Effect of Adding Different Concentrations of leaves alcoholic extract of the local silybum plant (*Silybum marianum*) to Drinking Water on Productive Performance of Broilers Ross 308

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Abstract

This experiment was conducted in the fields of Al-Anwar Poultry Company in Babylon Governorate for the period from 18/2/2023 to 24/3/2023 The study aimed to evaluate the effectiveness of adding different concentrations of alcoholic extract of the leaves of the Silybum marianum plant to drinking water in the productive performance of broilers, where 300 unsexed Ross 308 broilers equipped with a hatchery were used in the experiment. It was randomly distributed to 15 (cages) with 5 experimental treatments for each 60 bird treatment and each treatment included three replicates per 20 birds. The treatments of the experiment were as follows: the first treatment: a control group free of any addition, the second treatment: the addition of 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 0.5%, the third treatment: the addition of 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 1%, the fourth treatment: the addition of 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 2%, the fifth treatment: Add 10 ml of alcoholic extract of the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 3%.

The most important results of the study can be summarized as a significant improvement ($p\leq0.05$) for the third, fourth and fifth treatments in the rate of live body weight and total weight gain compared to the first treatment (control), as for feed consumption, there were no significant differences between all treatments, while the third and fifth treatments recorded the best cumulative food conversion ratio with a significant difference ($p\leq0.05$) compared to the first treatment, while the percentage of mortality notes that there are no significant differences between all experience treatments, either For the production index, the third and fifth treatment recorded the improvement measure of the productive index with a significant difference of $p\leq0.05$) compared to the first (control) and second treatment.

Key words: Silybum marianum leaves, alcoholic extract , productive performance , broiler .

The production process of international companies specialized in the manufacture of poultry birds is affected by the increase in the population, which encouraged them to increase their production capacity, especially for broilers from commercial hybrids, which are characterized by rapid growth rates, which are accompanied by a high metabolic rate, which makes them more vulnerable to oxidative stress and free radical formation [14], as well as a significant decrease in bird

Introduction

immunity[9]. Which encouraged researchers to add natural antioxidants as a key ratio in poultry nutrition for their role in removing free radicals and thus improving productive performance, maintaining high growth levels and increasing immunity for broilers [22]. For its effective role in reducing oxidative reactions, whether inside the body or in meat during storage, being safer and cheaper, and thus being a good alternative to chemical antibiotics, which were banned from being added to poultry diets in 2006 by the European Union countries due to their effects. harmful to consumer safety and health [16]. One of these plants is the Silybum marianum plant or milk thistle (Silybum marianum), which is a useful medicinal plant, belonging to the Carduus marianum family [24] and has a wide use in poultry nutrition [19] and contains many substances with antioxidant effectiveness and has many medicinal and biological activities [1] and the leaves of Algalgan contain protein up to 19% and contain many essential amino acids [15] as well as About the essential fatty acids predominantly oleic and linoleic acid [13]silymarin is the main active active compound of the plant [5] where silymarin consists of four main components, namely selebinin and is considered the most potent, isosilepinin, seledenin and silvcristine [7] One study indicates that silymarin works in four different pathways: it is an antioxidant, works on the absorption and regulation of intracellular clotathione, anti-inflammatory, reduces cholesterol and blood lipids [12] as a stabilizing and regulating ratio for cell membrane permeability that prevents the introduction of foreign substances into liver cells where it works to completely protect the liver from toxic agents and helps to regenerate it [3], and also promotes RNA production [2]. Sulimarin extracted from the Silybum marianum plant has antiviral and antiinflammatory properties [6].

For the lack of local studies on the addition of alcoholic extract of the leaves of the Silybum marianum plant to the drinking water of broilers and to benefit from the Silybum marianum plant and spread in large quantities in gardens and agricultural methods, this study aimed to evaluate the effectiveness of adding alcoholic extract of the leaves of the Silybum marianum plant to drinking water on the productive performance of broilers.

Materials and methods

This study was conducted in the field of Al-Poultry Company Anwar in **Babylon** Governorate for the period from 18/2/2023 to The experiment was used 300 24/3/2023. chicks broiler type Ross 308 age of one day non-naturalized randomly distributed to 15 cages by 5 experimental treatments per treatment 60 birds and each treatment included three repeaters per repeater 20 birds, and feed was provided to birds freely on the basis of the catalog Ross as provided a diet starting from the age of 1 - 21 days, and the growth diet from the age of 22 - 35 days as shown in (Table 1) where the treatments of the experiment as follows: The first treatment: a control group free of any addition, the second treatment: the addition of 10 ml of alcoholic extract to the leaves of the Silvbum marianum plant / liter of drinking water at a concentration of 0.5%, the third treatment: the addition of 10 ml of alcoholic extract to the leaves of the Silvbum marianum plant / liter of drinking water at a concentration of 1%, the fourth treatment: the addition of 10 ml of alcoholic extract to the leaves of the Silvbum marianum plant / liter of drinking water at a concentration of 2%, the fifth treatment: Add 10 ml of alcoholic extract of the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 3%.

The experiment included studying the following characteristics: average live body weight, weight gain, feed consumption, nutritional conversion ratio, the percentage of mortality, and production index. Rates of these traits were estimated for each of the five weeks of the trial. Completely Randomized Design was used to study the effect of different treatments on the studied traits, and the differences between the averages were compared using the Duncan polynomial test [10] and the SAS [17] statistical program was used to analyze the data.

Ingredient	Starter%	Grower%
Corn	38.50	42.29
Soya meal	44.36	40.11
Wheat	10	10
Concentrate	2.5	2.5
Di Calcium phosphate	0.04	0.0
Calcium carbonate	1.26	1.07
Sunflower oil	2.29	3.15
Sodium chloride	0.17	0.17
Supplement vitamin. &mineral	0.5	0.5
DL-Methionine (99%)	0.21	0.15
L-Lysine (99%)	0.09	0.01
Therionin	0.08	0.05
Wheat bran	0	0
Sum	100	100
Composition		
Me(kcal/Kg)	3000	3.100
C. protein	23	21.5
Ca	0.96	0.78
Р	0.58	0.56
Na	0.16	0.16
Dig. Lysine	1.44	1.29
Dig. Methionine	0.77	0.70
Dig. Threonine	0.97	0.88
Dig. Met + Cys	1.08	0.99
DCAB	236.23	220.74
C.F%	89.51	89.56
Fat%	3.10	3.08
Linoleic acid%	1.02	1.09

Table 1 Percentages of feed components used in the experiment and their chemical composition

(1) The protein concentrate was used for broilers produced by the company Provime / Dutch. (2) Represented energy, crude protein, crude fiber, fat, lysine, methionine + cysteine, calcium and biophosphorus were calculated for each feed material according to the catalog of ROSS broiler 2022 using (American UFFDA program).

*The chemical analysis of the diet was calculated on the basis of Ross index and UFFD program [11]

Results and discussion

It is noted from Table 2 the average living body weights (g) \pm the standard error of the experimental treatments, if the results of the statistical analysis of the effect of adding different concentrations of alcoholic extract of the leaves of the Silybum marianum plant to the average live body weight of broiler Ross308 for the weeks of the experiment and the amount of 5 weeks to the absence of significant differences between all the treatments in the first and second week of the experiment, either in the third week we note a significant superiority (P≤0.05) in the live body weight of the birds of the first treatment (control) The fourth treatment (adding 10 ml of alcoholic extract to the leaves of the Silvbum marianum plant / liter of drinking water at a concentration of 2%) and the fifth treatment (adding 10 ml of alcoholic extract of the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 3%) compared to the second treatment (adding 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking

drinking

water

in

water at a concentration of 0.5%) Where the highest body weight was recorded at 929.33, 944.00 and 951.00 g / bird respectively, while the second treatment recorded the lowest body weight of 887.67 g / bird, while the third treatment (adding 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 1%) there were no significant differences between it and the first, fourth and fifth treatment on the one hand and the second treatment on the other hand, where a body weight of 898.00 g / bird was recorded, but in the fourth and fifth week of the experiment, we note superiority Significantly ($P \le 0.05$) for birds of the third, fourth and fifth treatment compared to the birds of the first and second treatments.

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Table 2 the effect of adding different concentrations of alcoholic extract of the leaves of the Silybum marianum plant to drinking water at the rate of live body weight (g) of broilers (arithmetic mean ± standard error)

Treatments	weeks of experiment						
	first week	second week	third week	Fourth week	fifth week		
first treatment	182.33±5.60	454.00±17.21	929.33±19.78	1534.00±23.86	2126.33±16.58		
			a	b	b		
second treatment	182.33±4.66	427.67±13.53	887.67±15.24	1505.67±40.29	2137.33±12.28		
			b	b	b		
third treatment	178.33±5.45	418.00±22.77	898.00±27.55	1580.00±13.50	2231.67±26.36		
			ab	a	а		
fourth treatment	168.00±8.21	439.00±11.59	944.00±16.14	1598.00±22.01	2230.00±15.64		
			а	a	а		
fifth treatment	180.00±4.51	441.00±18.44	951.00±30.85	1623.33±0.88	2285.00±35.52		
			a	a	а		
significant level	NS	NS	*	*	*		

*

Averages with different letters within the same column indicate differences at the level of significance (P≤0.05). NS: Non- significant

First treatment = control treatment (drinking water free of any additive)

Second treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 0.5%.

Third treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 1%.

Table 3 shows the results of the statistical analysis of the effect of adding different concentrations of alcoholic extract of Silvbum marianum leaves to drinking water on the rate of weight increase of broiler for the weeks of the experiment of 5 weeks to the absence of significant differences between all treatments during the first and second week of the experiment, but in the third week we note from the results of the experiment significantly higher than the fourth and fifth treatments (P \leq 0.05) in the rate of weight gain compared to the second treatment, which recorded the least weight increase, which did not differentiate significantly from the first and third treatment. In the fourth week, the

superiority of the third and fifth treatments is observed significantly (P≤0.05) compared to the first treatment, which recorded the least weight increase, while the second and fourth treatments were not significant differences between them and the third and fifth treatment on the one hand and the first treatment on the other hand, either in the fifth week, as well as for the total weight gain, we note the recording of birds of the third, fourth and fifth treatments with the highest weight increase and a significant difference (P≤0.05) on the birds of the first treatment, which recorded the least weight gain While there were no significant differences between the second treatment and the rest of the experiment treatment.

Table 3 the effect of adding different concentrations of alcoholic extract of the leaves of the Silybum marianum plant to drinking water on the rate of weight gain (g) of broilers (arithmetic mean ± standard error)

Treatments	weeks of experiment						
	first week	second week	third week	Fourth week	fifth week	Total weight gain	
first treatment	138.33±9.60	261.67±8.79	485.33±22.55 ab	604.67±27.43 b	592.33±17.20 b	2082.33±16.58 b	
second treatment	138.33±8.66	245.33±12.68	460.00±20.10 b	627.00±38.00 ab	622.67±21.61 ab	2093.33±22.28 ab	
third treatment	134.33±5.45	239.67±18.52	480.00±11.26 ab	682.00±13.71 a	651.67±16.88 a	2187.67±46.36 a	
fourth treatment	124.00±6.21	271.00±16.31	505.00±15.50 a	654.00±28.00 ab	632.00±11.36 a	2186.00±75.04 a	
fifth treatment	136.00±7.51	261.00±20.42	510.00±17.36 a	672.33±11.52 a	661.67±19.39 a	2241.00±42.52 a	
significant level	NS	NS	*	*	*	*	

Second treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 0.5%.

Third treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 1%.

Averages with different letters within the same column indicate differences at the level of significance ($p \le 0.05$). NS: Non- significant

First treatment = control treatment (drinking water free of any additive)

Fourth treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 2%.

differences between all the treatment treatments, while the fifth week, we note that the birds of the fourth treatment recorded the highest rate of feed consumption and significantly (P≤0.05) amounted to 1115.71 g / bird compared to the birds of the first treatment, which recorded the lowest rate of feed consumption and amounted to 1008.14 g / bird, which in turn did not differ significantly from the birds of the second, third and fifth treatments, as for the total feed consumption, significant we note that there are no differences between all the experience treatments.

Table 4 shows the results of the statistical analysis of the effect of adding different concentrations of alcoholic extract of Silvbum marianum leaves to drinking water on the average weekly feed consumption of broilers for the experimental weeks of 5 weeks to the presence of a significant superiority ($P \le 0.05$) in the first week, where the first treatment (control) recorded the highest rate of feed consumption and reached 143.41 g and a significant difference (P<0.05) from the fourth treatment, which recorded the lowest rate of feed consumption and amounted to 133.91 g, followed by the fifth treatment and recorded 136.83 g. While in the second, third and fourth week, we note that there are no significant Table 4 the effect of adding different concentrations of alcoholic extract of the leaves of the Silybum marianum plant to drinking water on thefeed consumption (g) of broilers (arithmetic mean± standard error)

Treatments	weeks of experiment						
	first week	second week	third week	Fourth week	fifth week	Total feed consumption	
first treatment	143.41±0.82 a	341.42±13.69	661.10±16.69	902.81±21.14	1008.14±49.30 b	3056.89±88.72	
second treatment	142.66±1.30 ab	338.83±15.90	644.08±11.35	911.15±20.07	1062.20±38.00 ab	3098.94±40.25	
third treatment	139.41±3.56 abc	320.91±12.61	657.90±16.34	943.19±23.04	1036.60±65.34 ab	3098.03±52.09	
fourth treatment	133.91±2.83 c	332.99±11.63	674.96±18.70	923.00±22.84	1115.71±19.64 a	3180.57±36.84	
fifth treatment	136.83±2.67 bc	324.16±10.82	660.32±19.26	928.61±16.04	1089.19±40.90 ab	3139.11±45.60	
significant level	*	NS	NS	NS	*	NS	

Third treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 1%.

Fourth treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 2%. *Averages with different letters within the same column indicate differences at the level of significance ($p \le 0.05$). NS: Non-significant

First treatment = control treatment (drinking water free of any additive)

Second treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 0.5%.

Table 5 shows the results of the statistical analysis of the effect of adding different concentrations of alcoholic extract of the leaves of the Silybum marianum plant to drinking water on the nutritional conversion ratio of broiler for the weeks of the experiment, which amounted to 5 weeks. to the absence of significant differences between all treatments during the first, second and third week of the experiment, either in the fourth week, the birds of the third and fifth treatments recorded the best feed conversion ratio with a significant difference of ($P \le 0.05$) from the first treatment, where they recorded a food conversion ratio of 1.383 and 1.386 g. Feed / g weight gain / bird respectively, while the first treatment recorded a food conversion ratio of 1.496 g feed / g weight gain / bird, which in turn did not differ significantly from the birds of the second and fourth treatments,

While in the fifth week, we note from the results of the experiment that the third and fifth treatments recorded the best feed conversion treatment with a significant difference of ($P \le 0.05$) compared to the first, second and fourth treatments, as for the cumulative nutritional conversion ratio, the birds of the third and fifth treatments continued to record the best cumulative feed conversion treatment of 1.417 and 1.401 g feed / g weight increase / bird with a significant difference (P≤0.05) from the first and second treatments, which recorded a cumulative nutritional conversion ratio of 1.468 and 1.480 g feed / g Weight gain / bird respectively followed by the fourth treatment, which did not differ significantly from the rest of the experiment treatments.

Table 5 the effect of adding different concentrations of alcoholic extract of the leaves of the Silybum marianum plant to drinking water in the feed conversion ratio (g feed/g weight gain/Bird) for broilers (arithmetic mean ± standard error)

Treatments	weeks of experiment						
	first week	second week	third week	Fourth week	fifth week	Cumulative food conversion ratio	
first treatment	1.039±0.045	1.304±0.039	1.368±0.077	1.496±0.055 a	1.721±0.093 a	1.468±0.017 a	
second treatment	1.033±0.037	1.384±0.045	1.417±0.105	1.456±0.053 ab	1.713±0.074 a	1.480±0.004 a	
third treatment	1.041±0.052	1.347±0.057	1.372±0.050	1.383±0.015 b	1.599±0.012 b	1.417±0.009 b	
fourth treatment	1.081±0.033	1.233±0.068	1.353±0.099	1.413±0.037 ab	1.771±0.051 a	1.458±0.057 ab	
fifth treatment	1.005±0.038	1.250±0.060	1.310±0.113	1.386±0.017 b	1.579±0.023 b	1.401±0.012 b	
significant level	NS	NS	NS	*	*	*	

Third treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 1%.

Fourth treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 2%.

Fifth treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 3%. *Averages with different letters within the same column indicate differences at the level of significance ($p \le 0.05$). NS: Non-significant

First treatment = control treatment (drinking water free of any additive)

Second treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 0.5%.

Figure 1 shows the effect of adding different concentrations of alcoholic extract of Silybum marianum leaves to drinking water on the percentage of mortality of broilers for the trial weeks of 5 weeks to the absence of significant differences between all experimental treatments



Fourth treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 2%

Fifth treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 3%. First treatment = control treatment (drinking water free of any additive)

Second treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 0.5 %.

Third treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 1% .

Figure 1 The percentage of mortality for broilers

Figure 2 shows the effect of adding different concentrations of alcoholic extract of Silybum marianum leaves to drinking water in the production index of broiler for the experimental weeks of 5 weeks, where the third and fifth treatment recorded the highest production index of 450.90 and 466.36 respectively with a significant difference of ($P \le 0.05$) from the first treatment (control) and the second, which recorded the lowest production index of 413.82 and 412.39 respectively, while there were no significant differences between the fourth treatment and the rest of the experiment





* Averages with different letters within the same column indicate differences at the level of significance ($p \le 0.05$).

First treatment = control treatment (drinking water free of any additive)

Second treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 0.5%.

Third treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 1% .

Fourth treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 2%

Fifth treatment = add 10 ml of alcoholic extract to the leaves of the Silybum marianum plant / liter of drinking water at a concentration of 3%.

The significant improvement in the rate of live body weight in the alcoholic extract treatments of the leaves of the Silvbum marianum plant (third, fourth and fifth) compared to the first two ratios (control) and the second is due to the containment of the leaves of the Silvbum marianum leaves on the active substance silymarin, which is the strongest natural antioxidant activity with high effectiveness that protects the body from the damage of free radicals because it contains hydroxyl groups (OH-) that prevent the production of free radicals, the most important of which are hydroxyl radicals (OH•) and pyroxyl radical (RCOO•) by donating them with electrons to become their orbit. The outer is in equilibrium [21].

In addition, silymarin works to increase the digestibility of nutrients through its effect on increasing the activity of digestive enzymes and it also works to increase the absorption of these elements through the digestive system in the blood [20], and it has been noted that silymarin has the ability to accelerate the formation of protein and nucleic acids within the cell through its ability to enter the cell and then to the nucleus and work on its enzymes and then increase the effect on ribosomes (Asghar and Masood, Sonnenbichler [18] noted that silvmarin has a role in enhancing biosynthesis in cell cytoplasm by increasing the rate of synthesis of functional protein structures.

According to the close relationship between the rate of live body weight and weight gain, the significant improvement in the rate of total weight gain for the third, fourth and fifth treatments is due to the improvement in the rate of living body weight as a result of the effect of adding the alcoholic extract of the leaves of the Silybum marianum plant to drinking water, which had a clear impact on improving the total weight gain of experimental birds, which leads to good growth and to build the skeleton of the bird properly, As for the significant improvement (0.05>P) for the alcoholic extract treatments of the leaves of the Silybum marianum plant (third and fifth) in the characteristic of the

cumulative nutritional conversion ratio, which is an important indicator indicating the amount of benefit from feed and converting it to live weight in broilers, and that any decrease in this value is evidence of an improvement in the nutritional conversion ratio compared to the first and second treatment, which may be attributed to the presence of active compounds in the leaves of the Silybum marianum plant as well as the chemical composition of the leaves being rich in essential fatty acids such as Linoleic acid as well as oleic acid and palmitic acid [13] Which maintains the health of the digestive system and keep it healthy, as it was found that plants and herbs used as additives, whether feed or drinking water for animals, work to increase the secretions of the digestive system and maintain its health because it contains bioactive components, the most important of which are antioxidants and antimicrobial agents that improve growth rates and weight gain, which helps in achieving the maximum benefit from the feed consumed and thus improve the food conversion ratio [23]. As well as containing quercetin, which works to protect DNA from damage caused by the reaction of some types of oxygen, which is reflected in improving the health of birds [8].

This improvement in production performance is all positively reflected on the values of the productive index, which is one of the important indicators in evaluating the productive performance of broilers, which is attributed to the high value of the treatments of adding alcoholic extract of the leaves of the Silybum marianum plant to drinking water (third and fifth) to the high rate of live body weight and vital ratio, as well as the improvement of the nutritional conversion ratio in these two treatments, as the scale of the productive index is directly proportional to the rate of live body weight and the vital ratio.

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