Comparative study to evaluate productive performance of Iraqi Turkey female Strains.

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Abstract. The turkey females were randomly distributed on four groups, each group consisted of 12 birds depend on strain. The strains as follow, (T1): red turkey strain, (T2): bronze turkey strain, (T3): white turkey strain, (T4): black turkey strain. Each group constituted from 3 replicates and each replicate has 4 females. All birds housed under same environmental conditions. Feed and water were available (ad libitum) for all the period. Birds were fed on diet contains 20% crude protein and 2950 Kcal metabolic energy / kg through the experimental period. The flock was reared in a ground cages (pens) during the experiment period. Eggs were collected twice daily. Black turkey strain achieved the highest results, whereas the red strain recorded the lowest results in all traits measured in this study, also white turkey strain had superior on bronze turkey strain in all traits. Results revealed that strain had Significant effected on egg production rate, cumulative eggs number, egg weight, egg mass and feed conversion ratio, but, there was no significant effected for strain on feed intake.

1. Introduction
Insufficient of animal protein is nutritional problem in the third world countries. One of the solutions is develop poultry industry and flow untraditional ways to increase poultry protein, one of the methods is diversity producing poultry protein sources, Poultry are classified into chicken, turkey, geese, ducks, ostriches, pigeons, guinea fowl, quails, and some other species. [1]. Chickens are classify as the most important proteins sources, whereas the other poultry species did not find the same interesting like turkeys, geese, guinea fowl, ducks, quails, ostriches and pigeons. Turkey have raised for centuries from north and south America and most of European countries, in the third world countries turkey have not enough interesting and is still raised from single farmers, there is no specific companies to develop this industry [2]. Many different varieties of turkey have been developed for productivity. The American Poultry Association (APA) determined eight varieties of turkeys, they are Bronze, Black, White Holland, Narragansett, Slate, Beltsville Small White, Bourbon Red and Royal Palm [3]. Four local turkey strains have been found in Iraq they are Bronze, Black, White and Bourbon red. The aim of this
study was to comparative productive performance among four Iraqi local turkey strains to select the best and record the main productive features of each strain in order to start developing programs.

2. Materials and methods
This study was conducted at poultry farm of Al-latefa Researches department/ Agricultural researches directorate/ ministry of sciences and technology, during the period from 20/9/2018 to 12/1/2019. This experiment included a total of 48 local Iraqi turkey females in 32 weeks old. The turkey females were randomly distributed on four groups, each group consisted of 12 birds depend on strain. Each group constituted from 3 replicates and each replicate has 4 females. All birds housed under same environmental conditions. Feed and water were available for all the period (ad libitum). Birds were fed during the whole period on diet contain 20% crude protein and 2950 Kcal metabolic energy / kg. The flock was reared in a ground cages (pens) during the experiment period. Eggs were collected twice daily.

Groups were as following:
1. group 1 (T1): red turkey strain.
2. group 2(T2): bronze turkey strain.
3. group 3 (T3): white turkey strain.
4. group 4 (T4): black turkey strain.

2.1. Traits measured: Feed intake, eggs production rate, cumulative eggs number, egg weight, egg mass and feed conversion ratio.

2.2. Feed intake: Weekly feed intake per experimental unit was recorded and used to compute feed intake per bird per day, using the following equation [4]:
Feed intake /bird/ day = 

2.3. Hen-day egg production (HD):
Eggs were collected and recorded daily for each treatment during the period of 16 weeks to calculate hen-day egg production for each group, and during the whole experimental period. Hen-day egg production (HD) was calculated on daily basis according to the following equation [4]:
HD % = \frac{\text{No. of eggs produced on daily basis}}{\text{No. of hens alive on each day} \times \text{No. of days}} \times 100

2.4. Cumulative egg number:
Egg number during a certain period of time, has been calculated on the basis of the accumulation of eggs produced weekly for each replicate per treatment, as in the following equation[4]
Cumulative egg No. (eggs/hen/period) = \frac{\text{HD}}{100} \times \text{No. of days}

2.5. Egg weight:
In the course of the experimental period, eggs produced were collected every day by each replicate and were weighed by electronic digital scale to the nearest 0.01 g and the mean egg weight (g) was recorded by the weekly average weight of eggs.

2.6. Egg mass:
Egg mass was calculated by multiplying average of egg weight by egg production on replicate, using the following formula [4]
Egg mass (g) = \( \frac{HD}{100} \times \text{average egg weight} \times \text{No. of days} \)

2.7. Feed conversion ratio (FCR):
Feed conversion ratio (FCR) was calculated for each replicate as the ratio of the feed consumed to the egg mass [4].

\[
\text{FCR} = \frac{\text{Feed consumed (g)}}{\text{egg mass(g)}}
\]

2.8. Statistical analysis
A complete randomized design (CRD) has been used in this study. Statistical analyses for various variables were using the SAS program [5]. Significant differences between treatments mean were determined by using Duncan's multiple range tests [6]. The statistical model used is as follows:

\[ Y_{ij} = \mu + T_i + e_{ij} \]

Where:
- \( Y_{ij} \) = the value of observation of traits
- \( \mu \) = the overall mean of traits
- \( T_i \) = the effect of treatments
- \( e_{ij} \) = random error assumed to be mean equal to zero and variance is \( \sigma^2_e \).

3. Results and Discussion:
The results presented in Table 1 showed that feed intake was not significantly affected by strains. The overall mean values of female feed consumption were 103.25, 102.67, 102.04 and 102.52 g/day for groups T4, T3, T2 and T1, respectively.

| Periods (week) | T4          | T3           | T2           | T1           |
|---------------|-------------|--------------|--------------|--------------|
| 1             | 90.0 ± 1.08 | 91.6 ± 3.01  | 90.9 ± 1.13  | 90.2 ± 1.08  | N.S          |
| 2             | 93.1 ± 2.16 | 92.0 ± 2.11  | 91.4 ± 2.20  | 91.8 ± 2.41  | N.S          |
| 3             | 94.5 ± 1.32 | 93.8 ± 1.51  | 94.2 ± 1.36  | 93.80 ± 1.10 | N.S          |
| 4             | 95.11 ± 1.55| 95.22 ± 1.96 | 94.83 ± 1.38 | 95.21 ± 1.48 | N.S          |
| 5             | 98.10 ± 2.56| 98.56 ± 1.45 | 98.33 ± 1.39 | 98.21 ± 1.67 | N.S          |
| 6             | 100.13 ± 1.37| 100.12 ± 2.20| 100.21 ± 2.43| 100.9 ± 1.53 | N.S          |
| 7             | 103.12 ± 1.55| 103.10 ± 1.33| 105.30 ± 1.57| 102.13 ± 1.57| N.S          |
| 8             | 109.0 ± 2.50 | 108.5 ± 2.80 | 109.1 ± 2.08 | 107.2 ± 2.55 | N.S          |
| 9             | 106.3 ± 1.20 | 105.0 ± 1.73 | 105.8 ± 1.15 | 105.4 ± 1.33 | N.S          |
| 10            | 110.3 ± 2.15 | 109.3 ± 2.50 | 108.2 ± 2.30 | 110.1 ± 2.18 | N.S          |
| 11            | 108.0 ± 1.50 | 107.1 ± 2.60 | 105.3 ± 2.72 | 108.2 ± 2.7 | N.S          |
| 12            | 107.2 ± 2.88 | 106.6 ± 1.39 | 104.8 ± 2.14 | 105.1 ± 2.15 | N.S          |
| 13            | 104.2 ± 2.12 | 104.9 ± 2.30 | 106.3 ± 2.57 | 105.6 ± 2.52 | N.S          |
| 14            | 110.01 ± 3.20| 108.0 ± 2.55 | 107.5 ± 2.32 | 108.6 ± 2.13 | N.S          |
| 15            | 111.2 ± 29   | 108.2 ± 3.80 | 110.0 ± 3.36 | 108.1 ± 2.10 | N.S          |
| 16            | 113.0 ± 3.40 | 113.0 ± 3.60 | 111.1 ± 2.15 | 110.8 ± 2.15 | N.S          |
3.1. Egg production rate (EP):

Compared among fur strains (Table 2) revealed that values of the percentage of egg production during most periods of experiments have gradually increased (P≤0.05), linear enhancement was continuous up to T4 and T3 whereas T2(bronze strain) resulted in significant (P≤0.05) increase in the percentage of egg production compared with T1 (red strain). The highest overall means value of the egg production was in T4 and T3 groups compared with T2 and T1 groups. While T1 group had lowest percentage of egg production.

**Table 2.** Effect of strain on H.D egg production (%) (Mean ± SE) of turkey.

| Periods (week) | T4         | T3         | T2         | T1         | Level of significance |
|---------------|------------|------------|------------|------------|----------------------|
| 1             | 55.72±0.010a | 55.58±0.057a | 55.00±0.16 a | 51.29±0.020 b | *                    |
| 2             | 56.00±0.020a | 55.50±0.022 b | 55.48±0.011 b | 52.43±0.16 c | *                    |
| 3             | 57.86±0.01a  | 57.66±0.16 a  | 56.33±0.020 b | 53.43±0.047 c | *                    |
| 4             | 59.00±0.16a  | 59.02±0.022 a  | 56.72±0.025 b | 55.00±0.011 c | *                    |
| 5             | 61.15±0.022a | 60.98±0.011 a  | 58.73±0.025 b | 57.21±0.16     | *                    |
| 6             | 62.22±0.16a  | 62.80±0.14 a  | 57.80±0.29b  | 55.50±0.15     | *                    |
| 7             | 64.43±0.017a | 64.20±0.057 a  | 60.30±0.028 b | 55.00±0.57     | c                    |
| 8             | 65.15±0.028a | 65.25±0.28 a  | 60.68±0.03b  | 57.30±0.075c   | *                    |
| 9             | 67.45±0.028a | 67.33±0.017 a  | 61.10±0.028b | 59.50±0.15     | c                    |
| 10            | 67.40±0.035a | 67.50±0.026 a  | 62.25±0.092b | 60.61±0.18     | c                    |
| 11            | 68.00±0.23a  | 68.30±0.011 a  | 63.20±0.030b | 61.25±0.92     | c                    |
| 12            | 68.20±0.18a  | 67.90±0.035 a  | 63.20±0.26b  | 62.40±0.28     | c                    |
| 13            | 69.40±0.28a  | 69.35±0.022 a  | 65.15±1.23b  | 63.45±0.13     | c                    |
| 14            | 67.55±0.017a | 67.44±0.012 a  | 4.13±0.28b   | 62.34±0.15     | c                    |
| 15            | 67.45±0.02a  | 66.95±0.028 a  | 63.20±0.017 b | 58.10±0.13     | c                    |
| 16            | 65.00±0.03a  | 65.45±0.16 a   | 62.80±0.025 b | 59.24±0.28     | c                    |
| Overall means | 63.87±1.1a  | 63.82±1.88 a   | 60.37±1.2b   | 57.70±0.76c    | *                    |

T1: red turkey strain, T2: bronze turkey strain, T3: white turkey strain, T4: black turkey strain Means in same rows with different superscript were significantly different. * (P≤0.05).

3.2. Egg weight (EW):

In table 3, as seen, the data confirmed that average egg weight regarding to significant effect (P≤0.05) of strains. T4 (black turkey strain) recorded highest on egg weight as compared with other groups (T1, T2 and T3). Also T3 (white turkey strain) achieved high significant effect (P≤0.05) compared with groups T2 (bronze turkey strain) and T1 (red turkey strain), whereas T1 recorded lowest values in this trait during the all experimental period. However, the overall means of egg weight were 79.39, 75.14, 72.59 and 69.14 for T4, T3, T2 and T1, respectively.
Table 3. Effect of strain on egg weight (g) (Mean ± SE) of turkey.

| Periods (week) | T4     | T3     | T2     | T1     | Level of significance |
|---------------|--------|--------|--------|--------|-----------------------|
| 1             | 78.8±0.14<sup>a</sup> | 73.30±0.43<sup>b</sup> | 70.5±0.25<sup>c</sup> | 68.5±0.12<sup>d</sup> | *                      |
| 2             | 78.9±0.11<sup>a</sup> | 74.0±0.17<sup>b</sup> | 72.0±0.43<sup>c</sup> | 69.1±0.55<sup>d</sup> | *                      |
| 3             | 78.7±0.33<sup>a</sup> | 73.5±0.21<sup>b</sup> | 71.5±0.15<sup>c</sup> | 66.3±0.27<sup>d</sup> | *                      |
| 4             | 79.2±0.21<sup>a</sup> | 75.2±0.11<sup>b</sup> | 72.0±0.17<sup>c</sup> | 67.0±0.23<sup>d</sup> | *                      |
| 5             | 79.4±0.23<sup>a</sup> | 74.8±0.31<sup>b</sup> | 71.2±0.25<sup>c</sup> | 68.4±0.15<sup>d</sup> | *                      |
| 6             | 80.3±0.21<sup>a</sup> | 75.5±1.19<sup>b</sup> | 73.2±0.11<sup>c</sup> | 70.0±1.05<sup>d</sup> | *                      |
| 7             | 79.3±0.43<sup>a</sup> | 75.3±1.17<sup>b</sup> | 73.1±1.17<sup>c</sup> | 70.2±0.25<sup>d</sup> | *                      |
| 8             | 79.8±0.39<sup>a</sup> | 74.1±0.27<sup>b</sup> | 72.90±1.13<sup>c</sup> | 70.5±1.00<sup>d</sup> | *                      |
| 9             | 79.5±0.22<sup>a</sup> | 75.8±0.68<sup>b</sup> | 73.9±0.38<sup>c</sup> | 69.0±0.68<sup>d</sup> | *                      |
| 10            | 79.2±0.32<sup>a</sup> | 77.3±0.88<sup>b</sup> | 74.4±1.89<sup>c</sup> | 71.5±0.38<sup>d</sup> | *                      |
| 11            | 78.5±0.28<sup>a</sup> | 75.0±1.21<sup>b</sup> | 71.5±0.98<sup>c</sup> | 68.0±1.98<sup>d</sup> | *                      |
| 12            | 79.0±1.21<sup>a</sup> | 76.7±1.12<sup>b</sup> | 72.5±0.36<sup>c</sup> | 68.6±2.21<sup>d</sup> | *                      |
| 13            | 79.1±1.8<sup>a</sup> | 75.5±1.16<sup>b</sup> | 72.8±0.15<sup>c</sup> | 68.5±0.66<sup>d</sup> | *                      |
| 14            | 79.0±1.5<sup>a</sup> | 75.2±0.42<sup>b</sup> | 72.8±0.98<sup>c</sup> | 69.8±0.45<sup>d</sup> | *                      |
| 15            | 80.2±1.41<sup>a</sup> | 76.0±0.68<sup>b</sup> | 73.0±1.12<sup>c</sup> | 70.3±0.23<sup>d</sup> | *                      |
| 16            | 80.0±1.22<sup>a</sup> | 75.1±0.51<sup>b</sup> | 73.0±0.41<sup>c</sup> | 68.7±1.10<sup>d</sup> | *                      |
| Overall levels | 79.39±1.59<sup>a</sup> | 75.14±1.23<sup>b</sup> | 72.56±1.55<sup>c</sup> | 69.2±1.22<sup>d</sup> | *                      |

T1: red turkey strain, T2: bronze turkey strain, T3: white turkey strain, T4: black turkey strain Means in same rows with different superscript were significantly different. *(P<0.05).

3.3. Cumulative of egg number
Cumulative egg number calculated every week. As seen in Table 4, it was confirmed that Cumulative egg number values for T4 and T3 groups were increase significantly (P<0.05) during the most periods of experiment as compared with other groups also the T2 treatment were significantly (P<0.05) superior to T1 group. The overall means of this trait were recorded the highest values in T4 and T3 groups as compared with T2 and T1. whereas the T2 was significantly (P<0.05) as compared with T1 group. The overall means values of average Cumulative egg number were 4.02, 4.20, 4.46 and 4.47 for T1, T2, T3 and T4, respectively.

Table 4. Effect of strain on cumulative egg number (egg/hen/week) (Mean ± SE) of local turkey females.

| Periods (week) | T4     | T3     | T2     | T1     | Level of significance |
|---------------|--------|--------|--------|--------|-----------------------|
| 1             | 3.92±0.023<sup>a</sup> | 3.89±0.011<sup>a</sup> | 3.75±0.01<sup>a</sup> | 3.49±0.005<sup>b</sup> | *                      |
| 2             | 3.92±0.05a | 3.88±0.11 b | 3.87±0.013 b | 3.63±0.011 c | *                      |
| 3             | 4.05±0.01a | 4.03±0.05 a | 3.95±0.001 b | 3.73±0.023 c | *                      |
| 4             | 4.15±0.011a | 4.14±0.021 a | 3.95±0.021 b | 3.83±0.05 c | *                      |
| 5             | 4.28±0.005 a | 4.29±0.023 a | 4.10±0.01 b | 3.89±0.011 c | *                      |
| 6             | 4.35±0.01 a | 4.37±0.23 a | 4.04±0.023 b | 3.88±0.028 c | *                      |
| 7             | 4.50±0.021a | 4.49±0.011a | 4.22±0.016 b | 3.83±0.021 c | *                      |
| 8             | 4.56±0.18a | 4.56±0.005a | 4.24±0.011 b | 4.00±0.023c | *                      |
| 9             | 4.72±0.03a | 4.71±0.023a | 4.27±0.018 b | 4.16±0.012c | *                      |
| 10            | 4.71±0.03 a | 4.72±0.021 a | 4.35±0.015 b | 4.24±0.011 c | *                      |
| 11            | 4.76±0.001 a | 4.78±0.005 a | 4.42±0.016 b | 4.28±0.029 c | *                      |
| 12            | 4.77±0.004 a | 4.75±0.026 a | 4.42±0.001 b | 4.36±0.020 c | *                      |
| 13            | 4.85±0.006 a | 4.85±0.016 a | 4.56±0.005 b | 4.44±0.022 c | *                      |
| 14            | 4.72±0.018 a | 4.72±0.03 a | 4.48±0.005 b | 4.36±0.033 c | *                      |
T2 recorded the best results respecting feed conversion ratio as compared to T1 during all periods of experiment. The overall means values for this trait were 2.03, 2.16, 2.35 and 2.56 (g feed/g egg) for groups T4, T3, T2 and T1, respectively.

The T4 group recorded the best results, it had significant effect (P≤0.05) as compared with other experimental groups T1, T2 and T3 during all periods of experiment (Table 6). Results are presented in Table 5 indicated that overall means of egg mass for T4, T3, T2 and T1 were 354.53, 354.53, 305.57 and 260.71, respectively.

The effects of strains differences on egg mass as shown in Table 5. As seen strains have significantly (P≤0.05) influenced on egg mass during all periods of experiment. The egg mass was significantly higher in T4 compare with other groups at all periods examined. Egg mass value in T3 group increased significantly (P≤0.05) as compared with T2 and T1 treatments, whereas T1 group which were lowest than other groups over the whole period. Results are presented in Table 5 indicated that overall means of egg mass for T4 compare with other groups at all periods examined. Egg mass value in T3 group increased significantly (P≤0.05) as compared with T2 and T1 treatments, whereas T1 group which were lowest than other groups over the whole period. Results are presented in Table 5 indicated that overall means of egg mass for T4, T3, T2 and T1 were 354.53, 354.53, 305.57 and 260.71, respectively.

### Table 5. Effect of strain on egg mass (g/hen/week) (Mean ± SE) of turkey.

| Periods (week) | T4          | T3          | T2          | T1          | Level of significance |
|----------------|-------------|-------------|-------------|-------------|-----------------------|
| 1              | 308.90 ± 1.5 a | 285.13 ± 2.82 b | 264.37 ± 2.11 c | 239.09 ± 1.79 d | *                     |
| 2              | 309.28 ± 1.82 a | 287.12 ± 1.5 b  | 277.36 ± 1.76 c | 250.83 ± 1.11 d | *                     |
| 3              | 318.57 ± 2.76 a | 296.2 ± 1.82 b  | 283.85 ± 1.76 c | 248.62 ± 2.82 d | *                     |
| 4              | 328.68 ± 1.76 a | 311.32 ± 2.82 b | 285.84 ± 2.11 c | 257.95 ± 1.5 d  | *                     |
| 5              | 339.83 ± 2.5 a  | 320.89 ± 1.51 b | 291.92 ± 1.82 c | 273.66 ± 2.76 d | *                     |
| 6              | 349.30 ± 1.12 a | 329.93 ± 1.53 b | 295.71 ± 1.82 c | 266.045 ± 1.18 d | *                     |
| 7              | 356.85 ± 1.25 a | 338.09 ± 1.25 b | 308.48 ± 1.27 c | 268.86 ± 1.23 d | *                     |
| 8              | 363.87 ± 0.59 a | 337.89 ± 1.16 b | 311.28 ± 1.13 c | 284.80 ± 1.33 d | *                     |
| 9              | 375.24 ± 1.58 a | 357.01 ± 1.27 b | 315.55 ± 1.98 c | 287.04 ± 1.24 d | *                     |
| 10             | 373.03 ± 1.12 a | 364.85 ± 1.12 b | 323.64 ± 1.12 c | 303.16 ± 2.13 d | *                     |
| 11             | 373.66 ± 1.03 a | 358.50 ± 1.12 b | 316.03 ± 1.01 c | 291.04 ± 1.25 d | *                     |
| 12             | 376.83 ± 1.30 a | 364.32 ± 1.88 b | 320.45 ± 1.12 c | 299.06 ± 1.26 d | *                     |
| 13             | 383.17 ± 1.13 a | 366.27 ± 1.25 b | 331.96 ± 1.23 c | 304.14 ± 1.28 d | *                     |
| 14             | 372.89 ± 1.88 a | 354.91 ± 1.96 b | 321.77 ± 1.34 c | 304.32 ± 1.37 d | *                     |
| 15             | 378.50 ± 1.75 a | 355.68 ± 1.98 b | 320.47 ± 1.53 c | 288.97 ± 1.53 d | *                     |
| 61             | 364.00 ± 1.16 a | 344.70 ± 1.33 b | 320.47 ± 1.75 c | 277.54 ± 1.12 d | *                     |
| Overall means  | 354.53 ± 3.13 a | 335.28 ± 4.32 b | 305.57 ± 4.12 c | 260.71 ± 5.86 d | *                     |

Table 5: Effect of strain on eggs mass (g/hen/week) (Mean ± SE) of turkey.

T1: red turkey strain, T2: bronze turkey strain, T3: white turkey strain, T4: black turkey strain Means in same rows with different superscript were significantly different. *(P≤0.05).

### 3.4. Egg mass (EM)

The effects of strains differences on egg mass as shown in Table 5. As seen strains have significantly (P≤0.05) influenced on egg mass during all periods of experiment. The egg mass was significantly higher in T4 compare with other groups at all periods examined. Egg mass value in T3 group increased significantly (P≤0.05) as compared with T2 and T1 treatments, whereas T1 group which were lowest than other groups over the whole period. Results are presented in Table 5 indicated that overall means of egg mass for T4, T3, T2 and T1 were 354.53, 354.53, 305.57 and 260.71, respectively.

### 3.5. Feed conversion ratio

The T4 group recorded the best results, it had significant effect (P≤0.05) on the mean feed conversion ratio as compared with other experimental groups T1, T2 and T3 during all periods of experiment (Table 6). However, T3 had better feed conversion ratio (P≤0.05) compared to T2 and T1 groups. Furthermore, T2 recorded the best results respecting feed conversion ratio as compared to T1 during all period of experiment. The overall means values for this trait were 2.03, 2.16, 2.35 and 2.56 (g feed/g egg) for groups T4, T3, T2 and T1, respectively.
The red strain had the lowest characterization, the effect of strain in egg characteristics had been mentioned by [11]. Effect of turkey strain in eggs parameters may be due to genetic differences in strains in this study. Differences in eggs quantity in relation to turkey strains in current study were also results indicated that the black strain had better quantitative eggs production compared with the other strains. Means in same rows with different superscript were significantly different. * (P≤0.05).

It was previously found that strain had affected in productive performance of turkey and that may be due to different concentration of progesterone in the blood serum of each strain, and that affected to the LH hormone, which works to increase the concentration of progesterone in the blood by stimulations production from granulosa cells [7]. Progesterone worked with LH to raise the numbers of egg production [8]. Effects of progesterone is not limited in the ratio of egg production only, but the effects are clear in the rate of egg weight as well, the same hormone is working on the growth and differentiation of the epithelium oviduct, and increase the number of tubular gland cells in magnum and play a role in secretion of layers of albumin [9] and this may be the reason for the significant differences among strains in the average of egg weight. The significant differences among strains in averages of egg production rates (Table 2) and average of egg weight (Table 3) may explain the significant differences in the means of egg mass (Table 4) because the egg mass was calculated by multiplied the percentage of egg production by the average of egg weight. It follows that the significant differences in feed conversion rate (Table 6) with were not significantly different Effect of strain on Feed intake. These results indicated that the black strain had better quantitative eggs production compared with the other strains in this study. Differences in eggs quantity in relation to turkey strains in current study were also reported by [10]. The red strain had lowest characterization, the effect of strain in egg characteristics had been mentioned by [11]. Effect of turkey strain in eggs parameters may be due to genetic differences among strains for their abilities to protect the concentration of progesterone in blood serum for each strain, and that affected to LH hormone from negative effects of free radicals and reactive oxygen species (ROS) because of the differences in their biological antioxidant systems [12]. The biological antioxidant system consists of some enzymes like Superoxide dismutase (SOD), Glutathione peroxidase (GSH-px) and catalase (CA). Therefore the different abilities of strains biological systems led to differences in quantitative eggs production.

| Table 6. Effect of strain on feed conversion ratio (g feed/g egg) (Mean ± SE) of local turkey. |
|---------------------------------------------------------------|
| Periods (week) | T4 | T3 | T2 | T1 | Level of significance |
|-----------------|----|----|----|----|----------------------|
| 1               | 2.03±0.02<sup>d</sup> | 2.22±0.015<sup>c</sup> | 2.40±0.03<sup>b</sup> | 2.64±0.018<sup>a</sup> | * |
| 2               | 2.10±0.01<sup>c</sup> | 2.24±0.02<sup>c</sup> | 2.31±0.011<sup>b</sup> | 2.54±0.012<sup>a</sup> | * |
| 3               | 2.01±0.01<sup>c</sup> | 2.22±0.011<sup>c</sup> | 2.32±0.02<sup>b</sup> | 2.64±0.012<sup>a</sup> | * |
| 4               | 2.02±0.01<sup>c</sup> | 2.14±0.017<sup>c</sup> | 2.32±0.012<sup>b</sup> | 2.41±0.02<sup>a</sup> | * |
| 5               | 2.02±0.01<sup>c</sup> | 2.15±0.002<sup>c</sup> | 2.35±0.028<sup>b</sup> | 2.51±0.01<sup>a</sup> | * |
| 6               | 2.00±0.01<sup>c</sup> | 2.12±0.012<sup>c</sup> | 2.37±0.010<sup>b</sup> | 2.65±0.014<sup>a</sup> | * |
| 7               | 2.02±0.01<sup>c</sup> | 2.13±0.012<sup>c</sup> | 2.37±0.027<sup>b</sup> | 2.65±0.017<sup>a</sup> | * |
| 8               | 2.09±0.00<sup>d</sup> | 2.24±0.015<sup>c</sup> | 2.45±0.005<sup>b</sup> | 2.63±0.002<sup>a</sup> | * |
| 9               | 1.98±0.02<sup>c</sup> | 2.07±0.013<sup>c</sup> | 2.34±0.012<sup>b</sup> | 2.57±0.01<sup>a</sup> | * |
| 10              | 2.06±0.02<sup>d</sup> | 2.11±0.010<sup>c</sup> | 2.34±0.011<sup>b</sup> | 2.49±0.010<sup>a</sup> | * |
| 11              | 2.00±0.01<sup>d</sup> | 2.10±0.005<sup>c</sup> | 2.33±0.003<sup>b</sup> | 2.60±0.011<sup>a</sup> | * |
| 12              | 1.99±0.03<sup>d</sup> | 2.14±0.011<sup>c</sup> | 2.28±0.012<sup>b</sup> | 2.46±0.015<sup>a</sup> | * |
| 13              | 1.90±0.01<sup>d</sup> | 2.09±0.002<sup>c</sup> | 2.25±0.012<sup>b</sup> | 2.43±0.008<sup>a</sup> | * |
| 14              | 2.06±0.03<sup>d</sup> | 2.13±0.023<sup>c</sup> | 2.40±0.012<sup>b</sup> | 2.61±0.021<sup>a</sup> | * |
| 15              | 2.05±0.03<sup>d</sup> | 2.12±0.011<sup>c</sup> | 2.42±0.012<sup>b</sup> | 2.68±0.013<sup>a</sup> | * |
| 16              | 2.17±0.03<sup>d</sup> | 2.29±0.02<sup>c</sup> | 2.42±0.013<sup>b</sup> | 2.73±0.011<sup>a</sup> | * |
| Overall means   | 2.03±0.01<sup>d</sup> | 2.16±0.063<sup>c</sup> | 2.35±0.014<sup>b</sup> | 2.56±0.065<sup>a</sup> | * |

T1: red turkey strain, T2: bronze turkey strain, T3: white turkey strain, T4: black turkey strain Means in same rows with different superscript were significantly different. * (P≤0.05).
4. Conclusions
The current results revealed that strain had significant effects on egg production rate, cumulative eggs number, egg weight, egg mass and feed conversion ratio, but, there was no significant effect on feed intake.

5. Acknowledgements
Authors would like to thank all members in Agricultural researches directorate/ ministry of sciences and technology and in department of Animal production/ Agriculture College for supplying the abilities for achieving of this experiment.

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