Asian J. Med. Biol. Res. 2016, 2 (4), 541-546; doi: 10.3329/ajmbr.v2i4.30994

Asian Journal of
Medical and Biological Research
ISSN 2411-4472 (Print) 2412-5571 (Online)
www.ebupress.com/journal/ajmbr

Article

Antibiotic use to the production performance of ISA brown layer

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Received: 10 November 2016/Accepted: 08 December 2016/ Published: 29 December 2016

Abstract: The present study was designed with a view to study the effects of enrofloxacin antibiotic on ISA brown layer performance. A total of 1,80,000 laying hens (ISA brown) received and supplied enrofloxacin antibiotic in the dose of 0 mg, 10mg and 20 mg/kg BW with normal diet. Each layer was fed 120 g feed/day from 42 to 48 weeks of age. Antibiotic made significant differences in egg production ($p<0.05$) and especially on mortality ($p<0.01$). The different doses of enrocin (0 mg, 10mg and 20mg/kg BW) had no significant effect on feed conversion efficiency and egg weight. Therefore, it can be suggested that a lower dose (10mg/kg BW) of antibiotic may be benefited in commercial layer diet.

Keywords: enrofloxacin; ISA brown; antibiotic; layer

1. Introduction

In Bangladesh, Livestock contributes 2.73% in GDP (GEP, 2008-09). In Fiscal year 2008-09 the estimated growth rate in this subsector was 3.46% and poultry has now become a major contributor. At present, poultry farming is one of the most profitable businesses. Commercial layer production started in Bangladesh during 1980, but faster growth took from 1999 and is increasing day by day. Antibiotic is a chemical substance produced by a *microorganism* that inhibits the growth or kills other microorganisms. Antibiotics as growth promoters have long been supplemented to poultry feed to stabilize the intestinal microbial flora and improve the general performance and prevent some specific intestinal pathogens (Miles *et el.*, 2006; Waldroup *et al.*, 1995). The biological basis of using antibiotic as growth promoter in poultry production is that, it stimulates appetite, increase feed intake, reduce microbial load in gastro-intestinal tract, inhibit sub-clinical infection, increase nutrient utilization and ultimately improve the performance. Without scientific knowledge most farmers administer antibiotics. Enrofloxacin, a fluoroquinolone developed exclusively for veterinary use is advocated in poultry in large-scale for treatment of chronic respiratory disease, colibacillosis, salmonellosis and fowl cholera. The effect of enrofloxacin on the immune response is not well documented. Enrofloxacin and chloramphenicol decreased the level of specific IgY in laying hens immunized with living cells of Salmonella enterica subsp. Enteric serovar enteritidis and lipopolysaccharide. After administration, enrofloxacin is metabolized in the liver via de-ethylation into pharmacologically active metabolite ciprofloxacin. Porchezhian reported that ciprofloxacin significantly reduced the antibody titre against Lasota and Sheep Red Blood Cells (SRBC) antigens in broiler chicks. This depends on the production level of the flock. No research has been conducted to identify, quantify and assess the effect of enrofloxacin on production performances of ISA brown layer in large scale. Therefore, the present study was undertaken in order to assess the effect of Enrocin (Enrofloxacin) antibiotic on the production performance of ISA brown layer.

2. Materials and Methods

2.1. Statement of experiment

The experiment was conducted from 1 April to 12 May, 2013 with 1,80,000 ISA brown layer aged 42 weeks for a period of 42 days to investigate the effect of enrofloxacin antibiotic on ISA brown layer.

2.2. Venue of the experiment

The experiment was conducted at a commercial layer farm of CP Bangladesh Co. Ltd located at Ghatail upazila under Tangail district.

2.3. Experimental layer

A total of 1,80,000 of pullets transfer from Pullet project of CP Bangladesh Co. Ltd located at Seed store bazaar Valuka, Mymensingh. All pullets transfer at 16 weeks of age from pullet's project to the layer project.

2.4. Collection of enrofloxacin antibiotic

Enrofloxacin antibiotic was collected from Animal Health Division of CP Bangladesh Co. Ltd.

2.5. Layout of the experiment

In this experiment, three treatment and four replication in each treatment (Table 1). There were 15000 layers in each replication.

2.6. The technique used in providing antibiotics

In the experimental farm one house contained four towers. Medicator used to provide antibiotic, vaccine & medicine. House 1 kept control, two given 10 mg enrofloxacin antibiotic in per kg body weight and house number 3 given 20 mg enrofloxacin antibiotic in per kg body weight of the layer. Enrofloxacin antibiotic was mixed with 2700 ml water.

2.7. Ration

In this experiment feed from C.P. Rajshahi feed mill was used. The ingredients and nutrient composition of this feed is given below in Table 2. The nutrients requirement of layers was followed by ISA brown management guide.

2.8. House management

The experiment was conducted in a tunnel ventilated environmental controlled house. Proper management procedures according to ISA brown management guide were followed during experimental period.

2.9. Feeding method

The layers were supplied diets in a day on a fixed amount (120g/layer/day) of mash diet. Fresh clean drinking water was made available at all times. Normally three times in a day chain feeding process was running in the house and supplying the diet for the layers.

2.9.1. Lighting management

In this experimental period 15 hours continuous light was given in layer house and 9 hours dark.

2.9.2 Vaccination and medication

- The water was treated with chlorine before starting house.
- Multivitamin was used at three times per week at 1 gm/4 ltr water.
- ND+IB vaccine was used at every six weeks following the vaccination schedule (Table 3).

2.9.3. Bio-security measures

As a commercial layer farm biosecurity always maintained in farm to prevent diseases. To maintain strict biosecurity in farm following steps always followed:

2.9.4. Litter management

Litter was managed in the farm automatically by running litter belt. Then litter is out into CHUBU machine (USA) & process. Finally we get bio-fertilizer from this machine.

2.9.5. Data collection and record keeping
The following records were kept during the experiment:

2.9.6. Body weight
The body weight of layers (about 3 %) was taken at the beginning of the experiment. Thereafter, body weights were taken at weekly intervals until the termination of the experiment. The layers were weekly weighed after collection of egg.

2.9.7. Egg production
Egg production performance after used the enrocin (enrofloxacin) antibiotic was recorded in experimental period. So, daily egg production (%) of layers was recorded after use enrofloxacin antibiotic.

2.9.8. Mortality
Mortality and survivability data was recorded every day before egg collection and took out the dead layer from the cages.

2.9.9. Egg weight
Egg weight data was recorded after finishing egg collection every day from each replication.

2.9.10. Feed conversion ratio (FCR)
The FCR was calculated as the total feed consumption divided by egg mass of each replication, as an indicator of feed conversion.

FCR= Feed intake of the hen (g/b/d) **/** Egg mass (g/b/d)

2.10. Statistical analysis
All recorded and calculated data were statistically analyzed using SAS statistical computer package program in accordance with the principles of Completely Randomized Design (CRD). Least Significant differences (LSD) were calculated to compare variations among diets

3. Results
3.1. Egg production (%)
Generally egg production was increased with the increasing dose of antibiotic (Table 4). In control group (0mg/kg BW) the mean of egg production was 91.05% whether in the dose of enrofloxacin antibiotic (10mg/kg BW) the mean of egg production was 92.74%. In terms of enrofloxacin antibiotic level 20mg/kg BW the mean of egg production was 93.76%. In this study, egg production was increased with increasing dose of enrofloxacin antibiotic followed by 10mg/kg BW and 0 mg/kg BW. It indicates that egg production (%) significantly ($p<0.05$) higher when the dose of enrofloxacin antibiotic was 20mg/kg BW. It was also observed that there was little variation in egg production in the dose of enrofloxacin antibiotic at the level of 0 & 10 mg/kg BW.

3.2. Egg weight (gm)
There was no significant difference among the dose of enrocfloxacin antibiotic 0, 10 and 20 mg/kg BW (Table 4). In control group mean of egg weight was 61.78g whether in the dose of 10mg/kg BW 60.95g and in the dose of 20 mg/kg BW mean of egg weight was 61.00g (Table 4).

3.3. Mortality (%)
Mortality was highly significant in the experiment. Mortality percentage decreased with increasing the dose of enrofloxacin antibiotic. In control group mean of mortality percentage was 0.164 whereas 0.130 & 0.108 for 10mg/kg BW and 20mg/kg BW. Mortality was significantly higher ($p<0.01$) in 0mg/kg BW than 10mg/kg BW & 20mg/kg BW.

3.4. Initial weight (gm)
There was no significant difference observed of initial weight that was collected before starting the experiment.

3.5. Final weight (gm)
No significant difference was found in case of final weight at different doses of enrofloxacin. Weight gainwas more or less similar among the different doses of enrofloxacin.

Table 1. Layout of the experiment.

Replication	Different level of Antibiotic (mg/kg BW)			Total
	0	10	20	
R 1	15000	15000	15000	45000
R 2	15000	15000	15000	45000
R 3	15000	15000	15000	45000
R 4	15000	15000	15000	45000
Total	**60000**	**60000**	**60000**	**180000**

Table 2. Ingredients of the ration.

Ingredients	(%)	Nutrient profile	Amount
Maize	40.50	ME (Kcal/kg)	2800
Rice	20.00	Crude Protein (%)	17.7
Rice polishing	7.50	Lysine (%)	0.82
Soybean meal	6.70	Methionine (%)	0.41
Cotton seed meal	1.50	Cystine + Methionine (%)	0.71
Corn gluten 60%	6.10	Ca (%)	3.60
Fish meal	5.30	Available P(%)	0.40
Di-calcium phosphate	2.70	Tryptophan (%)	0.18
Limestone	7.00		
Molasses	2.20		
Vitamin/mineral premix	0.50		
Total	**100.00**		

Table 3. Vaccination schedule maintained in CP farm.

Age	Vaccine	Description	Route	Dose	Company
1 Day	Marek's		Cell associated		
	ND+IB	Clone30+Ma5	IO+Spray		Intervet
14 Day	Nd killed	Imopest	SC	0.15 cc	Intervet
18 Day	IBD LZ228E	Intervet	DW	1vial/1000chicks	Intervet
25 Day	ND+IB	Clone30+Ma5	Spray	1vial/1000chicks	Intervet
	FP	Lohman/intervet	WW	1 dose (1 punch)	Lohman
6 Weeks	Nd killed	Newcavac(/Intervet) or Imopest(/Merial)	IM	0.3-0.5cc	
8 Weeks	Coryza	Haemovac (Merial)	IM	0.3cc	Merial
10 Weeks	ILT	Intervet	IO/IN	1 drop	Merial
	FP+AE	Lohman/Intervet	WW	1 dose (1 punch)	Intervet
12 Weeks	ND+IB	Clone30+ma5	Spray	1vial/1000 chicks	Intervet
	CORYZA	Haemofac/merial	IM	1dose(0.3ml)	Merial
14 Weeks	ND+IB+EDS	Killed,Intervet/Merial	IM/SC	1dose(0.5cc)	Intervet
After16Weeks	ND+IB vaccine give in every 6 weeks after up to retired layer sale.				

Table 4. Effect of enrofloxacin antibiotic on the production performance of ISA brown layer.

Parameters	Dose of antibiotic (mg/kg BW)			Level of significance
	0	10	20	
Egg production (%)	91.05	92.74	93.76	0.017*
Egg weight (gm)	61.78	60.95	61.00	0.361 NS
Mortality	0.164	0.130	0.108	0.0001**
Initial weight	1925.00	1891.25	1928.75	0.227 NS
Final weight	1965.00	1978.75	1967.50	0.652 NS
FCR	2.135	2.127	2.095	0.252 NS

3.6. Feed conversion ratio (FCR)
Feed conversion was more or less similar on different doses of enrofloxacin antibiotic. There was no significant variation in FCR for adding enrofloxacin antibiotic from control dose (0mg/kg BW) to higher dose (20mg/kg BW).

4. Discussion
4.1. Egg production (%)
Lucky (2010) found providing 15and 20mg/kg body weight in the diet increased egg production by 2% to 5%, respectively. Mahanta JD *et al*. (2009) found egg production and egg mass of hens (ISA brown layer aged 26 weeks) were improved by biocilin supplementation. Auguspurger *et al*. (2007) stated supplementation of Interflox increased egg production during the first 4 weeks of experimental period. Liu *et al*. (2005) showed increased egg production and egg mass of hens due to supplementation of antibiotic with water at the level of 20, 25, 30mg/kg BW. In this experiment egg production was increased 1.7% to 2.7% which is similar to Lucky (2010) and other authors.

4.2. Egg weight (gm)
Rahman (2007) indicated different levels of antibiotic 15% and 30% had ($P<0.05$) influence on egg weight, whereas control had no improved egg mass production. Jalal and Scheideler (2001) noted that supplementation of antibiotics diets at the low (0.10%) improved egg weight. Miao *et al*. (2000) investigated that the effect of antibiotics on egg weight enhanced by addition of antibiotics into diet. Um *et al*. (1999) and Silverside *et al.* (2006) found supplementation of antibiotics enhanced egg production of chicken coupled with increased egg weight. In this study egg weight of ISA brown layers with different doses (0, 10 and 20mg/kg BW) did not affect significantly.

4.3. Mortality (%)
Different doses (0, 10 and 20mg/kg BW) of antibiotic (enrofloxacin) had significant effect on mortality percentage of layer. With the increasing level of doses (20 mg/kg BW) decreased the mortality percentage (0.108%) than the dose of 10 mg/kg BW and control (0mg/kg BW).

4.4. Final body weight (gm)
In layer body weight has not greater importance. This experiment showed that at 10 mg/kg BW of enrocin antibiotic level average body weight of layers was 1978.75gm followed by higher dose (20 mg/kg BW) 1967.50gm and control (0mg/kg BW) 1965.00gm. Therefore a further research can be done among different doses of antibiotic with lower differences.

4.5. Feed conversion (FC)
In conducted experiment at different doses of antibiotic (0, 10 and 20 mg/kg BW) FCR had no significant effect. Though the efficiency of feed conversion was increased at the advancement of dose of enrocin antibiotic according to 2.135, 2.127 and 2.095.

5. Conclusions
After geting the findings it can be suggested that a lower dose (10ml/kg BW) of antibiotic may be supplied with normal diet to layer for increasing the production performances.

Acknowledgements
The author wishes to express his heartfelt respect, deep sense of gratitude and immense indebtedness to his honorable supervisor Professor Dr. Fowzia Sultana, Department of Poultry Science, Bangladesh Agricultural University, Mymensingh for planning the experiment, scholastic supervision, continuous guidance, constant encouragement, valuable suggestions and constructive criticism during the entire period of the research work .The author owes his immense debt to his co-supervisor Professor Dr. Shawkat Ali, Department of Poultry Science, Bangladesh Agricultural University, Mymensingh for scholastic guidance, heartfelt generous cooperation, creative advice and comments for improvement of this work.

Conflict of interest
None to declare.

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