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Effect of using fermented feed with Iraqi probiotic on some physiological traits of ducks

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Abstract

In order to show the impact of fermented feed including Iraqi bio-enhancer on some immune and physiological aspects of ducks, this study was carried out at one of the domestic duck breeding farms in the Al-Muthanna Governorate between January 14, 2025, and March 10, 2025. I raised 75 one-day-old chicks, each weighing 42 grams on average. The ducklings were created using ingredients from the Diwaniyah Governorate's local markets. In accordance with the experiment's four treatments and the control treatment, the chicks were grown in a closed hall and placed in a group of cages. Three replicates were used for each treatment, and each replicate contained five birds, for a total of fifteen broiler chicks for one treatment. The following were the experimental treatments:

T1: (without any additives)

T2: Second treatment: 25% feed fermented with Iraqi bio-enrichment + 75% dry feed

T3: Third treatment: 50% feed fermented with Iraqi bio-enrichment + 50% dry feed

T4: Fourth treatment: 75% feed fermented with Iraqi bio-enrichment + 25% dry feed

T5: Fifth treatment: 100% feed fermented with Iraqi bio-enrichment The results indicated the following:

I. Introduction

As a result of the large gap that occurred between the amount of production of eggs and poultry meat and the increasing population growth and the changes that accompanied it in the economic, cultural and health levels, in addition to the change in social tradition on the one hand and the increase in the prices of red meat (Hamed, 1998) and the development that occurred in the breeds of domestic birds, including ducks on the other hand, and for all these reasons their nutritional, administrative and health requirements increased (Naji, 2006) Raising poultry, including ducks, depends on three main pillars: health, management, and nutrition. The nutrition factor is one of the important pillars in establishing poultry projects, including ducks, because it represents 60-70% of the cost of any project (Naji and others, 2006) Therefore, the attention of nutrition specialists turned towards means that improve the nutritional value of feed, including physical, chemical and microbial properties, which positively reflects on the digestive efficiency and absorption of feed, which results in a noticeable increase in the product of eggs and meat (Naji et al., 2006) Among the data that support the readiness of the nutritional elements of the feed consumed is the fermentation process of the

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feed in the presence of bio-enhancers in duck feed. It improves production performance by making maximum use of the various nutritional elements in the feed, such as proteins, by increasing the secretion and activity of digestive enzymes, especially feeds with a low protein level used in feeding Ducks are ranked second among domestic birds, contributing to meeting human nutritional requirements for meat and eggs, in addition to their production of feathers, which are used for various purposes. Asian countries are distinguished by their high production of ducks, ranking first in the world in terms of duck meat production, as Asian production constitutes 84% of the total global production between 2000 and 2011 (FAO; 2014) China is the largest producer of duck meat in Asia, accounting for 73% of global production, while contributing about 83% of meat production in Asia (Cherr and Morrise, 2008).

In Iraq, ducks are found in abundance in southern Iraq, which is famous for its meat and egg production. Duck meat represents about 6% of the total poultry meat production in the world (Baeza et al., 2002). The main types of ducks used for meat production in Iraq are the Peking duck, the Muscovy duck, and the Molucca duck. Ducks are characterized by good growth rates, a tendency to obesity, a low protein requirement in feed, and a high resistance to most diseases that affect other poultry, in addition to a high level of unsaturated fatty acids that suit many consumers who suffer from many diseases therefore, it does not cause health damage to consumers (Baeza et al., 2006). Due to the lack of prior studies on the use of the effect of fermented feed with Iraqi bio-enhancer in duck feed, The purpose of this study was to ascertain how Iraqi probiotic-infused fermented diet affected the ducks' immunological, physiological, and productive traits.

The effect of using fermented feed with Iraqi probiotic on some physiological traits of ducks

Table 1 illustrates how the amount of duck blood changes when several amounts of Iraqi fermented feed are added to the meal. The table shows that, in comparison to the other treatments in the experiment, which do not differ significantly in this attribute, treatment T5 (100 percent fermented feed with a bio-enhancer) showed a significant decrease ($P \leq 0.05$) in the blood glucose concentration. The same table also shows that the concentration of cholesterol in treatment T5 decreased significantly ($P \leq 0.05$) when compared to the other treatments in the experiment. Treatments T2, T3, and T4 showed no significant differences, and treatment T5's concentration of cholesterol also decreased significantly when compared to the control treatment T1, In contrast to the other treatments in the experiment, treatment T5 showed a significant decrease ($P \leq 0.05$) in the concentration of triglycerides, while treatments T1 and T2 and treatments T2, T3, and T4 did not show any significant differences. On the other hand, the concentration of low-density lipoproteins (LDL) in duck blood was significantly lower ($P \leq 0.05$). in the ducks receiving treatment T5 as opposed to those receiving the other treatments. There were no discernible differences in the trial between treatments T3. and T4, or between treatments T2 and T3 and treatments T1. and T2, respectively, The concentration of high-density lipoproteins (HDL) did not significantly differ amongst any of the experiment's treatments, according to the same table. The findings of this investigation aligned with the findings of Falaki et al. (2011), who observed a reduction in the levels of cholesterol and sugar in the blood of ducks fed probiotic-fermented feed and attributed this reduction to the probiotic-fermented feed. While this result was not in line with the findings of (Puspani et al., 2016), microorganisms control blood sugar and restore its concentration to normal under normal circumstances or in the event of stress.

The results of this study were in line with those of Puspani et al. (2016), who observed a significant drop in the blood cholesterol concentration of ducks fed feed fermented with a probiotic as opposed to broiler chickens fed regular feed when the chickens were fed feed containing a probiotic as opposed to the control treatment. The findings of this study, however, contradicted those of Bidura et al. (2019), who found no appreciable variations

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in the levels of triglycerides, cholesterol, and sugar in the blood of birds fed probiotic-enriched feed as opposed to broiler chickens fed conventional feed.

Table (1) Impact of fermented feed on some biochemical traits of duck

Treatments	Glucose concentration (mg/100ml)	Cholesterol concentration (mg/100ml)	Triglyceride concentration (mg/100ml)	LDL	HDL
T1	203.64±.878 A	283.98±.762 A	144.24±.214 A	220.18±.161 A	46.16±8.856
T2	198.26±.023 B	278.62±.040 B	142.17±.023 Ab	217.46±.029 B	37.92±.049
T3	198.07±.023 B	278.42±.024 B	142.06±.029 B	217.32±.020 Bc	38.15±.026
T4	197.83±.049 B	278.20±.035 B	141.92±.023 Bc	217.13±.031 Cd	38.39±.043
T5	197.54±.051 Bc	276.93±.052 C	141.72±.020 C	216.95±.044 D	38.63±.032
incorporeal level	*	*	*	*	**N.S**

N.S.no significant, * significant at the 0.05

Impact of fermented feed on albumin, globulin and total protein in duck blood

The impact of adding varying amounts of fermented feed containing Iraqi bio-enhancer on the levels of albumin, globulin, and total protein in duck blood is displayed in Table (2). In contrast to the other treatments in the experiment, which showed a significant difference in total protein concentration, the table shows that treatment T5 had a significant increase ($P \leq 0.05$) in albumin concentration. This study's findings were consistent with those of earlier studies (Abd El Azeem and others, 2002; Talba and others, 2007). When compared to ducks provided feed without probiotics, they found that the blood of ducks fed feed with additional probiotics had significantly higher levels of albumin, globulin, and total protein, Some have theorized that this is because of the additional beneficial microbial community, which raises the activity and secretion of digestive enzymes in the digestive tract. This increases the nutritional value of the feed that the ducks eat, makes the absorbed protein more ready, and raises the concentration of the protein in their blood serum.

Table (2) Impact of fermented feed on albumin, globulin and total protein in duck blood

Treatments	Albumin concentration (mg/100ml)	Globulin concentration (mg/100ml)	Protein concentration (mg/100ml)

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T1	2.39±.011 e	2.19±.012 C	4.58±.023 E
T2	2.44±.015 d	2.22±.008 Be	4.66±.024 D
T3	2.51±.011 c	2.24±008 B	4.75±.020 C
T4	2.60±.017 b	2.31±.011 A	4.91±.028 B
T5	2.68±.015 A	2.34±.011 A	5.02±.026 A
incorporeal level	*	*	*

N.S.no significant, * significant at the 0.05

Using fermented feed with Iraqi probiotic on phosphorus and calcium in duck

The impact of adding varying amounts of fermented feed containing Iraqi bio-enhancer on the levels of calcium and phosphorus in duck blood is displayed in Table (3). The table shows that the blood phosphorus concentration of ducks fed feed fermented with Iraqi bio-enhancer appeared to have increased significantly (P≤0.05). treatment T5, as opposed to treatments T1, T2, T3, and T4. On the one hand, there were noticeable changes between treatments T2, T3, and T4, while on the other hand, there were none between treatments T1 and T2. in the phosphorus concentration. According to the same table, phosphorus significantly increased (P≤0.05) the calcium concentration during treatment. T5 in contrast to the other therapies. There were no discernible variations (P≤0.05) in the calcium content of duck blood between treatments T1 and T2, or between treatments T3 and T4 on the one hand. The study's findings supported the conclusions made by Al-Khafaji (2008) and Naji et al. (2011). Those who discovered that adding a probiotic to feed or fermenting feed with one increased the pace at which mineral elements, such as calcium and phosphorus, were absorbed and increased their availability. In addition to the enzymes that are naturally amplified in the digestive tract, it was shown that the beneficial microbial population in the feed increased the secretion of digestive enzymes. Therefore, in comparison to the concentration of calcium and phosphorus in the blood of those fed the standard feed, it was feasible to raise its concentration in the blood of those provided the feed to which the probiotic was added.

Table (3) effect of using fermented feed with probiotic on phosphorus and calcium of duck.

Treatments	Phosphorus concentration (mg/100ml)	Calcium concentration
T1	6.49±.018 D	12.82±.170 C
T2	6.44±.032 D	13.03±.034 Bc
T3	6.59±.027 C	13.23±.011 B
T4	6.70±.023 B	13.50±.026 A
T5	6.82±.023	13.61±.020

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	A	A
incorporeal level	*	*

* significant at 0.05.

Impact of fermented feed with Iraqi probiotic on immunity traits of ducks

The impact of adding varying amounts of fermented feed including Iraqi bio-enhancer on the weight and Fabrica index of ducks is displayed in Table (4). The table shows that treatment T5 (100% fermented feed with a probiotic) significantly outperformed treatment T1 (no fermentation) in terms of the relative weight of the Fabricius gland (P≤0.05). On the one hand, there were no significant differences between treatments T2, T3, T4, and T5, and on the other hand, there were no significant differences between treatments T1, T2, T3, and T4. Additionally, the same data shows that treatment T5 significantly outperformed the control treatment T1 in terms of the Fabrica index (P≤0.05). The findings of this investigation were consistent with those reported by Nahashon et al., 1994, even though no significant differences were identified in the Fabricia index between treatments T1, T2, T3, and T4 on the one hand, and between treatments T2, T3, T4, and T5 on the other. It came to the conclusion that giving laying hens grain that had been fermented with lactobacilli as a probiotic source increased the chicken's immunological response. due to the rise in the weights of the primary immune organs, such as the thymus and Fabricius glands, which serve as the locations where B and T lymphocytes mature, respectively. This results in an increase in the number of immune bodies in the blood serum and of B and T cells, respectively, which raise blood serum immune bodies and, consequently, the birds' immunological response to illness (Khasetidi and Ghoorchi, 2006). Adding probiotic-rich feed fermented with Bacillus Subtillus bacteria to the meals of day-old ducks increased their body immunity and, consequently, their resistance to Newcastle disease. In comparison to groups of birds fed ordinary feed, Al-Zamili (2015) demonstrated that groups of birds provided feed fermented with a 100% probiotic showed a substantial rise in both weight and Fabricius index. Since the Fabricius gland is the site of B and T cell maturation, its weight increase explains this improvement in the immune response. This is because the Fabricius gland's weight increases the level of antibodies in the blood serum content, which in turn increases the immune response. Additionally, there is a correlation between the Fabricius gland's weight and immune strength, as the gland's atrophy or decrease in weight results in a decrease in immunity in the blood serum, which in turn causes a decrease in antibodies and a decrease in the immune response.

Table (4) The effect of using different levels of fermented feed with Iraqi probiotic on the weight of the Fabricius gland of ducks (mean ± standard error).

Treatments	Relative weight of the Fabricius gland	Fabricia guide
T1	.0720b±.0005	1.000b±.000
T2	.072ab±.0003	1.015ab±.0063
T3	.0740ab±.0011	1.032ab±.0083
T4	.0773ab±.0039	1.082ab±.0534
T5	.076a±.0031	1.098a±.0161
incorporeal level	*	*

*Significant at 0.05.

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