

Dept of Physiology,
Fac. Vet. Med., Cairo University.

EFFECT OF LASALOCID SUPPLEMENTATION ON SOME METABOLIC AND ENDOCRINE PARAMETERS IN TURKEY POULTS.

(With 4 Tables)

By

F.A.R. SAWIRESS; M.Z. ATTIA and SOHAIR Y. SALEH

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**تأثير إضافة اللاسالوسيد على بعض مؤشرات الأيض
والهرمونات في دجاج الرومي**

فرانسوا رياض ساويرس ، محمود زغول عطية ، سهير يوسف صالح

أجريت الدراسة على عدد عشرين من دجاج الرومي عمر شهرين لمعرفة مدى تأثير إضافة مادة اللاسالوسيد (Carboxylic antibiotic) على بعض مؤشرات الدم والكفاءة الغذائية للدجاج. تم تقسيم الدجاج إلى مجموعتين متساويتين. مجموعة ضابطة ومجموعة تم إضافة مادة اللاسالوسيد إلى العليقة بمقدار ١٢٠ جزء من المليون. تم سحب عينات الدم دورياً كل ثلاثة أسابيع حتى الأسبوع الثالث والعشرون لتقدير مستوى الجلوكوز، الدهون الثلاثية، الكولسترول، البروتين الكلي، الألبومين وكذا تقدير هرمونات الأسترايول والبروجستيرون، كما تم تسجيل وزن الجسم واستهلاك الغذاء، كفاءة التغذية وجودة الذبائح من حيث الوزن ونسبة التصافي. أحدثت إضافة اللاسالوسيد للعليقة زيادة معنوية في مستوى البروتين الكلي، الألبومين، هرموني الإسترايول والبروجستيرون وكذا الكفاءة الغذائية مقارنة بالمجموعة الضابطة. بينما لم يحدث تغيرات معنوية في مستوى الجلوكوز، الدهون الثلاثية والكولسترول بالدم. ويستدل من التجربة أن إضافة مادة اللاسالوسيد لعلائق الدجاج الرومي له أثر طيب على الكفاءة الغذائية ونسبة التصافي.

SUMMARY

Lasalocid, a carboxylic ionophore antibiotic, is used frequently in poultry feeds as a coccidiostat, however the present study centered on its role as growth promoter and in steroidogenesis. Twenty turkey poults, 60 days old, were allocated randomly in two equal groups; control group and lasalocid supplemented group (120 ppm). Blood samples were collected at three weeks interval, till the 23rd week, for determination of serum biochemical parameters (glucose, triglycerides cholesterol, total proteins and albumin), and gonadal steroids (namely estradiol and progesterone). Body weight and feed consumption were also determined

weekly to calculate feed efficiency. Carcass weight and dressing % were also recorded. The results revealed that lasalocid supplementation did not result in any significant change in glucose, triglycerides and cholesterol concentrations among the two experimental groups, however, the total protein and albumin concentrations were significantly increased in lasalocid supplemented group. Similarly, feed efficiency and dressing % of lasalocid supplemented group were significantly higher than those of the control group. Moreover, serum estradiol (E2) and progesterone (P4) levels were significantly higher in lasalocid supplemented group compared to the control. In conclusion, lasalocid supplementation was found to be useful in terms of increasing feed efficiency in turkey.

Key words: *Feed efficiency, lasalocid, metabolic profile, teroidogenesis.*

INTRODUCTION

The use of antibiotics as feed additives has been a hallmark of modern animal husbandry (Butaye *et al.*, 2003). The growth promoting effect of these products in chickens was discovered by feeding fermentation offal from the chlortetracycline production of streptomyces aureofaciens (Jukes and Williams, 1953). These products improved feed conversion, animal growth and reduced morbidity and mortality due to clinical and sub clinical disease (Ewing and Cole, 1994). The mechanism of growth promotion of these agents is still not exactly known, however experiments on germ free chickens have indicated that the growth promotive effect of these agents are mediated via four hypothesis either the nutrients are protected from bacterial destruction, or better absorption is achieved through thinning of the intestinal barrier, or decrement of intestinal bacterial toxins production or reduction in the incidence of subclinical intestinal infection (Feighner and Dashkevicz, 1987). Additional reports showed that better performance is achieved by these agents is attributed to their antioxidant (Grijalba *et al.*, 1998) &/or immune stimulating property (Perregaux and Gabei 1994).

Among the widely used antibiotics as growth promoters, stands the ionophores group (Butaye *et al.*, 2003). In animals, this group is mainly used as coccidiostats besides being a growth promoter (Butaye *et al.*, 1998). Lasalocid is a divalent carboxylic ionophore (Watanabe *et al.*, 1981), that transports bivalent ions as calcium and magnisuim very well (Pressman and Fahim, 1982) ,moreover it was also reported that it is an efficient potassium carrier (Caffarel-Mendez *et al.*, 1987).

Several experiments reported a growth promotive effect of lasalocid in chicks and ruminants (Hampson and Murdoch, 2003; Yang *et al.*, 2003 and Stanley *et al.*, 2004), while other reports mentioned either a no beneficial effect on growth or even a depressive effect on growth (Willis and Baker, 1980 and 1981)

Additionally besides affecting growth, lasalocid was reported to alter reproductive performance, gonadal steroids and laying rate in layers (Amaal, 1996; Tag El-Den, 2000). The same in cattle concerning growth and reproductive performance (Sprott *et al.*, 1988) and shorten postmortem interval (Webb *et al.*, 2001)

Thus this experiment was conducted to evaluate the growth promotive effect of lasalocid in turkey, and whether the supplementation could hasten the onset of puberty.

MATERIALS and METHODS

Twenty female turkey poults (Gioban strain) at the age of 60 days old were obtained from Tiba Company, Egypt.

Birds were placed on saw dust litter in floor pens where they were randomly allocated into two equal groups; the control group, fed on standard grower diet, and the treated group fed on the former ration supplemented with lasalocid at a level of 120 ppm. Chemical analysis of the ration showed that it furnished 20% crude protein, 8.5% fat, 1.3% calcium and 0.6% phosphorus and metabolisable energy 2820 Kcal/ Kg. The diet was available for all birds at an average of 150g / day / poult.

Birds were maintained in controlled condition of light (14 hours light: 10 hours darkness).

Sampling:

Blood samples were collected between 9-10 A.M every three weeks, starting from the 11th week till the age of 23rd week. Serum was separated by centrifugation at 3500 rpm for 15 minutes and kept at -20 °C until assaying.

Data collection techniques:

The weekly body weight and average feed intake was recorded and used to compute the average weekly weight gain and the feed efficiency. By the end of the experimental period (the 24th week) birds were slaughtered, dressed and their carcass weight and dressing % were recorded.

Biochemical analysis:

Biochemical parameters were analyzed spectrophotometrically; including serum glucose (Trinder, 1969), triglycerides (Wahlefeld,

1974), cholesterol (Allain, 1974), total proteins and albumin (Doumas *et al.*, 1981) and (Doumas and Biggs 1972), respectively. The kits used for determination of serum biochemical parameters were purchased from Stanbio laboratory USA .INC.

Hormonal assay:

Serum estradiol and progesterone were determined by chemiluminescent micro particle immunoassay kit purchased from Abott laboratories, USA. The minimum detectable limits were 1.5pg/ml and 0.01ng/ml respectively.

Intra and inter assay coefficient of variation were 7.4%-5.2%, and 12%-9.1%, respectively.

Statistical analysis:

Data are presented as means \pm S.E, and analyzed by one or two way ANOVA according to the method of Snedecor and Cochran (1980). Groups were compared by the protective significant difference test (P.S.D.) at the 5% level of probability.

RESULTS

Data presented in Table (1) revealed that there wasn't any significant difference in concentration of serum glucose triglycerides and cholesterol between the control and lasalocid supplemented groups. Additionally, The presented results in Table (1) showed that there was a significant increase in total protein concentration of the lasalocid group at the 20th and 23rd weeks, moreover, the over all mean of total protein concentration of the lasalocid group was significantly higher than that of the control group. As for serum albumin, the tabulated results (table 1) showed that the over all mean of the lasalocid group was significantly higher than that of the control group.

The presented data in Table (2) showed that lasalocid significantly increased the feed efficiency in almost all weeks of the experiment with the exception of the 20th week when compared to the control group. Moreover, the over all mean of feed efficiency of the lasalocid group was significantly higher than that of the control group. Similarly, the dressing % of the lasalocid group (Table 3) was significantly higher than that of the control group.

Concerning serum estradiol, the data shown in Table (4) revealed an increase in levels of the lasalocid treated group when compared to the control group, moreover, the over all mean of the lasalocid group was higher than that of the control. Similarly, the over all mean of P4 of the lasalocid group was significantly higher than that of the control.

Table (1): Effect of lasalocid supplementation on metabolic profile in turkey poults.

Parameters	Age Group	11 weeks old		14 weeks old		17 weeks old		20 weeks old		23 weeks old		All over mean	P.S.D of interaction	PSD of all over mean
		old	old	old	old	old	old	old	old	old	old			
Glucose mg/dl	Control	251.4 ±6.80	255.6 ±11.5	291.2 ±7.73	264.8 ±12.90	292.4 ±8.51	271.08	N.S	N.S	N.S	N.S	N.S	N.S	
	Lasalocid supplemented	250.6 ±5.50	264.6 ±1.96	288.6 ±7.24	289.6 ±3.90	289.8 ±5.05	276.64							
Triglycerides mg/dl	Control	163.4 ±21.60	115.2 ±10.91	148.2 ±23.73	129.6 ±14.59	90.0 ±9.90	129.28	N.S	N.S	N.S	N.S	N.S	N.S	
	Lasalocid supplemented	173.2 ±31.60	112.0 ±7.27	131.4 ±21.31	135.2 ±12.14	89.0 ±8.50	128.16							
Total cholesterol mg/dl	Control	105.8 ±3.71	148.4 ±3.61	154.8 ±12.30	180.2 ±18.50	160.2 ±5.52	149.88	N.S	N.S	N.S	N.S	N.S	N.S	
	Lasalocid supplemented	103.6 ±8.03	151.8 ±6.1	155 ±7.03	119.4 ±4.38	147.4 ±8.52	135.44							
Total protein g/dl	Control	4.58 ±0.92	4.60 ±0.09	5.58 ±0.22	7.48 ±0.18	3.42 ±0.16	5.132	0.5259	0.22352	0.5259	0.22352	0.22352	0.22352	
	Lasalocid supplemented	4.54 ±0.27	4.62 ±0.12	5.70 ±0.19	8.06 ±0.07	5.80 ±0.21	5.6							
Albumin g/dl	Control	2.68 ±0.11	2.72 ±0.04	2.46 ±0.07	2.28 ±0.07	1.76 ±0.024	2.38	N.S	N.S	N.S	N.S	N.S	N.S	
	Lasalocid supplemented	2.8 ±0.05	2.75 ±0.02	2.62 ±0.07	2.42 ±0.12	2.06 ±0.03	2.53							

Data presented as mean ± SE, number=10, P<0.05, N.S=non significant.

Table (2): Effect of lasalocid supplementation on feed efficiency in turkey poults.

Age group	11 weeks old	12 weeks old	13 weeks old	14 weeks old	15 weeks old	16 weeks old	17 weeks old	18 weeks old	19 weeks old	20 weeks old	21 weeks old	22 weeks old	23 weeks old	24 weeks old	All Over mean	PSD of interaction	PSD of all over mean
Control	0.0688 ±0.004	0.074 ±0.003	0.156 ±0.015	0.152 ±0.007	0.100 ±0.015	0.123 ±0.016	0.119 ±0.016	0.110 ±0.013	0.156 ±0.021	0.092 ±0.004	0.082 ±0.021	0.090 ±0.018	0.090 ±0.016	0.084 ±0.018	0.107		
Lasalocid treated	0.093 ±0.009	0.119 ±0.012	0.23 ±0.017	0.27 ±0.023	0.184 ±0.025	0.148 ±0.016	0.176 ±0.011	0.188 ±0.12	0.266 ±0.019	0.062 ±0.017	0.170 ±0.020	0.188 ±0.027	0.156 ±0.019	0.186 ±0.022	0.174	0.03297	0.01246

Data presented as mean ± SE, number=10, P<0.05, N.S.=non significant.

Table (3): Effect of lasalocid supplementation on carcass trait of turkey poults

Group	Control group	Lasalocid supplemented group	P.S.D
Parameters			
Carcass Weight (g)	3040 ±85.25	3267.5 ±123.38	N.S
Dressing %	73.68 ±0.35	76.56 ±0.32	1.09868

Data presented as mean ± SE, number=10, P<0.05, N.S.=non significant.

Table (4): Effect of lasalocid supplementation on serum estradiol and progesterone levels in turkey poult.

Parameters	Age Group	11 week		14 week		17 week		20 week		23 week		All over mean	P.S.D of interaction	PSD of all over mean
		old	±	old	±	old	±	old	±	old	±			
E ₂ (pg/ml)	Control	36	±0.71	25.2	±0.90	41.6	±1.21	41.2	±3.25	80.7	±2.7	44.94	3.5145	2.223
	Lasalocid supplemented	42.4	±1.03	32	±0.71	56	±2.07	66.8	±2.42	150.4	±4.2	69.52		
P ₄ (ng/ml)	Control	0.03	±0.007	0.05	±0.004	0.09	±0.002	0.1	±0.04	0.2	±0.06	0.094	N.S	0.0697
	Lasalocid supplemented	0.03	±0.005	0.07	±0.006	0.1	±0.003	0.3	±0.05	0.5	±0.07	0.2		

DISCUSSION

In the present experiment lasalocid supplementation did not alter serum concentrations of glucose cholesterol and triglycerides. This finding confirmed those of Duff *et al.* (1994) in beef steers and Yang *et al.* (2003) in goats who demonstrated that lasalocid supplementation had no effect on the concentration of the above mentioned parameters. Despite the failure of lasalocid to alter serum concentration of the previous parameters, yet one must keep in consideration that, with lower feed intake elicited by the former additive, a lower serum concentration must have been expected, yet the non significant change in the above mentioned parameters reflects a better absorptive state achieved either directly or indirectly by lasalocid supplementation (Feighner and Dashkevicz, 1987). This explanation was further confirmed in this study by the increase in feed efficiency.

The results of the present study showed an increase in total protein concentration of the lasalocid supplemented group. The former results agreed with those of Muntifering *et al.* (1980) and Yang *et al.* (2003) who demonstrated that lasalocid supplementation resulted in improvement of nitrogen utilization and decrement of urinary nitrogen output. The relatively elevated concentration in total protein of the lasalocid supplemented group, accompanied by better absorption for energy producing substrate, has resulted in better protein accretion which was further reflected by an increase of the dressing %. The reported increase in the dressing % of the lasalocid supplemented group goes hand by hand with the results obtained by Hooge *et al.* (1999) who demonstrated an increase in breast meat yield due to lasalocid supplementation.

Concerning the dynamics of the gonadal steroids, the previously mentioned results showed that lasalocid supplementation increased both the levels of estradiol and progesterone. This systemic effect is achieved since ionophores are readily absorbed after oral administration (Halvorson *et al.*, 1982), where they lower the energy barrier necessary for transmembrane transport of divalent ions in both prokaryotic and eukaryotic cells (Westley, 1982), consequently, lasalocid acting as calcium mobilizing agent, elicited an increase in intracellular calcium levels through either influx from extra cellular fluid and/or release from intracellular stores. This increase in intracellular calcium levels resulted in enhancement of steroidogenic enzymatic activity (Zobell *et al.*, 1987; Levorse *et al.*, 1991 and Tag EL-Den, 2000). The obtained results

disagreed with those of (Roche, Personal communication,1983) who reported that lasalocid supplementation in breeder turkey hens did not affect fertility or egg production. The discrepancy between the former study and the present one may be due to difference in the age and productivity of the birds.

In conclusion, lasalocid supplementation is issued in turkey flocks to improve feed efficiency and dressing %.

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