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Adding lactic acid bacteria to local sunflower meal used in broiler feed and its effect on production performance.

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ABSTRACT

The current experiment was conducted in the poultry field of the department of animal production at the College of Agriculture - University of Kirkuk for the period from 22/2/2024 until 4/4/2024, to study the effect of improving the nutritional value of local sunflower seed meal used in broiler diets by adding a lactic acid bacteria and its effect on production traits. 280 one-day-old, unsexed Rose 308 broiler chicks were randomly distributed into seven treatments, with four replicates for each treatment (ten birds for each replicate). The treatments were as follows: (T1) the control diet without any additives, (T2) 25% of the soybean meal replaced with sunflower meal, (T3) 50% of the soybean meal replaced with sunflower meal, (T4) 75% of the soybean meal replaced with sunflower meal, (T5) 25% of the soybean meal replaced with sunflower meal and the lactic acid bacteria added, (T6) 50% of the soybean meal replaced with sunflower meal with the addition of the lactic acid bacteria and (T7) 75% of the soybean meal with sunflower meal with the addition of the lactic acid bacteria. The results showed Significant differences ($P \geq 0.05$) in the treatments (third, fourth, sixth and seventh) in the feed consumption rate and no significant differences in the nutritional treatments (first, second and fifth) in the weight gain rate, and in the cumulative week for the feed conversion treatment, the results showed no significant differences ($P \leq 0.05$) between the treatments (third, fourth, sixth and seventh), and as for the carcass weight, the first, second, third, fifth and sixth treatments were significantly superior to the fourth and seventh treatments. The relative weight of the gizzard, the fourth treatment, was significantly superior ($P \leq 0.05$) to the rest of the nutritional treatments, unlike the relative weight of the breast, which showed a significant difference ($P \geq 0.05$). The results of the study showed that there were no significant differences ($P \leq 0.05$) in the relative weight of the liver, heart, thigh, back, wings and neck.

***Keywords*:** Nutritional value, Sunflower, Broiler, lactic acid bacteria, Productive performance..

INTRODUCTION

The vital functions in the body of birds need nutritional supplements such as vitamins, minerals, and essential amino acids, through which growth, absorption, and food metabolism are improved. They also work as antibacterial agents [1]. There are natural food additives called photo enhancers, such as plant parts (bark, leaves, shrubs and seeds), that have taken a distinguished position in the field of practical scientific research related to animal production in order to reduce or limit the use of antibiotics as growth stimulants [2,3]. One of the crops that produces ornamental seeds is sunflower plants, which are grown in many countries worldwide due to their tolerance and adaptation to different climatic conditions and agricultural soils [4,5]. The protein produced from the peeled sunflower plant cake is considered to be an excellent protein because it contains the same essential amino acids found in soybean cake, but it is opposite in its content of lysine and methionine [5,6]**.** The addition of lactic acid bacteria works to cause Microbial balance in the digestive system that leads to an increase in the number of beneficial bacteria, inhibiting the growth of pathogenic bacteria and enhancing vital immunity [7,8], as beneficial bacteria and lactic acid bacteria work to secrete digestive enzymes that support the work of internal enzymes in digesting food compounds by increasing the length of the villi and the apparent surface area, which increases the absorption rate [9,10]. This study aimed to determine the effect of partial replacement of the protein of peeled sunflower meal instead of the protein of soybean meal on production performance by adding lactic acid bacteria as a vital enhancer.

Materials and methods

This study was conducted in the poultry field of the Animal Production Research Unit/College of Agriculture/University of Kirkuk. The experiment extended from 2/22/2024 to 4/4/2024 for 42 days of field work, improving the nutritional value of local sunflower cake used in broiler feed by adding lactic acid bacteria and their effect on production performance. In the first experiment, 280 chicks were used, and in the second experiment, 280 one-day-old unsexed 308ROS broiler chicks were used, with an initial weight of 42 grams. The chicks were obtained from the Rife Private Hatchery, Erbil-Kirkuk Governorate Road. These chicks were raised on the floor in a semi-closed hall using 28 floor cages, and in the second

experiment, 28 floor cages with dimensions (90 x 200 cm) on a bed of white sawdust. The hall was equipped with two air extractors. In the first experiment, the chicks were randomly distributed into seven treatments, with four replicates for each treatment, and 10 birds for each replicate. The replicates were randomly distributed starting from the first day of age. In the second experiment, the chicks were randomly distributed into seven treatments, with four replicates for each treatment, and 10 birds for each replicate. The replicates were randomly distributed starting from the first day of age. The chicks were fed during the period from 1-21 days on the starter diet, which contained 23% protein and 3000 kilocalories/kg of metabolized energy, and on the growth diet for the period from 21-42 days, which contained 521.7% protein and 3097.76 kilocalories/kg of metabolized energy, and on the final diet for the period from 25-42 days, which contained 19.84% protein and 3210.22 kilocalories/kg of metabolized energy. The experimental treatments were as follows: (4 replicates for each treatment, 10 birds/replicate) T1: control diet without any additives, T2: comparison diet with 25% replacement of soybean meal with sunflower cake, T3: comparison diet with 50% replacement of soybean meal with sunflower cake, T4: comparison diet with 75% replacement of soybean meal with sunflower cake, T5: comparison diet with 25% replacement of soybean meal with sunflower cake and lactic acid bacteria added, T6: comparison diet with 50% replacement of soybean meal with sunflower cake and lactic acid bacteria added, T7: comparison diet with
75% replacement of soybean meal with sunflower cake and lactic acid bacteria added.

The amount of feed consumed was calculated based on the following equation: Total feed consumed = Feed added at the beginning of the period - Feed remaining at the end [29]

The food conversion ratio is according to the following equation: Food conversion ratio = Feed intake (g) / Weight gain (g)[30]

Weight gain rate during the same period (g)

The weekly weight gain is according to the following equation: Weekly weight gain = Live body weight at the end - Live body weight at the beginning.

Carcass weight and cuts

The carcass is subject to the following treatment: Relative weight of carcass parts = (Part weight / Carcass weight) × 100 [30]

The relative weight of the eaten internal organs is according to the following treatment: Carcass piece ratio% % = (Organ weight (g) / Carcass weight (g)) × 100 [30]

The results were analysed statistically using the SAS program [11] and the Duncan test [12] to test the significance between the coefficients at the 5% probability level.

Table 1. Proportions of feed materials for experimental treatment diets with calculated chemical composition

Experimental treatment diets for broilers during the rearing stage from (1-21) days							
Feed material %	T1	T2	T3	T4	T5	T6	T7
Crushed wheat	21	21	21	21	21	21	21
Crushed corn	36	36	36	36	36	36	36
Soybean meal (47%)	37	27.75	18.5	9.25	27.75	18.5	9.25
Sunflower	———	9.25	18.5	27.75	9.25	18.5	27.75
BHT	———	———	———	———	0.10	0.10	0.10
Vegetable oil	3	3	3	3	3	3	3
Limestone	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.15	0.15	0.15
Bromix - 2.5% Bromix	2.5	2.5	2.5	2.5	2.5	2.5	2.5
TOTAL	100	100	100	100	100	100	100
Calculated chemical analysis							
Representative energy (kcal/kg feed)	3069	3062	3055	3047	3062	3055	3047
Crude protein (%)	24.44	24.5	24.5	24.5	24.5	24.5	24.5
Calcium (%)	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Available phosphorus (%)	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Methionine (%)	0.57	0.60	0.61	0.62	0.60	0.61	0.62
Lysine (%)	0.37	0.18	0.99	0.80	0.18	0.99	0.80
Experimental treatment diets for broilers during the rearing stage from (21-42) days.							
Feed material %	T1	T2	T3	T4	T5	T6	T7
Crushed wheat	15	15	15	15	15	15	15
Crushed corn	48	48	48	48	48	48	48
Soybean meal (47%)	31	23.25	15.5	7.75	23.25	15.5	7.75
Sunflower	——	7.75	15.5	23.25	7.75	15.15	23.25
BHT	———	———	———	———	0.10	0.10	0.10
Vegetable oil	3	3	3	3	3	3	3
Limestone	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.15	0.15	0.15

Bromix - 2.5% Bromix	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Total	100	100	100	100	100	100	100
Calculated chemical analysis							
Representative energy (kcal/kg feed)	3160	3153	3146	3138	3153	3146	3138
Crude protein (%)	22.10	22.16	22.16	22.16	22.16	22.16	22.16
Calcium (%)	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Available phosphorus (%)	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Methionine (%)	0.40	0.43	0.44	0.45	0.43	0.44	0.45
Lysine (%)	1.11	1.08	1.12	1.14	1.08	1.12	1.14

a) According to the chemical composition of feed materials based on what was stated in the US National Research Council [13].

Results

The results in Figure 2 show the improvement of the nutritional value of local sunflower cake used in broiler diets by adding lactic acid bacteria in feed consumption (g/bird), weight gain (g/bird) and feed conversion ratio (g feed/g weight gain) of broiler chickens during the 42-day experimental period. The statistical analysis showed a significant difference ($p \leq 0.05$) in the total feed consumption as a result of substituting partially and completely peeled sunflower meal (25, 50 and 75% De-hulled sunflower meal) for soybean meal in the second, third and fourth treatments, respectively, compared to the control treatment (free of additives). The total feed consumption amounted to (4346.42, 4201.40, 4042.15 and 3625.58) g/bird, respectively. Due to the effect of adding lactic acid bacteria to the feed, a significant difference ($p \leq 0.05$) was observed in the weekly and total feed consumption by birds as a result of adding lactic acid bacteria compared to the treatment free of additives (control treatment) at the substitution level (25, 50 and 75% De-hulled sunflower meal) with the addition of lactic acid bacteria compared to the control treatment. The highest feed consumption was recorded by birds in the partial replacement treatment (25% De-hulled sunflower meal) containing the probiotic (4240.00 g feed/bird). As for weight gain, the second replacement treatment (25% De-hulled sunflower meal) gave weekly and total weight gains close to the control treatment and reached (2797.69 and 2821.39) g/bird, respectively. While the average weekly and total weight increases differed significantly ($p \leq 0.05$) when the replacement ratios increased in the third (50% De-hulled sunflower meal) and fourth (75% De-hulled sunflower meal) treatments, they reached 2166.48 and 1914.98 g/bird, respectively. Regarding the effect of adding lactic acid bacteria to the feed, a significant improvement ($p \leq 0.05$) was observed in the weight gain of the fifth treatment (25% De-hulled sunflower meal) for the total and weekly increases, except for the first week, as a result of adding lactic acid bacteria compared to the treatment without the addition, where the total weight gain reached (2853.80 g/bird). As for the feed conversion ratio, it is clear from the results of the statistical analysis that the second substitution treatment (25% De-hulled sunflower meal) is equivalent to the control treatment in its weekly and total feed conversion ratio. In comparison, a significant difference ($p \leq 0.05$) was observed in the same trait with increasing the substitution level to (50 and 75% De-hulled sunflower meal) in the third and fourth treatments compared to the control treatment. The total feed conversion ratio reached (1.21, 1.50, 1.85 and 1.89) g feed/g weight gain. As for the effect of adding lactic acid bacteria to the feed, the results of the statistical analysis showed a significant difference ($p \leq 0.05$) for lactic acid bacteria in the total feed conversion ratio when added to the treatments of sunflower seed meal at levels (25%) compared to the substitution level (50% De-hulled sunflower meal) and (75% De-hulled sunflower meal) with Addition of lactic acid bacteria amounted to (1.48 g feed/g weight gain).

Table 2: The effect of improving the nutritional value of local sunflower meal by adding lactic acid bacteria to the feed on the rate of feed consumed (FI) (kg), weight gain (WG) (g) and feed conversion (FCR) (g feed/g weight gain) for Ross308 broilers (mean ± standard error).

Traits		W1	W2	W3	W4	W5	W6	W7	Sig.
T1	FI	144.00±0.00 a	144.00±0.00 a	144.00±0.00 a	144.00±0.00 a	144.00±0.00 a	144.00±0.00 a	144.00±0.00 a	N.S.
	WG	123.12±0.87 a	123.81±0.80 a	123.64±0.88 a	123.70±0.79 a	124.05±0.30 a	124.81±0.27 a	123.96±0.26 a	N.S.
	FCR	1.16±0.007 b	1.16±0.008 b	1.16±0.007 b	1.16±0.008 b	1.17±0.007 b	1.15±0.008 b	1.16±0.006 b	N.S.
T2	FI	363.82±6.91 a	327.95±2.05 b	311.58±4.51 c	299.66±2.22 c	331.14±2.12 b	320.08±6.16 c	311.41±1.51 C	*
	WG	322.94±6.21 a	320.24±5.92 a	271.96±5.40 b	199.30±3.18 c	329.85±1.52 a	275.29±2.54 b	206.16±5.77 c	*
	FCR	1.12±0.03 b	1.02±0.02 c	1.14±0.02 b	1.50±0.03 a	1.00±0.004 d	1.16±0.02 b	1.52±0.01 a	*
T3	FI	573.30±12.18	545.91±3.41	521.97±7.51	476.41±13.64	552.23±3.53	532.82±10.28	490.51±3.63	*

		a	b	c	c	b	c	c	
	WG	449.30±10.7 a	444.55±9.40 a	324.55±8.42 b	305.88±6.00 c	463.80±1.69 a	345.16±1.28 b	318.28±0.32 c	*
	FCR	1.27±0.03 b	1.22±0.03 b	1.60±0.03 a	1.55±0.04 a	1.19±0.005 b	1.54±0.03 a	1.54±0.03 a	*
	FI	849.33±17.46 a	797.40 ±4.99 b	762.41±10.98 c	677.34±14.80 c	804.17±5.15 b	777.27±15.03 c	691.68±20.27 c	*
T4	WG	502.93±3.73 a	498.80±3.08 a	395.18±7.31 b	389.71±15.05 c	497.54±1.83 a	394.24±11.22 b	313.56±13.66 c	*
	FCR	1.68±0.04 c	1.59±0.008 c	1.92±0.04 b	1.73±0.06 b	1.61±0.006 c	1.97±0.005 a	2.20±0.03 a	*
	FI	1141.80±10.73 a	1173.64±7.33 b	1123.07±16.17 c	999.58±22.83 c	1185.09±7.60 b	1144.44±22.14 c	1004.08±37.05 c	*
T5	WG	739.90±11.25 a	733.74±9.66 a	585.99±27.11 b	463.59±14.09 c	752.23±2.75 a	590.16±37.09 b	469.72±25.15 c	*
	FCR	1.54±0.01 b	1.59±0.01 b	1.91±0.22 a	2.15±0.09 a	1.57±0.007 b	1.93±0.03 a	2.13±0.01 a	*
	FI	1278.18±7.08 a	1216.55±7.60 b	1163.14±16.75 c	1034.60±11.96 c	1228.43±7.87 b	1187.33±22.93 c	1048.18±1.15 c	*
T6	WG	686.22±5.78 a	681.56±4.61 a	585.20±15.50 b	436.90±7.09 c	686.37±2.15 a	511.82±18.89 b	455.22±11.35 C	*
	FCR	1.86±0.02 b	1.78±0.007 c	1.98±0.08 a	2.36±0.06 a	1.78±0.008 c	2.31±0.01 a	2.30±0.07 a	*
	FI	4346.42±24.83 a	4201.40±25.39 b	4024.15±55.93 c	3625.58±26.27 c	4240.00±26.27 b	4104.93±76.53 b	3684.82±47.71 C	*
T7	WG	2821.39±37.23 a	2797.69±30.20 a	2166.48±45.01 b	1914.98±30.31 c	2853.80±10.63 a	2238.50±48.66 b	1982.82±24.85 c	*
	FCR	1.21±0.01 c	1.50±0.009 b	1.85±0.05 a	1.89±0.03 a	1.48±0.005 b	1.83±0.08 a	1.85±0.04 a	*

*Different letters within one column indicate presence of significant differences ($p \leq 0.05$) between the coefficients.
**Treatments T1, T2, T3, T4, T5, T6 and T7 add sunflower meal (control diet (free of additives) , 25% sunflower meal/kg feed. 50% sunflower meal/kg feed, 75% sunflower meal/kg feed, 25% sunflower meal + lactic acid bacteria, 50% sunflower meal + lactic acid bacteria, 50% sunflower meal + lactic acid bacteria and 75% sunflower meal + lactic acid bacteria, respectively.
*** FI: feed consumed, WG: weight gain, FCR: Food conversion ratio.

The table 3 is shown the effect of replacing three levels of local sunflower meal 25, 50 and 75% and one level of the lactic acid bacteria (0.10%) on the average live weight (LW), average carcass weight (CW), average thigh weight (TW), average back weight (BW), average wing weight (WW), average breast weight (Ch.W), average heart weight (HW), average liver weight (Lwe), average gizzard weight (GW), and average neck weight (NW) was demonstrated, with no significant differences ($P \leq 0.05$) in the nutritional parameters of the traits. Liver weight, heart weight, gizzard weight, thigh piece weight, back weight, wing weight, and neck weight were demonstrated. While the first, second, fifth and sixth treatments significantly ($P \geq 0.05$) outperformed the rest of the treatments in the average live weight percentage, average carcass weight percentage and average breast weight percentage, the fourth treatment significantly ($P \geq 0.05$) outperformed the rest of the treatments in the average gizzard weight.

Table 3: Effect of improving the nutritional value of local sunflower meal by adding lactic acid bacteria to the feed on live weight (g/bird) and carcass weight (%) of Ross308 broiler chickens (mean ± standard error)

Traits	T1	T2	T3	T4	T5	T6	T7	Sig.
LW	2862.91±37.22 a	2839.12±30.19 a	2210.00±45.02 b	1957.52±27.41 c	2895.26±10.63 a	2220.02±40.31 a	1024.36±20.62 c	*
CW	73.94±0.37 a	.08±0.8273 a	33.62±0.72 a	68.96±0.18 b	1.81±72.96 a	72.57±0.64 a	68.60±0.04 b	*
TW	16.39±0.18	16.59±0.23	16.74±0.13	16.05±0.23	16.46±0.35	16.46±0.06	16.18±0.29	N.S.
BW	16.78±0.22	16.33±0.17	16.62±0.16	16.82±0.37	15.83±0.30	16.91±0.11	17.06±0.45	N.S.
WW	10.76±0.15	10.60±0.27	10.44±0.27	10.35±0.63	10.29±0.48	10.10±0.41	10.89±1.23	N.S.
Ch W	34.28±0.17 a	34.48±0.28 a	33.80±0.38 b	32.60±1.01 c	34.48±0.30 a	34.34±0.38 a	32.84±1.23 b	*
HW	0.52±0.08	0.48±0.01	0.58±0.05	0.48±0.01	0.51±0.01	0.58±0.02	0.46±0.01	N.S.
LWe	2.32±0.03	2.49±0.04	2.37±0.03	2.66±0.08	2.55±0.04	2.45±0.02	2.71±0.18	N.S.
GW	1.66±0.04 c	1.72±0.03 c	1.98±0.06 b	.219±0.06 a	1.80±0.03 c	1.88±0.08 bc	.208±0.06 ab	*
NW	7.54±0.28	7.63±0.02	8.02±0.12	8.07±0.28	7.60±0.02	8.16±0.19	8.03±0.46	N.S.

* Different letters within one column indicate the presence of significant differences ($p \leq 0.05$) between the coefficients.
** Treatments T1, T2, T3, T4, T5, T6 and T7 add sunflower meal (control diet (free of additives), 25% sunflower meal/kg feed. 50% sunflower meal/kg feed, 75% sunflower meal/kg feed, 25% sunflower meal + lactic acid bacteria, 50% sunflower meal + lactic acid bacteria, 50% sunflower meal + lactic acid bacteria and 75% sunflower meal + lactic acid bacteria) respectively. **
*** (LW) average live weight, (CW) average carcass weight, (TW) average thigh weight, (BW) average back weight, (WW) average wing weight, (Ch.W) average breast weight, (HW) average heart weight, (Lwe) average liver weight, (GW) average gizzard weight, (NW) average neck weight.

Discussion and Conclusion

The reason for the improvement in the amount of feed consumed when adding lactic acid bacteria compared to the treatments without it is attributed to the improvement in the digestion coefficient of nutrients through the enzymes secreted by the bacteria involved in its formation, especially the enzymes that decompose non-starch polysaccharides (NSPase) in sunflower cake and the reduction of their negative effects, which improves the intestinal environment, in addition to the secretion of other digestive enzymes such as amylase, lipase and phytase, which have a biological and vital role in digesting and analysing the eaten nutrients, which increases the body's need for nutrients to cover the body's increasing requirements for rapid growth and thus increases feed consumption [14]. On the other hand, lactic acid bacteria work to reduce the time of emptying the stomach, which leads to increased feed consumption [15]. Or perhaps the reason is due to the role of lactic acid bacteria in creating microbial balance in the digestive tract, which is one of the necessary orders for the development of the small intestine and increasing its surface area, through the products of the decomposition of non-starchy polysaccharides such as oligosaccharides that work pre-biotic ally, leading to the selective enrichment of beneficial bacteria such as lactobacilli bacteria, which work to increase the production of organic acids and reduce the pH of the intestine, which increases the activity and work of the internal enzymes secreted by the bird and thus increases the digestion of nutrients, as indicated by [16]. The addition of lactic acid bacteria works to increase the digestion coefficient of carbohydrates and proteins, and this increase in the digestion coefficients of nutrients is closely linked to the enzymes produced by microorganisms that form lactic acid bacteria, or perhaps the increase in feed consumption was linked to the increase in live weight, which increased as a result of adding lactic acid bacteria, which led to an increase in feed consumption by the bird to meet its needs for nutritional elements of energy and protein in a manner consistent with the rates of weight gain [17] The reason for the improvement in the average weight gain of the treatments to which lactic acid bacteria were added may be due to the positive role of the bacteria involved in its formation through the secretion of many digestive enzymes, including the xylenes enzyme secreted by bacteria (*Bacillus* spp), which works to analyse the non-starch polysaccharides in the peeled sunflower cake and the feed as a whole, which leads to the production of oligosaccharides (XOS), which are considered pre-biotic that are useful in the indirect digestion process by increasing the number of beneficial bacteria such as lactobacilli and reducing the number of pathogenic bacteria [7], As mentioned by [18], lactic acid bacteria increase the speed of adhesion of lactobacilli to the surface

of the mucus layer spread over the myosin fibre network covering the intestinal cells, which is a suitable environment for their growth and reproduction, which consequently leads to an increase in their secretions of amino acids such as lysine, lactic acid, volatile fatty acids, minerals and some types of vitamins such as vitamin B group, which may contribute to improving the morphological characteristics of the intestine by increasing the length of the villi, which improves the efficiency of the absorption process and the utilization of available nutrients. The reason may be the role of lactic acid bacteria in increasing the activity and secretion of internal intestinal enzymes, thus increasing the readiness of nutrients that can be absorbed and metabolised [19,20]. The reason for the lack of a significant effect of lactic acid bacteria on the feed conversion factor when added to the treatments containing sunflower cake and the control treatment may be due to the significant increase observed in the weight gains and feed consumed by the birds in these treatments, which may have been similar to those birds in the treatments free of lactic acid bacteria. The reason for the improvement in the live weight of the fetus as a result of adding lactic acid bacteria compared to the treatments without addition may be attributed to the role of lactic acid bacteria in improving the nutritional value of peeled sunflower cake through the secretion of digestive enzymes, as Bacillus Spp. Bacteria secrete the enzyme xylenolysis, which works to reduce the negative effects caused by non-starch polysaccharides by breaking down xylem and arabinoxylan sugars, which leads to the release of retained nutrients by reducing viscosity [21,22]. The researcher [23]. also explained in his study the role of lactic acid bacteria in reducing the viscosity of the small intestine and improving the digestion coefficient of nutrients, at which time an increase in the values of metabolic energy represented by (1.6%) occurs, in addition to the ability of lactic acid bacteria to increase the digestion coefficient and readiness Many nutrients such as (amino acids, fatty acids, some minerals and vitamins) are obtained by secreting digestive enzymes that enhance the effectiveness of internal digestive enzymes and reduce the enzymatic activity of harmful bacteria [10]. Or the reason may be due to the possession of probiotics, including lactic acid bacteria, the competitive mechanism in inhibiting intestinal germs by competing with pathogenic microorganisms for nutrients, and occupying receptor sites on the epithelial cells lining the digestive tract, thus facilitating their exclusion and expulsion with waste outside the body, as mentioned by [24]. The significant differences in the average carcass weight percentage in the replacement treatment (75% De-hulled sunflower meal) of the current sunflower cake or the one to which lactic acid bacteria were added may be due to the differences in the live body weight of these treatments, due to the existence of a direct relationship between the live body weight and the net percentage. Birds with high body weight have higher net percentages than weak and low body weight birds [25]. The reason for the increase in the relative weight of the gizzard in the treatments containing lactic acid bacteria may be attributed to the ability of the bacteria entering into its composition to eliminate pathogenic bacteria and increase the number of lactobacilli bacteria that are naturally present in the intestinal flora as mentioned by [21,26], which work to produce volatile fatty acids (VFA) and short-chain fatty acids (SCFA) that can be used as a source of energy by the host (bird), as the researcher [27] indicated that the increase in The production of organic acids by lactobacilli bacteria leads to a differences in the pH of the intestine, which creates an acidic environment in it that is necessary for the work of digestive enzymes such as lipase, and thus increases the digestion and metabolism of fats. The improvement in the percentage of breast piece for the treatments to which lactic acid bacteria were added may be attributed to their role in stimulating the internal digestive enzymes and increasing their biological activity in the process of analysing food compounds, which leads to increasing the bioavailability of essential nutrients, or due to the ability of lactic acid bacteria to secrete digestive enzymes that increase the efficiency of starch and protein digestion and absorption of amino acids used in the manufacture of breast muscle protein [20], because the breast piece represents the most important part in building body tissues, as it represents about 50% of the total protein of broiler chickens [28]

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اضافة بكتريا حامض اللاكتيك الى كسبة زهرة الشمس المحلية المستخدمة في علائق فروج اللحم وتأثيرها على الأداء الإنتاجي.

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الخلاصة

أجريت التجربة الحالية في حقل الدواجن التابع لقسم الإنتاج الحيواني في كلية الزراعة – جامعة كركوك للفترة من 2024/2/22 ولغاية 2024/4/4، لدراسة تأثير تحسين القيمة الغذائية لكسب بذور عباد الشمس المحلي المستخدم في علائق فروج اللحم بإضافة بكتيريا حامض اللاكتيك وتأثيرها على الصفات الإنتاجية. تم استخدام 280 فرخ فروج لحم غير مجنس بعمر يوم واحد من سلالة روز 308، وزعت عشوائياً على سبع معاملات بواقع أربع مكررات لكل معاملة (عشرة طيور لكل مكرر). وكانت المعاملات على النحو التالي:-

المعاملة الأولى (*T1*) عليقة السيطرة خالية من أي إضافة, المعاملة الثانية (*T2*) عليقة المقارنة مع استبدال25% من كسبة فول الصويا بكسبة زهرة الشمس. المعاملة الثالثة (*T3*) عليقة المقارنة مع استبدال50% من كسبة فول الصويا بكسبة زهرة الشمس, المعاملة الرابعة (*T4*) عليقة المقارنة مع استبدال75% من كسبة فول الصويا بكسبة زهرة الشمس, المعاملة الخامسة (*T5*) عليقة المقارنة مع استبدال25% من كسبة فول الصويا بكسبة زهرة الشمس مع اضافة بكتريا حامض اللبنيك, المعاملة السادسة (*T6*) عليقة المقارنة مع استبدال50% من كسبة فول الصويا بكسبة زهرة الشمس مع اضافة بكتريا حامض اللبنيك, المعاملة السابعة (*T7*) عليقة المقارنة مع استبدال75% من كسبة فول الصويا بكسبة زهرة الشمس مع اضافة بكتريا حامض اللبنيك. وأظهرت النتائج انخفاضاً معنوياً *($P \geq 0.05$)* في المعاملات (الثالثة والرابعة والسادسة والسابعة) في معدل استهلاك العلف وعدم وجود فروق معنوية في المعاملات التغذوية (الأولى والثانية والخامسة) في معدل الزيادة الوزنية، وفي الأسبوع التراكمي لمعاملة التحويل الغذائي أظهرت النتائج عدم وجود فروق معنوية *($P \leq 0.05$)* بين المعاملات (الثالثة والرابعة والسادسة والسابعة)، أما بالنسبة لوزن الذبيحة فقد تفوقت المعاملات الأولى والثانية والثالثة والخامسة والسادسة معنوياً على المعاملات الرابعة والسابعة، أما الوزن النسبي لقوانص المعاملة الرابعة فقد تفوق معنوياً *($P \leq 0.05$)* على بقية المعاملات التغذوية، على عكس الوزن النسبي للصدر الذي أظهر انخفاضاً معنوياً *($P \geq 0.05$)*. وأظهرت نتائج الدراسة عدم وجود فروق معنوية *($P \leq 0.05$)* في الوزن النسبي لكل من (الكبد, القلب, الفخذ, الظهر, الاجنحة و الرقبة).

الكلمات المفتاحية: القيمة الغذائية، عباد الشمس، دجاج اللحم، بكتيريا حامض اللاكتيك، الأداء الإنتاجي.