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EFFECT OF GROWTH PROMOTOR (VIRGINIAMYCIN) ON BROILER PERFORMANCE UNDER EGYPTIAN ENVIRONMENT

BY

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INTRODUCTION

Poultry industry in Egypt is essential since it contributes., to a great extent, in overcoming the meat shortage and provides the consumers with cheap source of animal protein. Growth promotors are compounds given to animals to improve the growth rate and food efficiency. Concomitant with these improvements is a decrease in morbidity and mortality rates. Generally, they are added at low levels to diet less than 55 ppm (O'Conner, 1980). Antibiotics, as growth promotors, are added to poultry diets to prevent or control diseases, to stimulate growth and to improve feed efficiency. Among antibiotics which are commonly used as growth promotors in poultry are penicillin, zinc bacitracin, Flavomycin and Virginiamcyin (VG). Virginiamycin has a gram positive antimicrobial activity and its mode of action depends on inhibiting bacterial protein synthesis. Virginiamycin has a beneficial effect in producing higher body weight., reducing food consumption and decreasing mortality rates that had been studied among different species of animals, in chickens (Ibrahim, 1988; Lesson, 1984; Miles et al., 1984 a and b; Salah, 1987) in turkey poults (Bruesh et al., 1983 and Harms and Miles,1984), in rabbits (King, 1971 and 1974) and in ducks (Adams, 1987).

The aim of this work was to study the effect of adding virginiamycin, in broiler diets, on their performance and resistance against diseases as well as the farm profitability under Egyptian field conditions.

MATERIALS AND METHODS

One thousand, one day old Red Hypeco broiler chicks were raised in a well equiped farm located at Nawag, El-Gharbia Governorate. The water was supplied automatically while feeding was manually fed to chicks. The chicks were divided into two groups each of 500 chicks. Chicks of the control group (C group) were fed on the basal diet while those of (V group) were fed on basal diet supplemented with Virginiamycin (20 ppm) for 52 days experimental period (Table, 1), while the vaccination program was done as follows:

Age in days	Disease	Vaccine type	Route of vaccination
8	Newcastle disease	Colone 30	D.W.
12	Newcastle disease	Inactivated oil emulsion	I.M.
14	Infectious bursal disease	Infectious bursal virus	D.W.

D.W.: Drinking water.
I.M.: Intra muscular injection.
All vaccines were Intervet Company products.

Chicken performance was determined by measuring body weight as well as food consumption, food conversion ratio (FCR) and mortality rates weekly. Dressing value was measured at 52 days old for 15 chicks of each group.

Litter humidity was measured in samples taken from different places in the two farms.

At one day and two weeks old, random samples were collected from 10 chicks sacrified from each group (C and V) for bacteriological examination. Samples from liver, gall bladder and yolk sac were cultivated on MacConkey and nutrient agar. The isolated bacteria were subcultured on peptone water and nutrient broth for bacteriological and serological identification according to Cruickshank et al., (1980) and sensitivity test according to Gould and Bowie (1952) and Klomer et al., (1951)to determine the suitable drug. At 49 days old, pooled cloacal swabs were collected for plate counting (Cruickshank et al., 1980).

The agar gel precipitation test (AGP) was used to detect the IBD virus antigen in the bursa of affected chicks as a result of natural exposure to the disease at 23 days old according to Woernle (1966) against known reference IBD precipitating antisera (Doorn, Holland Lab.).

At one day old, blood samples were collected for rapid slide agglutination test (SAT) using stained antigen of Mycoplasma gallisepticum (MG) and Mycoplasma synovae (MS), Intervet products). At 35 & 45 days old, blood samples were collected for the detection of antibodies against ND and IBD using indirect enzyme linked immunosorbent assay (ELISA) as described by Khafagy et al., (1990) for ND and IBD, microhaemagglutination inhibition (HI) test according to Anon (1971) for ND and agar gel precipitation (AGP) for IBD. Positive and negative precipitating antisera (Doorn, Holland Lab. for AGP test) were included. The test was carried out as described by Woernle (1966).

RESULTS

The results in (Tables 2,3 and 4) showed that there was an improvement in body weight gain (2.3%), less food intake (-10.6%) and feed conversion ratio in chicks fed the basal diet supplemented with 20 ppm virginiamycin than that fed on the basal diet alone. Also, there was an improvement (7.8%) in dressing value in chicks fed the basal diet supplemented with virginiamycin.

Litter humidity was less in litter of chicks fed virginiamycin supplemented diet than the control one being 32 and 37.5% respectively.

SAT for one day old chicks proved to be free from MG and MS.

Microbiological findings, at one day age, E. coli (O1:KI) was isolated from liver, gall bladder and yolk sac from groups C and V, and were sensitive to oxolonique acid, flumequine but resistant to chloramphenicol, sulphatrimethoprim, ampicillin, nalidxic acid and virginiamycin. For treatment, oxomoid plus 0.5 g/l for 72 hours was used.

At 2 weeks age, Proteus vulgaris was isolated from liver and gall bladder from groups C and V which were sensitive to ampicillin, chloramphenicol, oxolonique acid, gentamycin but resistant to doxycycline, flumequine, streptomycin, sulphatrimethoprim and virginiamycin. For treatment, ampicillin (20%) 1 g/l for 72 hours was used.

At 22 days age, high mortality rate reached 13.2% and 6.2% in both groups (C and V) due to natural simultaneous infection with IBD and E. coli, where E. coli was isolated from liver, gall bladder and kidney and typed as 078 : K80 and was sensitive to gentamycin, oxolonique acid, ampicillin, flumequine, VG, streptomycin and doxycycline and resistant to nalidixic acid and sulphatrimethoprim. Oxomoid plus was used for treatment.

Table (1): Composition and calculated analysis of basal diet.

Ingredients	Starting diet	Growing diet	Finishing diet
	0-21 days	22-35 days	35-49 days
Yellow corn	61	64	67
SBM (44% CP)	28	25	22
Concentrate*	10	10	10
Oil	0.5	0.5	0.5
Lime stone	0.4	0.4	0.4
Mould inhibitor**	0.05	0.05	0.05
Anticoccidial***	0.05	0.05	0.05
Calculated analysis:			
CP %	22.9	21.8	20.77
MEKcal/kg	2955.9	2989.5	3023.1
Caloric protein ratio	129.0	137.1	145.6
Fat %	3.33	3.42	3.41
Lysine %	1.26	1.18	1.1
Meth. %	0.49	0.47	0.46
Meth & cystine %	0.84	0.81	0.78

*CP min 52% ,MEKcal/kg 2440, c.fat, min. 2%, C.fiber, max 4%, Ca. min 1.5%, P.min 3.1%, Methinine 1.78%, Meth+cystine 2.54%, Lysine 2.9 %, salt 3% , per kg, vit A 125000IU , D_3 2500 IU, vit E 100 IU, B_{12} 100 mcg vit K_3 20 mg, B_2 2 mg , pantothenic acid 100 mg , niacin 200 mg, B_1 2.5 mg, Pyrodoxine 15 mg, biotin 1.5 mg, choline Hcl 5000 mg, Mn 640 mg, Zn 600 mg, Fe 500 mg, I 17 mg, Co 2 mg, Se 1 mg, Antioxidant (BHT) 1250 mg and anticoccidial (DOT) 1250 mg .

** : Mouldban *** : Coccistac .

Table (2): Effect of virginiamycin supplementation on average body weight (g) feed intake and feed conversion ratio during the experimental period.

Age in week	Average body weight (g)		Average food intake (g/bird/week)		Cumulative feed intake (g/bird)		FCR	
	V	C	V	C	V	C	V	C
1	119	104	117	118	117	118	0.98	1.13
2	278	267	353	428	470	546	1.69	2.04
3	543	467	423	453	893	999	1.64	2.14
4	765	711	554	657	1447	1656	1.89	2.33
5	1.120	914	605	681	2052	2337	1.83	2.55
6	1.440	1.323	689	795	2741	3132	1.90	2.37
7	1.789	1.755	794	831	3535	3963	1.97	2.26

V : Virginiamycin diet group.
C : Control diet group .
FCR : Feed conversion ratio.

Table (3): Dressing values at 53 days old.

Statement	V	C
Live body weight (kg)	$\bar{X}$ 1.85 ± 0.134	1.8 0.038
Carcess weight (kg)	$\bar{X}$ 1.432 ± 0.105	1.32 0.085

V : Virginiamycin diet group .
C : Control diet group .

Table (4): Economic values following virginiamycin supplementation.

Parameters	V	C	Difference than C
Number of chicks	500	500	
Mortality %	6.2	13.2	- 7.0 %
Average body weight (kg)	1.8	1.76	+ 2.3 %
Food intake (kg)	3.54	3.96	-10.6 %
Food price/ton	720	705	+ 2.1 %
Cost per 100 kg LBW (L)	1.42	1.58	-10.13%

V : Virginiamycin diet group .

C : Control diet group .

LBW: Live body weight .

Table (5): Effect of virginiamycin on immune response against ND and IBD viruses at 35 and 45 days old.

Age (day)	Group	Exam. samp. No.	NDV										IBV	
			HI-titer distribution (log 2)								ELISA (absorbency mean)	% AGPT	ELISA absorbency mean	
			4	5	6	7	8	9	10	GM				
35	V	48	-	6	-	12	6	6	18	8.25	0.493	48/48	0.475	
35	C	45	-	-	-	27	9	-	9	7.8	0.560	45/45	0.483	
45	V	42	2	-	8	8	14	6	4	7.57	0.484	42/42	0.545	
45	C	50	-	-	-	5	30	10	5	8.3	0.534	50/50	0.507	

% : Positive No./ examined No.

Table (6): Bacteria isolated during 7 weeks old from Red Hypeco broiler chicken

No. of chicken	Age of chicken (week)	No. of dead chicken per week		% of mortality per week		No. of +ve bacterial isolates		Serotyping of bacterial isolates from both groups					
								E. coli				Proteus vulgari	
		C	V	C	V	C	V	C	V	C	V	C	V
500 per each group	1	1	1	0.2	0.2	1	1	+	+	-	-	-	-
	2	2	3	0.4	0.6	2	2	-	-	-	-	+	+
	3	7	2	1.4	0.4	4	1	-	-	+	+	-	-
	4	49	21	9.8	4.2	30	10	-	-	+	+	-	-
	5	2	1	0.4	0.2	-	-	-	-	-	-	-	-
	6	2	1	0.4	0.2	-	-	-	-	-	-	-	-
	7	3	2	0.6	0.4	2	1	+	+	-	-	+	+
Total		66	31	13.2	6.2	39	15						

V : Virginiamycin diet group .

C : Control diet group .

IBD was characterised by gross pathological lesions as described by Cosgrove (1962) and identified by detection of viral antigen in the bursa by AGP test against a known positive precipitating serum.

At 49 days age. Plate count for pooled cloacal swabs was done and counted 30×10^{16} (group C) and 30×10^{11} group V. The isolated E. coli: strains has OI : K1 antigen.

DISCUSSION

Although the increase in body weight gain and less feed consumption in group V did not significantly differed from that of group C fed the control basal diet, there was about 50 g more body gain in chicks fed basal diet supplemented with virginiamycin. Many authors reported the same finding (Ibrahim, 1988; Lesson, 1984; Miles et al., 1984 a and b and Salah. 1987) while Henry et al., (1986) found that virginiamycin supplementation has no effect on food intake, body weight and food efficiency. The improvement of the dressing value in chicks fed basal diet supplemented with virginiamycin was in agreement with the reports of Ibrahim (1988) and Lesson (1984). These improvements may be related to the growth promotor activity associated with their nutrient sparing effect, metabolic effect. better absorption of nutrient, change in microbial population in GIT and suppression of organisms causing signs of diseases (O'Connor, 1980).

From the economic point of view, the producer aim is to achieve maximum rate of growth with the lowest cost of feed per unit of meat. Virginiamycin supplementation lead to a decrease in the mortality rate, less feed consumption per unit of meat production (Table, 4), hence reduced the cost of meat production about 10% in chicks fed basal diet supplemented with virginiamycin.

Effect of growth promotor.....

The mortality rate in group V was lower about 7% than the control (group C). Also, when the two groups at 22 days age were exposed to simultaneous natural infection with IBD and E. coli (078: K80). E. coli was sensitive to virginiamycin and less mortality occurred.

Vaccination against ND using colone 30 vaccine in drinking water at 8 days age followed by intramuscular injection of inactivated oil emulsion vaccine at 12 day age, resulted in stimulation of specific humoral immune response as measured at 35 and 45 days by ELISA assay and HI-test. The results as shown in Table (5) indicated that the immune response within the two groups was identical and no difference could be detected, VG has negative immune stimulus effect on the humoral immune response against ND.

Natural exposure of the two experimental groups to IBD at 22 days age was accompanied by morbidity, mortality, gross pathological changes and identified by detection of viral antigen in the bursae using AGP test and resulted in a high immune stimulant as detected by presence of specific precipitating antibodies as measured by AGP test and ELISA assay (Table, 5) at 35 and 45 days age. Results were identical within the two groups indicating that VG had no enhancing effect on humoral immune response against IBD. Natural occurrence of IBD at 22 days of age had a negligible effect on the immune response against ND as previously reported (Rosenberger et al., 1975).

At 49 days age, bacterial count for caecal swab was more in group C than group V supplemented with virginiamycin by about 30×10^5. This means that virginiamycin affected the bacterial count of E. coli (01: K1) in the intestine of chickens which increases the viability of chickens.

SUMMARY

Two groups each of 500 one-day old Red Hypeco chicks were fed on basal diet (group C), while other group (group V) was fed basal diet supplemented with 20 ppm Virginiamycin. Virginiamycin supplementation gave better body weight gain, less feed consumption, better FCR, less mortality rates and better dressing values than the control group. E. coli (O1 : K1 & O78 : K80) was isolated from both groups at one day old and 24 days old respectively. E. coli O1 : K1 and Proteus vulgaris was isolated from cloacal swab at 49 day old. Virginiamycin had an effect on E. coli plate count for cloacal swab at 49 day old and was $30x10^{11}$ and $30x10^{16}$ for group V and C respectively. Virginiamycin had no significant immune stimulus effect on the immune response against ND and IBD.

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