and T4 recorded the highest significant increase (P≤0.05) in feed consumption compared with the other treatments, which did not differ significantly between them, in the fourth week, all treatment recorded the highest significant increase (P≤0.05) in the rate of feed consumption and significantly outperformed the control treatment was less significant (P≤0.05) in Feed consumption rate. At fourth , fifth and sixth weeks and in cumulative period treatment T6 recorded highest significant (P≤0.05) then T7 and T5 Compared to other treatments.

Table 5. Effect of improving the nutritional value of (WHL**) added to diet at different periods on the weekly feed consumption (gm) for broilers during 1-6 weeks old**

T	weekly feed consumption ratio 1	2	3	4	5	6	Cumulative 0 - 6
T_1	± 126.333.22	± 384.80 3.60	± 643.732.40 c	± 916.33 3.17 c	± 1010.005.19 d	± 1210.06 5.83 d	± 4291.26 11.35 e
T_2	± 127.531.44	± 392.46 1.81	± 663.663.52 a	± 926.764.39 b	± 1018.131.04 cd	± 1213.332.40 cd	± 4341.90 7.05 d
T_3	± 129.87 2.14	± 394.53 2.78	± 670.00 3.21 a	± 935.00 2.88 ab	± 1023.66 4.70 c	± 1234.16 2.11 b	± 4387.238.49 c
T_4	± 122.930.54	394.70 ± 3.88	± 665.661.76 a	± 931.33 4.66 ab	± 1021.333.84 c	1221.66± 2.18 c	± 4357.638.50 d
T_5	± 126.602.61	± 388.131.39	± 646.862.07 bc	± 936.93 2.25 ab	± 1060.731.18 b	± 1242.101.15 ab	± 4401.36 4.12 bc
T_6	±125.46 2.66	± 391.66 3.75	± 653.93 2.65 b	± 940.463.01 a	± 1081.561.71 a	± 1246.76 1.29 a	± 4439.86 7.71 a
T_7	± 124.260.69	± 390.604.96	± 650.00 2.30 bc	± 937.332.18 ab	± 1066.032.11 b	1245.10 ± 4.05 a	± 4413.336.05 b
Sig	N.S	N.S	*	*	*	*	*

T1:Control without any replacement, T2: replacement (WHL) powder at a level 6% instead of wheat and for the period from 1-21 Day, T3 : replacement (WHL) powder treated with (Sc) yeast at a level 12% instead of wheat for a period of 1-21 days, T4: replacement (WHL) powder treated with Iraqi probiotics at a level 12% instead of wheat and for a period of 1-21 days, T5: replacement (WHL) powder at a level 6% instead of wheat and for the period from 22-42 days, T6: replacement (WHL) powder treated with (Sc) yeast at a level 12% instead of wheat and for the period from 22-42 days and T7: replacement (WHL) powder treated with Iraqi probiotics at a level 12% instead of wheat and for the period of 22-42 days

***N.S indicates that there are no significant differences between the averages of the transactions. * The different letters within the same column indicate that there are significant differences between the treatments at the 0.05 . probability level**

4-Feed conversion ratio

Table 6 indicate the effect of improving the nutritional value of (WHL) added to the diet at different periods on the weekly and total food conversion factor at the age (1-6) weeks, there were no significant differences between the treatments during the first and second weeks, while in the third week a significant increase occurred for the treatments T2,T3 and T4 in comparison with the experimental treatments. In the fourth, fifth and sixth week a significant increase occurred for the treatments T5, T6 and T7 in comparison with the experimental treatments, in the feed conversion ratio. In total, all treatments for improving the nutritional value of (WHL) added to the diet recorded the best nutritional conversion ratio compared to the control treatment.

Table 6. Effect of improving the nutritional value of (WHL) added to diet at different periods on the weekly feed conversion ratio for broilers during 1-6 weeks old

T	feed conversion ratio Weekly 1	2	3	4	5	6	mean
T1	±1.017 0.029	±1.1280.002	± 1.2190.013 a	0± 1.485.013 bc	±1.5290.019 b	0±1.804.001 ab	1.459 ± 0.003 a
T2	±1.0440.043	±1.1230.008	± 1.0800.016 b	±1.4640.011 c	±1.606 0.008 a	0±1.848.009 a	1.443± 0.003 c
T3	±1.0730.015	0±1.117.006	± 1.0520.008 b	±1.5320.008 a	±1.5950.017 a	±1.8160.022 a	1.442± 0.004 b
T4	±1.0110.015	±1.1220.017	± 1.0620.010 b	± 1.5000.011 ab	±1.6060.013 a	±1.8180.019 a	1.439 ± 0.0004 bc
T5	±1.0470.009	±1.1080.003	± 1.2210.015 a	0± 1.297.013 d	±1.4750.002 c	±1.7500.006 bc	1.397± 0.001 bc
T6	±1.0170.035	±1.1270.003	± 1.2240.014 a	±1.3080.004 d	±1.4660.012 c	±1.6860.009 d	1.387± 0.0016 bc
T7	±1.016 0.004	±1.1250.017	± 1.2170.004 a	± 1.3030.005 d	±1.4630.003 c	±1.7320.040 cd	1.392± 0.008 bc
Sig	N.S	N.S	*	*	*	*	*

T1:Control without any replacement, T2: replacement (WHL) powder at a level 6% instead of wheat and for the period from 1-21 Day, T3 : replacement (WHL) powder treated with (Sc) yeast at a level 12% instead of wheat for a period of 1-21 days, T4: replacement (WHL) powder treated with Iraqi probiotics at a level 12% instead of wheat and for a period of 1-21 days, T5: replacement (WHL) powder at a level 6% instead of wheat and for the period from 22-42 days, T6: replacement (WHL) powder treated with (Sc) yeast at a level 12% instead of wheat and for the period from 22-42 days and T7: replacement (WHL) powder treated with Iraqi probiotics at a level 12% instead of wheat and for the period of 22-42 days.

***N.S indicates that there are no significant differences between the averages of the transactions. * The different letters within the same column indicate that there are significant differences between the treatments at the 0.05 . probability level**

The significant increase in the productive traits (Tables 3, 4, 5 and 6) are all for the addition treatments (T5,T6 and T7) means that the feed additions in the second period (22-42) day the birds responded better to it, because the digestive system for birds, it is fully completed in the period after 21 days, and thus the utilization of the feed item will be better than if the transactions were given in the first period of 1-21 days . The significant increase in all the productive characteristics of the addition treatments in the second period of life (22-42) days, especially for the fermentation of the leaves powder with (Sc) yeast, can be attributed to the role of (Sc) yeast in improving the nutritional value of the leaf powder during the fermentation process on the one hand and to the components produced by the yeast after fermentation, including , peptides, alcohols, esters and organic acids on the other hand (38,26), which change the composition of the medium after fermentation, The increase in feed consumption and the improvement in the health status of birds are attributed to fermentation products, which include growth factors such as vitamins and micronutrients that stimulate animal growth (9,32) or the improvement may be due to the active role of yeast, which is attributed to its ability to Participation in highlighting many characteristics, the most important of which are :- (13)

1- Preventing harmful microbes from attaching to the intestinal cells of birds.

2- Improving the digestion of feed and strengthening the beneficial microorganisms in the gastrointestinal tract.

3- Enhancing the activity of digestive enzymes.

4- The effect of an immune stimulant and to enhance the immune response of birds.

5- Tolerance of high acidity and resistance to bile salts.

6- Improving the morphological structure of the intestine (31).

7- Direct antagonistic effect on harmful intestinal bacteria and other yeasts and inhibiting their formation and action (28,30).

8- Improving the organoleptic characteristics and quality of meat of birds and animals (2,19, 22).=

9- Decrease in the proportion of cholesterol and albumin in the blood serum.

10- Increasing the levels of nutritional yeast in the fattening rations did not have any adverse effects on the performance of birds until an addition level of 1% of the weight of the diets (3).

In vitro analyzes of yeast (Sc) have shown that five minor metabolites or micro-components of yeast can be identified: sucrose, inositol, glycine, fructose and galactose. The efficacy of yeast may be related to its composition and content of these active ingredients (36). The effect of yeast is not a function of a single substance, but the nutritional and health effect of these components together (29). In addition to the effect of the main substance it worked on (WHL) and changed its original components by increasing the active substances and reducing harmful substances in them, the role played by (Sc) yeast may be in reducing the proportions of nutritional inhibitors present in the leaves such as Phytate, Oxalate, Cyanide, Saponin and Total alkaloids as a result of its fermentation and the effect of yeast (7), yeast and other types of beneficial bacteria also play an important role in improving the quality of food when fermented with it. Therefore, these activities and activities carried out by yeast can be widely used to improve the nutritional value of farm animal feed, especially Traditional poultry or rough feed, which may have a role in the future. As for the treatment of (WHL) fermentation with Iraqi probiotics, the reason for the improvement in the characteristics of productive performance may be that broilers fed on forage containing probiotics in the forage or in a fermented form showed a significantly higher activity of two degrading enzymes associated with modifying the intestines and stimulating immunity, a-galactosidase and b-galactosidase, meaning that the feed containing probiotics has many benefits, including modification of the intestinal ecosystem with probiotic components, interaction with native microorganisms, increased feed consumption and improvement in the general health of birds (11) and that probiotics (during the fermentation process) can play a role in enhancing the beneficial effects of secondary

metabolites of one or all of (WHL)or counteracting the more negative aspects of some metabolites through fermentation activities that remove certain toxins from some chemical structures, Thus, the benefits of probiotics can be inferred by a significant improvement in all productive traits and immunological (20,21) and probiotics are often added to poultry feed to increase feed consumption and enhance the active substances present in the feed (14), The efficacy of probiotics may lie through positive effects on gastrointestinal anatomical characteristics, gut microbial populations, nutrient absorption, gut wall function, antioxidant capacity, and immune response, ultimately enhancing digestive health and productive performance of broilers (10,15,34,39), or the effectiveness of probiotics in poultry and farm animals in general may be through increased body weight, feed consumption, weight gain, improved feed conversion factor and health status, or raising the immune response and reducing stress and mortality during some critical production periods, such as food stress (diet change, rich food rations with concentrates) and health stress (eg animal density and other factors) (37,40). As for the treatment of adding leaf powder also gave an improvement in all productive characteristics compared to the control treatment and this could be due to the fact that the biologically active compounds present in the leaf powder, which are alkaloids, flavonoids, phenols, essential oils and polyphenols (23) natural ones contain antibacterial, antiviral and anti-inflammatory and have important effects as they expand blood vessels (25), and it proved its effectiveness in improving the general health of birds, improving metabolic processes and facilitating the processes of digestion and absorption in the bird's body, which was reflected in the increase in the rate of live body weight and consequently the high rate of weight gain of birds, where there is a positive correlation coefficient between the percentage of digestion, body weight and the amount of feed intake (1). The increase in live body weight and weight gain is due to an improvement in the feed conversion factor due to the effect of antioxidants (36) or antimicrobials (18) and other phenolic compounds in the leaf powder. Or it could be because the plant leaves contain large levels of the three main unsaturated fatty acids (linolenic, linoleic and palmitic) that are often found in most plants ,they are essential fatty acids in the nutrition of monogastric animals and the birds' body cannot manufacture them, so they must be obtained from feed (16,24,35).

C0NCLUSION

The (WHL) fermented with (Sc) yeast treatment achieved the highest productivity rate when replacing the fodder wheat, followed by the fermentation treatment with the probiotic, followed by (WHL) treatment in the second period of the chicks' lifespan (22-42 days).

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