Egyptian J. Anim. Prod.,Vol. 31,Supplement Issue, Nov.(1994):249-270.

EFFECT OF SOME ANTIBIOTICS INTERACTIONS WITH SOME COCCIDIOSTATS ON CARCASS CHARACTERISTICS AND PLASMA CONSTITUENTS OF BROILER CHICKS

A.E. El-Sherbiny[1] ,N.E. Omar[2] and K.Y. El-Nagmy[2].

1- Animal Production Department, Faculty of Agriculture, University of Cairo, Giza, Egypt, 2- Animal Production Research Institute, Ministry of Agriculture, Dokki, Giza, Egypt

SUMMARY

The objective of this study was to examine some carcass characteristics and plasma constituents of broiler chicks as affected by feeding diets containing 37.5 or 75 ppm lasalocid (Las) or 30 or 60 ppm salinomycin (Sal) with or without 20 ppm virginiamycin (Virg) or 10 ppm avoparcin (Avo).

Each of the medicated and unmedicated fifteen diets was fed to 4 replicates of 8 chicks each. The diets were supplemented with the drugs from one to six weeks of age followed by a week withdrawal period. At the end of the 6 and 7 weeks of age, 4 birds from each treatment were sacrificed to study carcass traits and blood plasma constituents.

The results of carcass characteristics (g/100 g body weight) showed that chicks fed diets containing antibiotic and /or coccidiostat exhibited higher dressing and total edible parts values and lower intestinal weight than those obtained from the unmedicated birds either at 6 or 7 weeks of age. There were significant ($P<0.05$) interactions in dressing, total edible parts and intestinal weight between antibiotics and coccidiostats. Feeding the combination of 20 ppm virginiamycin + 37.5 ppm lasalocid resulted in better dressing and greater total edible parts and lower intestinal weight than those obtained with either

supplement fed alone.

The results of the plasma constituents at 6 wks of age showed that the addition of antibiotics and/or coccidiostats to broiler diets tended to increase the levels of total proteins,globulin, glucose, alkaline phosphatase and glutamic pyruvic transaminase and decrease the levels of cholesterol and total lipids when compared with the corresponding values of the unmedicated birds. The results of albumin and glutamic oxaloacetic transaminase did not give consistent trends.There were no significant differences in plasma constituents among the medicated and unmedicated treatments at 7 wks of age. The data indicated that no deleterious effects on plasma constituents of chicks were obtained as a result of such supplementation under the experimental conditions either at 6 or 7 wks of age.

Keywords: Lasalocid, salinomycin, virginiamycin, avoparcin, coccidiostat, carcass characteristics, plasma constituents, broiler

INTRODUCTION

With the developing interest in further processing of broilers, there has been an increased interest in factors that may influence dressing percentage. Reportes of the effects of antibiotics and /or coccidiostats upon carcass parameters have been inconsistent, some studies suggest an improvement in carcass yeild or yield of various parts of the carcass and others suggest little or no change.

Hematochemistry constitutes an increasing useful aid in zootechnical and veterinary research. It permits the study of specific pathological alterations of certain blood constituents and recognition,under strictly controlled experimental conditions, of the existence of metabolic alterations of different origin. Many factors can influence the level of a particular blood constituent,genetic type,feeding, micro and macro-climate, rearing technique,age, physiological state,and sex, as well as pathological factors. Moreover,methods of sampling and obtaining the biological material and the methods of analysis can also influence results. Because of the importance of dressing percentage and total edible parts in the commercial poultry industry

in Egypt, the present experiment was conducted to study the effects of feeding diets containing 37.5 or 75 ppm lasalocid (Las) or 30 or 60 ppm salinomycin (Sal) with or without 20 ppm virginiamycin (Virg) or 10 ppm avoparcin (Avo) on some carcass characteristics. The effects of such treatments on plasma constituents was also investigated.

MATERIALS AND METHODS

The experimental design, dietary treatments, birds and management were as described previously by El-Sherbiny et al. (1994). Each of the medicated and unmedicated fifteen diets was supplemented with the drugs from one to six weeks of age followed by a week withdrawal period. At the end of the 6 and 7 weeks of age, 4 birds of each treatment were taken to study carcass traits and blood plasma constituents. The dressing weight included the front parts with wings and hind parts. Dressing percentage was calculated on the basis of live weight. Individual blood samples were taken from 4 birds within each treatment at 6 and 7 weeks of age from Jugular vein. The blood samples were collected into dry clean centrifuge tubes containing drops of heparin.Plasma was separated by centrifugation at 3000 r.p.m for 20 minutes. The following variables were measured: total protein by the biuret method (Weichselbaum 1946), albumin by the green bromocresol method (Doumas et al., 1971); globulin was calculated by difference between total protein and albumin; total lipids by the method of Zollner et al. (1962); cholestrol by the enzymatic method of Richmond (1973); glucose by enezymatic method of Trinder (1969); alkaline phoshatase by the method of Kind and King (1954); glutamic oxaloacetic trasaminase (GOT) and glutamic pyruvic transaminase (GPT) by the method of Reitman and Frankel (1957). Analysis were performed usng Boehringer Mannheim Gmb kits or The BioMerieux company kits and spectronic 1201 spectrophotometer (Milton Roy company/ analytical products Division).

The data were analyzed using base SAS^{R} software (SAS Institute, 1986). Arcsine transformation was applied to carcass characteristics data prior to analysis. The data were subjected to ANOVA procedures (General linear Model) according to the following model:

$$Y_{ijkl} = \mu + A_i + B_j + C_k + (AB)_{ij} + E_{ijkl}$$

where:
μ =population mean; A_i = effect of i^{th} exluding growth promoters; B_j = effect of j^{th} including growth promoters; $(AB)_{ij}$ = interaction of i^{th} excluding growth promoters and j^{th} including growth promoters; C_k = effect of replication; E_{ijkl} = mean random error and assumed to be independently and normally distributed with zero mean and σ^2 i.e. NID $(0,\sigma^2)$.
When significant ($P \leq .05$) differences were obtained, Duncan's new multiple range test (1955) was used to separate treatment means.

RESULTS AND DISCUSSION

Carcass Characteristics

The results of carcass characteristics (g/100 g body weight) of broiler chicks at 6 wks of age are summarized in Table 1. Chicks fed rations containing antibiotics and/ or coccidiostats significantly ($P<0.05$) exhibited higher dressing and total edible parts values and lower intestinal weight than those obtained from the unmedicated birds.

There were significant ($P<0.05$) interactions in dressing, total edible parts and intestinal weight between antibiotics and coccidiostats.

The highest values for dressing and total edible parts and the lowest values for the intestinal weight were obtained from birds fed the two combinations of Virg.+ Las. 37.5 and Virg.+ Las. 75.

Feeding these two combinations resulted in greater weights for dressing and total edible parts and lower intestinal weight than those obtained with either supplement fed alone.

Therefore, Virg. was found to be compatible with Las. 37.5 or Las. 75 since appreciable improvements in tested measurements were obtained as a result of feeding such combinations compared with all other treatments.

The overall mean values of antibiotics and coccidiostats clearly showed that no significant differences in dressing, total edible parts and intestinal weight were detected either between the overall mean values of the two antibiotics, the two coccidiostats or between the levels of each

coccidiostat. However, the medicated birds exhibited significantly ($P<0.05$) better values for dressing, total edible parts and intestinal weight than those of the unmedicated birds. This could indicate that virginiamycin at the level of 20 ppm was comparable to avoparcin at the level of 10 ppm and salinomycin with its levels was comparable to lasalocid with its levels in increasing dressing,total edible parts and decreasing the intestinal weight of broiler chicks at 6 weeks of age.

The results of carcass characteristics of broiler chicks at 7 weeks of age are summarized in Table 2. The presence of antibiotics and/ or coccidiostats in diets allowed for higher dressing and total edible values and lower intestinal weight value when compared to the unmedicated birds.

There were significant interactions in dressing, total edible parts and intestinal weight between antibiotics and coccidiostats.

Chicks fed the combination of Virg. + las 37.5 exhibited higher values for dressing and total edible parts and lower value for intestinal weight than all the medicated birds.

The increases in dressing and total edible parts as a result of feeding the combination of Virg. + Las. 37.5 were significantly ($P<0.05$) higher than those of birds fed Virg. alone and numerically higher than those fed Las. 37.5 alone. The decrease in intestinal weight as a results of feeding such combination was numerically lower than those obtained with either supplement fed alone.

Therefore, Virg. was found to be compatable with Las. 37.5 since marked improvements in dressing, total edible parts and intestinal weight were obtained as a result of feeding such combination compared with other treatments.

The overall mean values of the tested antibiotics and coccidiostats clearly showed that no significant differences in dressing, total edible parts and intestinal weight were detected either between the overall mean values of the two antibiotics, the two coccidiostats or between the levels of each coccidiostat. However, the values of dressing and total edible parts were nearly similar to those of unmedicated birds but the weights of intestine tended to decrease by supplementing the diets with the tested drugs.

Table 1.Effect of some antibiotics and /or anticoccidial compounds on carcass characteristics (g/100 g body weight) of broiler chicks at 6 weeks of age.

Treatments	LBW	dressing	Giblets	T edible parts	intestinal weight
Overall coccidiostat means					
No Coccidostats	1738±19.48	69.56±0.17^{E}	6.06±0.17^{D}	75.62±0.47^{D}	3.74±0.21^{D}
Sal 30 ppm	1749±14.89	70.32±0.19^{D}	6.15±0.10^{D}	76.47±0.21^{C}	3.48±0.07^{E}
Sal 60 ppm	1760±32.45	70.34±0.15^{D}	5.96±0.13^{D}	76.30±0.18^{D}	3.54±0.10^{E}
Overall sal means	1754±17.50	70.33±0.12^{C}	6.06±0.08^{C}	76.38±0.14^{C}	3.51±0.06^{C}
Las 37.5 ppm	1739±27.31	70.62±0.22^{D}	6.06±0.16^{D}	76.67±0.19^{D}	3.38±0.05^{E}
Las 75 ppm	1765±16.69	70.77±.022^{D}	5.98±0.06^{D}	76.75±0.22^{C}	3.46±0.10^{E}
Overall Las means	1752±15.88	70.69±0.16^{C}	6.02±0.08^{C}	76.71±0.27^{C}	3.42±0.10^{C}
Overall growth promoter means					
No growth promoters	1755±19.10	69.61±0.23^{B}	5.94±0.12^{A}	75.55±0.26^{B}	3.84±0.11^{A}
Avo 10 ppm	1753±16.73	70.69±0.13^{A}	6.02±0.08^{A}	76.70±0.13^{A}	3.40±0.04^{B}
Virg 20 ppm	1742±17.30	70.66±0.15^{A}	6.17±0.09^{A}	76.84±0.15^{A}	3.36±0.07^{B}
Interactions					
Basal diet	1733±26.04	67.99±0.47^{g}	5.60±0.21^{g}	73.59±0.30^{g}	4.68±0.01^{a}
Avo 10 ppm	1746±48.47	70.14±0.29^{bcd}	6.50±0.18^{a}	76.64±0.31^{abc}	3.41±0.11^{bcd}
Virg 20 ppm	1736±32.97	70.54±0.06^{abc}	6.08±0.35^{abcd}	76.62±0.68^{abc}	3.30± 0.04
Sal 30 ppm	1724±29.50	69.95±0.31^{cd}	5.98±0.14^{abcd}	75.93±0.42^{f}	3.74±0.03^{bc}
Sal 60 ppm	1817±74.67	70.12±0.30^{bcd}	5.80±0.30^{abcd}	75.92±0.38^{f}	3.41±0.10^{bcd}
Las 37.5 ppm	1754±74.67	69.81±0.30^{d}	6.40±0.39^{ab}	76.21±0.24^{def}	3.62±0.04^{bcd}
Las 75 ppm	1749±39.29	70.16±0.12^{abcd}	5.93±0.17^{abcd}	76.09±0.26^{def}	3.74±0.22^{bc}
Avo X Sal 30 ppm	1748±29.24	70.78±0.[illegible]^{abcd}	6.10±0.09^{abcd}	76.88±0.15^{abc}	3.38±0.08^{cde}
Avo X Sal 60 ppm	1755±45.76	70.68±0.20^{abcd}	5.76±0.08^{bcd}	76.44±0.20^{abcd}	3.42±0.11^{bcd}
Virg X Sal 30 ppm	1774±17.47	70.22±0.41^{abcd}	6.36±0.24^{abc}	76.58±0.33^{abc}	3.34±0.13^{de}
Virg X Sal 60 ppm	1709±44.31	70.21±0.26^{abcd}	6.31±0.15^{abcd}	76.52±0.36^{abc}	3.78±0.26^{b}
Avo X Las 37.5 ppm	1739±50.69	70.88±0.22^{abcd}	5.68±0.22^{cd}	76.56±0.24^{abc}	3.40±0.08^{bcd}
Avo X Las 75 ppm	1776±27.13	70.96±0.49^{abcd}	6.03±0.03^{abcd}	76.99±0.48^{abc}	3.40±0.13^{bcd}
Virg X Las 37.5 ppm	1724±66.37	71.16±0.29^{a}	6.08±0.04^{abcd}	77.24±0.32^{a}	3.13±0.08^{e}
Virg X Las 75 ppm	1770±25.51	71.18±0.34^{a}	5.99±0.11^{abcd}	77.17±0.25^{ab}	3.26±.03de

Sal = Salinomycin ,Las = lasalocid,Avo = Avoparcin,Virg = Virginiamycin, Giblets= Liver+Heart+Gizzard, T edible parts= Dressing+Giblets

a-e Means within a column without common letters are significantly different (P<0.05)

A,B Overall growth promoter means within a column without common letters are significantly different (P<0.05)

C No significant difference was detected between overall coccidiostat source means

D,E Overall coccidiostat level means within a column without common letters are significantly different (P<0.05)

Table 2. Effect of some antibiotics and /or anticoccidial compounds on carcass characteristics (g/100 g body weight) of broiler chicks at 7 weeks of age

Treatments	LBW	dressing	Giblets	T. edible parts	intestinal weight
Overall coccidiostat means					
No Coccidostats	2177±48.28	71.65±0.81^{D}	5.26±0.11^{D}	76.91±0.80^{D}	4.07±0.16^{D}
Sal 30 ppm	2169±34.17	71.77±0.51^{D}	5.38±0.13^{D}	77.15±0.56^{D}	3.78±0.11^{D}
Sal 60 ppm	2164±54.0	72.57±0.42^{D}	4.96±0.21^{D}	77.53±0.41^{D}	3.83±0.06^{D}
Overall sal means	2167±31.25	72.17±0.33^{C}	5.17±0.13^{C}	77.34±0.34^{C}	3.80±0.06^{C}
Las 37.5 ppm	2166±34.11	72.53±0.75^{D}	5.36±0.20^{D}	77.90±0.34^{D}	3.79±0.06^{D}
Las 75 ppm	2159±24.40	71.92±.56^{D}	4.91±0.15^{D}	76.84±0.50^{D}	3.79±0.08^{D}
Overall Las means	2162±24.40	72.22±0.47^{C}	5.14±0.12^{C}	77.37±0.45^{C}	3.79±0.08^{C}
Overll growth promoter means					
No growth promoters	2175±26.09	72.00±0.45^{A}	5.09±0.11^{A}	77.09±0.46^{A}	4.02±0.09^{A}
Avo 10 ppm	2193±32.68	71.48±0.35^{A}	5.20±0.14^{A}	76.68±0.28^{A}	3.82±0.06^{AB}
Virg 20 ppm	2130±35.27	72.09±0.62^{A}	5.10±0.14^{A}	77.18±0.63^{A}	3.72±0.09^{B}
Interactions					
Basal diet	210±73.35	69.14±0.98^{e}	5.20±0.05^{a-e}	74.34±0.97^{e}	4.66±0.02^{a}
Avo 10 ppm	2118±87.03	70.98±0.38^{b-e}	5.35±0.09^{a-e}	76.33±0.44^{b-e}	3.86±0.24^{a}
Virg 20 ppm	2184±56.63	71.30±1.95^{b-e}	4.53±0.25^{b}	75.83±1.81^{b-e}	3.70±0.23^{a}
Sal 30 ppm	2203±73.34	72.66±0.17^{a-b}	5.39±0.14^{a-e}	78.05±0.29^{a-b}	3.87±0.14^{a}
Sal 60 ppm	2158±56.02	72.82±0.46^{a-b}	4.60±0.10^{b}	77.42±0.50^{a-b}	3.88±0.07^{a}
Las 37.5 ppm	2093±30.96	72.66±1.12^{a-b}	5.30±0.33^{a-e}	77.96±1.35^{a-b}	3.81±0.24^{a}
Las 75 ppm	2210±57.38	72.70±0.79^{a-b}	4.96±0.35^{a-e}	77.66±0.77^{a-b}	3.89±0.14^{a}
Avo X Sal 30 ppm	2154±11.07	71.89±0.87^{a-e}	5.59±0.28^{a}	77.48±0.74^{a-b}	3.79±0.06^{a}
Avo X Sal 60 ppm	2344±63.14	72.42±1.04^{a-b}	4.57±0.37^{b}	76.99±1.42^{b-e}	3.82±0.09^{a}
Virg X Sal 30 ppm	2151±82.25	70.77±1.20^{b-e}	5.16±0.23^{a-e}	75.93±37.38^{b}	3.67±0.35^{a}
Virg X Sal 60 ppm	1991±63.89	72.48±0.78^{a-b}	5.70±0.28^{a}	78.18±0.95^{a-b}	3.79±0.16^{a}
Avo X Las 37.5 ppm	2202±79.70	70.12±0.45^{b-e}	5.55±0.25^{a}	75.67±0.53^{b-e}	3.89±0.13^{a}
Avo X Las 75 ppm	2144±70.21	72.02±0.79^{a-b}	4.91±0.28^{a-e}	76.93±0.61^{b-e}	3.76±0.06^{a}
Virg X Las 37.5 ppm	2204±10.63	74.82±0.72^{a}	5.24±0.34^{a-e}	80.06±0.48^{a}	3.68±0.18^{a}
Virg X Las 75 ppm	2122±70.41	71.04±1.34^{b-e}	4.86±0.25^{a-e}	75.90±1.13^{b-e}	3.73±0.21^{a}

Sal = Salinomycin ,Las = lasalocid, Avo = Avoparcin, Vir =Virginiamycin,Giblets=Liver+Heart+Gizzard,
T.edible parts = Dressing+Giblets
a-e Means within a column without common letters are significantly different (P<0.05)
A,B Overall growth promoter means within a column without common letters are significantly different (P<0.05).
C No significant difference was detected between overall coccidiostat soutce means
D No significant difference was detected between overall coccidiostat level means

This could indicate that the effectiveness of these antibiotics and coccidiostats had been diminished during the week withdrawal period after offering the supplemented diets for the first 6 weeks of age.

From the foregoing results of carcass characteristics it could be concluded that the best combination between the tested antibiotics and coccidiostats was that of virginiamycin and Las. 37.5. This combination generally exhibited higher dressing and total edible parts values and lower intestinal weight compared with other medicated and unmedicated birds. This observation confirmed the previous finding (El-Sherbiny et al., 1994) in which this combination was shown to exhibit significant improvement in body weight gains of chicks. This could indicate that decreasing the intestinal weight has a pronounced effect in improving the nutrient absorption by the host. However, the present results clearly showed that the addition of the tested antibiotics and/ or coccidiostats to broiler diets had a great effect in increasing dressing and total edible parts and decreasing the intestinal weight than those of the unmedicated birds. These findings are in general agreement with those reported previously by Stutz and Johnson (1976), Stutz et al. (1983), Jong et al. (1985), Dafwang et al. (1985) and El-Sherbiny et al. (1990) who concluded that antibiotics had a great effect in stimulating the growth as a result of reducing the intestinal weight. Several workers(Khakpour et al., 1984; Leeson, 1984a,b; Fairley et al., 1985; El-Sherbiny et al., 1990; Izat et al., 1990, 1991; Newcombe et al., 1992; Jamroz et al., 1992; Ibrahim et al., 1993) had confirmed the improvements which occurred in carcass measurements as a result of feeding broiler chicks on diets containing antibiotics and /or coccidiostats.

Plasma constituents

Results of plasma constituents of broiler chicks at 6 weeks of age are summarized in Table 3.

Total plasma protein (TP), albumin (AL) and globulin (g/100 ml).

There were no significant interactions in TP,AL and globulin between antibiotics and coccidiostats. Although no significant differences were detected in TP,AL and globulin among the fifteen treatments, the medicated

Table 3.Effect of some antibiotics and/ or anticoccidial compounds on blood plasma constituents of broiler chicks at 6 weeks of age.

Treatments	TP g/100 ml	AL g/100 ml	globulin g/100 ml	Glucose mg/100 ml	Chol mg/100 ml	TL g/L	ALP U/L	GOT U/ml	GPT U/ml
Overall coccidiostat means									
No Coccidiostats	4.39±0.15^{E}	1.79±0.05^{E}	2.60±0.05^{E}	226±13.33^{E}	130±2.98^{E}	4.88±0.16^{E}	439±13.22^{B}	206±3.90^{E}	24.49±0.81^{F}
Sal 30 ppm	4.32±0.16^{E}	1.78±0.07^{E}	2.55±0.17^{E}	232±11.56^{E}	114±2.26^{F}	4.86±0.11^{E}	454±9.57^{A}	210±2.76^{E}	27.68±1.40^{B}
Sal 60 ppm	4.62±0.15^{E}	1.82±0.02^{E}	2.79±0.16^{E}	231± 9.00^{E}	117±1.73^{F}	4.76±0.11^{E}	426±4.80^{C}	201±4.07^{F}	24.17±0.72^{F}
Overall sal means	4.47±0.12^{C}	1.80±0.02^{C}	2.67±0.11^{C}	232± 7.17^{C}	116±1.43^{C}	4.81±0.08^{C}	440±6.02^{C}	206±2.58^{C}	25.92±0.85^{C}
Las 37.5 ppm	4.52±0.17^{E}	1.70±0.03^{E}	2.82±0.16^{E}	234± 9.62^{E}	115±1.69^{F}	4.89±0.06^{E}	444±10.45^{B}	210±4.39^{E}	26.78±1.74^{B}
Las 75 ppm	4.72±0.17^{E}	1.74±0.02^{E}	2.98±0.16^{E}	238± 7.19^{E}	116±2.82^{F}	4.88±0.12^{E}	458±7.00^{A}	206±3.74^{E}	29.58±1.47^{E}
Overall Las means	4.62±0.12^{C}	1.72±0.02^{C}	2.90±0.11^{C}	236± 5.87^{C}	116±1.62^{C}	4.88±0.07^{C}	451±6.33^{C}	208±2.85^{C}	28.18±1.15^{C}
Overall growth promoter means									
No growth promoters	4.20±0.06^{E}	1.77±0.02^{A}	2.44±0.06^{E}	222±6.79^{A}	118±2.49^{A}	4.92±0.10^{A}	436±9.60^{A}	210±2.30^{A}	26.83±1.25^{A}
Avo 30 ppm	4.42±0.12^{E}	1.75±0.02^{A}	2.66±0.12^{E}	233±7.97^{A}	120±2.18^{A}	4.90±0.06^{A}	448±5.93^{A}	208±2.32^{A}	26.47±0.95^{A}
Virg 20 ppm	4.92±0.12^{E}	1.78±0.02^{A}	3.14±0.12^{E}	241±6.18^{A}	116±1.86^{A}	4.74±0.08^{A}	450±6.61^{A}	202±3.82^{A}	26.31±1.03^{A}
Interactions									
Basal diet	3.92±0.06^{E}	1.79±0.06^{E}	2.13±0.07^{E}	175±5.57^{E}	133±4.60^{A}	5.47±0.07^{A}	396±17.34^{DE}	208±5.59^{E}	22.98±1.07^{DE}
Avo 10 ppm	4.66±0.26^{E}	1.83±0.10^{E}	2.82±0.32^{E}	265±13.38^{E}	131±6.72^{A}	4.79±0.14^{BCD}	484±3.47^{A}	206±6.17^{E}	26.22±0.84^{BCD}
Virg 20 ppm	4.59±0.24^{E}	1.76±0.06^{E}	2.84±0.16^{E}	238±17.73^{E}	125±4.38^{A}	4.37±0.15^{C}	439±17.8^{BCD}	204±5.71^{E}	24.26±1.89^{DE}
Sal 30 ppm	4.04±0.15^{E}	1.73±0.07^{E}	2.31±0.17^{E}	254±18.36^{E}	110±2.48^{A}	4.50±0.10^{CD}	480±17.43^{A}	206±6.38^{E}	28.14±3.56^{ABC}
Sal 60 ppm	4.48±0.15^{E}	1.90±0.01^{E}	2.57±0.15^{E}	218±15.04^{ABC}	116±2.94^{A}	4.51±0.20^{CD}	416±8.02^{DE}	203±2.36^{E}	24.03±1.44^{DE}
Las 37.5 ppm	4.37±0.30^{E}	1.68±0.07^{E}	2.70±0.26^{E}	234±17.50^{AB}	110±2.53^{A}	5.09±0.07^{AB}	412±7.82^{DE}	219±4.50^{E}	25.36±2.39^{BCD}
Las 75 ppm	4.22±0.25^{E}	1.73±0.02^{E}	2.48±0.24^{E}	229±20.01^{AB}	123±5.30^{A}	5.0± 0.05^{AB}	476±12.31^{AB}	212±4.35^{E}	33.66±1.84^{A}
Avo X Sal 30 ppm	4.01±0.23^{E}	1.76±0.02^{E}	2.25±0.22^{E}	188±3.66^{BC}	120±3.12^{A}	5.12±0.14^{AB}	431±6.30^{CDE}	213±1.11^{E}	29.55±1.61^{ABCD}
Avo X Sal 60 ppm	4.40±0.35^{E}	1.75±0.02^{E}	2.65±0.40^{E}	233±13.35^{AB}	120±2.78^{A}	4.80±0.15^{BCD}	423±5.30^{CDE}	208±6.17^{E}	22.68±0.76^{E}
Virg X Sal 30 ppm	4.93±0.29^{E}	1.84±0.04^{E}	3.08±0.32^{E}	252±12.96^{A}	112±4.71^{A}	4.97±0.06^{ABC}	452±15.85^{ABCD}	210±5.87^{E}	25.34±1.78^{BCD}
Virg X Sal 60 ppm	4.97±0.14^{E}	1.82±0.02^{E}	3.15±0.32^{E}	242±19.76^{A}	116±3.62^{A}	4.99±0.22^{ABC}	439±8.52^{BCD}	191±9.50^{E}	25.80±1.20^{BCD}
Avo X Las 37.5 ppm	4.28±0.12^{E}	1.67±0.02^{E}	2.61±0.14^{E}	238±22.45^{A}	116±3.38^{A}	4.86±0.21^{BCD}	440±11.70^{BCD}	205±3.47^{E}	23.72±2.61^{CD}
Avo X Las 75 ppm	4.74±0.26^{E}	1.75±0.04^{E}	2.99±0.25^{E}	242±5.84^{A}	114±4.64^{A}	4.96±0.23^{ABC}	462±5.54^{ABC}	206±8.27^{E}	30.20±1.64^{ABC}
Virg X Las 37.5 ppm	4.90±0.36^{E}	1.76±0.04^{E}	3.15±0.35^{E}	231±14.11^{AB}	118±1.85^{A}	4.72±0.06^{BCD}	480±15.92^{A}	205±11.60^{E}	31.27±3.18^{AB}
Virg X Las 75 ppm	5.20±0.17^{E}	1.74±0.04^{E}	3.47±0.15^{E}	244±5.35^{A}	111±3.20^{A}	4.63±0.19^{BCD}	439±6.25^{BCD}	199±6.42^{E}	24.89±2.16^{BCD}

Sal = Salinomycin ,Las = lasalocid, Avo = Avoparcin, Virg = Virginiamycin, TP= total protein, AL = Albumin,Chol = Cholesterol,TL = total lipids,ALP = Alkaline phosphatase.
a-e Means within a column without common letters are significantly different (P<0.05).
A,B Overall growth promoter means within a column without common letters are significantly different (P<0.05).
C,D Overall coccidiostat source means within a column without common letters are significantly different (P<0.05).
E,F Overall coccidiostat level means within a column without common letters are significantly different (P<0.05).

birds with antibiotic and/ or coccidiostats tended to show higher TP and globulin values than the unmedicated birds. The TP and globulin values ranged from 3.92 and 2.13 for unmedicated group to 5.20 and 3.47 g/100 ml for Virg. + Las. 75, respectively. The AL values ranged from 1.67 for Avo. + Las. 37.5 to 1.90 g/100 ml for Sal. 60. It is clear that chick plasma contained more globulins than albumins. However, globulins are associated with the production of antibodies in mammals and birds. It is well known that chickens are good producers of antibiotics and this is related to the higher ratio of globulins to albumins in chicken blood (Wolfe et al., 1957). Therefore, the increase in globulins in blood could be an indication of the presence of immunoproteins.

It seemed that antibiotics and/ or coccidiostats had a slight effect in increasing the total plasma protein and globulin. A similar observation was reported by Drumev et al. (1976) who showed that flavomycin and virginiamycin had a favourable effect on the concentration of protein in blood of broiler chicks.

However, the TP, AL and globulin values obtained in this study were within the normal ranges of 2.7-5.6, 1.5-2.5 and 1.9-3.1 g/100 ml, for TP,AL and globulin, respectively as reported by Sturkie and Newman (1951), Sturkie (1965,1976), Morgan and Glick (1972), Abd El Mothy et al. (1986), Kaneko (1989), El-Sherbiny et al. (1990), Ghazalah et al. (1990) and Meluzzi et al. (1992).

The overall antibiotic means showed that virginiamycin treatment exhibited significantly ($P<0.05$) higher TP and globulin values but only numerically higher AL values than those of avoparcin or antibiotic-free diet. Drumev et al. (1976) reported that flavomycin and virginiamycin had a favourable effect on the concentration of protein in blood of broiler chicks.

No significant differences in TP and globulin were detected among the overall coccidiostat means either for sources or levels. No significant differences in AL between coccidiostat level means but a significant difference was detected between the two sources of coccidiostats since salinomycin showed significantly ($P<0.05$) higher AL than lasalocid.

Glucose (mg /100 ml)

There were significant differences in glucose content among the fifteen treatments. The unmedicated birds showed the lowest value of 175 mg/100 ml which was significantly ($P<0.05$) lower than the highest value of 265 mg/100 ml recorded for the avoparcin treatment. Among the medicated birds,the Avo. + Sal. 30 recorded the lower value (188 mg/100 ml) which was also significantly ($P<0.05$) lower than that of avoparcin treatment. It seemed that the tested levels of antibiotics and coccidiostats have no deleterious effect on the plasma glucose levels of broiler chicks at 6 weeks of age. The present range of 175 to 265 mg /100 ml was in harmony with the values of 201.00 and 254.9 mg/100 ml reported by Abdo et al. (1983) and Abd El Mothy et al.(1986). Bell and Sturkie (1965) reported that plasma glucose increases constantly during chicken embryogenesis to reach a level of about 160-180 mg per 100 ml at the time of hatching and continues to increase for several weeks, reaching adult levels of 200-240 mg per 100 ml by 2 months of age.

No significant differences were detected in plasma glucose content either between overall antibiotic mean values or between overall coccidiostat mean values.

Cholesterol (mg/100 ml)

Although no significant differences in cholesterol values were detected among the fifteen treatments, the cholesterol level tended to decrease by feeding chicks on diets containing antibiotics and/ or coccidiostats. The highest values of 133 mg/100 ml was recorded for the unmedicated birds while the lowest value of 110 mg/100 ml was recorded for the Sal. 30 and Las. 37.5 treatments. It seemed that the addition of the tested antibiotics and/ or coccidiostats to broiler diets has no appreciable effect on plasma cholesterol level. Unfortunately, no data are available on the effect of antibiotics and /or coccidiostats on cholesterol level in chicken blood. The only available report is that of Shaddad et al. (1985) who claimed that the presence of oxytetracycline in diets tended to decrease serum cholesterol in laying hens. However, the present values are within the normal published data. Estep et al. (1969) observed a decrease of serum cholesterol in cockerels from the sixth to twelfth week, followed by an

increase to the twentieth week. The low and high levels were 83 and 132 mg per 100 ml, respectively. Rudas et al. (1972) found that serum cholesterol of unsexed White Leghorn chicks from 1 to 15 weeks of age varied between 116 and 134 mg per 100 ml. Meluzzi et al. (1992) reported that normal total blood cholesterol ranged from 87 to 192 mg/100 ml in broiler chicks.

No significant differences were detected in cholesterol levels between the overall antibiotic mean values. The overall coccidiostat mean values clearly showed that the addition of coccidiostats to diets significantly ($P<0.05$) decreased the plasma cholesterol level in broiler chicks.

Total lipids (TL g/L).

There were significant differences in plasma total lipids among the fifteen treatments. The medicated birds gave lower values than that of the unmedicated birds. The unmedicated birds exhibited the highest value (5.47g/L) while the Virg. treatment showed the lowest value (4.37g/L). There were significant ($P<0.05$) interactions in plasma total lipids between antibiotic and coccidiostats. Although the antibiotics and /or coccidiostats had a great effect in decreasing the TL in plasma of broiler chicks these values are still within the normal published levels. Rudas et al. (1972) reported that serum lipids of unsexed White Leghorn chicks from 1 to 15 weeks of age varied between 4.20 and 4.80 g/L. Leclercq et al. (1974) showed that 10-week old broiler-type pullets, weighing 2200 g, had 10.10 g total lipids/L 80 min after a meal containing 50 g dry matter,but only 5.72 and 5.78 g, respectively, after 2 and 4 hours.

No significant differences were detected in plasma TL content either between overall antibiotic mean values or between overall coccidiostat mean values.

Alkaline phosphatase (ALP U/L)

There were significant differences in ALP among the fifteen treatments. The birds fed diets containing antibiotics and/ or coccidiostats showed higher ALP values ranging from 412 to 484 U/L compared with the values of 396 U/L recorded for unmedicated birds. Similar finding was reported by Horovitz et al. (1988) who showed that using monensin at levels of 300 or 400

ppm significantly ($P<0.05$) increased alkaline phosphatase in broiler chicks at 5-8 weeks of age. However, conflicting results were obtained by the previous workers. Abdo et al. (1983) found that the normal ALP in growing Hubbard chickens ranged from 250 to 300 U /L. Abdel Malaak (1989) obtained the ALP value of 453 U/L for broiler chicks at 56 days of age. Meluzzi et al.(1992) reported that the reference intervals was rather wide for ALP (568 to 8831 U/L). They attribute this wide range to the effects exerted by the variables chosen for the sampling,i.e., age, sex, strain and sampling season.

No significant differences were detected in ALP either between the overall antibiotic means or between the coccidiostat source means.There was a significant difference in ALP between the two levels of Salinomycin but not between the two levels of lasalocid. The Las. 75 treatment showed significantly ($P<0.05$) higher ALP values than that of Sal. 60.

Glutamic oxaloacetic transaminase activity (GOT U/ml)

No significant differences were detected among the fifteen treatments. The GOT values ranged from 191 U/ml for Virg.+ Sal. 60 to 219 U/ml for Las. 37.5.

There were no significant differences in GOT values either between overall antibiotic means,between overall coccidiostat source means or between overall coccidiostat level means. This could indicate that the addition of antibiotics and /or coccidiostats to broiler diets have no significant effect on the plasma GOT activity of broiler chicks. This is in harmony with the finding of Jamroz et al. (1986) who reported that growth promoters and coccidiostats had no adverse effect on blood chemistry of broiler chicks. On the other hand, Shaddad et al. (1985) found that oxytetracycline tended to increase GOT activity in young chicks and laying hens.

Glutamic pyruvic transaminase activity (GPT U/ml)

There were significant differences in GPT among the fifteen treatments.Birds fed on diets containing antibiotics and/ or coccidiostats exhibited higher GPT values than that of birds fed on unsupplemented basal diet. The Avo. + Sal. 60 and unmedicated treatments recorded the lowest values being 22.68 and 22.98

U/ml,respectively,while the three treatments of Las. 75, Virg.+ Las. 37.5 and Avo. + Las. 75 recorded the higher values being 33.66,31.27 and 30.20 U/ml,respectively. The latter three treatments showed significantly ($P<0.05$) higher GPT activity than that of the unmedicated bird. No available review concerning the effect of antibiotics and coccidiostats on GPT activity. The only available report is that of Shaddad et al. (1985) who showed that oxytetracycline tended to increase GPT activity in broiler chicks.

No significant differences were detected in GPT either between the overall antibiotic means or between the overall coccidiostat source means. There was no significant differences in the overall mean values of GPT between the two levels of each coccidiostat. However, the Las. 75 treatment exhibited significantly ($P<0.05$) higher value than that of Sal. 60.

Under the experimental condition, it could be concluded therefore, that no significant differences were detected in TP,Al,globulin cholesterol and Got among the medicated and unmedicated birds as a result of feeding broiler chicks on diets containing antibiotics and/ or coccidiostats during the first 6 weeks of age. Significant ($P<0.05$) differences were obtained in glucose,TL,ALP and GPT among the 15 treatments. No significant differences were detected in all the overall mean values of plasma measurments between the two tested antibiotics except those of TP and globulins in which Virg. exhibited significantly ($P<0.05$) higher overall TP and globulin mean values than those of avoparcin diet and antibiotic-free diet.

No significant differences were detected in all the overall mean values of plasma measurements either between the tested two coccidiostats or between the two levels of each coccidiostat except that of ALP since the Sal. 30 treatment showed significantly($P<0.05$) higher overall ALP mean value than Sal. 60 treatment.

It seems from the results of the fifteen treatments that the addition of antibiotics and/or coccidiostats to broiler diets could increase the levels of TP,globulin, glucose, ALP and GPT and decrease the levels of cholesterol and TL when compared with the corresponding values of the unmedicated basal diet. The results of AL and GOT did not give a consistent trend. The variation in blood constitute levels among the published data and

the present results could be mainly due to many factors such as genetic type, feeding, sampling season(summer or winter), rearing techinque,age, physiological state, and sex, as well as pathological factors. Moreover,methods of sampling and obtaining the biological material and the method of analysis can also influence results (Meluzzi et al., 1992).

Unfortunately, no enough data are available concerning the effect of supplementing the diets with antibiotics and or coccidiostats on blood parameters of chicks. The present results of blood analysis could be considered as a tentative.Further studies are worth to be carried out to relate blood parameters to such dietary treatments with chicks using a large number of blood samples taken from birds given different sources and levels of antibiotics and coccidiostats,before a definite conclusion could be confirmly stated.

Results of plasma constituents of broiler chicks at 7 weeks of age are summarized in Table 4. The results and statistical analysis of plasma measurements at 7 weeks of age clearly showed that there were no significant differences among the medicated and the unmedicated treatments. This could indicate that feeding chicks on diets containing antibiotics and/ or coccidiostats during the first 6 weeks of life have no significant effect on the tested blood measurements at 7 weeks of age after a week- withdrawal period. The ranges of the tested criteria are considered normal values and no deleterious effects occurred as a result of feeding such medicated diets during the first 6 weeks of age followed by a week withdrawal period (7th week) before taking the blood samples and marketing the chicks. The blood constituent values could be used as indicators of metabolic and health conditions of broiler farm, provided an adequate number of birds is examined.

Table 4: Effect of some antibiotics and/or anticoccidial compounds on blood plasma constituents of broiler chicks at 7 weeks of age [a].

Treatments	Total Protein g/100ml	Albumin g/100ml	Globulin g/100ml	Glucose mg/100ml	Cholesterol mg/100 ml	Total lipids g/L	ALP U/L	GOT U/ml	GPT U/ml
Overall coccidiostat means :									
No coccidiostat	4.28±0.16	1.64±0.03	2.65±0.15	222±4.86	144±1.59	5.56±0.11	422±11.07	207±3.85	26.98±1.67
Sal 30 ppm	4.36±0.16	1.56±0.02	2.80±0.15	236±8.94	144±1.20	5.54±0.09	436± 7.60	205±3.08	26.56±1.02
Sal 60 ppm	4.60±0.18	1.66±0.04	2.95±0.18	230±9.54	138±2.09	5.45±0.10	438±11.02	206±5.20	28.28±1.16
Overall Sal means	4.48±0.12	1.61±0.02	2.88±0.12	233±6.43	141±1.33	5.50±0.07	437± 6.55	206±5.60	27.42±0.78
Las 37.5 ppm	4.45±0.15	1.67±0.04	2.77±0.14	236±8.13	145±2.20	5.48±0.13	437± 9.93	208±4.10	26.82±1.46
Las 75 ppm	4.18±0.18	1.61±0.02	2.57±0.17	226±5.89	144±2.07	5.52±0.12	430± 9.61	206±3.00	27.30±1.65
Overall Las means	4.32±0.11	1.64±0.02	2.67±0.11	231±5.02	145±1.49	5.50±0.08	434± 6.80	207±2.49	27.06±1.08
Overall growth promoter means :									
No growth promoter	4.39±0.14	1.65±0.02	2.74±0.13	231±6.00	143±1.39	5.44±0.07	428±9.18	204±3.64	27.65±1.26
Avo 10 ppm	4.33±0.12	1.63±0.03	2.70±0.11	229±6.06	144±1.52	5.58±0.09	434±7.36	205±3.11	27.64±1.13
Virg 20 ppm	4.40±0.13	1.60±0.02	2.79±0.13	230±5.88	142±1.64	5.50±0.09	435±6.04	210±1.72	26.28±0.78
Interactions :									
Basal diet	3.84±0.14	1.67±0.04	2.17±0.14	224±11.18	148±1.11	5.54±0.13	388±18.50	211± 4.96	24.00±1.57
Avo 10 ppm	4.57±0.16	1.65±0.04	2.92±0.16	215± 8.37	146±2.69	5.49±0.22	426±9.24	200±10.20	29.84±3.88
Virg 20 ppm	4.45±0.38	1.58±0.07	2.86±0.31	226± 6.20	139±1.93	5.66±0.24	454±13.72	211± 2.87	27.10±2.65
Sal 30 ppm	4.25±0.39	1.55±0.03	2.70±0.37	205± 5.98	144±1.35	5.49±0.17	434±15.29	195± 3.30	27.05±2.01
Sal 60 ppm	4.72±0.22	1.67±0.01	3.05±0.21	227±14.22	142±4.01	5.36±0.21	435±24.02	196±11.60	28.88±2.00
Las 37.5 ppm	4.71±0.24	1.72±0.05	2.99±0.23	256±13.70	142±4.82	5.38±0.18	463±18.81	217± 7.87	28.77±2.77
Las 75 ppm	4.42±0.36	1.62±0.01	2.80±0.33	242± 9.74	141±4.62	5.43±0.18	420±12.78	204± 8.21	29.57±4.19
Avo X Sal 30 ppm	4.66±0.19	1.59±0.07	3.07±0.21	246±14.70	144±2.66	5.70±0.16	436±12.91	206± 4.59	27.42±2.48
Avo X Sal 60 ppm	4.23±0.36	1.66±0.12	2.56±0.26	237±17.20	136±0.75	5.55±0.13	442±23.80	217± 7.72	28.51±1.14
Virg X Sal 30 ppm	4.16±0.20	1.54±0.02	2.62±0.11	258±11.20	144±2.63	5.44±0.13	438±15.26	214± 3.14	25.23±0.60
Virg X Sal 60 ppm	4.86±0.32	1.63±0.04	3.23±0.35	225±21.75	137±4.95	5.45±0.21	436±13.56	206± 5.40	27.45±1.42
Avo X Las 37.5 ppm	4.34±0.31	1.64±0.08	2.70±0.26	234±16.53	145±2.97	5.67±0.26	425±17.08	197± 4.64	25.88±3.00
Avo X Las 75 ppm	3.87±0.12	1.60±0.03	2.26±0.11	216± 7.58	148±4.62	5.52±0.28	444±22.38	203± 4.38	26.56±2.42
Virg X Las 37.5 ppm	4.29±0.22	1.66±0.06	2.63±0.24	218± 3.92	149±3.72	5.36±0.25	423±10.18	209± 5.78	25.83±2.17
Virg X Las 75 ppm	4.23±0.38	1.60±0.05	2.63±0.38	222±10.35	142±2.40	5.62±0.18	426±15.90	210± 0.96	25.78±1.92

Sal = Salinomycin , Las = Lasalocid , Avo = Avoparcin , Virg = Virginiamycin and ALP = Alkaline phosphatase.
(a) No significant differences were detected between means within a column for each set of data

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دراسة تأثير تداخل بعض المضادات الحيوية مع مضادات الكوكسيديا على صفات الذبيحة وبعض قياسات بلازما الدم لكتاكيت التسمين

امال السيد الشربينى[1] - نجدة السيد عمر[2] - كمال يوسف النجمى[2]

١- قسم الانتاج الحيوانى، كلية الزراعة، جامعة القاهرة، الجيزة، مصر،
٢- معهد بحوث الانتاج الحيوانى، الجيزة ، مصر.

الغرض من هذا البحث هو دراسة تأثير التغذية على علائق محتوية على ٣٧,٥ أو ٧٥ ملجم / كجم علقية لاسالوسيد أو ٣٠ أو ٦٠ ملجم/ كجم علقية سالينومايسين) مع اضافة أو عدم اضافة ٢٠ملجم / كجم علقية فرجينيامايسين أو ١٠ ملجم عليقة افوبارسين على صفات الذبيحة وبعض قياسات بلازما الدم.

استخدم فى هذه التجربة ٤٨٠ كتكوت عمر يوم من سلالة اربرايكرزوتم توزيع الكتاكيت عشوائيا فى بطاريات على ٦٠ مجموعة كل مجموعة ٨ كتاكيت حيث استخدام ١٥ معاملة تجريبية بكل منها اربع مكررات .

تم اضافة الادوية للعلائق حتى الاسبوع السادس وبعد ذلك تم رفعها من العلائق لمدة اسبوع .

تم اجراء قياسات الذبيحة وتقدير مكونات بلازما الدم ف ٤ كتاكيت من كل معاملة تجريبية عند نهاية الاسبوع السادس والسابع.

ويمكن تلخيص النتائج والاستنتاجات المتحصل عليها فى الاتى :

- اظهرت اضافة المضادات الحيوية (فرجينيامايسين او افوبارسين) أو مضادات الكوكسيديا (سالينومايسين او لاسالوسيد) او كليهما الى تحسين معنوى فى وزن الذبيحة ونسبة الاجزاء المأكولة وخفض وزن الامعاء مقارنة بمجموعة المقارنة وادى مخلوط الفرجينيامايسين مع المستوى المنخفض من الاسالوسيد الى الافضل النتائج المتحصل عليها بالنسبة لصفات الذبيحة المختبرة وكذلك سواء عند الاسبوع السادس أو السابع من العمر.

ادى اضافة المضادات الحيوية أو مضادات الكوكسيديا او مخاليطها المختلفة الى زيادة قيم البروتين الكلى والجلوبيولين والجلوكوز alkaline phosphtase , GPT, وخفض نسبة الكلولسترول والليبدات الكلية فى بلازما الدم عند عمر ٦ اسبوع وذلك بالمقارنة بالعلائق الخالية من العقاقير ولم تعطى قيم الالبيومين و GOT اى اتجاه محدد .

- لايوجد اى فروق معنوية لقياسات الدم المختبرة بين المعاملات التجربية عند عمر ٧ اسبوع وهذا يدل على ان اضافة المضادات الحيوية ومضادات الحيوية الكوكسيديا الى علائق الطيور خلال الستة اسابيع الاولى من العمر لم تؤثر على قياسات الدم المختبرة عند عمر ٧ اسبوع بعد سحب الادوية لمدة اسبوع قبل التسويق وتعتبر جميع القيم المختبرة معدلات طبيعية بالنسبة لمكونات دم الكتاكيت .

- لم يؤدى خلط المضادات الحيوية (فرجينيامايسين او افوبارسين) مع مضادات الكوكسيديا (لاسالوسيد او ساينومايسين) بالنسب المختبرة الى اى تأثير ضار على مكونات الدم المختبرة سواء عند الاسبوع السادس أو السابع من العمر .