

A STUDY ON THE EFFECT OF ANTIBIOTIC DOXYCYCLINE ON BROILER

¹Bijukumar, B.S., ¹Aswin, S.R., ¹Rajasree, .S.R., ²Suja, S.R. and ³Jayaram, V.S.

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Abstract

The use of sub therapeutic dose of antibiotic doxycycline on broilers on weight gain and feed conversion ratio was studied. Doxycycline was administered to broilers once in seven days of the experimental period (Total 3 doses / chick).The dosage was 20 mg/kg body weight. The antibiotic was dissolved in water and was orally administered. Experimental period was 21 days. Weight gain in broilers which were treated with doxycyclin was high when compared to control group. There was no significant difference in feed intake in both the groups. Feed conversion ratio in antibiotic administered group was low when compared to control group

Key words: Digestion, Absorption, Prophylactic

Introduction

The Indian poultry market, consisting of broilers and eggs was worth INR 1,750 Billion in 2018. The market is further projected to reach INR 4,340 Billion by 2024. Poultry is one of the fastest growing segments of the agricultural sector in India today. While the production of agricultural crops has been rising at a rate of 1.5 to 2 percent per annum, that of eggs and broilers has been rising at a rate of 8 to 10 percent per annum. As a result, India is now the world's fifth largest egg producer and the eighteenth largest producer of broilers.(Agricultural and Processed Food Products Export Development Authority)

Antibiotics have been used for more than five decades in commercial poultry enterprises. In addition to control diseases, antibiotics help to enhance intestinal digestion and absorption of nutrients and thereby improve growth (Miles and Harms, 1984). Although sub-therapeutic antibiotics have been used successfully for years, there is a growing concern about their continued use as performance enhancers with

regard to build-up of antibiotic resistance in the human population. Several approaches are now being considered as alternatives to antibiotic growth promoters. About 90% of the antibiotics used in agriculture are for growth promotion and prophylactic purposes rather than treating disease infections (Chadwick and Goode, 1997). It is estimated that more than 8 million kg of antibiotics (about one third of all antibiotics) are used sub-therapeutically for growth promotion in the United States.

Doxycycline is one of the antibiotics commonly used in poultry farming. It is considered as the 'second generation' tetracycline mainly active against Gram-positive and Gram-negative aerobic and anaerobic bacteria. (Riond and Riviere, 1988).

Doxycycline is a semi synthetic tetracycline derivative. Doxycycline is used in poultry, turkeys, and cattle's for the treatment of infections due to bacteria at doses of 10-20 mg/kg for 3-5 days.

¹Postgraduate Department of Zoology and Research Centre, Mahatma Gandhi College, Thiruvananthapuram, Kerala, India
email: bijukumarbsd@gmail.com (Bijukumar B.S. Corresponding Author)

²Principal Scientist and Head,,Ethnomedicine and Ethnopharmacology Division,KSCSTE-
Jawaharlal Nehru Tropical Botanic Garden & Research Institute,Palode, Thiruvananthapuram, Kerala, India
email: drsujasremep@gmail.com

³Government College, Kariavattam, Thiruvananthapuram, Kerala, India

Materials and Methods

Animal selection

Broiler chickens (*Gallus gallus domesticus*) of the breed White Cobb were selected for the study. Healthy and active birds were purchased from a commercial hatchery. Almost same sized broilers of body weight 50g were used for the experiment. One day old broiler chickens were kept in pens with raised wire floors in an environmentally controlled room. The birds were divided into two groups consisting of six in each pen. They were kept in pens having a dimension of 2m x 8m. First group was control and was not treated with antibiotic. While the second group was administered with antibiotic doxycycline. Both the groups were fed with same synthetic feed.

Doxycycline was purchased from the market. Experimental period was 21 days and the broilers were administered 3 doses of doxycycline in seven days duration. The dosage was 20 mg/kg body weight. The antibiotic was dissolved in water and was orally administered.

The data regarding the body weight gain, amount of feed intake and the feed conversion ratio were collected. The feed conversion ratio can be calculated using the following equation.

Feed Conversion Ratio (FCR) =

$$\text{Feed intake (g) / Live weight (g)}$$

Statistical analysis

Student’s t test was done for finding the significance.

Results and Discussion

1. Body weight gain: The use of sub therapeutic doses of doxycycline antibiotic on broilers promotes growth. Weight gain of broilers with and without antibiotics show remarkable differences. Weight gain at the end of three week experiment was 600g in control and 800g in doxycycline treated ones. The results are graphically represented in figure 1, 2 and 3.

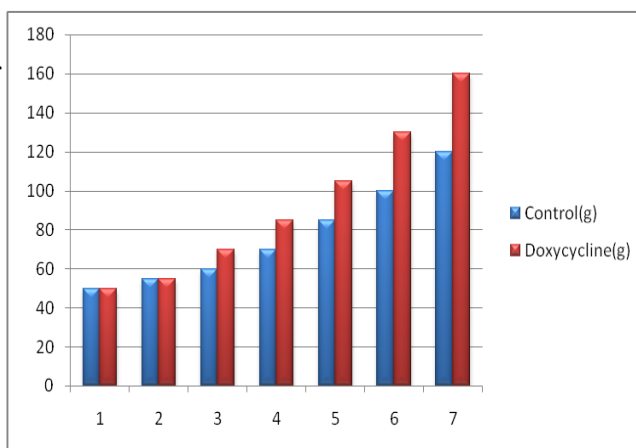


Figure 1. Weight gain during the first week

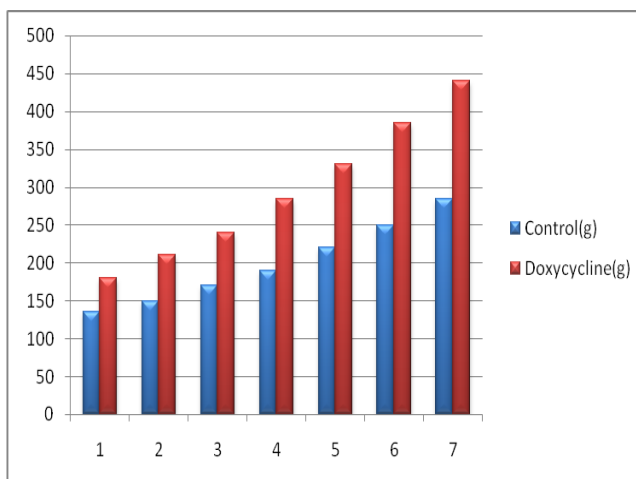


Figure 2. Weight gain during the second week

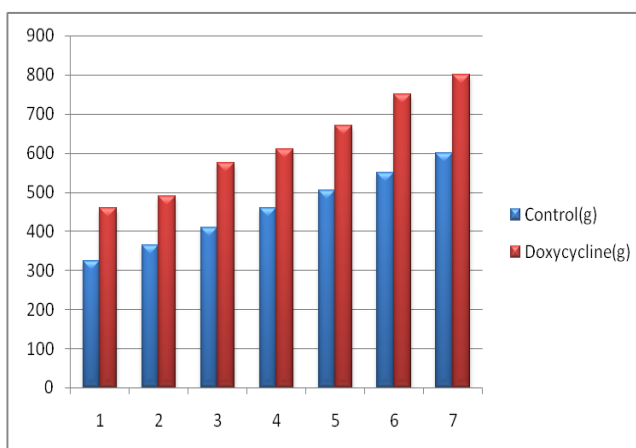


Figure 3. Weight gain during the third week

2. Feed intake

Feed intake of broilers at the end of three week experiment was 69g for control and 73g for doxycycline treated ones. There was no significant difference in feed intake in both the groups. The results are graphically represented in figure 4, 5 and 6.

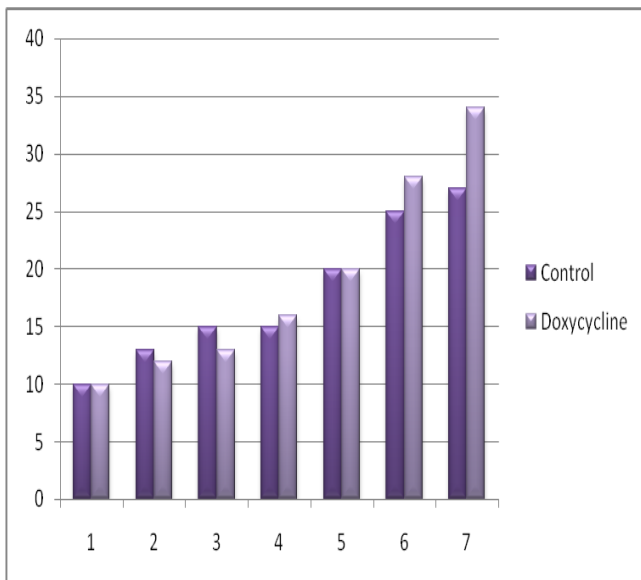


Figure 4. Feed intake during the first week

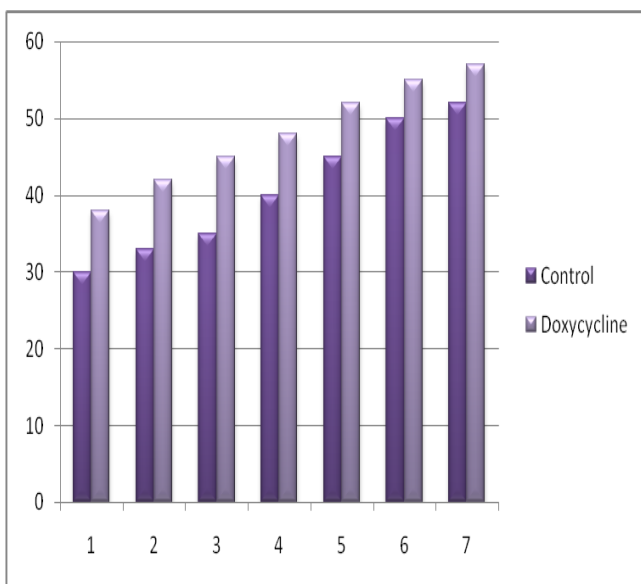


Figure 5. Feed intake during the second week

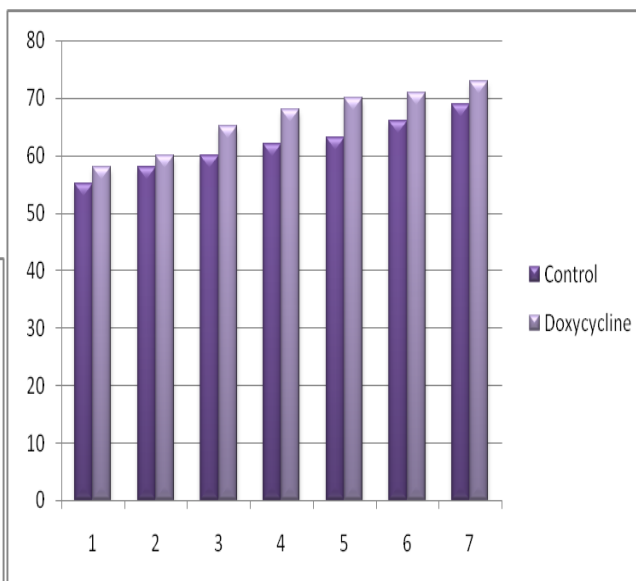


Figure 6. Feed intake during the third week

3. Feed Conversion Ratio (FCR)

Feed conversion ratio shows a remarkable difference during the second and third week. Feed conversion ratio of broilers at the end of third week experiment was 0.11g for control and 0.091g for doxycycline treated ones. The results are graphically represented in figure 7, 8 and 9.

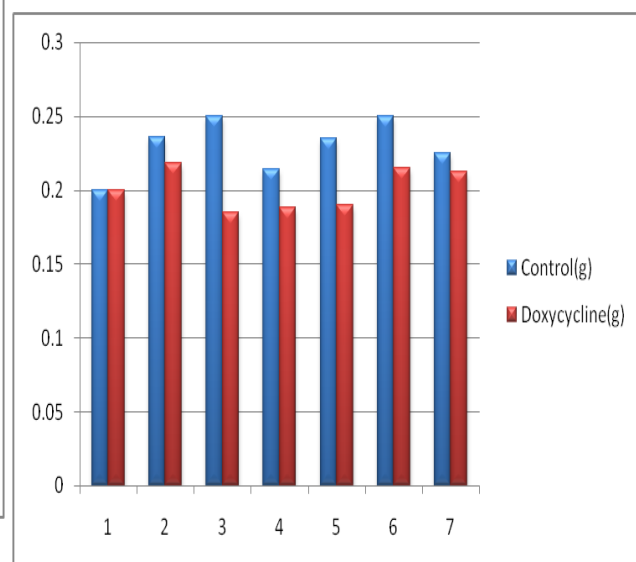


Figure 7. Feed conversion ratio during the first week

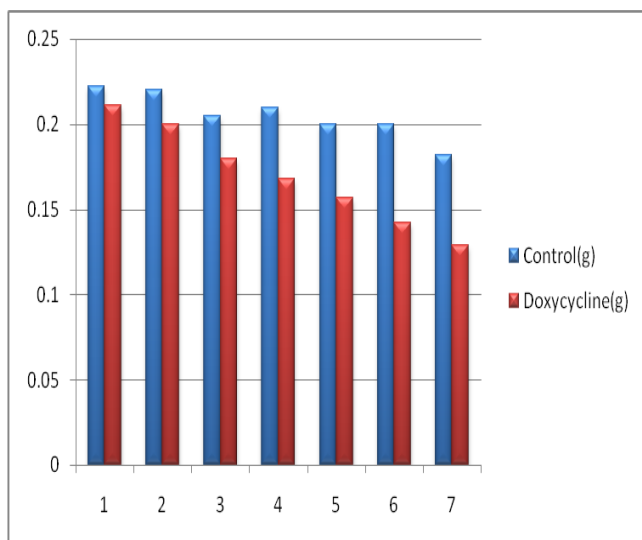


Figure 8. Feed conversion ratio during the second week

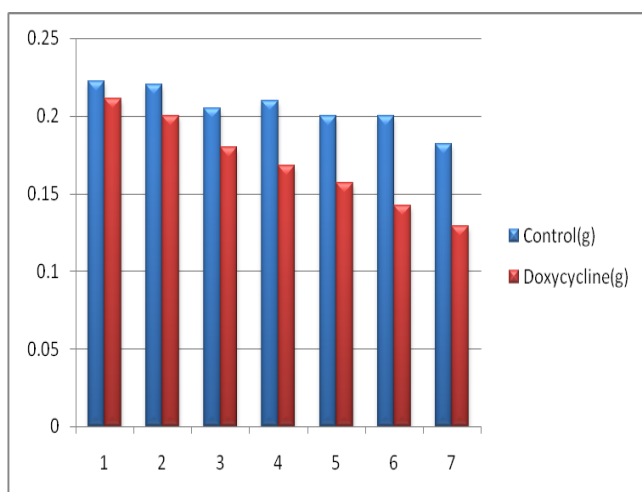


Figure 9. Feed conversion ratio during the third week

4. Average weight gain, feed intake and feed conversion ratio (FCR)

Average body weight gain, feed intake and food conversion ratio of broilers is given in Table 1.

Table 1. Average weight gain, feed intake and FCR

Experiment	Weight gain	Feed intake	Feed conversion ratio (FCR)
Control	245.47	40.14286	0.190
Doxycycline	337.1429	44.52381	0.15981

Diet supplemented with doxycycline resulted increased body weight. Doxycycline acts as growth promoter and thereby increasing the growth of broilers. The modes of action of antibiotics is their ability to alter gut microbial balance thereby reducing the population of pathogenic microbes and improving feed efficiency and growth. Many reports indicate the weight enhancing effect of antibiotics. These results are in agreement with that given by Alloui *et.al.* (2001), Mehdi *et.al.*(2011) with Panda *et.al.*, (2005).

Antibiotics promote improved growth response because of an effect on the microflora in the gastrointestinal tract. The continuous use of antibiotics at sub therapeutic levels in animal feeds to promote improved weight gain and feed conversion in broilers has become a controversial issue because of concerns over development of antibiotic resistance. The mode of action of the antibiotics used as feed additives to promote improved weight gain and feed conversion in broilers was reported by Feighner and Dashkevich, (1987). Similar results had also reported by Bedford, (2000) and Choudhari *et.al.* (2008) where a more balanced micro population in gut is expected to lead a greater efficiency in digestibility and utilization of food, which consequently results in an enhanced growth and improved feed conversion ratio. The significant benefits of antibiotic supplementation observed on chick growth and feed conversion study were in agreement with many reviewers Mehdi, (2011). The possible mechanism of this phenomenon can be explained as follows. Antibiotic growth promoters are known to suppress the gut bacteria, leaving more nutrients for chick to be absorbed for greater weight gain.

The Feed Conversion Ratio (FCR) was significantly lower in chicks which had received the doxycycline antibiotic up to the end of experiment. Feed conversion ratio in the control group was slightly higher than that of the group of chicks that were subjected to antibiotic treatment. Lower FCR indicates high feed efficiency and increased weight gain. The results were in accordance with Yeo and Kim, (1997) who

reported that the use of antibiotics in broiler chicks significantly improved the daily body weight gain and feed efficiency. From obtained results it can be concluded that administration of antibiotics in broilers led to significantly better feed conversion to body mass compared to basal diet.

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