EFFECT OF PROBIOTICS, PREBIOTICS AND SYNBIOTIC ON GROWTH PERFORMANCE OF BROILER UNDER DIFFERENT STOCK DENSITY

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ABSTRACT

This study was conducted to evaluate probiotic, prebiotic and synbiotic on the broiler growth performance, reread under different stock density. A total of 448 Ross 308 broiler reared for 6 weeks and divided into two groups normal density and high density. For each stock density birds were fed standard diet (T1), standard diet + 0.15g probiotic powder/ kg diet(T2), standard diet + 0.15g prebiotic powder/ kg diet(T3) and standard diet + 0.15g synbiotic powder/ kg diet (T4). All dietary additives had no significant differences (p≤ 0.01)on the body weight gain, feed intake and feed conversion ratio at 6 weeks of age. However, body weight was different significantly compared to the control group. Dietary synbiotic enhanced the body weight, body weight gain and feed conversion ratio. Broiler reared at high density had significantly affect body weight, body weight gains and feed intake. It was concluded that birds fed diet supplemented with synbiotic and reread at high density showed the highest (p≤ 0.01)body weight and body weight gain when compared with the other groups.

Keywords: stock density; synbiotic, reread, standard diet, body weight, symbiotic.
INTRODUCTION
During the evolution of modern chicken production, there have been several changes in the nutritional requirements associated with a healthy feed product. In fact, in recent years, several food additives have been applied as replacements for antibiotic growth promoters. The most recent of these additives are prebiotics, probiotics and synbiotics (13). Probiotics, based on (12) definition, “are live microbial feed supplement that beneficially affects the host animal by improving its intestinal microbial, however, beneficial effects of probiotic on broilers including: performance (22); improving feed intake, digestion and absorption(29). Prebiotic is a non-digestible food ingredient that can be utilized by intestinal microflora, which beneficially affects the host. The beneficial effects of prebiotics on performance, feed conversion ratio (9). The mixture of prebiotics and probiotics as named synbiotics may apply to the synergistic effect on growth and colonies multiplication of beneficial microorganism which ultimately exert positive effect on the health of the intestine and absorption of the nutrient in the host (10). Stocking density may affect the performance, health and welfare of broiler chickens. The MATERIALS AND METHODS
Birds and management
This study was carried out in farm of commercial breeding. Using 448 Broiler Ross 308, for 6 weeks. The two levels of stocking density were used include the experimental which are normal stock density with a groups number of 192 broiler reared in normal stock density (12 bird/m²) and subjected in to four treatments 48 and four replicates per each (12 chicks) and high stock density with a number of 256 broiler reared in high stock density (16 bird/m²) and subjected into four treatments (64 chicks ) and four replicates in each (16 chicks), broiler were reared under same environment conditions, pen measured as 2×2×1.2m,width × length × height, respectively. covered with (5) cm depth of wood shaving litter. vitamin solution at concentration 0.1% were as drinking water introduced at chicks arrival, and after that the chicks were fed and water were provided appropriate stocking densities depend mainly on the inputs and outputs prices and thus on the cost-benefit analysis (21). A high stocking density reduces the production cost and produces more kilograms of chicken per area up to a certain extent, with an increasing profitability (23). However, there are some negative points using high stocking density that increase the stress on broilers and effect on growth performance, problem of leg weakness (31; 8). In an attempt to reduces the negative influence of stress in poultry farm several dietary approaches have been used, including probiotics. Because of the positive effects of prebiotics on gut microbiota, it is possible that dietary supplementation with probiotics can help the birds overcome any deficiency and concomitantly increase their tolerance to stress (15). Numerous studies reported effect of different prebiotics, probiotics and synbiotic on the performance of commercial broilers however their interaction with different stocking densities are still neglected and require further investigations. Therefore, the present study was conducted to evaluate the Effect of probiotics, prebiotics and their combination in growth performance of broiler under different stock density.

Feeding system
Vitamins solution introduced at arrival, then the chicks were fed three types of rations starter (from 1 day – 10 day), grower (from 11-24day) and finisher (from 25 – 42 day). The experimental broiler starter, grower and finisher basal diets composition were show in Table 1.
Table 1. Experimental diet composition

| Feed stuff       | Starter | Grower | Finisher |
|------------------|---------|--------|----------|
| Corn%48          | 195     | 100    | 118      |
| Soybean meal     | 341     | 285    | 250      |
| Wheat            | 400     | 540    | 558      |
| Limestone        | 15      | 16     | 14       |
| Preconex-breeder | 25      | 25     | 25       |
| Dicalcium phosphate | 6      | 4   | 3        |
| Anzym            | 1       | 1      | 1        |
| Anti oxidant     | 1       | 1      | 1        |
| Fatty Acid       | 16      | 28     | 30       |
| Total            | 1000    | 1000   | 1000     |

Chemical analyses

| Item              | Starter | Grower | Finisher |
|-------------------|---------|--------|----------|
| Protein %         | 23      | 21.5   | 20       |
| Metabolizable energy (kcal/kg) | 3000 | 3100   | 3150     |
| Methionine %      | 0.47    | 0.45   | 0.44     |
| Lysine %          | 1.19    | 1.07   | 0.99     |
| Calcium %         | 0.81    | 0.78   | 0.71     |
| Phosphorus % available | 0.45 | 0.41   | 0.39     |

Composition of Local Prebiotic or Iraqi Probiotic and Synbiotic Use in the Diet

Table 2. Types of bacteria in probiotic

| Type of bacteria         | Number of bacteria per gram of product |
|--------------------------|----------------------------------------|
| Lactobacillus acidophilus| $10^8$                                  |
| Bacillus subtilis        | $10^9$                                  |
| Bifidobacterium          | $10^8$                                  |
| Saccharomyces cervisiae   | $10^9$                                  |

Table 3. The nutritional information of Jerusalem artichoke inulin which was used as a prebiotic source in the experiment

| Items                               | Jerusalem Artichoke /100 g2 |
|-------------------------------------|-----------------------------|
| Carbohydrates (g)                   | 81.02                       |
| Digestible (Sugars) (g)             | 6.54                        |
| Non-digestible (Inulin) (g)         | 74.48                       |
| Proteins (g)                        | 7.43                        |
| Fats (g)                            | 0.40                        |
| Dietary fibres (g)                  | 74.48                       |
| Moisture (g)                        | 5.56                        |
| Gross energy (kcal/g)               | 0.4                         |
| Minerals - Ash (g)                  | 5.59                        |

The chemical composition was analyzed in the lab Nutrition-Plymouth University (3).

Live body weight and body weight gain

birds were weighted weekly by , digital balance (sorter balance).

The weight gain was calculated using the equation:

Weight gain (g) = B.w at the end of the week - B.w at the beginning of the week (4).

Feed consumption and feed conversion ratio (FCR)

Feed intake in each pen or replicate was recorded and measured weekly and feed conversion ratio was calculated by the following equation.

Feed intake during a period

\[
\text{FCR} = \frac{\text{Weight gain during the same period}}{\text{Feed intake during a period}}
\]

Statistical analysis

The experiment followed a two (stock density) and four (levels of treatment) factorial arrangement in a completely randomized design. All data obtained were analyzed using a generalized linear model of SAS (28). Significant differences between treatment means were compared using Duncan test at a probability of 0.01.
RESULTS AND DISCUSSION

Body weight

Data in Table 4 shows means of live body weight of supplement of diet during the entire period of experiment 1-6 weeks according to the stoking density and interaction between supplement and stocking density. The overall means ranged from 46.33g to 2537.54g, the supplements had highly significant (p≤ 0.01) effect on live body weight at all weeks except 2nd week of age. The dietary synbiotic were improved live body weight compared with control group at all weeks except 2nd and 4th weeks of age. Prebiotic showed significant (p≤ 0.01) increases in their live body weight at first week of age. The present study was in agreement with the finding of Hussein et al.(16) they found that the dietary supplementation of broiler chicks (Ross 308) with probiotic the final body weight was found to increase significantly (p < 0.01) in the entire supplemented group at 35 days of age when compared with the positive control group. Whereas the result disagreed with the finding of Sarangi, et al. (27) who observed that using prebiotic, probiotic and synbiotic in feed of chicken did not affect the body weight, until day 42 of age. The improved live body weight of broiler chicks, observed herein, could be due to increased absorption and utilization of nutrients. Added probiotic can also improve the balance between the useful and pathogenic bacteria in the gastrointestinal tract in favor of the host animal, non-pathogenic bacteria may depress FCR and growth in chickens due to competition with the host for the nutrients in the intestinal tract or via reducing the absorptive surface area (20). The stocking density had highly significant (p≤ 0.01) effect in live body weight at 2nd, 3rd and 6th week of age but no significant differences in live body weight between stoking density at 1st, 4th and 5th week of age. High stocking density were found to be statistically higher than normal density at all weeks except 2nd and 4th week of age in growth. The results were in agreement with the finding of Altaf et al.(6) found that examining three stocking densities (0.046, 0.056, 0.065m2) of Ross308 broiler they observed that body weight were birds reared at 0.065m2 stocking density showed the highest (p≤0.05) body weight followed by those reared at 0.056m2 and 0.046m2. Under normal density low body weight recorded might be due to more activity of the birds in low stocking density. Data in Table 4 presents interactions between supplement and stocking density. There are highly significant differences (p≤ 0.01) among all interactions between supplement and stocking density. Also interaction between synbiotic and high stocking density was higher of body weight compared to control group at all weeks except 2nd week of age, but no significant differences found between supplement with high density camper with control group at 2nd and 4th week of age. The results were in agreement with the finding of Mahmoud and El-Rayes.(21) The effects of interaction between stocking density and probiotic supplementation were significant on live body weight and bodyweight gain of broiler. The results were in contrast with the finding of Cengiz et al.(8) they noticed that the effects of interaction between stocking densities and probiotic, on the performance of Ross 308 broiler chicks indicated that weight gain was no significantly (P < 0.001) effect during d 0 to 42 of age.
Table 4. Effect of density, treatments and their interactions on body weights of broiler (g).

| Factor       | BW /g week1 | BW /g week2 | BW /g week3 | BW /g week4 | BW /g week5 | BW /g week6 |
|--------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Overall mean | 136.94      | 398.59      | 815.07      | 1388.55     | 1969.69     | 2537.54     |
| Socking density |           |             |             |             |             |             |
| Normal       | 135.57±1.69 a | 404.58±3.18 a | 804.01±5.67b | 1399.90 ± 12.32 a | 1969.58 ± 10.98 a | 2494.58 ± 12.36 b |
| High         | 137.97±1.24 a | 394.97±2.67b | 823.36±5.07 a | 1380.04 ± 5.48 a | 1969.77 ± 7.29 a | 2569.77 ± 7.61 a |
| Supplement   |             |             |             |             |             |             |
| Control      | 124.28 ± 1.25 c | 401.16 ± 4.24 a | 827.23 ± 7.50ab | 1383.66 ± 11.28 b | 1971.96 ± 8.69 b | 2545.27 ± 8.98 b |
| Probiotic    | 140.09 ± 1.88 b | 394.02±4.24a | 782.59 ± 7.72c | 1338.66 ± 9.59c | 1922.77 ± 14.13 c | 2486.52 ± 19.30 c |
| Prebiotic    | 136.70 ± 1.84 b | 398.93 ± 3.38 a | 814.38 ± 5.49b | 1418.57 ± 13.77 a | 1954.11 ± 11.26 bc | 2505.45 ± 9.95c |
| Synbiotic    | 146.70 ± 1.83 a | 400.27 ± 4.66 a | 836.07 ± 7.84 a | 1413.30 ± 11.55ab | 2029.91 ± 11.18a | 2612.95 ± 11.68a |
| Interaction  |             |             |             |             |             |             |
| Normal control | 120.42±2.04e | 411.46±3.57a | 836.46±8.77a | 1394.79 ± 14.98b | 1958.54 ± 17.82cde | 2546.67 ± 11.81bc |
| Normal probiotic | 147.50±2.57b | 383.33±7.64 d | 762.50±12.9d | 1290.21 ± 9.81c | 1917.08 ± 24.55e | 2360.00 ± 24.95d |
| Normal Prebiotic | 138.33±4.01c | 407.71±6.11ab | 791.25±4.92c | 1470.63 ± 28.67a | 1976.67 ± 18.05cde | 2507.08 ± 14.38c |
| Normal Synbiotic | 136.04±1.99c | 415.83±5.61ab | 825.83±10.6ab | 1443.96 ± 23.22a | 2026.04 ± 21.91ab | 2564.58 ± 20.74b |
| High control | 127.19 ± 1.38 d | 393.44±6.66bcd | 820.31±11.33abc | 1375.31 ± 16.27b | 1982.03 ± 7.09bc | 2544.22 ± 13.14bc |
| High Probiotic | 134.53±2.24c | 402.03±4.30abc | 797.65±8.63bc | 1375.00 ± 11.50b | 1927.03 ± 16.83de | 2581.41 ± 11.51b |
| High Prebiotic | 135.47±1.22c | 392.34±3.37bcd | 831.72±7.59a | 1379.53 ± 4.12b | 1937.19 ± 13.82cde | 2504.22 ± 13.86c |
| High Synbiotic | 154.69±1.85a | 388.59±6.29cd | 843.75±11.10a | 1390.31 ± 8.62 b | 2032.81 ± 10.95a | 2649.81 ± 9.22a |

a, b, c, d Means followed by different letters in the columns are significantly different (p≤ 0.01).
Body weight gain

Results in Table 5 refer to effect of supplement, density and their interactions on weekly body weight gain / bird of broiler (g). The treatments had no significant effect (p≤ 0.01) in weight gain at all week except 1st and 5th week of age. The dietary supplementation with synbiotic showed increased numerical on body weight gain compared with control group at 1st, 4th, 5th and 6th week of age. The results were in agreement with finding of Salehimanesh, et al.(26), they reported that using additives of prebiotic, probiotic and synbiotic in the broiler rations did not affect significantly body weight gain. The result was in contrast with the finding of Hussein et al.(17) that the dietary supplementation of broiler chicks (Ross 308) with probiotic the body weight gain body weight gain were found to increase significantly (p < 0.01) in the entire supplemented group at 35 days of age when compared with the positive control group. The increased body weight gain in chicks fed synbiotic may be due to improvement of digestibility and availability for many nutrients such as proteins and fats and carbohydrates as well as some mineral elements and vitamins. It was noted that many of the beneficial bacteria and yeast that used to simulating digestible enzyme that enhance the effect of endogenous enzyme that produces naturally within the gastrointestinal tract (7). There were no significant differences among stocking density on body weight gain in all week of study except 6th week of age and also increase numerical high density compared with normal density at all weeks except 2nd and 4th week of age. The result was in agreement with the finding of Cengiz et al.(8) they noticed that the effects of two stocking densities, including 10 and 20 birds/m², were compared on the performance of Ross 308 broiler chicks indicated that weight gain was significantly higher (P < 0.001) in birds at low stock density than those at high stock density during d 0 to 42days. But, the result was in contrast with the finding of Rashidi et al.(25), they showed that body weight gain was affected negatively by increasing density in the growing period (7.6%, p < 0.01). Also, the results of this study showed that there were significant interactions among all treatments with the stocking density on body weight gain from all week of experiments except of 3rd week of age. In another hand the dietary synbiotic with high density increase numerical compared with control group at all week except 2nd and 4th week of age. The present study was in agreement with the report of Kridtayopas et al.(19) The study investigated the effect of prebiotic and symbiotic under high density on body weight gain. During the finisher phase, the body weight gain of the high stock density and high stock density prebiotic groups was significantly lower than the normal stocking density group (P <0.05), and the body weight gain of the high stock density synbiotic group was higher than the high stock density prebiotic group (P <0.05). The result disagreement with finding of Cengiz et al. (8) study was effect of dietary probiotic supplementation and stocking density on the performance, there were no significant effect interaction probiotic with stocking density on body weight gain.
Table 5. Effect of density, treatments and their interactions on weekly body weight gain / bird of broiler

| Factor                           | BWG 1 week | BWG 2 week | BWG 3 week | BWG 4 week | BWG 5 week | BWG 6 week |
|----------------------------------|------------|------------|------------|------------|------------|------------|
| Overall mean                     | 90.39      | 262.57     | 384.34     | 574.72     | 579.71     | 562.5      |
| Socking density                  |            |            |            |            |            |            |
| Normal                           | 88.82±3.04a| 269.01±7.61a| 339.43±12.97a| 592.76±22.63a| 569.69±16.27a| 525.0±15.85b|
| High                             | 91.97±2.93a| 256.14±7.21a| 429.26±9.76a| 556.68±11.65a| 589.73±13.94a| 600±12.32a|
| Supplement                       |            |            |            |            |            |            |
| Control                          | 77.69±2.51b| 278.65±11.47a| 425.94±12.76a| 556.67±17.42a| 585.23±19.12ab| 575.16±12.02a|
| Probiotic                        | 94.10±3.17a| 251.67±12.24a| 387.40±23.06a| 552.53±25.47a| 589.45±22.11ab| 548.65±41.41a|
| Prebiotic                        | 91.11±2.76a| 263.13±6.15a | 411.46±14.49a| 613.60±34.02a| 531.85±21.3b | 548.73±14.38a|
| Symbiotic                        | 98.70±4.35a| 256.85±10.82a| 432.58±13.41a| 576.10±22.81a| 612.29±14.83a| 577.47±18.86a|
| Interaction                      |            |            |            |            |            |            |
| Normal control                   | 74.81±4.54d| 291.04±10.09a| 425.0±20.23a | 558.33±26.48b | 563.75±18.75abc | 588.13±9.94bc |
| Normal probiotic                 | 100.14±3.05ab| 235.83±18.95b| 379.17±48.19a| 527.71±45.05b | 626.87±31.85ab | 442.92±11.63e |
| Norma Prebiotic                 | 91.23±5.94bc| 269.38±9.28ab| 383.54±8.83a | 679.38±42.27a| 506.04±35.66c | 530.42±26.96d |
| Norma Symbiotic                  | 89.1±3.09bc | 279.79±6.67a | 410.0±8.83a  | 605.63±36.97ab| 582.09±12.36abc| 538.54±20.58cd |
| High control                     | 80.56±1.84cd| 266.25±20.26ab| 426.88±18.71a| 555.0±26.72b | 606.72±32.35ab | 562.19±21.53bcd |
| High Probiotic                   | 88.05±3.63c| 267.50±13.17ab| 395.63±10.7a | 577.35±24.24b | 552.04±18.28bc | 654.38±20.41a |
| High Prebiotic                   | 90.99±0.54bc| 256.88±8.02ab| 439.38±19.56a| 547.82±27.01b| 557.66±20.05bc | 567.04±3.85bcd |
| High Symbiotic                   | 108.29±4.19a| 233.91±12.31b| 455.16±20.54a| 546.57±21.91b| 642.50±16.32a | 616.41±15.06ab |

a, b, c, d Means followed by different letters in the columns are significantly different (p≤ 0.01)
Feed intake

Data in Table 6 refers to effect of supplement, density and their interactions on weekly feed intake / bird of broiler (g). The supplements had a highly significant affect (p≤ 0.01) in feed intake at 1st, 3rd and 4th week of age. But no significant effect in feed intake at 2nd, 5th and 6th week of age, however supplement group higher statistically feed intake than control group. The result was in agreement with the finding of Pourakbari et al. (24) they noticed that the dietary supplementation probiotic at level (0.005%, 0.01%, 0.015% and 0.02%) of broiler Ross 308, there result were showed significant increase on feed intake compared with control group when they used 0.01 Probiotics in feed while the response of feed intake was mostly quadratic (P<0.01) compared with the control. But, the result was in contrast with the finding of Silva et al. (30), suggested that the dietary supplementation of Cobb chicks with probiotic had no significant effect on feed intake and feed conversion rate when compared with control at 42 days of age. The result could be due to feeding probiotic that causes a morphological change in digestive tract thought increasing the villi high and crypt depth the mucosal enzyme activity is closely associated with a number of enterocytes per villi therefore greater digestive enzyme activity has been noted in the higher villi (14). The prebiotic may provide nutrients effectively stimulates the growth of beneficial microflora in the small and large intestine and the result would be better balance of bacterium population (5). These new bacteria population produce different digestive enzymes which add to existing broiler endogenous enzymes and improved digestibility of nutrients in digestive tract (7). The stocking density had highly significant (p≤ 0.01) effect in feed intake at all weeks except at 1st and 3rd week of age. Birds in high stocking density had significantly (P≤0.01) higher feed intake compared with normal stocking density except at 1st and 4th weeks of age. Our result is agreement with previous result obtained by Cengiz et al. (8) noticed that the effects of two stocking densities, including 10 and 20 birds/m², were compared. on the performance, of Ross 308 broiler chicks indicated that Feed intake was significantly decreased on d 0 to 42 in birds at high stock density (P < 0.001) in comparison with those at low stock density. In contrast results are not in agreement with finding of Rashidi et al. (25), showed that Feed intake was not significantly affected parameters throughout the experimental period broiler chickens when density increased from 12 to 18 bird/m². The interaction of supplement and stocking density was significantly different in the most weeks of experiment. The interaction supplement under high density significantly increase feed intake compared with supplement with normal density at 5th and 6th week of age, and also symbiotic under high density increases feed intake compared with control group at 1st, 3rd and 4th week of age. The present study was in agreement with the finding of Altaf et al. (6), they found that examining three stocking densities (0.046, 0.056, 0.065m²) of Ross 308 broiler they observed that feed intake the birds supplemented with symbiotic as growth promoter and reared at 0.065m² stocking density showed the lowest (p≤0.05) feed intake compared to the other groups.
Table 6. Effect of density, treatments and their interactions on weekly feed intake / bird of broiler (g).

| Factor          | feed intak/bird week1 | feed intak/bird week2 | feed intak/bird week3 | feed intak/bird week4 | feed intak/bird week5 | feed intak/bird week6 |
|-----------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Overall mean    | 120.43                | 298.3                 | 644.91                | 810.31                | 1020.88               | 1109.8                |
| Socking density |                       |                       |                       |                       |                       |                       |
| Normal          | 120.58 ± 1.83a        | 279.37 ± 4.79 b       | 641.80 ± 5.38a        | 822.15 ± 8.39 a       | 977.80 ± 8.04 b       | 1045.31 ± 6.44 b      |
| High            | 120.29 ± 1.59a        | 317.40 ± 6.31a        | 648.03 ± 6.40 a       | 798.08 ± 4.64b        | 1063.96 ± 20.20 a     | 1174.29 ± 8.81 a      |
| Supplement      |                       |                       |                       |                       |                       |                       |
| Control         | 124.62 ± 0.91 a       | 304.50 ± 17.8 a       | 639.76 ± 3.49b        | 787.30 ± 3.41b        | 1040.09 ± 20.48 a     | 1113.00 ± 35.63 a     |
| Probiotic       | 119.13 ± 2.43b        | 291.24 ± 2.47a        | 618.46 ± 2.82c        | 786.82 ± 4.53b        | 989.49 ± 18.28a       | 1088.79 ± 14.8a       |
| Prebiotic       | 112.26 ± 0.94 c       | 300.00 ± 3.78a        | 642.67 ± 2.70 b       | 834.93 ± 10.6 a       | 1030.81 ± 6.54a       | 1133.40 ± 22.89a      |
| Synbiotic       | 125.73 ± 1.14a        | 297.80 ± 11.11a       | 678.77 ± 3.17 a       | 831.27 ± 5.31 a       | 1023.13 ± 45.64 a     | 1104.02 ± 26.05a      |
| Interaction     |                       |                       |                       |                       |                       |                       |
| Normal control  | 124.25 ± 1.83 a       | 257.44 ± 2.69 c       | 631.91 ± 3.03 cd      | 789.13 ± 6.57ef       | 986.95 ± 7.84bcd      | 1019.56 ± 8.84f       |
| Normal probiotic| 119.14 ± 5.21 ab      | 291.30 ± 3.96c        | 622.22 ± 3.97de       | 795.55 ± 5.73de       | 942.22 ± 7.25d        | 1051.11 ± 7.20 e      |
| Norma Prebiotic | 112.67 ± 0.88bc       | 300.00 ± 6.49c        | 638.63 ± 4.01bc       | 861.36 ± 7.20a        | 1018.18 ± 8.75abcd    | 1074.41 ± 9.96 d      |
| Norma Synbiotic | 125.00 ± 1.98 a       | 268.75 ± 2.68d        | 674.46 ± 4.50 a       | 842.55 ± 5.59b        | 963.83 ± 6.67cd       | 1036.17 ± 7.65ef      |
| High control    | 125.00±0.64a          | 351.56 ± 2.01a        | 647.62 ± 2.59b        | 785.48 ± 3.00ef       | 1093.22 ± 3.80a       | 1206.45 ± 5.11 a      |
| High Probiotic  | 119.11±0.76 ab        | 291.17 ± 3.56c        | 614.70 ± 3.46e        | 778.08 ± 3.49f        | 1036.76 ± 4.32abcd    | 1126.47 ± 5.33c       |
| High Prebiotic  | 111.76±1.80 c         | 300.00± 4.98c         | 646.72 ± 2.68b        | 808.50 ± 3.26cd       | 1043.43±4.08abc       | 1192.39 ± 5.26ab      |
| High Synbiotic  | 126.47±1.34a          | 326.86 ± 2.41b        | 683.07 ± 3.77a        | 820 ± 4.21c           | 1082.42 ± 85.63ab     | 1171.87 ± 6.37b       |

a, b, c, d Means followed by different letters in the columns are significantly different (p≤ 0.01).
Feed conversion ratio

Data in Table 7 refers to the effect of treatment and stocking density and interaction on feed conversion ratio. The treatments showed no significant differences in feed conversion ratio at all week of age except first week. The dietary supplement improved feed conversion ratio compared with control at all week except third week. The present study was in agreement with the finding of Pourakbari et al. (24) noticed that the best feed conversion was found for birds fed (Protexin) as probiotic at level (0.02% feed) as compared with control at 42 days of age being 1.69 and 1.84, respectively. Whereas the result disagreed with the finding of Abdel-Raheem et al. (1), they found that the addition broiler diets with prebiotic at level (0.5g / kg) had significant effect on feed conversion ratio from 42 days of age, when compared with control. The result could be due to the present of prebiotic that provide nutrients, effectively stimulates the growth of beneficial microflora in the small and large intestine and the result would be better balance of bacterium population (5). These new bacteria population produce different digestive enzymes which add to existing broiler endogenous enzymes (2). Also probiotic which improve absorption of nutrients and depressed harmful bacteria that causes growth depression (11). The microorganisms that are present in the probiotic have been delivered enzymes and other beneficial substances into the intestines (18). Supplementation of L. acidophilus or a mixture of Lactobacillus cultures to chickens significantly increased (P<0.05) the levels of amylase after 40 d of feeding (17). This result is similar to the finding of (7), who reported that inclusion of a probiotic resulted in significantly higher carbohydrase enzyme activities in the small intestine of poultry. It is well established that probiotics alter gastrointestinal pH and flora to favor an increased activity of intestinal enzymes and digestibility of nutrients (7). In the stocking density not significant effect at all weeks except second week however normal density better feed conversion ratio than high stocking density except first week. The results were in agreement with the finding of Rashidi et al.(25) showed that feed conversion rate was not significantly affected parameters throughout the experimental period broiler chickens when density increased from 12 to 18 bird/m2. The results were in contrast with the finding of Altaf etal.(6), they found that examining three stocking densities (0.046, 0.056, 0.065m²) of Ross 308 broiler they observed that feed conversion ratio were birds reared at 0.065m² stocking density showed the significant (p≤0.05) feed conversion ratio followed by these reared at 0.046m² during the period of experiment. The interaction of treatment with stocking density was significantly effect on feed conversion ratio at all week except 4th and 5th week of age. However dietary probiotic with high density better then control group at all week for feed conversion ratio. The present results agreed also with these of Mahmoud and El-Rayes.(21), observed there were significant interactions between stocking density and added probiotic on feed conversion ratio of broiler chicks. The best mean of feed conversion ratio was achieved by birds kept at 10 birds/m2 and given 2.0 ml probiotic per liter of water compared with other treatments during the whole experimental periods.
Table 7. Effect of density, treatments and their interactions on feed conversion ratio / bird of broiler

| Factor        | FCR 1 week | FCR 2 week | FCR 3 week | FCR 4 week | FCR 5 week | FCR 6 week |
|---------------|------------|------------|------------|------------|------------|------------|
| Overall mean  | 0.88       | 1.05       | 1.31       | 1.36       | 1.46       | 1.58       |
| Normal        | 0.89 ± 0.03a | 0.99 ± 0.02b | 1.30 ± 0.02a | 1.33 ± 0.02a | 1.44 ± 0.02a | 1.56 ± 0.02a |
| High          | 0.87 ± 0.02a | 1.11 ± 0.03a | 1.32 ± 0.02a | 1.39 ± 0.01a | 1.49 ± 0.02a | 1.60 ± 0.01a |
| Supplement    |            |            |            |            |            |            |
| Control       | 1.00 ± 0.02 a | 1.07 ± 0.06a | 1.29 ± 0.04a | 1.34 ± 0.03a | 1.47 ± 0.02a | 1.57 ± 0.03a |
| Probiotic     | 0.85 ± 0.03 b | 1.05 ± 0.02a | 1.32 ± 0.03a | 1.36 ± 0.03a | 1.46 ± 0.03a | 1.58 ± 0.03a |
| Prebiotic     | 0.82 ± 0.02 b | 1.03 ± 0.01a | 1.30 ± 0.02a | 1.33 ± 0.03a | 1.49 ± 0.02a | 1.61 ± 0.02a |
| Synbiotic     | 0.86 ± 0.02 b | 1.06 ± 0.05a | 1.32 ± 0.03a | 1.37 ± 0.03a | 1.46 ± 0.04a | 1.56 ± 0.03a |
| Interaction   |            |            |            |            |            |            |
| Normal control| 1.03 ± 0.04a | 0.93 ± 0.02d | 1.21 ± 0.03b | 1.29 ± 0.04a | 1.43 ± 0.03a | 1.49 ± 0.02c |
| Normal probiotic| 0.81 ± 0.06c | 1.07 ± 0.03c | 1.36 ± 0.05ab | 1.42 ± 0.03a | 1.45 ± 0.05a | 1.62 ± 0.05ab |
| Norma Prebiotic| 0.82 ± 0.05c | 1.01 ± 0.02cd | 1.32 ± 0.01ab | 1.31 ± 0.07a | 1.48 ± 0.04a | 1.59 ± 0.03abc |
| Norma Synbiotic| 0.92 ± 0.03abc | 0.95 ± 0.03cd | 1.29 ± 0.04ab | 1.33 ± 0.06a | 1.42 ± 0.05a | 1.52 ± 0.03bc |
| High control  | 0.98 ± 0.06ab | 1.22 ± 0.06a | 1.38 ± 0.06a | 1.39 ± 0.05a | 1.51 ± 0.02a | 1.65 ± 0.03a |
| High Probiotic| 0.89 ± 0.04 cd | 1.02 ± 0.03cd | 1.29 ± 0.05ab | 1.31 ± 0.03a | 1.47 ± 0.04a | 1.53 ± 0.02abc |
| High Prebiotic| 0.82 ± 0.01c | 1.05 ± 0.02bcd | 1.27 ± 0.04ab | 1.35 ± 0.01a | 1.50 ± 0.03a | 1.64 ± 0.03ab |
| High Synbiotic| 0.81 ± 0.02 c | 1.17 ± 0.05ab | 1.35 ± 0.05ab | 1.41 ± 0.03a | 1.49 ± 0.06a | 1.59 ± 0.04abc |

a, b, c, d Means followed by different letters in the columns are significantly different (p≤ 0.01).

CONCLUSION
This study found that increasing broiler stocking density from 12 to 16 birds/m² of floor space with probiotic positively influenced body weight gain, feed intake and feed conversion ratio compared with control group.

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