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Biotrophy and Its Biological Role Productivity, Physiological and Microbial Indicators of Broiler Chickens and Layng Hens

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Abstract After the excessive use of antibiotics in poultry breeding projects, which were used to reduce or reduce pathogenic bacteria, and to achieve biosecurity, however, these attempts were negatively reflected in the emergence of bacterial species that possess the characteristic of resistance against some types of antibiotics, which made the World Health Organization prohibit the use of some types of these antibiotics in poultry farming, for fear of transmission to the consumer. This has preoccupied many researchers with conducting various studies on safe alternatives instead of using manufactured antibiotics, as efforts have intensified by supporting the intestinal flora with probiotics, which contain beneficial bacteria and some yeasts, to achieve microbial balance. We can summarize the results of previous studies in this article: the use of vital nutrition with different levels of beneficial bacteria and yeasts has an influential role in enhancing the natural intestinal flora of domestic birds, which effectively contributes to creating a microbial balance, as a result of competitive exclusion in obtaining attachment sites for receptors. The cells of the intestinal wall, and the excretion of large numbers of harmful bacteria outside the alimentary canal, thus improving the functioning of the alimentary canal, which is represented by an increase in the use of nutrients, and this is reflected in a significant improvement in the productive, physiological and microbial characteristics of broilers and laying hens.

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Keywords: *probiotic, beneficial bacteria, intestinal flora, bio nutrition.*

1. INTRODUCTION

Biotrophy is defined in the field of poultry nutrition as feeding birds on single-celled microorganisms, these organisms, specifically beneficial bacteria, are added to feed or drinking water for domestic birds in specific proportions that work to maintain the microbial balance in the gastrointestinal tract, which contributes to Improving the general health of poultry, and thus this will be reflected in the improvement of productive performance (Al-Salhi, 2022).

These microorganisms (beneficial bacteria) are introduced mainly through industrial processes before they are trained to poultry through feed or water. The most common industrial process is to load the bacteria on carriers such as skim milk or MRS broth to mitigate the effect of Manufacturing processes and the permanence of the activity of bacteria, during their movement to the parts of the gastrointestinal tract. This manufacturing process is known as the process of manufacturing the probiotic, whose effectiveness is represented in blocking the receptors of the epithelial cells lining the intestines, and thus preventing pathological bacteria from obtaining adhesion sites in the epithelial cells, which contributes to In excluding or displacing them outside the body, as well as its role in bringing about a microbial balance of the intestinal flora, and the production of some enzymes that the digestive system of poultry is unable to produce, which supports and enhances the enzymes produced in the digestive system of birds, and as a result will contribute to supporting the general health of domestic birds (Naji et al., 2012).

And due to the importance of vital nutrition and its role in strengthening the gastrointestinal tract, with beneficial bacteria and some yeasts, which contribute to achieving biosecurity and supporting the general health of poultry, we decided to conduct an extensive survey supported by comprehensive applications and results. To conclude through them the influential biological role in bringing about the microbial balance of the alimentary canal and its reflections on the productive, physiological and microbial indicators of broilers and laying hens.

2. Effect Of Biotrophy On The Productive, Physiological And Microbial Characteristics Of Broiler Chickens

2.1. Effect of Biotrophy on the productive traits of broiler chickens

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A study conducted by Al-Fattan and Al-Gharawi (2015) to evaluate the use of different methods of the Iraqi probiotic in some characteristics of broiler carcasses indicated that the probiotic was added at the level of 1 g / kg of feed, as well as 1 g / litre of drinking water, which contains no less than 10^7 (cfu/g), as the results indicated that there was a significant superiority in the relative weight of the ingested internal organs (heart, liver and gizzard) for the treatments in which the probiotic was provided through feed and water compared to the control treatment that was free of the addition. Jawad (2015) explained that adding kefir milk as a probiotic in different proportions (0.2, 0.4, and 0.6) % leads to a significant superiority in the values of the production index, in favour of the probiotic treatments compared to the control treatment.

Sarangi *et al.* (2016) stated that adding a probiotic at a concentration of 400 g/ton in the broiler ration did not lead to significant differences in the relative weights of the heart, liver and gizzard compared to the control treatment.

While Ognik *et al.* (2017) found that adding the probiotic to drinking water at a concentration of 0.25 g/L had an important role in obtaining a significant superiority in live body weight compared to the control treatment.

This was confirmed by Gunasekaran and Karunakaran (2017) in their study, in which they indicated that the probiotic contributes to improving the productive performance of broiler chickens during the productive period that extends from 21 to 35 days. Odeh (2017) noted that there were no significant differences in the relative weight of the spleen, pancreas, liver, and heart, when using three types of probiotics from different international origins (Korean-made Labzyme, German-made Biozyme, and Vietnamese-made Biolac) at a concentration of 0.5 g/kg feed from broiler diet. Jam meat for 35 days.

It was found by Qorbanpour *et al.* (2018) that the use of a multispecies probiotic (*Lactobacillus acidophilus*, *Lactobacillus casei*, *Enterococcus faecium* and *Bifidobacterium thermophilum*) containing 10^8 (cfu/g), does not affect the body weight, feed consumed, feed conversion, and the relative weight of the liver, and leads to a decrease in the relative weight of the gizzard.

While Humam *et al.* (2019) indicated that there was a significant improvement in body weight and the food conversion coefficient, and there was no significant difference in the relative weight of the internal organs, which included: the liver, gizzard and spleen, when using the probiotic with a concentration of 0.3%, which contains *Lactobacillus plantarum* bacteria 10^9 (cfu/g), in broiler ration under conditions of heat stress. It was noted Wang *et al.* (2019) that the addition of lactic acid bacteria *Lactobacillus reuteri* at a concentration of 2.5 x 10^8 (cfu/ml) to the drinking water of broilers aged one day up to 42 days does not affect the average live body weight.

It was found by Hossain *et al.* (2020) that the probiotic contributes to a significant improvement in weight gain, live body weight, and feed conversion coefficient and does not affect the feed consumption rate and mortality rate, compared to the control treatment when adding 1 g / litre of drinking water, and with three brands commercial probiotics (Starsol, Avilac plus, and Avibac), in an experiment that was conducted on broiler chickens for 28 days. Adli and Sjofjan (2020) observed in an experiment conducted on broiler chickens that the probiotic was used at a weight of 80 g per 100 kg of feed, as it was noted that no Significant differences in the productive traits represented by body weight, weight gain, feed consumed, and the relative weight of the internal organs: liver, spleen, glandular tissue, pancreas, compared to control treatment. Sjofjan and Adli (2020) found in another study, in which he indicated that there were no Significant differences were obtained in body weight, feed conversion coefficient, average feed consumption, weight gain, as well as in the relative weights of liver, spleen, and glandular tissue when using the probiotic at a weight of 80 g per 100 kg of feed, in the experiment of broiler chickens raised for 35 days, and compared with the control treatment. Sabaa (2020) observed when using the Iraqi probiotic at a rate of 1 g / kg to the diet of broiler chickens, that there were no significant differences in the production index scale, the economic efficiency scale, and the mortality rate, as well as there were no significant differences in the average relative weights of the internal organs (heart, liver, gizzard pancreas, spleen, and the relative weight of the glandular tissue Fabricia) in comparison with the control treatment.

Abbas *et al.* (2021) explained in an experiment conducted on broilers for 42 days, in which 1 g of probiotic was used in 10 litres of drinking water, which contains *Lactobacillus brevis* bacteria, indicated that there were no significant differences in the relative weight of the internal organs that the gizzard, liver and spleen were included in comparison with the control treatment. Khabirov *et al.* (2021) noted that the probiotic containing two types of *Lactobacillus* and *Enterococcus* bacteria with numbers of 10^6 and 10^7 (cfu/g) for each type, respectively, contributes to improving the productive performance of broilers. Zhang *et al.* (2021) observed when adding 1% of the probiotic consisting of *L. acidophilus* bacteria with a number of 5×10^9 (cfu/g), that is (by adding 10 ml of the probiotic to a litre of water) to broiler chickens, as the results indicated there was a significant improvement in the productive traits, which included average body weight, weight gain, and feed conversion coefficient compared to the control treatment. At the same time, Wahyudi *et al.* (2021) indicated no significant differences in the relative weight of the internal organs, which included (the liver, gizzard, and heart) for additional treatments. The probiotic was compared to the control treatment in an experiment conducted on broiler chickens, in which a liquid commercial probiotic was used at three levels (1, 1.5, and 2)% of the drinking water.

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2.2. Effect of Biotrophy on the physiological traits of broiler chickens

Karumi *et al.* (2012) noted that adding 0.3% of the Iraqi probiotic did not lead to significant differences in PCV, total protein concentration, albumin, globulin, and glucose concentration. Still, it did contribute to lowering cholesterol concentration compared to the control treatment.

Odeh (2013) concluded that when using kefir milk as a probiotic with three different levels (12, 8, and 4) ml/litre of drinking water for broiler chickens, there were no significant differences in PCV, albumin, glucose, liver enzymes AST and ALT, with a significant decrease. In the ratio of heterotrophs to lymphocytes (H/L), cholesterol and a significant increase in total protein and globulin concentration compared with the control. In a study conducted by Fathi (2013) conducted on broiler chickens for 42 days, in which *Lactobacillus* bacteria were used as a probiotic that was added to broiler diets at a rate of (0.05, 0.10, and 0.15)%, as the results of the study indicated a significant improvement in the volume of cells PCV when using 0.15% of the probiotic compared to the control treatment.

Ghasemi et al. (2014) showed that adding the probiotic at 1 g per kg of the ration of broiler chickens raised for 42 days leads to a significant decrease in the concentration of cholesterol in the blood serum, compared with the control treatment.

Noted that Beski and Al-Sardary (2015), the use of the probiotic at a level of (2.5 and 5) g / kg does not affect the rate of (PCV) and the concentration of cholesterol, glucose and total protein and contributes to reducing the ratio of heterologous cells to lymphocytes (H/ L) compared to the control treatment.

Odeh (2017) indicated in another study that there were no significant differences in the size of (PCV), glucose concentration, liver enzymes AST and ALT when using three types of probiotics from different international origins (Korean-made Labzyme, German-made Biozyme, and Vietnamese-made Biolac). At a concentration of 0.5 g / kg, feed from the diet of broiler reared for 35 days.

Haque *et al.* (2018) reported that using a commercial probiotic (Promax®) at a concentration of 5 g/L of drinking water for broiler chickens leads to a significant decrease in cholesterol, ALT and AST enzymes compared to the control treatment. It was found Qorbanpour *et al.* (2018) that the use of a multi-strain probiotic (*Lactobacillus acidophilus*, *Lactobacillus casei*, *Enterococcus faecium* and *Bifidobacterium thermophilum*) containing 10^8 (cfu/g) in the broiler diet, did not affect the blood biochemical parameters, which included: total protein, albumin, glucose, cholesterol.

Another study published that lactic acid bacteria, which is used as a probiotic, effectively contribute to improving the blood parameters of broiler chickens, which improves physiological activities and thus is reflected in the improvement of the productive performance of broilers (Kamboh, 2018).

Hammond *et al.* (2019) found that adding 1g of (Biosb-Gold) to 1kg of broiler ration for 35 days did not affect the PCV.

They have observed Adli and Sjofjan (2020) in an experiment conducted on broiler chickens that used the probiotic at a weight of 80 g per 100 kg of feed, as it was noted that there were no significant differences in the biochemical parameters of the blood, which included total protein, albumin, globulin, cholesterol, glucose, and liver enzymes AST and ALT. Indicated Krauze *et al.* (2020) indicated that the use of different types of bacteria to act as a probiotic contributes to reducing the ratio of heterotrophic cells to lymphocytes (H/L) when using *Enterococcus faecium* with a number of 33×10^{12} (cfu/g), and *Bacillus subtilis* with a number of 2×10^9 (cfu/g) in two separate treatments and compared with the control treatment. Sjofjan and Adli (2020) found that the probiotic did not affect serum biochemical parameters at the age of 21 and 35 days, represented by total protein, albumin, globulin, glucose, cholesterol and enzymes. While sabaa (2020) observed when using the Iraqi probiotic at the rate of 1 g / kg to the broiler diet, there was a significant increase in hematocrit (PCV) in the concentration of glucose and total protein, there was no significant difference in the concentration of cholesterol and the percentage of cells Heterolytic (H/L) and liver enzymes in comparison with control treatment.

It was concluded by Khabirov *et al.* (2021) that the probiotic that contains two types of *Lactobacillus* and *Enterococcus* bacteria with a number of 10^6 and 10^7 (cfu / g) for each type, respectively, contributes to the improvement of biochemical blood parameters (glucose, total protein, liver enzymes) for broiler chickens.

2.3. Effect of Biotrophy on the microbial traits of broiler chickens

Mahmmod *et al.* (2014) indicated that the addition of the Iraqi probiotic at a rate of 1 kg / 100 kg in the diet of broiler chickens contributed to a significant decrease in the numbers of coliform bacteria in the jejunum of the small intestine compared to the control.

Jawad (2015) explained that the addition of kefir milk as a probiotic in different proportions (0.2, 0.4, and 0.6) %, led to a significant increase in the numbers of lactic acid bacteria with a decrease in total bacteria and coliform bacteria, compared with the control treatment. Ahmed and Manati (2015) noted that using probiotics contributes to the establishment of microbial balance in the intestines of broiler chickens by reducing the numbers of total bacteria and coliform bacteria and increasing the numbers of lactic acid bacteria compared to the control treatment. This was confirmed by Al-Gharawi and Al- Zubaidi (2015) through their study on broiler chickens, in which they found that the probiotic contributes to increasing the numbers of lactic acid bacteria in the small intestine of the

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treatments that contain the probiotic and reduces the numbers of total bacteria and coliform bacteria compared to the control. Note Olnood *et al.* (2015) that the addition of different species of lactic acid bacteria to the diet of broiler chickens led to a significant increase in the number of lactic acid bacteria in the small intestine, with a significant decrease in the number of colonic bacteria compared to the control treatment.

Zangana and Jasim (2016) indicated that the use of probiotics contributes to an increase in the number of lactic acid bacteria and a decrease in the number of coliform bacteria in the jejunum in their experiment that was conducted to study the tissue characteristics and microbial community of broiler chickens.

Ognik *et al.* (2017) found that adding the probiotic to drinking water at a concentration of 0.25 g/L had an important role in establishing microbial balance by decreasing the content of total bacteria and coliform bacteria and increasing the lactobacillus bacteria in the jejunum of the small intestine of broiler chickens.

Whereas, Qorbanpour *et al.* (2018) found that the use of a multispecies probiotic (*Lactobacillus acidophilus*, *Lactobacillus casei*, *Enterococcus faecium* and *Bifidobacterium thermophilum*) containing 10^8 (cfu/g), did not affect the numbers of total bacteria, coliform bacteria, and lactic acid bacteria in the intestine Broiler.

Humam *et al.* (2019) stated that the use of a probiotic with a concentration of 0.3% in broiler feeding under conditions of heat stress, which contains *Lactobacillus plantarum* with a number of 10^9 (cfu/g), led to a significant increase in the numbers of total bacteria and lactic acid bacteria in the jejunum. And a significant decrease in the numbers of coliform bacteria, in favour of the probiotic treatment, compared to the negative control that was free of the addition, while Deraz *et al.* (2019) observed in his experiment that was conducted on broiler chickens for 42 days, in which he used lactic acid bacteria as a probiotic, It contains two species of lactic acid bacteria, *Lactobacillus plantarum*, with a number of 10^{12} (cfu/g) and *Lactococcus lactis*, with a number of 10^9 (cfu/g) per ml of drinking water. A significant increase in the number of lactic acid bacteria was observed, with a significant decrease in the number of coliform bacteria. *Salmonella* bacteria in the cecum area.

It was noted in an experiment conducted on broiler chickens that used the probiotic with a weight of 80 g / 100 kg of feed, as was noted that there were no significant differences in the numbers of lactic acid bacteria and coliform bacteria in the jejunum. However, there were arithmetic differences in favour of the probiotic treatment compared to the control treatment (Sjofjan and Adli, 2020).

It was indicated that Krauze *et al.* (2020) the use of different types of bacteria as a probiotic contributes to reducing the numbers of total bacteria and coliform bacteria compared to the control treatment when *Enterococcus faecium* 33×10^{12} (cfu/g) and *Bacillus subtilis* bacteria with a number of 2×10^9 (cfu/g) in two separate treatments and compared them with the control treatment. It was found by Sjofjan and Adli (2020) that the probiotic did not affect the numbers of total bacteria and coliform bacteria in the small intestine of broiler broilers, at the age of 35 days, compared with a control treatment.

Sabaa (2020) noted that the use of the Iraqi probiotic at a rate of 1 g / kg in the diet of broiler chickens contributes to increasing the numbers of total bacteria and lactic acid bacteria and reduces the numbers of coliform bacteria in the probiotic treatment compared to the control treatment.

Zhang et al. (2021) stated that adding 1% of the probiotic consisting of *L. acidophilus* bacteria with a number of 5×10^9 (cfu/g) (by adding 10 ml of the probiotic to a litre of drinking water) to broilers, as a study confirmed the probiotic contributed to increasing the number of lactic acid bacteria and decreased the number of coliform bacteria, in favour of the probiotic treatment compared to the control treatment.

3. Effect of Biotrophy on The Productive, Physiological And Microbial Traits of Laying Hens

3.1. Effect of Biotrophy on the Productive Traits of Laying Hens

S Afsari *et al.* (2014) showed that the use of the probiotic brand (Yeasture®) in the diet of laying hens at a level of 0.06 g / kg did not affect the feed conversion factor, shell weight, thickness, yolk colour, and body weight. A significant decrease was observed in the percentage of egg production. Eggs (HD%) and egg mass, in a 7-week study of 144 experimental Lohmann Lite laying hens.

Sobczak and Kozłowski (2015) indicated that the addition of *Bacillus subtilis* as a probiotic at a level of 1.4×10^8 (cfu/g) per kilogram of ration, did not affect the product characteristics, which included: egg weight, number of eggs, egg mass, feed consumption and feed conversion, and it was observed there were significant differences in the weight gain of laying hens, and it also did not affect the qualitative characteristics of eggs, which included: white weight, yolk weight, but a significant improvement was observed in shell weight, thickness and average yolk colour when studying 288 laying hens of the Lohmann Brown strain. For 26 weeks.In a study conducted on 112 laying hens at the age of 42 weeks, the Sheffer breed, which aimed to know the effect of adding the locally prepared probiotic on productive performance, as one gram of the probiotic contains no less than 10^{10} (cfu / g) of Lactobacilli bacteria And no less than 10^{10} (cfu/g) of Saccharomyces cerevisiae, no less than 1^{10} (cfu/g) of *Lactobacillus acidophilus*, and no less than,100^{10} (cfu/g) of *Bacillus subtilus*, the probiotic was used in this study in different proportions. (5, 10 and 15) g / kg feed to study the following characteristics: egg production, egg weight, egg mass, feed consumption and the feed conversion factor. The

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results indicated a significant increase in egg production and the mass of eggs produced, significantly improving the feed conversion factor. Compared with the control treatment (Mousa and Al-Rawi, 2015).

Alagawany *et al.* (2016) found that the addition of probiotics had no significant effect on the amount of feed consumed, feed conversion factor, egg weight, egg production percentage (HD%) and egg mass in a study conducted on 160 laying hens the Lohmann breed, for 20 weeks, in which the probiotic was used at the level of 1 g / kg feed, which contains *Lactobacillus acidophilus* in an amount of 10^{10} (cfu/g). It was observed by Bidura *et al.* (2016) in a study conducted on 120 experimental units of laying hen strain Lohmann Brown at the age of 32 weeks for 56 days (8 weeks) in which the probiotic was used, which was isolated from the colon of cattle, as it was used in the diet of laying hens at three levels (0.20, 0.40 and 0.60) g of probiotic / kg of feed, respectively, and noted that it increases the number of eggs and the percentage of egg production (HD%). Getachew et al. (2016) confirmed that the addition of a probiotic that contains two types of lactic acid bacteria: *Lactobacillus acidophilus* and *Lactobacillus plantarum* at a level of 5% improves the productive performance of chickens, the whiteness of the strain (White Leghorn) compared to the control treatment.

Zhang *et al.* (2017) stated that feeding laying hens under conditions of heat stress with the addition of a probiotic that contains a mixture of *Bacillus subtilis* and *Enterococcus faecium*, as it contains *E. faecium* at a rate of 5.0×10^5 (cfu/g) and B bacteria subtilis by 4.0×10^6 (cfu/g) was added to the ration of laying hens at the age of 40 weeks, for 20 weeks, as the results showed a significant increase in the rate of egg production and egg weight, as well as an improvement in the strength of the shell and its resistance to breaking.

Fathi *et al.* (2018) indicated that including the probiotic in the diet of laying hens had no significant effect on the feed conversion factor, number of eggs, egg weight, egg mass and yolk colour. Still, the level of 400 g / ton contributed to an increase in Mean shell thickness and weight compared to the control treatment, in a study conducted on 216 laying hens of different breeds (White Leghorn, Saudi black and Saudi brown) at the age of 32 weeks under conditions of heat stress for 90 days, in which the probiotic was used at levels (0, 200, and 400) g / ton of feed.

Xiang *et al*. (2019) showed that the probiotic is considered one of the safe products to use, as it contributes to the improvement of normal gut morphology, in an experiment conducted on 8208 laying hens of the Lohmann brown strain, in which the probiotic was used in the diet at a ratio of (0.05, and 5.0) g/kg It was noticed that there were no significant differences between the experimental treatments in the mortality rate.

In a study conducted by both Naseem and King (2020) for eight weeks and carried out on 934 experimental units of laying hens, the Rhode Island Red breed, at the age of 30 weeks, in which *Lactobacillus* bacteria were used as a probiotic at a concentration of 0.05 g / 10 ml in the drinking water of laying hens to study productive performance. It did not notice any significant effect on the final body weight, egg production and egg weight, and a significant improvement was noted in the colour of the yolk compared to the control.

Another study confirmed that the probiotic positively affects productive performance, as it increases the rate of egg production, improves shell thickness, weight, and yolk colour, and reduces serum cholesterol concentration (Sjofjan *et al*., 2021).

3-2. Effect of Biotrophy on the Physiological Traits of Laying Hens

Sobczak and Kozłowski (2015) indicated that the addition of a commercial probiotic at a level of 1.4×10^8 (cfu/g) per kg of diet did not affect the concentration of cholesterol in the blood serum when it was studied on 288 laying hens of the Lohmann Brown breed for 26 weeks. In another study conducted on 112 laying hens at the age of 42 weeks, Scheffer breed, which aimed to know the effect of adding the locally prepared probiotic (Iraq probiotic) on productive and physiological performance, as one gram of the probiotic contains no less than 10^{10} (cfu/g) of Lactobacilli and not less than 10^{10} (cfu/g) of *S. cerevisia* and not less than 1^{10} (cfu/g) of *Lactobacillus acidophilus* and not less than 100^{10} (cfu/g) of *Bacillus subtilus*, for which it was used The probiotic at different ratios (5, 10 and 15) g/kg feed, to study the following biochemical parameters (blood cholesterol, glucose concentration, total protein, albumin, globulin, AST enzyme concentration and ALT enzyme concentration. The results showed no significant differences in Glucose concentration, total protein concentration, albumin, globulin, AST enzyme concentration and ALT enzyme concentration, with a significant decrease in blood cholesterol (Mousa and Al-Rawi, 2015).

While Bidura *et al.* (2016) observed in a study conducted on 120 laying hens of the Lohmann Brown strain, 32 weeks old, for 56 days (8 weeks) in which the probiotic was used, which was isolated from the colon region of cattle, as it was used in diet Layering chickens with three levels (0.20, 0.40 and 0.60) gm of probiotic / kg of feed, respectively, and it was noted that it reduced the concentration of cholesterol in the blood serum compared to the control treatment.

In a study conducted by Abd El-Hack *et al.* (2017) on 216 laying hens of the Hi-sex Brown breed, which lasted from 22 to 34 weeks (12 weeks), in which a probiotic containing 1.5 x 10^8 (cfu/g) of *Bacillus subtilis* bacteria at the level of 1000 mg/kg of diet, as the results showed that the probiotic does not affect the total protein and the concentration of albumin and cholesterol in the blood serum. In another study in which, Wang *et al*. (2017) confirmed that the probiotic contributes to the microbial balance of the intestinal flora. It improves the

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tissues of the intestinal layers. In addition to that, it regulates the hormonal action that controls the production of eggs, which is reflected in the outcome of the improvement of the productive performance of laying hens in his experiment conducted on laying hens (Hy-Line W-36) at the age of 28 weeks, in which the booster was used. *B. licheniformis* in powder form to the laying hen's diet, at a level of 2×10^{10} (cfu/g). Tang *et al*. (2017) indicated in a study conducted on 160 laying hens from Hisex Brown strain, 36 and 52 weeks old, which aimed at the effect of using 0.1% commercial probiotic (Primalac®) on blood parameters for laying hens, which included: PCV, heterocyst to lymphocyte ratio H/L, protein concentration, glucose concentration and liver enzymes AST and ALT, where the results indicated a significant decrease in each of serum cholesterol concentration, ALT concentration, and H/L ratio, and there was no significant difference in each of AST enzyme, total protein, glucose concentration, and cell PCV stacked blood.

The findings of Fathi *et al.* (2018) indicated that the inclusion of the probiotic in the diet of laying hens did not affect the cellular blood parameters and the blood biochemical parameters that included total protein, albumin and globulin but caused a decrease in serum cholesterol, compared to the control group. Control, in a study conducted on 216 laying hens at the age of 32 weeks under conditions of heat stress for 90 days, the probiotic was used at a level of (0, 200, and 400) g / ton of feed. On laying hens (white lakehorn) at the age of 70 weeks, the commercial fortifier (Protexin®) prepared by Probiotics Uk International was used in drinking water at a concentration of 85 mg / L, as it was observed that there were no significant differences in the concentration of cholesterol and liver enzymes AST and Alt.

A study was published on 360 laying hens of the Lohmann Light breed for 21 weeks, as the results showed that the use of probiotics at the level of 0.1% in the diet did not affect the concentration of cholesterol in blood serum and the liver enzyme GOT compared to the control treatment that was free from the addition (Hassan *et al*., 2019).

Another study confirms that the probiotic reduces high cholesterol in the blood serum (Sjofjan *et al*., 2021), followed by another study on the effect of the probiotic on the physiological parameters of laying hens, as Naseem *et al*. (2021) confirmed that the probiotic does not affect In the concentration of total protein and albumin, in a study conducted on laying hens, White Leghorns W-36, 32 weeks old, for eight weeks, in which the probiotic was used at the rate of 1×10^{12} (cfu/g) per kg of diet, which consists of Lactobacillus species. spp. (*L. paracasei* + *L. plantarum* + *L. rhamnosus*).

3.3. Effect of Biotrophy on the microbial traits of laying hens

A study conducted by Park *et al.* (2016) conducted on 288 ISA Brown laying hens for 27 weeks at three different ages (27, 18, and 9) weeks; to evaluate the effect of a probiotic consisting of *Entercoccus faecium* on E- coli and lactic acid bacteria in the droppings of laying hens, as it was observed in the ninth week of age, that there were no significant differences in the numbers of lactic acid bacteria and coliform bacteria. Still, in weeks 18 and 27, a competitive exclusion process was observed, by removing coliform bacteria from the gastrointestinal tract, which It caused a decrease in their numbers in the treatments that contained the probiotic, according to the level of addition (0.005 and 0.01)% for the first and second treatments, respectively, compared to the control treatment.

(Zhang *et al.* (2017) stated that feeding laying hens under conditions of heat stress with the addition of a probiotic that contains a mixture of *Bacillus subtilis* and *Enterococcus faecium*, as it includes *E. faecium* at a rate of 5.0×10^5 (cfu/g) and B. subtilis by 4.0×10^6 (cfu/g) to the diet of laying hens, Hy-Line Brown, at the age of 40 weeks, for a period of 20 weeks, as the results showed: an increase in the numbers of beneficial bacteria, which may be responsible for inhibiting the invasion of harmful bacteria, In addition to enhancing intestinal integrity, in a study conducted by Abd El-Hack *et al.* (2017) on 216 Hi-sex Brown laying hens, over a period of 22 to 34 weeks (12 weeks), in which a probiotic containing 1.5×10^8 (cfu/g) of Bacillus subtilis at a level of 1000 mg / kg of diet, and the results showed that the probiotic reduces harmful emissions from chicken manure by reducing ammonia gas levels by an average of 34.51 g / dL, compared to the control treatment that The rate of ammonia production was 78.86 g / dl, which means that it contributes to creating environmentally friendly conditions, and thus is reflected in the quality of production.

Note Hilmi *et al.* 2020). In a study conducted on 120 laying hens of the Lohman strain at the age of 17 weeks, the probiotic was added at a rate of 3% in the drinking water, as it was noted that the probiotic contributes to microbial balance by reducing the number of coliform bacteria and increasing the numbers of Lactic acid bacteria in the small intestine. It was also noted that the probiotic contributes to reducing the numbers of harmful bacteria in the waste such as *salmonella* and E-coli bacteria and increasing the numbers of lactic acid bacteria in the stool, which contributed to a decrease in the levels of ammonia gas NH_3 from 3.73 to 2.59 (ppm) in the waste compared to the treatment the control.

4. CONCLUSION

We conclude from all the results of previous studies that enhancing the normal intestinal flora of broilers and laying hens with different levels of beneficial bacteria and yeasts has effectively contributed to creating a microbial balance; as a result of competitive exclusion in obtaining attachment sites for cell receptors of the intestinal wall, which contributed to the excretion of large numbers of harmful bacteria outside the alimentary canal, and thus a significant improvement was observed in the productive, physiological and microbial characteristics of broilers and laying hens, according to the results of the studies referred to in this study.

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