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Effects of fat source on broiler cecum total bacteria, *lactobacillus* bacteria, and lactic acid bacteria

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ABSTRACT

In order to study the effect of dietary fat source in the feed of broiler chickens, an experiment had been taken place with completely randomized design with five treatments and each is including four replications on two hundred Ross 308 broiler chicks. Experimental treatments were the first treatment with 4% animal fat of tallow, the second treatment with 4% fat plant of canola oil, the third treatment with 4% plant fat of sunflower oil, the fourth treatment with 2% animal fat of tallow + 2% plant fat of canola oil and the fifth treatment with 2% animal fat of tallow and 2% plant fat of sunflower oil. The results showed that adding plant and animal fat had no statistically significant effect on microbial bacteria of total bacteria, and microbial population of Lactic acid bacteria (P>0.05), but addition of fat sources on microbial populations of Lactobacillus bacteria was statistically significant effect (P<0.05).

Keywords: fat, microflora, cecum, broiler

INTRODUCTION

Poultry industry has a history about 170 years old. But the major development of this industry has been in recent years. Due to factors such as taste of people in recent years, chicken meat in the food basket of the entire population has increased.

Intestinal Micro-flora is an important component in the Digestion tract of all animals. Micro-floras are live organism and have food and space requirements. Therefore the ability to digest and absorb of digestive tract is depend to extended spices and total microbial population. Expanding the range and extent of microbial flows that can be found and total population, determines the extent of this current. Microbial population itself is dependent on dietary which are as a final source of organic substrate metabolism. So, dose of compound in combination with dietary concentrations of nutrients can have harmful effects on the intestinal microbial population. This will have a direct effect on digestion and absorption of food by animals [1].

Aim of this experiment was investigate on effects of fat source on broiler cecum total bacteria, lactobacillus bacteria, and lactic acid bacteria

MATERIALS AND METHODS

Preparation of brooder houses before starting the rearing period

For preparation hall to implement this plan, various measures taken place. At first the cleaning and washing was carried out in the hall, and all drinkers and feeders. Then, using disinfectant solution Dspadak (ratio 1: 100) all halls were disinfected, so that the walls, ceiling and also walls of pan shelves sprayed with above disinfectant solution. All drinkers and feeders also were immersed in the mentioned disinfectant solution. After this stage, floor, and feeders and drinkers were washed with water. In the next step, within one to two days when hall was completely dry, walls and doors of the hall was flamed into a half meter of total floor and metal walls of the pan. Then walls were sprayed with water and lime, into 1.5 m high. After a day that lime was dry, all joints, windows and ventilation was covered and gasified with Formaalex solution. Gasification was in this way that a tin plate was used for this operation which one was placed in the end and the other was placed at the beginning of the hall and gasification started from the end container and was end into the initial container. In forty-eight hours doors and windows remained closed. All equipment used during the rearing period including buckets, sandals, cardboard rolls, temperature gauges, and all drinkers and feeders was placed before the gasification. Twenty-four hours before the start of the rearing period, in order to remove poison gas in the hall, all windows of the hall was open and all the fans were turned until hall have to be well ventilated.

At final day, out of each replication, one bird slaughtered and after separation of the blind intestine and placing it in a sterile plate was transferred to Laboratory of Microbiology of Faculty of Agriculture, and microbial culture steps were taken place on the same day until intestinal mi sterile plate was sent to the laboratory. For the growth of bacteria and colony count, then the medium was prepared.

Studied treatments

In the first treatment 4% animal fat of tallow was used. In the second treatment, 4% plant fat of canola oil was used. In the third treatment, 4% plant fat of sunflower oil was used. In the fourth treatment, animal fat of tallow 2% + plant fat of canola oil 2% was used. In the fifth treatment, animal fat of tallow 2% + plant fat of sunflower oil 2% was used.

Method of preparation medium

Preparation of nutrient agar medium (solid medium)

Some of the powder medium (20 per liter) was poured into the Erlenmeyer flask. And the required amount of water was added to the flasks. Erlenmeyer flask was shaken until the powder is dissolved in water. In order to make smooth and transparent was boiled in water bath or was placed on the hot plate. In the next step, was placed inside the autoclave for Fifteen to twenty minutes in the temperature of 120ºc to be sterilized. It out of the autoclave to be completely dry. After cooling medium along the flame was transferred to the target plate.

Preparation of M.R.S. agar medium (solid medium)

Some of the powder medium (68.2 per liter) was poured into the Erlenmeyer flask. And the required amount of water was added to the flasks. Erlenmeyer flask was shaken until the powder is dissolved in water. In order to make smooth and transparent was boiled in water bath or was placed on the hot plate. In the next step, was placed inside the autoclave for Fifteen to twenty minutes in the temperature of 120ºc to be sterilized. It out of the autoclave to be completely dry. After cooling medium along the flame was transferred to the target plate.

Preparation of Rogasa agar medium (solid medium)

Some of the powder medium (76.5 per liter) was poured into the Erlenmeyer flask. And the required amount of water was added to the flasks. Erlenmeyer flask was shaken until the powder is dissolved in water. In order to make smooth and transparent was boiled in water bath or was placed on the hot plate. In the next step, was placed inside the autoclave for Fifteen to twenty minutes in the temperature of 121ºc to be sterilized. It out of the autoclave to be completely dry. After cooling medium along the flame was transferred to the target plate.

Data analysis Methods

This experiment was performed in a completely randomized design. Data was initially entered into Excel. Normality test was performed and if necessary the appropriate transformation has been used. Then data were analyzed with SPSS software. And averages were compared by Tukey test. The statistical model was as follows:

$$X_{ij}=M + T_j+ e_{ij}$$

In this formula, Xij represents the value observed in each experiment; M is the average of the whole population through the samples was evaluated by assuming null hypothesis, Tj represents the effects of each group or test diet and eij represents the error effects. Therefore, number value of any observed from the total of treatment effects, error and population total mean was obtained.

RESULTS

Obtained results are summarized in Table 3.

Effect of fat source on total bacteria

Comparison of fat source effects showed that diet fat type had not significant effect on the total bacteria of the broiler chickens (P>0.05). The comparison of data obtained showed that 5th treatment had the most effect on the total bacteria of broiler chickens, although this difference was not statistically significant (P>0.05) followed by 3rd treatment, 1st treatment, 4th treatment and 5th treatment had the lowest effect on total bacteria.

Effect of fat source on *Lactobacillus* bacteria

Comparison of fat source effects showed that diet fat type had significant effect on the lactobacillus bacteria of the broiler chickens (P<0.05). The comparison of data obtained showed that 4th treatment statistically had the most effect on the lactobacillus bacteria of broiler chickens, and this difference was statistically significant (P<0.05) followed by 5th treatment, 3rd treatment, 2nd treatment and 1st treatment had the lowest effect on lactobacillus bacteria.

Effect of fat source on Lactic acid bacteria

Comparison of fat source effects showed that diet fat type had not significant effect on the lactic acid bacteria of the broiler chickens (P>0.05). The comparison of data obtained showed that 1st treatment had the most effect on the lactic acid bacteria of broiler chickens, although this difference was not statistically significant (P>0.05) followed by 2nd treatment, 5th treatment, 4th treatment and 3rd treatment had the lowest effect on Lactic acid bacteria.

DISCUSSION

In the study of intestinal bacteria population was observed that adding fat sources had no statistically significant effect on microbial population of total bacteria, and microbial populations of lactic acid bacteria (P>0.05), but addition of fat sources on the microbial population of microbial population of *lactobacillus* had statistically significant effect (P<0.05).

Other authors [2] found that the effect of oil on broiler chickens diet increase total bacteria (P>0.05). The present study results were similar of this experiment (P>0.05). An author [3] have reported more significant effect of canola oil than tallow oil saturation in the diets of broiler chickens on increasing of *Escherichia coli*, coliforms bacteria and lactic acid bacteria, (P<0.05), The results of this experiment was rejected with the results of the present experiment (P>0.05).

Table 1- Mean comparison (±SEM) of cecum microflora among five studied treatments*

Trait / Treatment	Total bacteria [cfu/gr]	Lactobacillus bacteria [cfu/gr]	Lactic acid bacteria [cfu/gr]
1 (Animal fat: tallow; 4%l)	6000^{ab}±1000	51883333^{b}±12773611	9333352^{a}±9333324
2 (Plant fat: canola oil: 4%)	1192^{b}±856	71666667^{ab}±17814242	6666679^{a}±6666660
3 (Plant fat: sunflower oil; 4%)	8667^{a}±1525	66400000^{ab}±16495100	4900000^{a}±1550268
4 (Animal fat + plant fat; tallow: 2% + canola oil 2%)	1081^{a}±250	129500000^{a}±18678195	5366667^{a}±2130988
5 (Animal fat + plant fat; tallow 2% + sunflower oil 2%)	1800^{a}±551	112503767^{ab}±5715476	5525000^{a}±5085741

**There is significant difference between the numbers that are shown with the different letter(s) in each column (P<0.05). Each column of data without any letter has not significant differences (P>0.05).*

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