



## Effect of adding pomegranate (*Punica granatum*) and moringa (*Moringa oleifera*) in productive performance, relative growth rate, water consumption and production index of broiler chickens

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| <b>Received:</b><br>Apr. 27, 2022   | <b>Abstract</b><br>The aim of this study was to find out effect of adding of pomegranate and moringa and their combination in drinking water in the performance productive relative growth rate, water consumption and evidence productive for broiler used in this experiment. 180 broiler chicks asexual at one day old of the breed Ross308 and a starting weight 41 gram/chick, and distributed bird distribution randomly on seven transactions. Each transaction contained 30 birds with three replications each repeat contained 10 birds. The experimental parameters include the following: the first transaction T1 control treatment without any addition, second treatment T2 addition of aqueous extract to Pomegranate peels at a concentration of 50 ml / liter of water, the third treatment T3 Addition of aqueous extract of moringa leaf powder at a concentration of 75 ml / liter of water, Fourth treatment T4 add 75% aqueous extract of pomegranate peel powder ml/liter with aqueous extract for powder Moringa leaves 25% ml/liter, Fifth treatment T5 Adding the aqueous extract of pomegranate peel powder at a concentration of 50% at a concentration (25 ml/L) with the aqueous extract of dried moringa leaf powder at a concentration of 50% at a concentration/L., Sixth treatment T6 add 25% aqueous extract of pomegranate peel powder With 75% aqueous extract of Moringa leaf powder. I showed results get moral improvement In production performance, relative growth rate, water consumption, and productivity index for all Addition coefficients compared to the control coefficient. Transactions are recorded T2-T5 The best results in all the studied traits. |
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## Introduction

This great development in the poultry industry and the increase in productivity was accompanied by the emergence of diverse and large groups of bacterial and fungal pathogens and resistance to antibiotics as a result of the indiscriminate and excessive use of drugs [1], as well as the wrong management practices in poultry farming that caused metabolic diseases [2]. Which negatively affects the health of birds and consumers, as well as a decrease in the performance of broilers [3]. In recent years, researchers have tended to refer to the methods of folk medicine that were used in ancient times by using herbs and wild and cultivated plants to obtain medicine [4]. One of these plants is the pomegranate tree *Punica granatum*. It is called Pomegranate in English. It belongs to the Pomegranate family *Punicaceae*. It is native to western Asia and is cultivated in most Arab countries, especially the Mediterranean basin and the Levant [5]. Pomegranate peels are one of the most important substances of medical importance because they contain many active compounds that have an important role in supporting the immune system, such as tannins, alkaloids, phenolic compounds, tannins, and saponins [6]. It is the inedible part of the pomegranate plant, which constitutes about 50% of the total weight of the fruit [7], [8]. Phenolic compounds are natural polyphenolic compounds that are found in some compounds in the form of glycosides whose structure contains some sugar units, and they have biological importance on a large scale as they act as antioxidants, allergies, and against viruses, microbes, and fungi. [9] that pomegranate peels contain active compounds such as polyphenols (binoclagen and ellagic acid) that give them antioxidant properties and thus maintain vitality and activity of the cell, and this, in turn, is reflected in the vitality and activity of the body. [10] concluded that the high levels of fermented pomegranate peel 2% in broiler diets, led to a significant improvement in both body weight, weight gain, and feed conversion factor compared to levels of 0.5 and 1%. Explained [11] The addition of aqueous extract of pomegranate peels in three concentrations of 50, 75, and 100 ml / per liter for drinking broilers. The results showed a significant improvement at the concentration of 50 ml / per liter in the final body weight, weekly weight increase, and feed conversion factor compared to the control treatment due to the presence of a compound. The polyphenols found in pomegranate peels are considered natural antioxidants that work to prevent free radicals and thus maintain the activity and vitality of cells, and this reflects positively on the general health of birds. well, adding Pomegranate peel powder to broiler diet 308Rose at a level of 20 g / 1 kg of feed led to Significant superiority in final body weight, weekly weight gain, and relative growth rate compared to the control treatment [12.]

Moringa Oliver It is a member of the plant family Moringa cease and its most common cultivar. It has anti-bacterial, antiviral, and anti-fungal efficacy, as well as contains antioxidant compounds that protect the body from free radicals, and has been used in folk medicine in many countries of the world to treat many diseases [13]. Moringa leaves are considered antioxidants because they contain many active compounds such as carotene, vitamin C, vitamin A and vitamin E that prevent free radicals in the skin that cause tissue damage and aging, thus reducing aging [14]. contain leave her papers



It contains many phytochemicals (carotenoids, flavonoids, chlorophyll, phenols, xanthine, cytokines, and alkaloids) and the active substances are phenolic compounds, whose concentrations reach up to 13.23 g / 100 g, while the flavonoids have a concentration of about 6.20 g / 100 g, and these compounds act as powerful antioxidants [15]. As that it contains vitamins that act as antioxidants oxidation like a vitamin C, vitamin E, and beta-carotene protect cells from damage caused by free radicals and oxidative stress [16]. The use of the aqueous extract of Moringa leaves at a ratio of 10, 20, and 30 ml/liter drinking water led to a significant improvement in all productive traits body weight and the weight gain and the feed consumption, food conversion factor, and production index [17]. Also, when using Moringa leaf powder in broiler diets at rates of 0, 0.5, 1.0, 1.5, and 2.0%. The results showed a significant improvement in the final body weight, average weekly weight, and feed conversion factor at the level of 1.5% compared to the control treatment [18].

## **Materials and methods:**

### **Experiment design:**

This experiment was conducted in a poultry field belonging to the College of Agriculture / University of Karbala for the period from 27/3/2021 to 7/5/2021. In it, 180 unsexed one-day-old broiler chicks were used Ross 308 average weight is 40 g, the chicks were raised on four Batteries, and each battery has three floors, and each floor contains 2 cages away (1 x 1 m), inside a 6 x 12 m hall. Chicks were randomly distributed into six experimental treatments, with 30 chicks for each treatment, and three replications for each treatment (10 chicks/Duplicate), The chicks were fed on ready-made rations (fodder pellets). (Pellet, which was prepared from local markets, produced by the Oasis Factory) and included three relationships: The first bush Starter (Crude Protein 22-23%) and the 3010Kk represented energy It was used from the age of 1-14 days and the second diet (crude protein percentage 21-22%) and the 3100Kk represented energy) used From the age of 15-28 days and the third diet (crude protein percentage 18-19% and the 315th0Kk represented energy) was used from day 29 until the end of the experiment at the age of 42 days. The experiment was carried out according to a completely randomized design CRD) and means were compared using Duncan. Test.

## **Results and Discussion**

### **Average body weight**

Table (1) shows the effect of using the aqueous extract of pomegranate peel powder and dried Moringa leaves and their mixture on the weekly body weight rates of broilers. It is noted from the table that there are no significant differences between all experimental treatments in the first week of chicks' life. In the second week, the two treatments showed T2 that T5 was significantly superior ( $P \leq 0.01$ ) to the control treatment. While there were no significant differences between treatments T3, T4, and T6 on the one hand, and the control treatment on the other hand. At the third, fourth, fifth, and sixth

weeks of birdlife, all additional treatments were significantly ( $P \leq 0.01$ ) outperformed compared to the control treatment.

**Table (1): Effect of adding the aqueous extract to pomegranate peel powder and dried Moringa leaves And their mixture in drinking water in the average weekly body weight (g) for broilers  $\pm$  standard error.**

| body weight    |             |                |                |                |                 |                 |
|----------------|-------------|----------------|----------------|----------------|-----------------|-----------------|
| Treatment      | first week  | second week    | third week     | fourth week    | fifth week      | sixth week      |
| T <sub>1</sub> | 0.41±180.80 | b 0.44±516.16  | f 1002.33±3.84 | e 3.56±1672.17 | e6.71±2347.50   | d 8.68±3027.83  |
| T <sub>2</sub> | 1.16±183.16 | a 0.88±520.33  | a 2.40±1109.67 | a4.17±1799.67  | a 5.78 ±2573.33 | a 4.09 ±3348.33 |
| T <sub>3</sub> | 0.92±183.16 | ab 1.15±519.00 | e 1.45±1032.33 | d 3.78±1708.00 | d 7.64±2394.63  | c 7.63±3093.63  |
| T <sub>4</sub> | 1.23±182.93 | ab 0.88±518.33 | c 1.15±1056.00 | c 3.16±1728.17 | c 3.17±2412.50  | c 6.58±3095.83  |
| T <sub>5</sub> | 0.60±181.16 | a 1.45±520.33  | b 2.88±1095.00 | b 0.57±1780.00 | b 2.85±2535.97  | b 6.40±3312.97  |
| T <sub>6</sub> | 0.88±183.33 | ab 0.81±517.13 | d 1.73±1045.00 | d 3.05±1716.00 | c 2.40±2400.67d | c 4.93±3100.00  |
| Sig            | N.S         | **             | **             | **             | **              | **              |

First transaction T<sub>1</sub> (control): no addition. The second treatment: T<sub>2</sub> was added to the aqueous extract of pomegranate peel powder at a level of 50 ml/liter of water. The third treatment T<sub>3</sub>: adds the aqueous extract of moringa leaves powder at a concentration of 75 ml/liter of water. Fourth treatment T<sub>4</sub>: adding an aqueous extract of pomegranate peel powder at 75% and dried moringa leaves powder at 25%. Fifth treatment: T<sub>5</sub> Addition of aqueous extract of pomegranate peel powder at 50% and dried moringa leaf powder at 50%. Sixth treatment: adding an aqueous extract of pomegranate peel powder at 25% and dried moringa leaf powder at 75%. NOS indicates that there are no significant differences between the means of the treatments. \* \* The different letters within the same column indicate that there are significant differences between the groups at the 0.01 probability level.

### Weekly rate of weight gain

It is clear from Table (2) the effect of adding an aqueous extract of pomegranate peel powder and dried moringa leaf powder and their mixture in drinking water on the rate of weekly and total weight gain for broilers. There were no significant differences between all treatments in the first week of the chicks' life. In the second week, a significant improvement appeared. ( $P \leq 0.05$ ) in favor of treatment T<sub>5</sub> over the control treatment, while there are no significant differences between it and treatments T<sub>2</sub> and T<sub>3</sub>, while there are no significant differences between the remaining addiction treatments and the control treatment. In the third week, all addition treatments showed a significant ( $P \leq 0.01$ ) On the control treatment. In the fourth week, T<sub>2</sub> and T<sub>5</sub> were significantly ( $P \leq 0.01$ ) superior to the addition and control treatments. , While there were no significant differences between the addition of treatments T<sub>3</sub>, T<sub>4</sub>, and T<sub>6</sub> are between the control treatment. The moral superiority continues in the fifth week in favor of the

T2 treatment overall treatments of the experiment. In the sixth week, the additional treatments were significantly superior to the control treatment, except for treatment T4 which did not show significant differences between it and the control treatment. As for the total weight gain, the moral superiority was ( $P \leq 0.01$ ) in favor of all the additional treatments over the control treatment.

**Table (2): Effect of adding the aqueous extract to powder Pomegranate peels and dried Moringa leaves and their mixture in drinking water in the mean weekly weight gain (gm) for broilers  $\pm$  standard error**

| weight gain    |                 |                    |                   |                |                   |                   |                  |
|----------------|-----------------|--------------------|-------------------|----------------|-------------------|-------------------|------------------|
| Treatment      | first week      | second week        | third week        | fourth week    | fifth week        | sixth week        | Cumulative 0 – 6 |
| T <sub>1</sub> | 0.±142.46<br>46 | 0.03±335.36<br>b   | 3±486.16<br>f .98 | c 6.77 ±669.83 | 3.17 ±675.33<br>c | 2.60±680.33<br>c  | d 3.21±3007.00   |
| T <sub>2</sub> | ±144.50<br>0.28 | 1.92 ±337.16<br>ab | 2±584.66<br>a .60 | a 2.88±690.00  | 4.63±773.66<br>a  | 2.88±775.00<br>a  | a 4.09±3309.67   |
| T <sub>3</sub> | 1.±144.16<br>42 | 0.44±335.83<br>ab  | 1±513.33<br>e .20 | c 2.96±675.66  | 3.86 ±686.63<br>c | 1.00±699.00<br>b  | c 4.63±3104.33   |
| T <sub>4</sub> | ±144.93<br>0.86 | 1.24 ±335.40<br>b  | ±537.66<br>c 2.02 | c 3.60±672.16  | 2.33 ±684.33<br>c | 6.22±683.33<br>c  | b 4.97±3120.33   |
| T <sub>5</sub> | 1.±142.50<br>04 | 1.36±339.16<br>a   | ±574.66<br>b 3.92 | ba 3.21±685.00 | 3.18 ±755.96<br>b | 6.02±777.00<br>a  | a 3.75±3304.33   |
| T <sub>6</sub> | 1.±144.33<br>33 | b ±333.80<br>0.56  | 2±527.86<br>d .48 | c 1.52±671.00  | 2.90 ±684.66<br>c | 6.17 ±699.33<br>b | c 5.23±3105.67   |
| Sig            | N.S             | *                  | **                | **             | **                | **                | **               |

First transaction T1 (control): no addition. The second treatment: T2 was added to the aqueous extract of pomegranate peel powder at a level of 50 ml/liter of water. The third treatment T3: adds the aqueous extract of moringa leaves powder at a concentration of 75 ml/liter of water. Fourth treatment T4: adding an aqueous extract of pomegranate peel powder at 75% and dried moringa leaves powder at 25%. Fifth treatment: T5 Addition of aqueous extract of pomegranate peel powder at 50% and dried moringa leaf powder at 50%. The sixth treatment was adding an aqueous extract of pomegranate peel powder at a percentage of 25% and dried moringa leaves powder at a percentage of 75%. NS indicates that there are no significant differences between the means of the treatments. \* The different letters within the same column indicate that there are significant differences between the groups at the 0.05 probability level. \*\*The different letters within the same column indicate that there are significant differences between the groups at the 0.01 probability level.

**Average weekly feed consumption**

Table (3) indicates the effect of adding the aqueous extract to pomegranate peel powder and leaf powder moringa dried and their mixture in drinking water in the rate of weekly and total feed consumption for broilers, it was clear from the table that there were no significant differences between all experimental treatments during the first week of the chicks’ life. In the second week, the moral superiority was shown ( $P \leq 0.01$ ) in T2 treatment over control treatment and additional treatments except for T6. at When there are no significant differences between the two treatments T5 and T6 on one side



and the other hand between the treatments T3 and T4 and the control treatment. In the third week, the moral superiority was shown ( $P \leq 0.01$ ) in favor of all the additional treatments over the control treatment. In the fourth week, the moral superiority was shown in favor of the T2 treatment over the control treatment, while there were no significant differences between the rest of the treatments and the control treatment. In the fifth and sixth weeks of education, it outperformed All addition transactions to the control transaction, except transaction T6: There are no significant differences between it and the control treatment, and in the total feed consumption rate, the moral superiority was ( $P \leq 0.01$ ) in favor of all the additional treatments compared with the control treatment.

**Table (3): Effect of adding the aqueous extract to powder Pomegranate peels and leaves moringa dried and their mixture in drinking water in the weekly feed consumption rate (g) for broilers  $\pm$  standard error.**

| Average weekly feed consumption |                    |                     |                      |                      |                       |                       |                       |
|---------------------------------|--------------------|---------------------|----------------------|----------------------|-----------------------|-----------------------|-----------------------|
| T                               | first week         | second week         | third week           | fourth week          | fifth week            | sixth week            | Cumulative 0 – 6      |
| T <sub>1</sub>                  | 2.51 $\pm$ 136.00  | c3 $\pm$ 415.46 .64 | 2.40 $\pm$ 655.33 e  | b4.99 $\pm$ 940.43   | c4.70 $\pm$ 1279.33   | c0.44 $\pm$ .138 1.17 | c12.67 $\pm$ 4807.73  |
| T <sub>2</sub>                  | 0.57 $\pm$ 139.00  | a $\pm$ 430.33 1.45 | a $\pm$ 689.33 1.45  | a1.17 $\pm$ 955.70   | a2.08 $\pm$ 1301.00   | a2.88 $\pm$ .140 5.00 | a9.33 $\pm$ 4895.37   |
| T <sub>3</sub>                  | 1.04 $\pm$ 139.0   | c $\pm$ 416.73 2.6  | $\pm$ 674.66 dc 2.60 | ab3.45 $\pm$ 945.70  | bc2.02 $\pm$ 1288.5   | b3.36 $\pm$ .139 2.40 | b4.23 $\pm$ 4857.00   |
| T <sub>4</sub>                  | 4.12 $\pm$ 141.16  | c $\pm$ 421.50 1.97 | 1.32 $\pm$ 680.50 bc | ab3.81 $\pm$ 947.50  | bc2.12 $\pm$ 1286.17  | b0.68 $\pm$ 1390.13   | b6.40 $\pm$ 4866.97   |
| T <sub>5</sub>                  | $\pm$ 1.96136.33   | $\pm$ 422.23 bc1.32 | 2.08 $\pm$ 686.00 ab | ab 1.15 $\pm$ 950.00 | ab3.19 $\pm$ 1 293.37 | a $\pm$ 0.271399.47   | ab 1.80 $\pm$ 4894.07 |
| T <sub>6</sub>                  | 0. $\pm$ 138.33 44 | $\pm$ 429.00 ab2.01 | d2. $\pm$ 670.33 60  | ab 2.08 $\pm$ 944.00 | ab 2.64 $\pm$ 1289.00 | 0.3 $\pm$ 1383.53 c 7 | b 8.50 $\pm$ 4847.00  |
| Sig                             | N.S                | **                  | **                   | **                   | **                    | **                    | **                    |

First transaction T1 (control): no addition. The second treatment: T2 was added to the aqueous extract of pomegranate peel powder at a level of 50 ml/liter of water. The third treatment T3: adds the aqueous extract of moringa leaves powder at a concentration of 75 ml/liter of water. Fourth treatment T4: adding an aqueous extract of pomegranate peel powder at 75% and dried moringa leaves powder at 25%. Fifth treatment: T5 Addition of aqueous extract of pomegranate peel powder at 50% and dried moringa leaf powder at 50%. Sixth treatment: adding an aqueous extract of pomegranate peel powder at 25% and dried moringa leaf powder at 75%. NOS indicates that there are no significant differences between the means of the treatments. \* \* The different letters within the same column indicate that there are significant differences between the groups at the 0.01 probability level.

### Food conversion factor

Table (4) shows the effect of adding an aqueous extract of pomegranate peel powder and dried moringa leaf powder and their mixture to drinking water in the feed conversion factor. It was noted that there were no significant differences in all experimental treatments during the first week of life. In the second week, the moral improvement was ( $P \leq 0.01$ ) in favor of the T2 and T6 coefficients over the control and addition coefficients, Except for my lab There were no significant differences between T2 and T4 treatment, while there were no significant differences between T5, T6 and the control treatment. In the third week, the two addition treatments T2 and T5 were significantly better ( $P \leq 0.01$ ) in the food conversion factor than the control treatment and the rest of the additional treatments, and these last in turn were All of them are better than the control treatment. And in the fourth and fifth week, the moral improvement was ( $P \leq 0.01$ ) in favor of treatment T4, which outperformed treatment T2 and, in turn, significantly outperformed treatment ( $P \leq 0.05$ ), while no significant differences appeared between treatments T4 and T3 on the one hand and between the two treatments T3 And T2 on the other hand. Also, there was a significant improvement ( $P \leq 0.01$ ) in the rate of the feed conversion factor in favor of all the additional treatments over the control treatment.

**Table (4): Effect of adding the aqueous extract to powder Pomegranate peels and leaves moringa and their mixture in drinking water in the weekly and total feed conversion factor (gm of feed/gm of weight gain) for broilers  $\pm$  standard error.**

| The weekly feed conversion ratio |                 |                       |                      |                       |                      |                       |                   |
|----------------------------------|-----------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|-------------------|
| T                                | first week      | second week           | third week           | fourth week           | fifth week           | sixth week            | Cumulative 0 – 6  |
| T <sub>1</sub>                   | 0.02 $\pm$ 0.95 | 1.23<br>c 0.01 $\pm$  | 0.01 $\pm$ 1.34<br>a | 0.00 $\pm$ 1.40<br>ba | 1.89<br>a 0.00 $\pm$ | 2.03<br>ba 0.00 $\pm$ | a0.00 $\pm$ 1.59  |
| T <sub>2</sub>                   | 0.00 $\pm$ 0.96 | 1.27<br>ba 0.00 $\pm$ | 0.00 $\pm$ 1.17<br>d | b 0.00 $\pm$ 1.38     | 0.01 $\pm$ 1.68<br>b | 1.81<br>d 0.00 $\pm$  | c 0.00 $\pm$ 1.47 |
| T <sub>3</sub>                   | 0.00 $\pm$ 0.96 | 1.24<br>c 0.00 $\pm$  | 0.00 $\pm$ 1.31<br>b | 0.00 $\pm$ 1.39<br>ba | 1.87<br>a 0.01 $\pm$ | 1.99<br>bc 0.00 $\pm$ | b 0.00 $\pm$ 1.56 |
| T <sub>4</sub>                   | 0.03 $\pm$ 0.97 | 1.25<br>bc 0.00 $\pm$ | $\pm$ 1.26<br>c 0.00 | a 0.00 $\pm$ 1.40     | 1.87<br>a 0.00 $\pm$ | 2.03<br>a 0.01 $\pm$  | b 0.00 $\pm$ 1.56 |
| T <sub>5</sub>                   | 0.00 $\pm$ 0.95 | 1.24<br>c 0.00 $\pm$  | 0.00 $\pm$ 1.19<br>d | b 0.00 $\pm$ 1.38     | 1.71<br>b 0.00 $\pm$ | 1.80<br>d 0.01 $\pm$  | c 0.00 $\pm$ 1.48 |
| T <sub>6</sub>                   | 0.00 $\pm$ 0.95 | 1.28<br>a 0.00 $\pm$  | 0.00 $\pm$ 1.27<br>c | 0.00 $\pm$ 1.40<br>ba | 1.88<br>a 0.01 $\pm$ | 1.97<br>c 0.00 $\pm$  | b 0.00 $\pm$ 1.56 |
| Sig                              | N.S             | **                    | **                   | *                     | **                   | **                    | **                |



First transaction T1 (control): no addition. The second treatment: T2 was added to the aqueous extract of pomegranate peel powder at a level of 50 ml/liter of water. The third treatment T3: adds the aqueous extract of moringa leaves powder at a concentration of 75 ml/liter of water. Fourth treatment T4: adding an aqueous extract of pomegranate peel powder at 75% and dried moringa leaves powder at 25%. Fifth treatment: T5 Addition of aqueous extract of pomegranate peel powder at 50% and dried moringa leaf powder at 50%. Sixth treatment: adding an aqueous extract of pomegranate peel powder at 25% and dried moringa leaf powder at 75%. NOS indicates that there are no significant differences between the means of the treatments. \* The different letters within the same column indicate that there are significant differences between the groups at the 0.05 probability level. \*\*The different letters within the same column indicate that there are significant differences between the groups at the 0.01 probability level.

The results of the tables in the productive performance of broilers (1, 2, 3, and 4) showed a significant improvement in the bodyweight rate, weight gain, and the food conversion factor for the treatments of adding the aqueous extract to pomegranate peel powder and dried moringa leaves and their mixture in drinking water compared to the control treatment. This improvement is due to the synergistic action of the active compounds present in the pomegranate peels and moringa leaves, especially when mixed to increase the effectiveness of these compounds and their positive impact on productive performance .represented by phenol acids and the Water-soluble flavonoids. [19]like that contain It contains many bioactive compounds, such as flavonoidsanthocyanins and hydrolyzable tannins, Punicalagin and allergic acid, fatty acids and punicic acid [20]As well as containing phenol acids, flavonoids, and tannins) to which the antagonistic activity is attributed oxidation. Since ellagitannin is most responsible for oxidative activity[21]. Whereas Moringa leaves are characterized by the presence of many effective compounds in which[16]. It also contains vitamins, aryttenoids, polyphenols, tannins, alkaloids, and spooning [22]. as well as contains glycosides, flavonoids, and plant sterols [23]. These compounds combined and by their synergistic action have led to a clear improvement in these product qualities through Activating the metabolic processes within the digestive system, which facilitates the processes of digestion and absorption of nutrients, and thus its positive results are reflected in the performance of broilers Or through these biologically active compounds that increase the logarithmic numbers of beneficial bacteria at the expense of the logarithmic numbers of harmful bacteria, which contributed In enhancing the gut environment by supporting the microbial balance by inhibiting or killing harmful microorganisms and be Next, the numbers of beneficial bacteria inside the intestines outperform, when the microbial balance is supported inside the intestines, and this reflects positively on the general health of the birds. [24]. that use in pomegranate peel powder Broiler diets has significantly improved both the amount of feed consumption and the efficiency of feed conversion [25]. When it was added to the broiler feeding rations, it significantly improved the final body weight, the amount of feed consumption, the feed conversion factor, carcass weight, and the organ weight in broiler chickens. [26]. As for hen The use of 20 ml of concentrated aqueous and alcoholic extract of Moringa leaves per liter of drinking water for broilers led to a significant improvement in the final body weight, weight gain, feed consumption, and feed conversion factor. [27]. but when Adding it



to chicken diets had a positive effect on growth performance, increasing body weight and improving the food conversion factor [28 ]

### Relative growth rate of broilers

illustrated by Table (5) Effect of adding the aqueous extract to pomegranate peel powder and leaves moringa dried and their mixture in drinking water in the relative growth rate of broilers. The results showed that there were no significant differences in the first week of the experiment. In the second week, it showed the moral superiority between treatments T5 and T6 over the rest of the treatments, while no significant differences appeared between Transactions The other addition and the control treatment. In the third week, it was significantly superior that all the additional treatments were to the control treatment, while there were no significant differences between the addition treatments T2, T4, and T6. In the fourth week, there were no significant differences between the treatments. In the fifth and sixth weeks, the moral superiority was in favor of the two treatments T2 and T5 over the control treatment and the rest of the additional treatments. In the overall relative growth rate, each of the two addition treatments T2 and T5 outperformed the control treatment and the rest of the additional treatments, while there were no significant differences between the treatments T3, T4 and T6 and the control treatment .

**Table (5): Effect of adding the aqueous extract to powder Pomegranate peels and leaving moringa Dried in drinking water The weekly relative growth ratio for broilers ± standard error.**

| The weekly relative growth ratio |                 |                   |                  |             |                   |                  |                  |
|----------------------------------|-----------------|-------------------|------------------|-------------|-------------------|------------------|------------------|
| T                                | first week      | second week       | third week       | fourth week | fifth week        | sixth week       | Cumulative 0 - 6 |
| T <sub>1</sub>                   | 1.19±130.04     | 0.11±96.23<br>ab  | 0.37±64.03<br>d  | 1.44±49.72  | 0.07±33.60<br>b   | 0.06±25.31<br>b  | b 0.26±66.55     |
| T <sub>2</sub>                   | ±130.30<br>1.42 | 0.59±95.85<br>ab  | 0.30 ±71.53<br>b | 0.55±50.24  | a 0.19±35.38      | 0.12±26.1<br>a   | a 0.32±67.78     |
| T <sub>3</sub>                   | 1.09±129.78     | 0.23±95.65<br>ab  | 0.15 ±66.18<br>c | 0.48 ±50.70 | 0.09±33.47<br>cb  | ±25.47<br>b 0.07 | b 0.15 ±66.64    |
| T <sub>4</sub>                   | ±131.20<br>0.61 | ±95.65<br>ab 0.49 | 0.24±68.30<br>b  | 0.62 ±48.39 | 0.12 ± 33.05<br>c | ±24.81<br>c 0.20 | b 0.15 ±66.88    |
| T <sub>5</sub>                   | ±129.66<br>1.70 | a ±96.69<br>0.26  | ±71.15<br>a 0.42 | 0.72 ±49.28 | 0.12 ± 35.03<br>a | ±26.56<br>a 0.18 | a 0.29 ± 67.79   |
| T <sub>6</sub>                   | ±129.83<br>1.05 | ±95.30<br>b 0.28b | ±67.58<br>b 0.27 | 0.20 ±49.47 | 0.15 ±33.26<br>cb | ±25.42<br>b 0.21 | b 0.15 ±66.67    |
| Sig                              | N.S             | **                | *                | N.S         | **                | **               | **               |

First transaction T<sub>1</sub> (control): no addition. The second treatment: T<sub>2</sub> was added to the aqueous extract of pomegranate peel powder at a level of 50 ml/liter of water. The third treatment T<sub>3</sub>: adds the aqueous extract of moringa leaves powder at a concentration of 75 ml/liter of water. Fourth treatment T<sub>4</sub>: adding an aqueous extract of pomegranate peel powder at 75% and dried moringa leaves powder at 25%. Fifth treatment: T<sub>5</sub> Addition of aqueous extract of pomegranate peel powder at 50% and dried moringa leaf powder at 50%. Sixth treatment: adding an aqueous extract of pomegranate peel powder at 25% and dried moringa leaf powder at 75%. NOS indicates that there are no significant differences between the means of the treatments. \* The different letters within the same column indicate that there are significant differences

between the groups at the 0.05 probability level. \*\*The different letters within the same column indicate that there are significant differences between the groups at the 0.01 probability level.

It is clear from the table outweighs my treatment add T2 and T5 was significant ( $P \leq 0.01$ ) in all treatments Experience The moral superiority is attributed to the moral improvement of the final body weight, weekly weight gain, and a food conversion factor of the treatment. T2 (aqueous extract of dried pomegranate peel powder at a concentration of 50 ml/liter of water). And the treatment of T5 aqueous extract of dried pomegranate peel powder at a concentration of 50% (25 ml/liter) water with dried moringa leaf powder at a concentration of 50% (37.5 ml/liter) when both pomegranate peel powder and moringa leaf powder contained active substances. As the growth rate Relative is the rate of weight gain during a specific period and therefore the relative growth rate improves as a result of the improvement of the weekly and total weight gain. where the Adding pomegranate peel powder to broiler diets 308Rose at a level of 20 gm / 1 kg of feed led to a significant superiority in the final body weight, weekly weight gain, and relative growth rate compared to the control treatment. [12]

### **Average weekly and total water consumption**

Table (6) shows the addition of the aqueous extract of pomegranate peel powder and dried moringa leaves and their mixture in drinking water at an average rate. Weekly and total water consumption for broiler meat. In the second week, a significant improvement was observed ( $P \leq 0.01$ ) for the two addition treatments T2 and T5 on the control treatment, while there were no significant differences between the treatments of T3, T4, T5, and T6 on the one hand, and between T3, T4, T6 and the control treatment T1 on the other hand. In the third, fourth, and fifth week, the moral superiority was ( $P \leq 0.01$ ) in favor of the additional treatments compared to the control treatment. In the sixth week, all addition treatments ( $P \leq 0.01$ ) were significantly superior to the control treatment, while there were no significant differences between T3T4 and T6 on one side and T2 and T5 treatments on the other hand. As for the overall water consumption rate also Significantly superior to all addition coefficients ( $P \leq 0.01$ ) on the control treatment.

**Table (6): Effect of adding the aqueous extract to powder Pomegranate peels and leaves Dried meringue and its mixture in drinking water Average weekly and total water consumption for broilers  $\pm$  standard error**

| Average weekly and total water consumption |                  |                   |                    |                    |                    |                  |
|--|------------------|-------------------|--------------------|--------------------|--------------------|------------------|
| Treatment                                  | second week      | third week        | fourth week        | fifth week         | sixth week         | Cumulative 0 – 6 |
| T <sub>1</sub>                             | 0.88±825.93<br>c | 7.68±1303.66<br>f | 1879.86<br>e 7.12± | 13.42±2552.66<br>e | 11.54±2752.33<br>c | d 17.36±9314.44  |
| T <sub>2</sub>                             | 3.46±855.66<br>a | 4.80±1371.66<br>a | 8.35±1916.73<br>a  | 11.56±2596.00<br>a | 15.02±2800.00<br>a | a 8.19±9540.05   |



|                      |                                  |                                  |                                   |                                   |                                   |                         |
|----------------------|----------------------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-------------------------|
| <b>T<sub>3</sub></b> | <b>2.30±828.46</b><br><b>bc</b>  | <b>±1342.33</b><br><b>e 2.90</b> | <b>±3402.00</b><br><b>d 7.57</b>  | <b>15.28±1887.40</b><br><b>d</b>  | <b>±2774.80</b><br><b>b 18.60</b> | <b>c 15.56 ±9403.99</b> |
| <b>T<sub>4</sub></b> | <b>±838.00</b><br><b>bc 1.76</b> | <b>2.30±1354.00</b><br><b>c</b>  | <b>±1891.00</b><br><b>c 6.33</b>  | <b>6.35 ± 2566.33</b><br><b>c</b> | <b>±2770.26</b><br><b>b 34.80</b> | <b>c 13.16 ±9419.52</b> |
| <b>T<sub>5</sub></b> | <b>±839.46</b><br><b>b 2.90</b>  | <b>±1365.00</b><br><b>b 5.77</b> | <b>± 1909.33</b><br><b>b 1.15</b> | <b>5.71 ± 2580.73</b><br><b>b</b> | <b>8.54 ± 2788.93</b><br><b>a</b> | <b>b 12.80 ±9483.45</b> |
| <b>T<sub>6</sub></b> | <b>±853.00</b><br><b>bc 1.63</b> | <b>±1333.66</b><br><b>d 3.46</b> | <b>±1884.00</b><br><b>d 6.11</b>  | <b>4.80 ±2572.00</b><br><b>d</b>  | <b>±2757.06</b><br><b>b 34.47</b> | <b>c 9.86 ±9399.72</b>  |
| <b>Sig</b>           | <b>**</b>                        | <b>**</b>                        | <b>**</b>                         | <b>**</b>                         | <b>**</b>                         | <b>**</b>               |

First transaction T1 (control): no addition. The second treatment: T2 was added to the aqueous extract of pomegranate peel powder at a level of 50 ml/liter of water. The third treatment T3: adds the aqueous extract of moringa leaves powder at a concentration of 75 ml/liter of water. Fourth treatment T4: adding an aqueous extract of pomegranate peel powder at 75% and dried moringa leaves powder at 25%. Fifth treatment: T5 Addition of aqueous extract of pomegranate peel powder at 50% and dried moringa leaf powder at 50%. Sixth treatment: Adding aqueous extract of pomegranate peel powder at a percentage of 25% and dried moringa leaf powder at a percentage of 75%..\* \*The different letters within one column indicate significant differences between the groups at the probability level of 0.01.

It can be seen from the table above that Exceeds all addition parameters mor-ally( $P \leq 0.01$ ) on the control treatment in weekly and total water consumption. This may be attributed to the significant improvement in body weight, weight gain, feed consumption rate, and food conversion factor as a result of the synergistic action of the active substances present in both of them, which have a positive effect on increasing colonies of beneficial microorganisms, which increases digestion And absorption in the intestine and a role that is reflected on growth, weight gain, feed consumption, and food conversion factor, where It is evident from the results of the production performance tables (1, 2, 3 and 4) that the significant increase in the product characteristics in the treatments of aqueous extracts of pomegranate peel powder and dried moringa leaves powder to drinking water compared to the control treatment, and this, in turn, leads to an increase in the rate of consumption water where The water consumption for chickens ranges from 1.6 to 2.0 times the amount of feed [29]. Also, the consumption of water and feed is evidence of the good health of birds and the increase of beneficial microorganisms as a result of the synergistic action of the active substances found in each of the pomegranate peels and moringa leaves, and this, in turn, leads to an increase indigestion Absorption and increased feed consumption as a result of the significant increase in the number of beneficial microorganisms Which works on the production of lactic acid, which reduces the level of decreases PH inside the intestines. The amount of water consumption by chickens is estimated to be twice the amount of feed consumed [30]. That is, the consumption of water increases with the increase in feed consumption, as broilers consume 2.32 ml of water/A liter of drinking water for every 1 kg of feed, which means water consumes twice the amount of feed consumed. [31].

### Percentage of fatalities and production guide for broilers

Show from the schedule (7) Effect of adding an aqueous extract of pomegranate peel powder and dried moringa leaves and their mixture in drinking water on mortality and production index of broiler chickens. There were no deaths among the experimental treatments during the experiment period, as well as the appearance of a significant superiority ( $P \leq 0.05$ ) in the value of the production index for all the additional treatments compared to the control treatment. Except for treatment T3, which did not differ significantly from the control treatment.

**Table (7): Effect of adding the aqueous extract to the powder Dried pomegranate peels and moringa leaves and their mixture in drinking water In the percentage of deaths (%) and the production index for broilers**

| Treatment      | Loss Percentage (%) | production guide  |
|----------------|---------------------|-------------------|
| T <sub>1</sub> | 0                   | b 1.04 ± 425.12   |
| T <sub>2</sub> | 0                   | a 7.25 ± 476.92   |
| T <sub>3</sub> | 0                   | ab 18.42 ± 471.70 |
| T <sub>4</sub> | 0                   | a 20.90 ± 521.77  |
| T <sub>5</sub> | 0                   | a 14.16 ± 495.00  |
| T <sub>6</sub> | 0                   | a 26.64 ± 511.57  |
| T <sub>7</sub> | 0                   | b 1.04 ± 425.12   |
| Sig            | N.S                 | *                 |

First transaction T<sub>1</sub> (control): no addition. The second treatment: T<sub>2</sub> was added to the aqueous extract of pomegranate peel powder at a level of 50 ml/liter of water. The third treatment T<sub>3</sub>: adds the aqueous extract of moringa leaves powder at a concentration of 75 ml/liter of water. Fourth treatment T<sub>4</sub>: adding an aqueous extract of pomegranate peel powder at 75% and dried moringa leaves powder at 25%. Fifth treatment: T<sub>5</sub> Addition of aqueous extract of pomegranate peel powder at 50% and dried moringa leaf powder at 50%. Sixth treatment: adding an aqueous extract of pomegranate peel powder at 25% and dried moringa leaf powder at 75%. NOS indicates that there are no significant differences between the means of the treatments. \* The different letters within the same column indicate that there are significant differences between the groups at the 0.05 probability level.

The improvement in the productivity index scale for all the additional treatments was the result of a clear improvement in all the productive traits, which is the main indicator in evaluating the productive performance of broilers in the plant extracts treatments. An increase in the final weight rate, weekly weight gain, and food conversion factor for all additional treatments compared to the control treatment was noted. Positively reflected on the productivity index scale.

We conclude that adding an aqueous extract of pomegranate peel powder and powder of dried moringa leaves and their mixture to broiler drinking water has improved productive traits (body weight, weight gain, feed consumption, food conversion factor,



and productivity index). Also, a significant improvement in the relative growth rate and water consumption rate for some treatments of aqueous extracts was obtained.

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