# Effect of Lactobacillus fermentum and Lactobacillus plantarum bacteria on lipid profile in broiler fed leech contaminated with AFB1

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**Abstract**.

The study was conducted in the poultry field of the Department of Animal Production at the Faculty of Agriculture, University of Tikrit. The experiment used (240) Ross chicks, at the age of one week, where the chicks were randomly divided into (8) coefficients, each containing (3) duplicates. The chicks were distributed at an initial weight rate of (45 g per chick), where each repeater includes (10) chicks. The indications and characteristics studied included the effect of Lactobacillus fermentum and Lactobacillus plantarum bacteria on the lipid profile of leached chicken fed with a leech contaminated with AFB1. These include (cholesterol – triglycerides – HDL – LDL - VLDL), and the results showed that the addition of Lb. plantarum bacteria and Lb. fermentum bacteria and mixing them into feeds that are not contaminated with AFB1 poison caused a significant decrease in the level of cholesterol compared to feed contaminated with AFB1 poison. It also boosted lipid metabolism by improving intestinal function and increasing fatty acid absorption, and stimulated bacteria to produce enzymes such as lipase that help break down triglycerides and convert them into free fatty acids, which temporarily raised triglyceride levels in the blood and this positively affected lipid metabolism by modifying the intestinal microbiome. As for the effect of fodder contamination with AFB1 toxin, it led to a reduction in HDL levels compared to uncontaminated fodder. When adding the two types of bacteria to the uncontaminated bramble, the level of LDL was not significantly affected, but when adding them to the bramble contaminated with AFB1, the level of LDL decreased. VLDL levels were also generally lower in transactions fed contaminated feed (G) compared to transactions fed uncontaminated feed (N). This reflects the effect of AFB1 on the liver's ability to synthesize VLDL.

**Keywords Bacteria AFB1, Vital Enhancers, Triglycerides.**

## -1Introduction.

The toxic effects of AFB1 on health and the environment are considered one of the most dangerous results due to the widespread presence of its causes in soil and agricultural crops, as the poisoning of meat broiler with aflatoxinB1 leads to a significant decrease in the average body weight, weight gain and deterioration in the efficiency of food conversion (17). Bacteria are one of the most important additives used to remove these toxins, which are living organisms consisting of a single cell, and differ in their composition from plant, animal, protists and fungi cells. They can survive in harsh conditions that most organisms cannot withstand, and they have the potential to cause epidemics among all organisms. While there are other types of bacteria that are useful and indispensable, as they prevent the production of AFB1 and

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remove it quickly through protective effects during storage and production of feed or after consumption by sticking to toxins in the digestive system and throwing them out of the body (7). The use of Lb. plantarum bacteria as additives in fermented feeds helps in the absorption of mycotoxins by ion exchange through the cell wall and the binding of substances in the cell wall to mycotoxins through ionic and hydrogen bonds, thus being able to bind AFB1 in the gut and reduce its toxicity (5). The use of Lb.fermentum bacteria, which possess antioxidant properties, was able to treat oxidative stress resulting from poultry consumption of AFB1 (2). AFB1 also causes a decrease in the levels of glucose, triglycerides, HDL, VLDL, phosphorus, calcium, total protein, albumin, and clopulin, and a significant rise in cholesterol, LDL, and an imbalance in fat and protein metabolism. These fats are deposited in the liver and lead to cirrhosis, damage to its cells, fibrosis, and disease (24). This study aimed to evaluate the effect of supplementing Lb. fermentum and Lb. plantarum as Vital boosters. on lipid levels in broiler chickens fed diets contaminated with aflatoxin B1. The study included a set of physiological indicators (cholesterol, triglycerides, high-density lipoprotein (HDL), low-density lipoprotein (LDL), and very-low-density lipoprotein (VLDL)), and the liver's ability to synthesize some of these elements.

-2Materials and methods.

The experiment was conducted at the poultry farm of the Animal Production Department, College of Agriculture, Tikrit University, and lasted 35 days. Two hundred and forty unsexed, one-week-old Ross broiler chicks were used in the experiment. The chicks were randomly divided into eight treatments, each containing three replicates, and each treatment containing 10 chicks. Among the indicators and characteristics studied in the study, this research addresses some of them (cholesterol - triglycerides - VLDL - LDL - HDL), with the aim of determining the effect of Lactobacillus fermentum and Lactobacillus plantarum bacteria on the lipid levels in meat feed contaminated with AFB1.

1-2Source of bacteria.

Lactic acid bacteria (Lb. plantarum) were obtained from the Department of Food Science at the Faculty of Agricultural Engineering Sciences, University of Baghdad, where they were available in the form of dried bacteria preserved in capsules. Dried Lb. plantarum bacteria prepared in the form of capsules from the German company Merck were also used. Lactated yeast bacteria, Lb. fermentum, was obtained from the Department of Life Sciences at the College of Life Sciences, University of Baghdad, and was available in liquid form. The powder containing said bacteria was transferred to skimmed milk, then incubated at 37°C for 24 to 48 hours. These bacteria were then administered to the chicks with drinking water in a concentration of (1.5x10^8 CFU) starting from the second week.

2-2Production of AFB1 cm.

The AFB1 mycotoxin crown was performed as instructed by Vismer et al. (2004) and as follows (19.(

.1 Sporium suspension was obtained by harvesting blackboards from active dishes A.Flavus after incubating for (7) days, by adding 3 ml of distilled water to the dish and skimming it and then collecting the suspension from each dish.

.2 750)grams) of crushed rice was distributed to (10 decanters) for each decanter (75 grams) and the capacity of the decanter was (500) ml.

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.3 50)ml) of distilled water was added to each beaker and left for half an hour, after which the water was collected from the beakers.

.4 The rice-containing decanters in the Autoclave device were sterilized at a temperature of (121°) and a pressure of (15° A wind/inch2 ) for a period of (15) minutes, and (3 ml) of the spore suspension was added to each decanter and the decanters were incubated after being inoculated with the suspension in the incubator at a temperature of (28°) for 21 days and during the first three days the decanters were (5-3) times daily.

.5 After the end of the incubation period, which amounted to (21) days, the decanters were installed with the Autoclave device (to stop growth) at a temperature of (121) °C and a pressure of 15° C/inch2 for a period of (15) minutes, and then the contents of the decanters were dried in an electric oven at a temperature of (70° C) for a period of (12) hours, and after drying, the rice contaminated with poison was dried and grinded by an electric mill.

3-2Cholesterol concentration.

The concentration of cholesterol was measured using a special kit manufactured by the German company Human with serial number (21008). The measurement was carried out following the steps in the guide attached to the kit. The sample was read using a spectrophotometer and under a wavelength of (500) na Nometer according to the way Young (1995) came according to the equation, total cholesterol (mg/dL) = reading the sample ÷ reading the standard solution x reading the standard concentration (26.(

4-2Triglyceride concentration (mg/dL). Crews of standard solutions (Kits) manufactured by theGerman company Human with serial number (21001 ) were used to measure the concentration of triglycerides according to theattached instructions.

5-2Measuring the concentration of high-density lipoproteins HDL (mg / 100 ml serum.(

The high-density lipoproteins in the blood serum were measured according to the method of work shown on several Kits manufactured by the German company Human with serial number (21201 ). The measurements were taken with a spectrophotometer at a wavelength of 600 nm and according to the following equation:

High lipoproteins = sample absorbance ÷ standard solution absorbance x standard model concentration 100 ml/ mg.

6-2Measuring the concentration of low-density lipoproteins LDL (mg / 100 ml serum.(

The value of this compound was derived mathematically by means of a special equation based on the values of both cholesterol and the value of high-density lipoproteins, as follows:

Low-density lipoproteins LDL = cholesterol – (High-density lipoproteins HDL + very low-density lipoproteins VLDL) (1). The concentration of VLDL (mg / 100 ml serum) was measured by the following equation VLDL = triglycerides / 5.

- 3FINDINGS & DISCUSSION

1-3Cholesterol.

Through the results of the statistical analysis contained in Table (1), we note the impact of the coefficients on the level of cholesterol in meat chickens, as the results indicate a moral superiority of the control treatment T1 compared to the rest of the coefficients. As for the impact of poisoning, the contaminated fermentum (G) did not differ morally from the usual fermentum in the concentration of cholesterol. The overlap of uncontaminated natural feed with experimental treatments has

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a significant impact on the level of cholesterol, as it decreased in the overlap (N* T2), which includes the addition of Lb. fermentum bacteria (N* T3), which includes the addition of Lb. plantarum bacteria compared to the overlap (N* T1). In AFB1-contaminated fodder, the addition and mixing of Lb. plantarum bacteria and Lb. fermentum bacteria caused a significant decrease in the level of cholesterol compared to AFB1-contaminated fodder.

This may be due to the fact that natural uncontaminated feed (control) provides a balanced environment for the growth of birds without the intervention of external factors such as toxins or bacteria, allowing normal cholesterol metabolism. According to a study conducted by (28), uncontaminated feed promotes gut health and improves fat absorption, which may lead to the stabilization of cholesterol levels. While the poisoning of AFB1 in the contaminated bramble (G) did not show a significant difference in the concentration of cholesterol compared to the normal bramble, this may be due to the fact that AFB1 mainly affects the liver and its metabolic functions, but its direct effect on cholesterol levels in the blood may be limited, causes liver damage and affects lipid metabolism, but its effect on cholesterol may depend on the dose of the poison and the duration of exposure (13). If the level of cholesterol decreased significantly in the interference (N* T2), which included the addition of Lb. fermentum bacteria, and the interference(N* T3), which included the addition of Lb. plantarum, compared to the interference (N* T1), which included control, this decrease is due to the ability of these bacteria to improve intestinal health and modify lipid metabolism. A study showed (22). Lactobacillus bacteria reduce the absorption of cholesterol in the gut by converting it into non-absorbable compounds, resulting in lower blood cholesterol levels. The addition and mixing of Lb. plantarum and Lb. fermentum resulted in a significant decrease in cholesterol level compared to feed contaminated with AFB1 without the addition of bacteria and this may be due to the ability of these bacteria to neutralize the effect of AFB1 and improve liver and intestinal function. That Lactobacillus bacteria can bind to AFB1 in the gut and reduce its toxicity, which improves lipid metabolism and reduces cholesterol levels (10). Bacteria break down cholesterol in the gut by producing enzymes such as bile salt hydrolase, which converts bile salts into less absorbable compounds, which reduces reabsorption of cholesterol into the blood, bacteria Lb. fermentum and Lb. plantarum promote lipid metabolism and reduce LDL cholesterol levels while increasing HDL cholesterol (9). The results in our study suggest that adding Lactobacillus bacteria to feed, whether contaminated with AFB1 toxin or uncontaminated, can be an effective strategy to control cholesterol levels in meat broiler. The bacteria improve gut health and reduce cholesterol absorption, in addition to neutralizing the effect of AFB1 toxin.

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**Table (1) The effect of Lb.fermentum andLb. plantarum bacteria on the level of cholesterol in fed meat broiler on a leech contaminated with AFB1 toxin (averages ± standard error.(**

| Cholesterol (dL /mg) | | | | | |
|---|---|---|---|---|---|
| **Effect of Transactions** | **Cholesterol** | **Effect of feed Poisoning** | | **INTERFERENCE** | **Cholesterol** |
| **T1** | 147.13 ±3.24 a | Uncontaminated feed N | 126.90 ±3.51 a | T1 | 140 ±0.57 ab |
| | | | | T2 | 121.33 ±7.68 cd |
| **T2** | 115.66 ±4.82 b | | | T3 | 114.60 ±6.61 d |
| | | | | T4 | 131.66 ±1.66 bc |
| **T3** | 116.76 ±3.05 b | Contaminated feed G | 124.55 ±5.69 a | T1 | 154.26 ±1.15 a |
| | | | | T2 | 110 ±5.03 d |
| **T4** | 123.33 ±5.08 b | | | T3 | 118.93 ±4.56 cd |
| | | | | T4 | 115 ±7.54 d |
| SOV | P-value | R Square | CV | Over All Mean | Over All Stander Error |
| Effect of treatments | 0.05% | 0.81 | 6.67 | 125.72 | 8.39 |
| Effect of adding AFB1 | N.S | | | | |
| Effect of coefficient overlap and AFB1 | 0.05% | | | | |

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Similar letters indicate that there are no significant differences at a probability level ( p≤0.05), while different letters indicate that there are significant differences at a probability level ( p≤0.05. (

o T1= no-addition (natural or contaminated) control leech, T2 = control leech with CFU Lb. fermentum ( 1.5x108 cell /ml) T3 = control leech with CFU Lb. plantarum ( 1.5x108 cell /ml), T4 = control leech with( 1.5x108 cell /ml) CFU Lb. plantarum( 1.5x108 cell /ml) CFU + Lb. fermentum

o N= natural feed, G= AFB1-contaminated feed (3mg/kg feed.(

2-3Triglycerides.

From Table (2), it is clear that the transactions and the contamination of the fodder or not did not have a significant impact on the level of triglycerides, while the results of the interference effect, we note a significant increase in the level of triglycerides in the interference (N* T4), which includes feeding meat broiler on Lb. plantarum and Lb. fermentum bacteria, compared to the interference (G* T1), which includes adding feed contaminated with AFB1. The results in our study suggest that adding Lactobacillus bacteria to feed, whether contaminated with AFB1 toxin or not, can be an effective strategy to control cholesterol levels in meat broiler. The bacteria improve gut health and reduce cholesterol absorption, in addition to neutralizing the effect of AFB1 toxin. The addition of Lb. plantarum and Lb. fermentum bacteria may enhance lipid metabolism by improving intestinal function and increasing the absorption of fatty acids. Bacteria can stimulate the production of enzymes such as lipases that help break down triglycerides and convert them into free fatty acids, leading to temporarily high levels of triglycerides in the blood, which affects lipid metabolism by modifying the intestinal microbiome, leading to changes in triglyceride levels (27). It is known that AFB1 is a fungal toxin known for its negative effects on the liver, as it inhibits liver function and reduces its ability to

manufacture proteins and fats. This leads to a decrease in triglyceride levels in the blood due to inhibition of lipid synthesis in the liver. AFB1 exposure can lead to a decrease in triglyceride levels due to liver damage and inhibition of lipid metabolism enzymes (13). We note in the overlap (N* T4) that the broiler was fed Probiotic , there may be an improvement in intestinal health and an increase in lipid absorption, which leads to higher levels of triglycerides. In the overlap (G* T1) a contaminated AFB1 feed was added. There may be inhibition of lipid synthesis in the liver due to the toxic effects of this toxin, which leads to lower levels of triglycerides. Probiotic may play a role in reducing the toxic effects of AFB1 by neutralizing it or improving liver function (21). But in the absence of contamination, Probiotic increases triglyceride levels andimproves metabolism.

**Table (2) The effect of Lb.fermentum andLb. plantarum bacteria on the level of triglycerides in fed meat broiler on a leech contaminated with AFB1 toxin (averages ± standard error.(**

| **Triglycerides (dL /mg)** | | | | | |
|---|---|---|---|---|---|
| **Effect of Transactions** | **Triglycerides** | **Effect of feed Poisoning** | | **INTERFERENCE** | **Triglycerides** |
| **T1** | 65 ±5.93 a | Uncontaminated feed N | 72.16 ±3.65 a | T1 | 76.66 ±5.60 ab |
| | | | | T2 | 71 ±5.03 ab |
| **T2** | 70.16 ±4.00 a | | | T3 | 63.33 ±7.21 ab |
| | | | | T4 | 77.66 ±10.97 a |
| **T3** | 62.66 ±4.62 a | Contaminated feed G | 62.25 ±3.25 a | T1 | 53.33 ±2.66 b |
| | | | | T2 | 69.33 ±7.35 ab |
| **T4** | 71 ±6.44 a | | | T3 | 62 ±7.37 ab |
| | | | | T4 | 64.33 ±6.56 ab |
| SOV | P-value | R Square | CV | Over All Mean | Over All Stander Error |
| Effect of treatments | N.S | 0.37 | 17.98 | 67.20 | 12.08 |
| Effect of adding AFB1 | N.S | | | | |
| Effect of coefficient overlap and AFB1 | 0.05% | | | | |

o Similar letters indicate that there are no significant differences at a probability level ( p≤0.05), while different letters indicate that there are significant differences at a probability level ( p≤0.05. (

o T1= no-addition (natural or contaminated) control leech, T2 = control leech with CFU Lb. fermentum ( 1.5x108 cell /ml) T3 = control leech with CFU Lb. plantarum ( 1.5x108 cell /ml), T4 = control leech with( 1.5x108 cell /ml) CFU Lb. plantarum( 1.5x108 cell /ml) CFU + Lb. fermentum

o N= natural feed, G= AFB1-contaminated feed (3mg/kg feed.(

3-3HDL.

As for HDL values (High Density Lipoprotein), the results in Table (3) indicate a decrease in the level of HDL in the second, third and fourth treatment when adding and mixing Lb. fermentum andLb. plantarum bacteria compared to the control treatment. The effect of feed contamination with AFB1 (G) leads to a reduction in HDL levels when compared with uncontaminated feed (N), while the results of the interference (N*T) indicated a decrease in HDL levels in the interference (N* T2), (N* T3) and(N* T4) compared to the control, while the results of the interference between (G*T) indicated a decrease in the level of HDL in the interference (G* T3), which includes the addition of Lb. plantarum bacteria with the

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contaminated feed from the interference (G* T1) with no differences with the interference (G* T2) and(G* T4). Feed contamination with AFB1 (G) toxins also showed a decrease in HDL levels compared to uncontaminated (N) feed. Lower HDL in coefficients to which bacteria are added may be due to metabolic reactions Lb. fermentum and Lb. plantarum can affect lipid metabolism by altering the uptake of cholesterol or converting it to other compounds such as bile acids This may lead to lower HDL levels, especially if bacteria convert cholesterol to compounds other than HDL Probiotic affects blood lipid levels, but the effect depends on the strain of bacteria and experimental conditions (11). AFB1 toxin is a fungal toxin known for its negative effects on the liver and is the main organ responsible for the synthesis of lipoproteins such as HDL. Contamination of the feed with AFB1 toxin may lead to liver damage, which reduces its ability to synthesize HDL, thus decreasing its levels in the blood (20). In addition, it increases oxidative stress, which negatively affects lipid metabolism and reduces HDL (14). levels. In the case of overlap between contaminated feed (G) and bacteria (T), a greater decrease in HDL levels was observed, especially in the treatment G*T3 (which included the addition of Lb. plantarum). This may be due to the aggravation of the negative effect of AFB1 on the liver, which reduces its ability to manufacture HDL, as well as the metabolic effects of bacteria. The reason for the lack of significant differences in other interactions (G* T2) and (G* T4) may indicate that some strains of bacteria may be less effective on fat metabolism in the presence of aflatoxins, or that there are compensatory mechanisms that occur in the body.

**Table (3) The effect of Lb.fermentum andLb. plantarum bacteria on the level of HDL in fed meat broiler on a leech contaminated with AFB1 toxin (averages ± standard error.(**

| HDL (dL /mg) | | | | | |
|---|---|---|---|---|---|
| **Effect of Transactions** | **HDL** | **Effect of feed Poisoning** | | **INTERFERENCE** | **HDL** |
| **T1** | 56.83 ±2.79 a | Uncontaminated feed N | 51.58 ±2.09 a | T1 | 62 ±2.08 a |
| | | | | T2 | 46.66 ±2.18 bc |
| **T2** | 46.33 ±1.02 c | | | T3 | 46.33 ±0.88 bc |
| | | | | T4 | 51.33 ±2.60 bc |
| **T3** | 45.83 ±0.60 c | Contaminated feed G | 48.16 ±1.02 b | T1 | 51.66 ±2.84 b |
| | | | | T2 | 46 ±0.57 bc |
| **T4** | 50.50 ±1.25 b | | | T3 | 45.33 ±0.88 c |
| | | | | T4 | 49.66 ±0.66 bc |
| SOV | P-value | R Square | CV | Over All Mean | Over All Stander Error |
| Effect of treatments | 0.05% | 0.80 | 6.30 | 87 | 3.14 |
| Effect of adding AFB1 | 0.05% | | | | |
| Effect of coefficient overlap and AFB1 | 0.05% | | | | |

- Similar letters indicate that there are no significant differences at a probability level ( $p \leq 0.05$), while different letters indicate that there are significant differences at a probability level ( $p \leq 0.05$. (
- T1= no-addition (natural or contaminated) control leech, T2 = control leech with CFU Lb. fermentum ( 1.5x108 cell /ml) T3 = control leech with CFU Lb. plantarum ( 1.5x108 cell /ml), T4 = control leech with( 1.5x108 cell /ml) CFU Lb.

plantarum( 1.5x108 cell /ml) CFU + Lb. fermentum

o N= natural feed, G= AFB1-contaminated feed (3mg/kg feed. (

4-3LDL.

The results in Table (4) indicated that there was a significant decrease in the level of LDL in the coefficients T2, T3 and T4 compared to T1, and the contamination of the relations with AFB1 toxin did not have a significant impact on the levels of LDL. With regard to the overlap of the factors studied, we note that the addition of the two types of bacteria and their overlaps to the non-contaminated relations did not significantly affect the level of LDL. When adding them to the relations contaminated with AFB1, we note the low level of LDL compared to the overlapG* T1. While the effect of transactions at the VLDL level for lm birds shows significant differences in the effect of transactions. As for the effect of fodder poisoning, VLDL levels also showed similar results in both types of fodder. The results of the (G*N) overlap showed a decrease in the level of VLDL in the N*T3 overlap involving the addition of Lb. plantarum bacteria compared to the (N* T1) overlap. Regarding the overlaps with contaminated fodder, no significant differences were shown in the level of VLDL. The decrease in the level of (Low-Density Lipoprotein) when adding bacteria to the relations contaminated with AFB1 is attributed to several physiological mechanisms. It may be due to the effect of the beneficial bacteria Lactobacillus on lipid metabolism. It improves digestion and absorption of fats. Some Probiotic strains secrete enzymes such as lipase that promote lipolysis, improve the absorption of beneficial fatty acids, and regulate cholesterol synthesis. It can reduce cholesterol synthesis in the liver by reducing the expression of genes responsible for cholesterol synthesis such as (HMG-CoA reductase), which leads to low levels of LDL in the blood (25). Some bacteria have the ability to bind to free cholesterol molecules in the gut and block their absorption, causing them to be excreted from the body with release (12). Aflatoxins cause oxidative stress and hepatitis which may raise LDL cholesterol levels due to the effect on liver function in lipid regulation (18). The addition of bacteria can reduce hepatotoxicity and improve liver health to produce short-chain fatty acids (SCFAs) such as butyrate and propionate, which play a role in reducing cholesterol synthesis in the liver (15). Some Lactobacillus strains have the ability to bind AFB1 toxins in the intestines and prevent their absorption (7). It enhances the integrity of the intestinal barrier, which reduces the transfer of toxins to the liver, thus reducing the harmful effect of aflatoxins on lipid metabolism (28). They also secrete bile, which promotes the elimination of cholesterol by converting it into bile acids secreted with feces (3). In our study, adding bacteria to relations contaminated with AFB1 improved lipid metabolism, reduced hepatotoxicity, and stimulated the elimination of cholesterol, resulting in lower LDL levels compared to the group that was not given bacteria.

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**Table (4) The effect of Lb.fermentum andLb. plantarum bacteria on the level of LDL in fed meat broiler on a leech contaminated with AFB1 toxin (averages ± standard error.(**

| LDL (dL /mg) | | | | | |
|---|---|---|---|---|---|
| **Effect of Transactions** | **LDL** | **Effect of feed Poisoning** | | **INTERFERENCE** | **LDL** |
| **T1** | 75.76± 6.89 a | Uncontaminated feed N | 60.63± 2.17 a | T1 | 60.66± 1.98 bc |
| | | | | T2 | 61.13± 4.83 bc |
| **T2** | 50.63± 3.75 b | | | T3 | 55.60± 4.24 bc |
| | | | | T4 | 65.13± 5.99 b |
| **T3** | 58.40± 2.64 b | Contaminated feed G | 63.61± 5.17 a | T1 | 90.66± 2.94 a |
| | | | | T2 | 50.13± 4.10 c |
| **T4** | 58.80± 4.65 b | | | T3 | 61.20± 3.00 cd |
| | | | | T4 | 52.46± 5.69 bc |
| SOV | P-value | R Square | CV | Over All Mean | Over All Stander Error |
| Effect of treatments | 0.05% | 0.78 | 12 | 62.12 | 7.45 |
| Effect of adding AFB1 | N.S | | | | |
| Parameters overlap and AFB1 | 0.05% | | | | |

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Similar letters indicate that there are no significant differences at a probability level ( p≤0.05), while different letters indicate that there are significant differences at a probability level ( p≤0.05(

o T1= no-addition (natural or contaminated) control leech, T2 = control leech with CFU Lb. fermentum ( 1.5x108 cell /ml) T3 = control leech with CFU Lb. plantarum ( 1.5x108 cell /ml), T4 = control leech with( 1.5x108 cell /ml) CFU Lb. plantarum( 1.5x108 cell /ml) CFU + Lb. fermentum

o N= natural feed, G= AFB1-contaminated feed (3mg/kg feed.(

5-3VLDL.

In Table (5), the effect of transactions at the VLDL level for Lmbirds shows significant differences in the effect of transactions. As for the effect of fodder poisoning, VLDL levels also showed similar results in both types of fodder. The results of the (G*N) overlap showed a decrease in the level of VLDL in the N*T3 overlap involving the addition of Lb. plantarum bacteria compared to the (N* T1) overlap. Regarding the overlaps with contaminated fodder, no significant differences were shown in the level of VLDL. While the results showed that there is a significant effect ($p \leq 0.05$) of interference between coefficients (T1 , T2, T3, T4) and the effect of forage poisoning (AFB1) on VLDL levels, this suggests that the effect of coefficients varies depending on whether the feed is contaminated with AFB1 toxin or not. In the case of uncontaminated forage ( N), there were also significant differences between some coefficients ( N* T1) (N * T3), indicating that the addition of Lb. plantarum and Lb. fermentum bacteria may have an effect on lipid metabolism, as it affects VLDL levels. In the case of contaminated forage (G), there were also significant differences between coefficients (G* T1) and(G* T3), indicating that AFB1 toxin may change the effectiveness of bacteria in modifying VLDL levels. Fodder poisoning with AFB1 toxin can adversely affect liver function, as AFB1 is a known hepatic toxin and the liver is the main organ responsible for the manufacture and secretion

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of VLDL, so the liver damage caused by AFB1 can lead to changes in VLDL levels . Results showed that VLDL levels (4). were generally lower in groups fed contaminated feed (G) compared to groups fed uncontaminated feed (N). This may reflect the effect of AFB1 on the liver's ability to synthesize VLDL (46). Lb. plantarum and Lb. fermentum help improve liver health and reduce the toxic effects of AFB1 can enhance liver function and reduce oxidative stress, which may improve lipid metabolism and thus modify VLDL levels (23). In the case of contaminated feed (G), there were significant differences between the interventions that included the addition of bacteria (G* T3 and G* T4) compared to the group that did not receive any addition (G* T1). This suggests that the bacteria Lb. plantarumand Lb. fermentum may have a protective effect against the toxic effects of AFB1 at VLDL levels

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**Table (5) The effect of Lb.fermentum andLb. plantarum bacteria on the level of LDL in fed meat broiler on a leech contaminated with AFB1 toxin (averages ± standard error.(**

| VLDL (dL /mg) | | | | | |
|---|---|---|---|---|---|
| **Effect of Transactions** | **VLDL :** | **Effect of feed Poisoning** | | **INTERFERENCE** | **VLDL :** |
| **T1** | 14.63± 1.26 a | Uncontaminated feed N | 14.68± 0.83 a | T1 | 17.33± 0.76 a |
| | | | | T2 | 13.53± 1.67 ab |
| **T2** | 13.70± 0.99 a | | | T3 | 12.66± 1.44 b |
| | | | | T4 | 15.20± 1.90 ab |
| **T3** | 12.53± 0.92 a | Contaminated feed G | 12.76± 0.57 a | T1 | 11.93± 0.35 b |
| | | | | T2 | 13.86± 1.47 ab |
| **T4** | 14.03± 1.15 a | | | T3 | 12.40± 1.47 b |
| | | | | T4 | 12.86± 1.31 ab |
| SOV | P-value | R Square | CV | Over All Mean | Over All Stander Error |
| Effect of treatments | N.S | 0.41 | 17.44 | 13.72 | 2.39 |
| Effect of adding AFB1 | N.S | | | | |
| Parameters overlap and AFB1 | 0.05% | | | | |

o Similar letters indicate that there are no significant differences at a probability level ( $p \leq 0.05$), while different letters indicate that there are significant differences at a probability level ( $p \leq 0.05$(

o T1= no-addition (natural or contaminated) control leech, T2 = control leech with CFU Lb. fermentum ( 1.5x108 cell /ml) T3 = control leech with CFU Lb. plantarum ( 1.5x108 cell /ml), T4 = control leech with( 1.5x108 cell /ml) CFU Lb. plantarum( 1.5x108 cell /ml) CFU + Lb. fermentum

o N= natural feed, G= AFB1-contaminated feed (3mg/kg feed. (

-4Conclusion.

The effect of Lactobacillus fermentum and Lactobacillus plantarum onAFB1 was studied, and included analyzes (cholesterol, triglycerides, VLDL, LDL, HDL). The results showed a significant decrease in cholesterol due to the improvement of gut health and modification of lipid metabolism by bacteria, and an increase in triglycerides as a result of the breakdown of cholesterol through the enzyme bile salt hydrolase. AFB1 feed contamination also reduced HDL, while LDL

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was unaffected when bacteria were added to uncontaminated feed but decreased when contaminated feed was added. VLDL levels were lower in groups fed contaminated feed, reflecting the effect of AFB1 on liver function

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