

THE EFFECT OF ADDING A PLANT ADDITIVE (PFA) PHYTOGENIC IN SOME IMMUNE TRAITS OF BROILERS.

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Abstract: This experiment was conducted in the fields of the Department of Animal Production - College of Agriculture - University of Basra from the period 11/19/2020 to 12/23/2020 to know the effect of adding the plant additive PFA consisting of (nigella - anise - thyme) to feed and water over time periods. Different on some immune traits of broilers type ROSS,308. The experiment was carried out using a completely randomized design and a factorial experiment on 252 unsexed chicks distributed into (7) treatments for each treatment (3) replicates for each replicate (12) chicks area of each replicate (1 x 1.5 m² / replicate). The plant additive PFA was added to (6) treatments with different time periods in the feed And water, except for the control treatment, was not added to it. The results showed that all treatments of addition to feed or water were superior to the control treatment in the immunological characteristics studied in the experiment, which is the level of balance of the intestinal flora in the jejunum region of the intestine (total bacteria, lactic acid bacteria, E.Coli) as well as the measurement of the volumetric standard of antibodies against Newcastle disease and Kimboro disease, and measuring some parameters of oxidation in the blood serum of broilers at the age of 35 days, which is a measurement (SOD, G-PX, MDA).

Keywords: Vegetable additive, PFA , immune traits, broiler.

1. Introduction

Concerns about antibiotic resistance in their use in animal food have increased research into alternatives to these antibiotics, and the ban by the European Union and the United States on the use of antibiotics as catalysts for growth has stimulated researchers in the use of plant additives (PFAs), plant-derived compounds called plant feed additives¹, classified as sensory and debilitating compounds by European Union legislation, namely herbs or spices as security alternatives to antibiotics¹. These plant-based food additives are found in poultry feed in a single compound or cocktails (mixtures) of more than one compound and are enhanced for growth, immune regulation, pathogenic antimicrobial, digestive catalyst, booster and antioxidant catalyst in the bird's body². Plant protein is a key factor contributing to the increased cost of feed, so researchers in the animal diet in general and poultry in particular have sought to find alternatives in the diet that reduce the cost of feed and nitrogen secretion^{3, 4} as the shortage of fodder resources, the high cost of imported feed ingredients, the scarcity of their availability and the irregular import of them are among the most important problems facing the poultry industry⁵. It was therefore necessary to consider local alternatives and improve existing ones by raising their

nutritional value and making them more beneficial when consumed by the animal ⁶. Nutrition makes up the bulk of the cost ⁷. Studies have indicated that plant additive (PFA) has a role in promoting protein in animal and poultry food alike through nitrogen secretion ⁴, Promote growth, break down anti-nutritional agents, absorb toxins and improve nutrient deficiencies, activate tissue or activate tissue to reduce energy in dissipation processes containing methane production in the crush. Since the discovery of plant compounds that can be added to animal and poultry relationships to reduce the quantities of bacterial colonies, reduce intestinal fermentation, and increase intestinal mucus ⁸. These plant additives also showed special and significant effects (against microbes, antioxidants and gut house organization) ⁹. According to the European Commission (2003), plant additives (PFA) are sensory additives for feed and debilitating Aromatic oils, oleorescines, flavonoids and their active values ¹⁰. Furthermore, the plant additive (PFA) improves digestion of simple stomach animals through high intestinal fluff and enhanced digestion and absorption in the small intestine of the meat broiler ¹¹. In this research we addressed the addition of PFA vegetable additive containing pond oil, anise, thyme) as an addition in the drinking water of the meat broiler and the same dry vegetable additive (powder) in feed and for different and specific periods of bird life to see its effect in the immune qualities of the meat broiler.

2. Materials and methods

This experiment was carried out in the fields of the Department of Livestock Production of the Faculty of Agriculture/University of Basra for a period from 19/11/2020 to 23/12/2020 252 unsexual chickens were bred at the age of one day with an average weight of 40 g per chicken meat breed Ross 308. The hatcheries were randomly distributed to seven transactions and three reality repeats per transaction and each 12 bis according to the complete random design Complete Random Design. The hatchery was installed in three-storey metal batteries with dimensions of 1x 1.5 m and was up from the floor 70cm and fed on the standard relationship from the first day until the marketing life of 35 day During the breeding period, the experiment hall was equipped with gas incubators and electric fireplaces distributed regularly inside the hall for the purpose of providing temperature limits (34-35 m) during the first week and then gradually reduced by 20 m a week to 220 m by the fifth weeks. The ventilation was approved using the propellers of his drag, installed at the top of the walls of the experiment hall. The 24-hour continuous lighting system was used. The insulator used 12 kg per feed. The amount of feed provided at the beginning of the week was calculated and the remainder was calculated at the end of the week. Provide water with ground nuts and according to the timeline used in the experiment for the transactions in which the PFA was added in the water and then turn the birds into the automatic drinking method, the mineral nipple. The additive PFA, a mixture of oils (pond bean, anise and thyme) was given as follows: T1 First transaction without any additives ,T2 Second transaction add 150 mg/kg PFA to feed of lifespan (1-3) week ,T3 Third transaction add 150 mg/kg PFA to the feed of the lifespan (3-5) week ,T4 Fourth transaction Add 150 mg/kg PFA to feed from lifetime (1-5) week ,T5 Fifth transaction 3ml/L and liquid PFA added to water of 1-3 week lifespan ,T6

Sixth transaction 3ml/L and liquid PFA added to water from the lifespan (3-5) week , T7 Seventh transaction 3ml/L and liquid PFA added to water of 1-5 week lifespan. The spawns were first fed in the first three weeks where they contained 23.10% raw protein and 3010kg of their representative's energy and fed a growth leak later in the life of (4-5) weeks. They were given health and preventive measures to the chicks and were also given the mixture of vitamins and minerals after each inoculation at a rate of 0.5/2 litres of drinking water and were PFA using full random design (CRD) Complete Randomized Design Imported PFA vegetable additive containing both essential and aromatic oils was used for both (pond bean, anise, thyme) and quality mark-winning ISO 14046 which can be solved in water or milk for liquid PFA either dry was powder form.

Table 1. Proportions of fodder materials involved in the formation of starter and growth synthesis for meat broiler and calculated chemical analysis.

| Feed ingredients | Elegance Paddy 1-21 Days | Growth Suspension 22-35 Days |
|-------------------------------------------|-----------------------------|---------------------------------|
| Corn | 42.75 | 41.75 |
| Wheat | 15.00 | 22.00 |
| soybean meal 44% | 34.50 | 27.00 |
| protein concentrate | 5.00 | 5.00 |
| Vegetable oil | 0.80 | 2.30 |
| Premix (mixture of vitamins and minerals) | 0.20 | 0.20 |
| Limestone | 1.50 | 1.50 |
| table salt | 0.25 | 0.25 |
| Total | 100 | 100 |
| Power represented kg /kcal | 3010 | 3174 |
| Raw Protein% | 23.10 | 20.14 |
| Energy: Protein | 130.30 | 157.6 |
| Calcium% | 0.925 | 0.988 |
| Available phosphorus% | 0.42 | 0.51 |
| ICIN% | 1.35 | 1.17 |
| Methionine% | 0.52 | 0.49 |
| Methionine% + cysteine% | 0.886 | 0.826 |
| Tryptophan | 0.295 | 0.261 |

¹ By Chemical Analysis of Fodder Based on Dietary Analysis Tables (Yasin and Abdul Abbas 2010),.

3. Results and discussion:

3.1. Some immune qualities:

Intestinal fluorescence balance between Table No. (2) Vegetarian additive effect phytogetic Dry and liquid PFA in average total bacteria preparation in the fasting zone (average + standard deviation) where he found moral differences ($p \leq 0.05$) between experimental transactions as all additionality transactions exceeded (Add fodder and add water) in reducing total bacteria numbers by 7.32, 7.22, 7.67, 7.70, 7.21, 7.67, Cut\g and Lo respectively T2, T3, T4, T5, T6, T7 compared to T1 control treatment which 8.87 also showed a moral difference ($P \leq 0.05$) In the average percentage of acetic acid bacteria in the fasting area, all PFA additives outperformed the control transaction. The T2 feed additionality transaction recorded the highest measurements of 63.61 T3 T4, T5, T6, T7 where it was 54.07, 52.86, 52.23, 54.22, 52.08 by order compared to the T1 control transaction which was 43.03 as shown in the table there are moral differences ($P \leq 0.05$) In the average percentage of E.Coli pathological colitia bacteria in the fasting zone, all additionality factors exceeded the reduction in colon bacteria numbers of 32.24, 35.25, 23.03, 34.56, 35.22, 23.03, for each of T2, T3, T4, T5, T6. The microbial composition of the digestive tract is not always stable and varies between the types and parts of the digestive tract, changes in intestinal structure are very large in poultry aged 2-3 weeks and stable at 5-6 weeks¹². the increase in the number of bacteria actic acid E.Coli has an important role in improving bird health through detoxification and increasing nutrient uptake as well as a resource that makes this kind of beneficial bacteria (Actic acid bacteria) by producing actic acid, short-smooth fatty acids and other organic acids as well as producing antimicrobials (Bacteriosin) which is considered anti-growth of pathogenic bacteria in the gut¹³. The reason for all the above is the low level of total bacteria, the increase in the percentage of beneficial bacteria and the decrease in the proportion of pathogenic bacteria is the basic and effective work of PFA plant additives. They modify the level of microbial intestinal microbiote by controlling pathogens with active substances found in essential oils (Eos) consisting of the plant additive PFA where these medicinal plants contain bioactive substances available in the plant. These substances work synergistically and include Carva Kroll, Eugenone, Thymol, Sisen, Sinol and other substances known as antibacterial, antifungal, antiviral, anticoxidia^{7, 14, 15}. The antimicrobial work in PFA may be caused by the hydrophobia of these phenolic compounds or the reason why these active substances in PFA can enter the bacterial cell membrane leading to cell dinner breakdown, ion leakage and ultimately cell death while Lemonine through research showed an antibacterial effect¹⁶. Medical data and their aromatic oils possess antimicrobial properties because they contain many active substances such as (Thymol, Igonol) where these compounds can penetrate the bacterial cell membrane positively gram and antioxidant effect because they contain many effective compounds against oxidation. (Carvacrol, tocopherol) where these substances are found to reduce fat oxidation in the forage mix and oxidize unsaturated fatty acids in the meat. Moreover, they stimulate digestion and the production of digestive enzymes because they contain many effective compounds such as aniothol and econol¹⁵. The reason for the sensitivity of the positive bacteria gram more than the negative gram is mainly because the negative bacteria gram mixes its external dish surrounding the cell wall and acts as a barrier to influence that limits the arrival of hydro phobic compounds. Since most essential compounds of aromatic plant extracts are considered to be

water-averse, the negative bacteria gram shows resistance. Since aromatic plants consist of a large number of chemical compounds such as pathogenic micro-bioenergies, it is likely that the ability of these chemical compounds cannot be tempted to a single mechanism of action but there are different working mechanisms for these phenolic compounds. The black grain has a great natural effect for a bacteria of races (bacillus, staphylococcus, vibro) and for several kinds of fungi (microsprum canis, mentagrophyes Trichophyton). primarily responsible for giving medical plant extracts this important characteristic as antibiotics., By containing the substances Nagillon and Alicin, which play a significant role against microbes. Anise also plays an important role in strengthening the immune system because it has an antibacterial effect ¹⁷. Thyme plant is also of great importance because it contains many effective substances, the most important of which (Thamol, Carvacrol) improves the liver function by stimulating the production of digestive enzymes, thereby increasing the digestion of protein, fat and antibacterial antibacterial, especially intestinal endemic ¹.

Table 2. shows the effect of dry and liquid PFA on the average balance of the infectious flora in (the broiler's fasting area at the age of 35 days) (mean ± standard error)

| Treatments | Total Bacteria Preparation Log Cut /g | Prepare lactic acid bacteria% | Prepare colon bacteria% |
|--------------------|---------------------------------------|-------------------------------|-------------------------|
| T1 | 8.87 a ± 0.01 | 43.03 f ± 0.01 | 51.88a ± 0.02 |
| T2 | 7.32 c ± 0.01 | 63.61 a ± 0.00 | 32.24 ± 0.01 d |
| T3 | 7.22 d ± 0.01 | 54.07 c ± 0.04 | 35.25 ± 0.02 b |
| T4 | 7.67 b ± 0.02 | 52.86 d ± 0.03 | 23.03 ± 0.01 f |
| T5 | 7.70 b ± 0.01 | 52.23 E ± 0.01 | 34.56 ± 0.02 c |
| T6 | 7.21 d ± 0.02 | 54.22 b ± 0.01 | 35.22 ± 0.01 b |
| T7 | 7.67 b ± 0.02 | 52.86 d ± 0.00 | 23.03 ± 0.01 E |
| Significant | * | * | * |

* Indicates that there is a significant difference between the treatments at the level (P < 0.05).
 Basic ration without addition (control) T1

- T2: Add 150 mg/kg PFA to the feed from (1-3) weeks
- T3 Add 150 mg/kg PFA to the feed from (3-5) weeks
- T4 added 150 mg/kg PFA to the feed from (1-5) weeks
- T5 Add 3 ml / liter of liquid PFA to water for (1-3) weeks
- T6 Add 3 ml / liter of liquid PFA to water from (3-5) weeks
- T7 Add 3 ml / liter of liquid PFA to the water for (1-5) week

The volumetric criterion of antibodies against Newcastle disease and Camporo disease in Table No. (3) The effect of adding the plant additive (PFA) to the ration and liquid to drinking water in the volumetric criterion of antibodies against Newcastle disease and Camporo disease (mean \pm standard deviation) in the blood serum of broilers at age 35 days The results showed that there were significant differences ($P \leq 0.05$) between the experimental treatments, as the results showed a significant increase ($P \leq 0.05$) in the volumetric standard of antibodies against Newcastle disease for treatments T2, T3, T4, T5, T6, T7, which were 5380.00, 5449, 6148, 5638.7, 5799.3, 6150.3, respectively, while the control treatment T1 recorded the lowest level in the antibody volumetric criterion scale, and it was 3452.8. As for the volumetric criterion of antibodies against Camporo disease, the results also showed a significant increase ($P \leq 0.05$) for the experimental treatments T2, T3, T4, T5, T6, and T7, as they were 4518.0, 4621.5, 4641.5, 4573.6, 4522.5, 4544.7, respectively, while it was recorded T1 . control treatment The lowest level of the volumetric standard of antibodies against kombokoro disease was 2263.9. This good immune response is due to the role of the good Azeri mixture of the plant additive PFA consisting of (Nigella, anise, thyme) in eliminating coliform bacteria and other pathological organisms, thus increasing beneficial microorganisms in the intestine due to the presence of active compounds in these plants that can penetrate the wall of In addition to increasing the number of sputum cells through their stimulation by T-lymphocytes secreting cytokines (cytokins), which in turn eliminate pathogens, this indicates an improvement in the immune performance of birds ¹⁸. The increase in the number of lactic acid bacteria stimulates the immune system in the lymphoid tissue lining the intestinal tract ¹⁹, which is coupled with poultry immunity to its importance in reducing the damage caused by pathogens by increasing the local immune response to the mucosal cells and thus increasing the number of T lymphocytes and strengthening the endothelium. Epithelialization of the alimentary canal in birds and mammals ⁸. It could also be the reason for the increase in the number of antibodies against Newcastle and Kimboro disease due to the incorporation of plant extracts, which is attributed to the presence of polyphenols in plant extracts, which have the ability to scavenge free radicals and maintain the integrity of the immune structure of immune cells ²⁰.

Table 3. shows the effect of adding dry and liquid PFA to the feed and water on the volume titer of antibodies against Lenokastel disease and Kimboro disease of broilers at the age of 35 days (mean \pm standard error).

| Treatment | Yenocasil Disease | Camboro Disease |
|--------------------|----------------------|---------------------|
| T1 | 3452.8 \pm 0.46 E | 2263.9 \pm 0.17 E |
| T2 | 5380. \pm 0.23 d | 4518.7 \pm 0.11 d |
| T3 | 5449.3 \pm 0.17 c | 4621.5 \pm 0.17 |
| T4 | 6148.6 \pm 0.34 | 4641.5 \pm 0.05 |
| T5 | 56387.7 \pm 0.40 b | 4573.6 \pm 0.01 a |
| T6 | 5799.3 \pm 0.17 a | 4522.5 \pm 0.01 c |
| T7 | 6150.3 \pm 0.17 | 4544.7 \pm 0.17 d |
| Significant | * | * |

*Different letters indicate a significant difference at the level ($p \leq 0.05$).

T1 No addition (control treatment)

T2: Add 150 mg/kg PFA to the feed from (1-3) weeks

T3: Add 150 mg/kg PFA to the feed from (3-5) weeks

T4: Add 150 mg/kg PFA to the feed for (1-5) weeks

T5 Add 3 ml / liter of liquid PFA to the feed from (1-3) weeks

T6 Add 3 ml / liter of liquid PFA to the feed from (3-5) weeks

T7 Add 3 ml / liter of liquid PFA to the feed from (1-5) week

3.2. Some parameters of oxidation in the blood

Table (4) shows the effect of adding the plant additive PFA consisting of (Nigella, anise, thyme) to the feed and water on the level of concentration of some oxidation parameters in the blood serum of broilers at the age of 35 days, which led to a significant increase ($P \leq 0.05$) in the mean The concentration of SOD enzyme in the serum of broilers for all addition treatments, as the enzyme concentration reached 3.33, 3.43, 3.47, 3.42, 3.11, 3.50 for each of the treatments T2, T3, T4, T5, T6, and T7, in order, compared to the control treatment T1, in which the concentration decreased. to 2.25. The table also showed the superiority of the addition treatments T2, T3, T4,

T5, T6, T7 in improving the level of G-PX enzyme, which amounted to 3.01, 3.35, 3.35, 3.18, 3.01, 3.32 compared with the control treatment T1, which recorded the lowest level of enzyme concentration, as it was 2.47. The table also showed a significant decrease ($P \leq 0.05$) in the concentration of MDA compound in the serum of birds at the age of 35 days. The addition coefficients T2, T3, T4, T5, T6, and T7 were significantly decreased ($P \leq 0.05$), which amounted to 0.22, 0.25, 0.22, 0.21, 0.22, respectively, compared to the control treatment T1, which was 0.67. Malondi al dehyde (MDA) is an indicator of lipid peroxidation in the body that is often associated with oxidative stress³. Where (MDA) its high concentration indicates the occurrence of an oxidative process in the cell membrane¹². Because of the imbalance between the formation of reactive oxygen species (ROS) and antioxidants, where free radicals are higher than the level of antioxidants¹⁵. The reason for the improvement of liver enzymes SOD, G-PX and other ntioxidant enzymes and the decrease of MDA in the serum of birds is the role of the natural active substances found in the plant additive PFA, as it contains natural tioxidants that inhibit free radicals and thus reduce the effect of Oxidative stress, or these active substances in the plant additive stimulate the synthesis of antioxidant enzymes or prevent their denaturation or inhibition by free radicals, as the mixture of aromatic plants (nigella, anise, thyme) contains a high level of flavoids, vitamins and trace minerals⁸. The presence of active substances in thyme oil, such as (thymol, carvacrol), improves liver function and stimulates the production of antioxidant enzymes¹⁶. Where he confirmed that plants of the oral family contain antioxidant compounds, the active compounds in the black bean plant, anise and thyme contain natural effective antioxidant compounds, they act as a primary antioxidant by catching free radicals and as a secondary antioxidant to quench and reduce the effect of mono-oxygen.

Table 4. shows the effect of adding PFA to feed and water on the level of some oxidation parameters in the blood serum of broilers at 35 days of age (mean \pm standard error)

| Treatments | SOD Um/ mL | G-PX U / L | MDA Um / L |
|------------|----------------------|--------------------|----------------------|
| T1 | 2.25 d 0.02 \pm | 2.47 0.01 \pm | 0.67 a 0.04 \pm |
| T2 | 3.33 b 0.17 \pm | 3.01 0.00 \pm | 0.25 b 0.02 \pm |
| T3 | 3.43 a 0.17 \pm | 3.35 0.02 \pm | 0.22 b 0.01 \pm |
| T4 | 3.47 a 0.17 \pm | 3.35 0.22 \pm | 0.25 b 0.02 \pm |
| T5 | 3.42 b 0.01 \pm | 3.18 0.02 \pm | 0.22 b 0.01 \pm |

| | | | |
|--------------------|---------------------|----------------|---------------------|
| T6 | 3.11 0.06 ± c | 3.01 0.06 ± | 0.21 0.00 ± b |
| T7 | 3.50 0.02 ± a | 3.23 0.19 ± | 0.22 0.01 ± b |
| Significant | * | * | * |

* Indicates that there is a significant difference between the treatments at the level ($p < 0.05$).

T1 basic diet without supplement (control)

T2 Add 150 mg/kg PFA to the feed from (1-3) weeks

T3 Add 150 mg/kg PFA to the feed from (3-5) weeks

T4 Add 150 mg/kg PFA to the feed for (1-5) week

T5 Add 3 ml / liter of liquid PFA to the water for (1-3) weeks

T6 Add 3 ml / liter of liquid PFA to the water from (3-5) weeks

T7 Add 3 ml / liter of liquid PFA to the water for (1-5) week

4. Conclusions and recommendations

4.1. Conclusions:

1. We can say that through the results that were exposed in this research that medicinal plants (black seed, anise, thyme) and their essential oils can positively affect the productive performance of broilers in multiple ways, as they have properties against pathogenic microorganisms that negatively affect the formance of broilers. Meat broiler. Medicinal plants can also be used as an alternative to antibiotics.
2. The plant additives contain essential oils, which contain natural antioxidants that protect birds from the risk of oxidative stress and thus improve the immunity and health of birds and make the latter resistant to deadly diseases such as Newcastle and Kimboro through the production of antibodies to resist these diseases.

4.2. Recommendations:

We recommend the use of medicinal plants and their essential oils as alternatives to antibiotics in poultry feed additives. The use of medicinal plants should be of more than one type because their action is synergistic, which is the most beneficial.- Conducting other research on laying hens so that the period of use of these plants is longer to know their benefits in a broader picture.- Adoption of the mixture of essential oils in the medical and pharmaceutical fields for humans and animals.

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