EFFECTS OF PROBIOTIC, PREBIOTIC AND SYMBIOTIC ON BROILER BREEDER PERFORMANCE, EGG PRODUCTION AT DIFFERENT STOCK DENSITY

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ABSTRACT

This study was aimed to investigat the effects of probiotic, prebiotic and symbiotic on the egg production, suitable egg, unsuitable egg and uniformity reread at deferent stock density. A total of 600 broiler breeder Ross 308 (540 female and 60 male) was used in this study for a period of 48 -64 weeks at two levels of stocking density (normal and high stock density). For each stock density birds were fed diet either control diet (T1), standard diet + 0.15g probiotic (*Lactobacillus acidophilus, Bacillus subtilis, Bifidobacterium, Saccharomyces cervisiae*) powder/ kg diet (T2), standard diet + 0.15g prebiotic (inulin) powder/ kg diet(T3) and standard diet + 0.15g symbiotic (*Lactobacillus acidophilus, Bacillus subtilis, Bifidobacterium, Saccharomyces cervisiae*+inulin) powder/ kg diet (T4). Highly significant increase in egg production and suitable egg for dietary additives compared with control group at all weeks of production, but dietary probiotic had significant decrease in unsuitable egg when compared with the controls, however normal density significant increases in egg production and unsuitable egg compared with high density. The probiotic treatments had the lowest body weight variation. It can be concluded that the supplementation of probiotic in the diet of commercial broiler breeder reared under high stocking density had a positive influence on overall suitable egg.

Key words: symbiotic, stock density, egg production, broiler breeder

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تأثير المعزز الحيوي وسابق الحيوي والخليط التأزري على الكفاءة الانتاجية لأمهات فروج اللحم وانتاجية البيض و المرباة نظامي كثافة مختلفين

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المستخلص

تم اجراء هذه الدراسة لمعرفة تأثير المعزز الحيوي وسابق الحيوي والخليط التأزري على اداء انتاج البيض الصالح للتفقيس ونسبة التجانس ،وتحت نظامين للكثافة. استعملت في هذه الدراسة (600) من امهات فروج اللحم روص 308 (540 إناث و 60 من ذكر) للفترة الممتدة من (48–64) اسبوعيا من اعمارها بنظامي كثافة (اعتيادي وعالي الكثافة). وتحت تغذية كل نظام سيطرة(علف القياسي)معاملة(1), علف القياسي +0.15 معزز الحيوي /كغم معاملة (2), علف القياسي +0.15 السابق الحيوي /كغم معاملة (3), علف القياسي +0.15 خليط التأزري /كغم معاملة (4). ظهرت هناك زيادات عالية المعنوية في انتاج البيض الصالح للتفقيس مقارنة بعليقة المقارنة واستمرت في طيلة اسابيع الدراسة. اثرت العليقة المضافة اليها المعززالحيوي انخفاضا معنويا في نسبة البيض الغير صالح للتفقيس مقارنة بعليقة المقارنة . أظهرت معاملة الكثافة الاعتيادية زيادة معنوية في كل من انتاج البيض الصالح وغير الصالح للتفقيس مقارنة الكثافة العالية. معاملات المعزز الحيوي أظهرت ادنى تباين في معدلات أوزان الجسم و يمكن ان نستنتج من ذلك ان اضافة المعزز الحيوي الى العليقة المتجانسة الامهات فروج اللحم المرباه في نظام تربية عالية الكثافة كان لها الاثر الايجابي على البيض الصالح للتفقيس.

الكلمات المفتاحية: الخليط التأزري، كثافة التربية، انتاج البيض، امهات فروج اللحم.

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INTRODUCTION

The poultry industry has become an important economic activity in many countries, and has been developments in several areas such as nutrition, genetics and management strategies to maximize the efficiency of growth performance and meat production. The mortality of chickens due to intestinal pathogens such as *Escherichia coli*, *Salmonella*, *Campylobacter* and *Clostridium perfringens* continues to cause problems, especially with high stocking densities associated with intensive production systems. Prevention and control of diseases have led during recent decades to a substantial increase in the use of veterinary medicines (21). For many decades, the poultry industry has benefited from improved health and performance of birds due to inclusion of sub-therapeutic levels of antibiotics in feeds (13). However, the extensive use of some antibiotics in animal feeds has resulted in several problems. The most important problems are risk of development of antibiotic-resistant pathogens (25) and entering the antibiotic residues in animal products (meat, egg, milk) and therefore human food chain (21). In recent years, use of probiotics, prebiotics and symbiotic that enrich certain bacterial population in the digestive system are considered as alternatives to antibiotic growth promotants in poultry nutrition (17). There are various definitions of probiotics for example, according to FAO/WHO (11) defined probiotics as mono or mixed cultures of "live microorganisms which, when administered in adequate amounts confer a health benefit on the host. Specific studies on layers and breeders have indicated that supplementation of probiotics improved egg production, feed conversion and egg quality (14). Prebiotics are defined as 'a non-digestible feed ingredients that beneficially affect the host by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon (3), it leads to reduction of pathogen colonization in gut and thus health and performance of animal improves (8, 22). The combination of a probiotic and prebiotic is called symbiotic and includes both beneficial microorganisms and substrates, which may have synergistic effects on the intestinal tract of animals. Supplementation of combination of prebiotic (MOS) and probiotic (multistain bacteria and yeast) to the diet of quail breeders positively affected egg production and egg shell thickness (14). According to Gardiner et al, (6) under intensive poultry production system, stocking density that is floor space per chicken is a very important welfare factor which directly and indirectly influences and determines the level of growth of chicken body weight. Stress likely affects the response of broilers to different feed additives, such as prebiotics (20). Stressors have negative effects on the gut micro flora balance (15). Because of the positive effects of prebiotics on gut microbiota, it is possible that dietary supplementation with prebiotics can help the birds overcome any deficiency and concomitantly increase their tolerance to stress (7). Information on the effect of dietary probiotic, prebiotic and symbiotic at different stock density is very limited on broiler breeder. Thus, the objective of this study was to determine the effect of probiotic, prebiotic and symbiotic on broiler breeder performance, egg production reread at different stock density.

MATERIALS AND METHODS

Birds and Management

This study was carried out at the farm of commercial breeder. Using 540 female and 60 male (Broiler Breeder Ross 308), for a period of 48-64 weeks of age. The two levels of stocking density include the experimental groups which are normal stock density with a number of 216 female and 24 male broiler breeders reared in normal stock density (5 bird /m2) and subjected in to four treatments (54 females and 6 males) of three replicates in each (18 females + 2 males) and high stock density with a number of 324 female and 36 male broiler breeders reared in high stock density (7.5 bird /m^2) and subjected into four treatments (81 females and 9 males) of three replicates in each (27 females + 3 males), broiler breeder were reared in the same environment conditions, pen measured as 2×2×1.2m,width × length × height respectively. Separate sex- feeding male and female with track feeding system, the most effective method of preventing male access to the female feeder is to fit grills to the tracks, male feeding equipment generally used handing hoppers, Nipple drinkers were used for drinking water. A 16-hour lighting plan was implemented throughout the study, fluorescence lights were used during the light and dark periods of the day. Consist experiment for each normal and high stock density T1= control (standard diet). T2= standard diet + 0.15g probiotic *(Lactobacillus acidophilus, Bacillus subtilis, Bifidobacterium, Saccharomyces cervisiae*) powder/ kg diet T3= standard diet + 0.15g prebiotic (inulin) powder/ kg diet. T4= standard diet + 0.15g symbiotic (*Lactobacillus acidophilus, Bacillus subtilis, Bifidobacterium, Saccharomyces cervisiae*+ inulin) powder/ kg diet.

Feeding System

The feeding program for poultry was followed according to Ross-308 guide (Broiler management handbook 2019), as shows in Table 1.

Table1. Feed composition and nutrient content of egg production period experiment (commercial)

Ingredients	Female	Male
Corn	180	285
Soybean meal %48	140	65
Wheat	375	351
Wheat bran	146	150
Limestone	72	19
Preconex-breeder	25	25
Dicalcium phosphate	5	3
Anzym Enzyme!	1	1
Anti-oxidant	1	1
Fatty Acid	51	0
Barley	0	100
Calculated nutrient content		
Protein	15.5	13
Metabolizable energy (kcal/kg)	2837	2717
Methionine	0.37	0.35
Lysine	0.72	0.57
Calcium	2.13	0.81
Phosphorus available	0.44	0.41

Data of egg production Traits

Daily Egg Production –DEP (%): Total egg number was recorded as the accumulative number of eggs laid by commercial breed (broiler breeder Ross308) from week48th to the end of the week 64. The daily egg production (hen day HD) calculated as a percentage and = (number of daily egg produced / number of birds) *100.

Suitable egg % = total egg production - unsuitable egg * 100

Unsuitable egg % = total egg production - suitable egg * 100

Statistical Analysis

The experiment followed a two (stock density) × 4 (treatments) factorial arrangement in a completely randomized design. All data obtained were analyzed using a generalized linear model of SAS (24). Significant differences between treatment means were compared using Duncan test at a probability of less than 0.01.

RESULTS AND DISCUSSION

Egg production

Data shows table 2, summarizes density and supplement and their interaction on egg production. The overall mean of egg production ranged (67.6 % to 55.7%) during first week to final week (w 64) of experiment. There were significant increases in egg production observed between supplement groups in comparison with control group from all weeks of production. While, the results showed that there was a highly significant effect of supplements with control group on egg production at all weeks of production. They concluded that this improvement could be due to the improvement of hormonal status, especially FSH which enhances follicle growth and LH which enhances ovulation rate. They also reported that the improvement of gut ecosystem and metabolic activities (such as digestion, absorption and assimilation of nutrient) helps the birds to perform better. The present study was in agreement with the report of Yoruk et al, (28), they reported that supplementation of layers' diet probiotic resulted in increases in egg production. Sultan and Abdul- Rahman, (26) reported that probiotic supplementation improved egg weight, yolk weight and egg production of broiler breeders. Whereas the result disagreed with the finding of Aalaei et al, (1), study was conducted to investigate the effect of multi-strain probiotic using 300 broiler breeder hens (Ross 308) aged 51 weeks old. Although there were significant effects ($P<0.05$) of the stocking density on egg production at all weeks of laying while, the normal stocking density higher than the high stock density for (52, 56, 60) weeks except at week 64. might be due to increase egg production in normal density could be secondary to increased competition for nest space. In this study, laying performance was shown to decline in response to increased stocking density. This finding supports previous studies that have shown that decreasing egg production is attributable to a reduction in the amount of feeding area per hen (26). These findings are in agreement with the results of Faitarone et al, (4) studded that the Stocking density linear reduction (p>0.01) in percentage of production. Likewise, Mtileni et al, (18) reported that the influence of stocking density on egg production and egg weight. Interaction effect was significant increases on studied egg production, in birds fed the diet supplemented with prebiotic and reared at high stocking density for every week except 52-week comparison with control groups.

Table 2. Effect of density, treatments and their interactions on Production % of breeder

Factor	Production%			
	52 weeks	56 weeks	60 weeks	64 weeks
Overall mean	**67.6**	**68.34**	**63.27**	**55.7**
Stocking density				
Normal	**72.22 ± 0.71a**	**70.71 ± 0.08 a**	**64.92 ± 0.70a**	**54.06 ± 0.54b**
High	**62.99 ± 1.22b**	**65.98 ± 0.95b**	**61.63 ± 0.96 b**	**57.34 ± 0.74 a**
Supplement				
Control	**63.27 ± 2.91 b**	**66.78 ± 2.70 b**	**61.12 ± 2.05 d**	**55.00 ± 0.84 b**
Probiotic	**68.95 ± 0.99 a**	**68.42 ± 0.44ab**	**62.45 ± 0.67 c**	**55.59 ± 0.99ab**
Prebiotic	**69.24 ± 1.45 a**	**68.66 ± 0.52 a**	**65.40 ± 0.38 a**	**56.65 ± 1.35a**
Symbiotic	**68.96 ± 3.04 a**	**69.50 ± 1.31 a**	**64.12 ± 1.20 b**	**55.56 ± 1.43ab**
Interaction				
Normal control	**69.71 ± 0.70 c**	**72.59 ± 1.25 a**	**65.67 ± 0.01ab**	**56.48 ± 1.00 c**
Normal probiotic	**71.09 ± 0.24bc**	**68.77 ± 0.66 b**	**61.19 ± 0.77 d**	**53.64 ± 0.87 d**
Normal Prebiotic	**72.36 ± 0.67. b**	**69.11 ± 0.89 b**	**66.16 ± 0.34 ab**	**53.69 ± 0.19 d**
Normal Symbiotic	**75.73 ± 0.07 a**	**72.35 ± 0.56 a**	**66.65 ± 0.67 a**	**52.43 ± 0.52 d**
High control	**56.83 ± 0.69 f**	**60.98 ± 1.15 c**	**56.57 ± 0.51 e**	**53.53 ± 0.62 d**
High Probiotic	**66.80 ± 0.46d**	**68.07 ± 0.63 b**	**63.71 ± 0.32c**	**57.54 ± 0.57bc**
High Prebiotic	**66.12 ± 0.55 d**	**68.21 ± 0.62b**	**64.64 ± 0.18bc**	**59.61 ± 0.62 a**
High Symbiotic	**62.19 ± 0.67 e**	**66.65 ± 0.46 b**	**61.59 ± 0.56 d**	**58.69 ± 0.42ab**

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

Suitable egg:

The result of this study show, the mean of suitable egg during the experiment period, of experimental production have been given in Table 3. The results showed that the treatment had a highly significant (P<0.01) effect on suitable egg at all periods of experiments except the week 60. The mean of suitable egg ranged (94.92 to 97.16) during study period of experimental production, also probiotic supplement had significant increases on suitable egg when compared other group of supplement. The results agreed with results of Bozkurt et al, (2), the effect of three probiotic dietary supplements on the laying and reproductive performance of layer hens and broiler breeder hens all of the probiotic preparations decreased the cracked-to-broken egg ratio, compared to the untreated control group, and significantly increased the suitable egg and chick yield per hen in broiler breeders. Whereas the results didn't agreed with the finding of Hajati et al, (10) noticed that the addition of probiotic and prebiotic in Cobb 500 broiler breeders diet. There were no significant differences (P>0.05) among treatments in egg production, suitable eggs, and double-yolked eggs in broiler breeders during 26-40 weeks of age. There were significant differences among stoking density on suitable egg, the results showed a highly significant increases among high density on suitable egg when camper with normal density at all week except the 52 weeks. These result were in agreement with the finding of Kang et al, (12) noticed that the effects of stocking density on the performance, 34-week-old of Hy-Line Brown laying hens four stocking densities, including 5, 6, 7, and 10 birds/m2, were compared, with the results indicated that hen-day egg production and egg mass were less for ($P < 0.01$) 10 birds/m^2 than other stock densities but production rate of floor and broken eggs and eggshell strength were greater ($P < 0.01$) for 10 birds/m^2 than other stock densities. While it disagreement with the finding of Faitarone et al, (4), studded that the stocking density had no effects (P>0.05) on percentage of broken eggs but a linear reduction (p>0.05) in egg weight, percentage of production, increases in stocking density of Italian quails in the laying period with 30 weeks of age. Also, this study results showed that there were a highly significant interactions among all treatments with the stoking density on suitable egg from first week to final weeks of experiments. However high density and added probiotic had higher (P<0.01) suitable egg than other group at all weeks.

Table 3. Effect of density, treatments and their interactions on suitable egg % of breeder

Factor	Suitable egg%			
	52 weeks	56 weeks	60 weeks	64 weeks
Overall mean	**96.48**	**96.57**	**95.31**	**95.99**
Stocking density				
Normal	**96.40 ± 0.25a**	**95.97 ± 0.16b**	**94.16 ± 0.29b**	**95.01 ± 0.31 b**
High	**96.56 ± 0.16a**	**97.17 ± 0.22a**	**96.46 ± 0.31 a**	**96.97 ± 0.30 a**
Supplement				
Control	**95.93 ± 0.36 c**	**96.18 ± 0.41b**	**94.98 ± 0.43 a**	**95.66 ± 0.27 bc**
Probiotic	**97.16 ± 0.14 a**	**97.29 ± 0.44 a**	**95.76 ± 0.95 a**	**97.12 ± 0.69a**
Prebiotic	**96.65 ± 0.15ab**	**96.26 ± 0.13b**	**94.92 ± 0.64 a**	**95.01 ± 0.66c**
Symbiotic	**96.16 ± 0.20bc**	**96.54 ± 0.29b**	**95.58 ± 0.50 a**	**96.17 ± 0.35b**
Interaction				
Normal control	**95.35 ± 0.32 c**	**95.41 ± 0.40 d**	**94.56 ± 0.46cde**	**95.19 ± 0.37 d**
Normal probiotic	**97.29 ± 0.26 a**	**96.33 ± 0.06bc**	**93.80 ± 0.82 de**	**95.70 ± 0.58bcd**
Normal Prebiotic	**96.78 ± 0.26ab**	**96.08 ± 0.14cd**	**93.65 ± 0.64 e**	**93.57 ± 0.11 e**
Normal Symbiotic	**96.16 ± 0.23bc**	**96.06 ± 0.40cd**	**94.62 ± 0.35cde**	**95.57 ± 0.44 cd**
High control	**96.51 ± 0.45ab**	**96.96 ± 0.26b**	**95.40 ± 0.74bcd**	**96.13 ± 0.16bcd**
High Probiotic	**97.03 ± 0.12ab**	**98.24 ± 0.24 a**	**97.72 ± 0.13 a**	**98.54 ± 0.06 a**
High Prebiotic	**96.52 ± 0.19ab**	**96.44 ± 0.18bc**	**96.18 ± 0.17abc**	**96.46 ± 0.30bc**
High Symbiotic	**96.16 ± 0.37bc**	**97.02 ± 0.22 b**	**96.55 ± 0.42ab**	**96.77 ± 0.26b**

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

Unsuitable egg

The overall mean of treatments and stocking density interaction between treatments and stocking density unsuitable egg summarized in table 4. Although, there were highly significant decrease unsuitable egg on supplement in all week of study compared with control, except week 60. Hajati and Rezaei, (9) reported that beneficial effects from addition of prebiotics is reflected in the presence of antagonism towards pathogens, competition with pathogens, promotion of enzyme reaction, reduction of ammonia and phenol products, increasing resistance to colonization, improvement in the gut health (improved intestinal microbial balance) and performance, enhanced nutrient utilization (*e.g.* amino acids and proteins), as well as decreasing the environmental pollution and production costs. The result was in agreement with the finding of Maldarasanu et al, (16) verified that the dietary supplementation of laying quails with prebiotic supplementation had improve the average egg white weight, while reducing the percentage of eggs with defects (broken, cracked or soft-shelled eggs). In contrast, result is not in agreement with the finding of Hajati et al, (10) noticed that the addition Cobb 500 broiler breeders' diets Probiotic and prebiotic. There were not any significant differences in the mention parameters among treatments such as egg production, settable eggs, and double-yolked eggs in broiler breeders during 26-40 weeks of age.The present study showed a highly significant effect of stocking density on unsuitable egg at all week except 52 weeks of experiments. However numerical increase unsuitable egg in normal density compared with high density at all weeks, these results were agreement with the finding of Kang et al, (12) noticed that the effects of stocking density on the performance, 34-week-old of Hy-Line Brown laying hens four stocking densities, including 5, 6, 7, and 10 birds/m2, were compared. Show that the Results indicated that hen-day egg production and egg mass were less for ($P < 0.01$) 10 birds/m^2 than other stock densities but Production rate of floor and broken eggs and eggshell strength were greater ($P < 0.01$) for 10 birds/m^2 than other stock densities. While it disagreement with the finding of Faitarone et al, (4) studded that the Stocking density had no effects (p>0.05) on percentage of broken eggs but a linear reduction (p>0.05) in egg weight, percentage of production, increase in stocking density of Italian quails in the laying period with 30 weeks of age. The results showed that there was a highly significant effect of interactions between all treatments with the stocking density on unsuitable egg from first week to final weeks of experiments. The interaction effect was insignificant decrease on studied unsuitable egg, in birds fed the diet supplemented with probiotic and reared at high stocking density in comparison with those of the other groups during all period of experiment.

Table 4. Effect of density, treatments and their interactions on Unsuitable% of breeder

Factor	Unsuitable egg%			
	52 weeks	56 weeks	60 weeks	64 weeks
Overall mean	**3.47**	**3.38**	**4.62**	**3.97**
Stock density				
Normal	**3.56 ± 0.25a**	**3.96 ± 0.16 a**	**5.74 ± 0.29a**	**4.93 ± 0.30 a**
High	**3.39 ± 0.51a**	**2.80 ± 0.22b**	**3.50 ± 0.31b**	**3.01 ± 0.31 b**
Supplement				
Control	**4.03 ± 0.37 a**	**3.73 ± 0.38 a**	**5.02 ± 0.43 a**	**4.34 ± 0.27 ab**
Probiotic	**2.79 ± 0.13c**	**2.63 ± 0.43 b**	**4.19 ± 0.93 a**	**2.84 ± 0.70c**
Prebiotic	**3.27 ± 0.15bc**	**3.74 ± 0.13 a**	**4.98 ± 0.61 a**	**4.92 ± 0.64a**
Symbiotic	**3.81 ± 0.18ab**	**3.43 ± 0.30 a**	**4.29 ± 0.50 a**	**3.77 ± 0.30b**
Interaction				
Normal control	**4.65 ± 0.32 a**	**4.41 ± 0.43 a**	**5.44 ± 0.46ab**	**4.81 ± 0.37 b**
Normal probiotic	**2.62 ± 0.19 c**	**3.57 ± 0.16ab**	**6.09 ± 0.82 a**	**4.30 ± 0.58bc**
Norma Prebiotic	**3.12 ± 0.27bc**	**3.92 ± 0.14 a**	**6.14 ± 0.71 a**	**6.30 ± 0.18 a**
Norma Symbiotic	**3.84 ± 0.23ab**	**3.94 ± 0.40 a**	**5.28 ± 0.44ab**	**4.30 ± 0.32bc**
High control	**3.41 ± 0.43bc**	**3.04 ± 0.26b**	**4.60 ± 0.74abc**	**3.87 ± 0.16bcd**
High Probiotic	**2.97 ± 0.12bc**	**1.69 ± 0.18 c**	**2.28 ± 0.13 d**	**1.38 ± 0.12 e**
High Prebiotic	**3.41 ± 0.12bc**	**3.56 ± 0.18ab**	**3.82 ± 0.17bcd**	**3.54 ± 0.30 cd**
High Symbiotic	**3.77 ± 0.32b**	**2.92 ± 0.17b**	**3.31 ± 0.28 cd**	**3.23 ± 0.26 d**

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

Coefficient of variation (CV%) of body weight: Table 5 refers to the coefficient of variation for the effect of density, treatment and their interactions on body weights of broiler breeder Ross 308. At every week of age, the probiotic treatments had the lowest body weight variation, although body weight variation increased slightly in the probiotic treatment continued increase by progress of age at 64 weeks. The probiotic treatment resulted in the lowest flock body weight variance at 48 weeks with a body weight CV of 6.21% but higher flock body weight variance at 56 weeks with a body weight CV of 10.43% in control group. Similar result found by Neto, (19) found that when the broiler reared of deferent age 1, 21 and 42 days on body weight (CV) showed the result the percentage difference between the treatments for the 3 weightings was found to be statistically dissimilar (1.6% ,10% and 9.5%) respectively. Variation in body weight traits (CV) was generally the lowest in the normal of stocking density for every week compared with high stocking density, the best body weight variance at 48 weeks in normal stocking density but higher body weight variance at 64 weeks in high stocking density (6.62% and 9.83%) respectively. The negative effect of high stocking density on body weight variance and weight gain of chicks is related to the reduced chance of birds to get their nutritional requirements. The result was in contrast with the finding of Feddes et al, (5) who reported that the effect stocking the CV for body weight (relates inversely to flock uniformity) was higher (15.3%) in the lowest stocking density treatment than in the other three stocking density 23.8, 17.9, 14.3, and 11.9 birds/m2 on body weight variance of broiler performance density treatments, in which the CV for body weight ranged from 13.0 to 13.6. In the interaction between stocking density and added supplement on body weight CV of broiler breeder the best body weight variance resulted in normal density with probiotic supplement at 48 week 4.45% but the lower body weight variance result in bird fed diet supplemented with probiotic and reared at high stocking density compared with control group at all week. In practice, other factors related to broiler management, such as the intake of water and feed, the formation of groups and hierarchies, the maintenance of a suitable density, an appropriate placement environment, as well as immunity and health, appear to be more important for maintaining the uniformity of the flock until the end of the production cycle (23).

Table 5. Coefficient of variation for the effect of density, treatment and their interactions on body weights of breeder

Factor	Initial body weight (48 week)	Initial body weight (52 week)	Initial body weight (56week)	Initial body weight (60 week)	Initial body weight (64 week)
Overall mean	**7.77**	**8.22**	**8.92**	**9.35**	**9.35**
Socking density					
Normal	**6.62**	**7.13**	**8.03**	**8.08**	**8.08**
High	**8.4**	**8.55**	**9.3**	**9.83**	**9.83**
Supplement					
Control	**7.92**	**9.8**	**10.43**	**9.45**	**9.45**
Probiotic	**6.21**	**6.84**	**7.93**	**8.35**	**8.35**
Prebiotic	**8.18**	**7.97**	**8.8**	**9.65**	**9.65**
Symbiotic	**8.74**	**7.95**	**8.31**	**9.84**	**9.84**
Interaction					
Normal control	**6.6**	**6.66**	**6.74**	**7.41**	**7.41**
Normal probiotic	**4.54**	**7.3**	**8.52**	**8.39**	**8.39**
Normal Prebiotic	**7.66**	**7.96**	**8.43**	**7.81**	**7.81**
Normal Symbiotic	**5.89**	**6.54**	**8.2**	**8.38**	**8.38**
High control	**8.72**	**11.23**	**12.25**	**10.39**	**10.39**
High Probiotic	**7.19**	**6.31**	**7.31**	**7.61**	**7.61**
High Prebiotic	**8.54**	**8.06**	**9.2**	**9.96**	**9.96**
High Symbiotic	**9**	**8**	**7.96**	**10.9**	**10.9**

CONCLUSION

The results of present study indicate that all additives lead to improve egg production and suitable egg in normal density and high stock density as well. There is lowest unsuitable egg for high density with adding additives. The considerable improvements observed in the suitable egg and coefficient of variation for body weight of breeder hens fed on diets with probiotic.

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