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EFFECT OF FEEDING DIETARY STENOROL OR CYGRO ON PERFORMANCE OF BROILER CHICKS RAISED ON DIFFERENT LITTER MATERIALS.

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ABSTRACT

A total number of 540 one day old unsexed arbor -acres broiler chicks were used in this study. The birds were randomly distributed into 6 groups 90 chicks each. Each group sub divided into 3 replicates, 30 chicks each in floor pen. The 3 X 2 factorial designed experiment included Stenorol or Cygro at level of 3 ppm under three types of litter, rice hulls, wheat straw and wood shaving.

A significant ($P<0.05$) interaction was detected between coccidiostats and litter type. Chicks fed a supplemented diet with Cygro and reared on rice hulls gave the heaviest body weight gains compared with other groups. Birds reared on wood shaving and fed diet supplemented with Cygro significantly ($P<0.05$) recorded the highest value of feed intake during the experimental periods. While birds reared on rice hulls litter and fed diet supplemented with Stenorol recorded the lowest value of feed intake. . Birds fed Cygro diet and reared on rice hulls litter gave the lowest value feed conversion compared with other groups. Rice hulls as broiler litter increased significantly ($P<0.05$) dressing % and total edible parts %. Results of serum total protein, albumin, globulin and aspartate amino transferase (AST) show that no significant ($P<0.05$) differences were detected due to litter type or coccidiostat source. It could be concluded from the present results and those broiler chicks can be reared under different litter types without any adverse effects. Also poultry men keepers use Cygro or Stenorol as coccidiostats to stimulate growth and prevent coccidosis in poultry farms.

INTRODUCTION

The economic importance of coccidiosis, especially in the poultry industry, has presented a challenge to research workers for many decades to control the disease. Advancement have been made in the methods of husbandry but the major mean of control is chemotherapy. Drugs have been developed which, by continuous low level medication, have provided effective cover even in modern intensive condition. Use of coccidiostats, especially ionophores, in broiler feeds is the primary method for prevention and control of an economically important disease; coccidiosis. Lasalocid is more effective in controlling coccidiosis (Chapman and Hacker 1994 and Abou-Zeid *et al.*, 1999). The polyether ionophores antibiotic monensin has been used successfully for many years for control coccidiosis in poultry (Chapman, 1993 and Champan and Saleh 1999). Semadurmicin, recently approved as ionophorous anticoccidial for broiler chickens and having a slight effect on broiler performance when fed higher levels of protein and methionine. Also dietary Semadurmicin had no effects on Na, Cl, K levels in serum (Pesti *et al.*, 1999 a, b, c). Continual expansion of broiler industry has resulted in additional demand for litter materials. However, production of wood shaving

and sawdust have not increased, and their availability is less due to competition from other industries. Some alternative litter materials have been tested with favorable results.The present study aimed to investigate the effects of ionophores occidiostat and litter types on performance of broiler chicks and litter moisture.

MATERIALS AND METHODS

This experiment was carried out at the Research Farm, Faculty of Agriculture Ain Shams Univ., Cairo.

A total number of 540 one-day-old unsexed Arbor -Acres broiler chicks were used in this study. The birds were randomly distributed into 6 groups each of 90 chicks having nearly similar means of live weight. Each group sub divided into 3 replicates, 30 chicks each. Chicks were raised in well-ventilated floor pens. Rice hulls, wheat straw or wood shaving were used as litters, 10 cm in depth. A 2 x 3 factorial designed experiment included supplementation of Stenorol or Cygro "ionophores coccidiostats" at 3 ppm with using three types of litter; rice hulls, wheat straw and wood shaving. The experimental periods were divided into two stages. From 1-28 days (starter period) and from 28-42 days (finisher period) of age. During starter period (1-28 days) chicks fed on diet contained 22 % crude protein and 3200 Kcal metabolizable energy. At the finisher period (28-42 days) chicks fed on finisher diet contained 18 % crude protein and 3200 Kcal metabolizble energy. Diets were formulated to cover the chick requirement of nutrients according to NRC (1994) as shown in Table 1.

Table (1): Composition and chemical analysis of basal diets.

Ingredients %	Basal diet 1	Basal diet 2
Yellow corn	64.76	74.00
Soy bean meal 48.5%	20.00	15.30
Meat meal 62 %	10.70	6.27
Vegetable oil	3.10	2.21
Calcium carbonate	0.54	0.90
Dicalcium phosphate	-	0.40
Methionine	0.30	0.17
Lysine	-	0.15
*Vitamin and mineral mixture	0.30	0.30
Salt	0.30	0.30
Total	100.00	100.00
Determined values		
Crude protein	22.18	18.08
Crude fat	6.65	5.75
Crude fiber	2.28	2.25
Calculated values		
Metabolizable energy (Kcal/kg feed)	3204	3215
Lysine	1.12	1.00
Methionine +cysteine	0.98	0.75
Calcium	1.02	0.92
Available phosphorus	0.46	0.39

***vitamin and mineral mixture supplied each kg diet :Vit A 12000 IU,Vit D_3 2500 IU,Vit E 12 mg, Vit k_3 3 mg,Vit B_1 1 mg, Vit B_2 6mg, Vit B_6 3 mg, Vit B_{12} 13µg, Niacin 30 mg, Pantothenic acid 12 mg, Folic acid 1 mg, Biotin 75µg, Choline chloride 600 mg, Copper 5 mg, Manganese 70 mg, Zinc 50 mg, Iron 60 mg, Iodine 0.3 mg, Selenium 0.1 mg and Cobalt 0.1mg.**

Feed and water were offered *ad-libitum* throughout the experiment and chicks were kept under the same managerial conditions. Weekly body weight and feed intake were recorded. At the end of the experiment, six birds from each group were randomly chosen for slaughter. Dressing, giblets and total edible parts were estimated. Blood samples were collected at slaughtering and centrifuged at 3500 rpm for 15 minutes. Serum produced was frozen at -20°C till the time of chemical determination of serum protein, Albumin as well as activities of aspartate aminotransferase (AST) using specific kits of Boehringer Mannheim Gmbh. Data were analysed using general linear model 's procedure for analysis of variance (SAS Institute, 1994). Significant differences among treatment means were detected using new multiple range test (Duncan,1955).

RESULTS AND DISCUSSION

A- Body weight gains

Chicks fed a diet supplemented with Cygro during starter and finishing periods had significantly ($P< 0.05$) heavier body weight gain during the two periods compared with Stenorol diet by about 9.6, 10.8 and 10.1% at 1-28, 28-42 and 1-42 days, respectively. Chicks reared on rice hulls significantly ($P< 0.05$) gave heavier body weight gains during the experimental periods than those other reared on litter types. Chicks reared on shaving litter gave the lowest body weight gains (Table 2). A significant ($P<0.05$) interaction was detected between coccidiostats and litter types. Chicks fed a diet supplemented with Cygro and reared on rice hulls gave the heaviest body weight gain compared with other groups at all periods studied.

B- Feed intake

Chicks fed diet supplemented with cygro at level of 3 ppm significantly ($P<0.05$) consumed more feed compared with other groups fed diet supplemented with Sternol at level 3 ppm by about 9.0, 10.2 and 9.7 at 1.28, 28-42 and 1-42 days, respectively. Birds reared on wood shaving significantly ($P<0.05$) consumed more feed during starter and finisher periods than other groups, however, the opposite situation was found at 28-42 and 1-42 day (Table 2). The interaction between type of litter and coccidiostat showed that birds reared an wood shaving and fed diet supplemented with Cygro significantly ($P<0.05$) consumed the highest value of feed intake during the experimental periods.

C- Feed conversion

The types of cocidiostat had no significant effects on feed conversion ratio where the chicks fed diets supplemented as the Sternol and Cygro had nearly similar values of feed conversion ratio at all periods studied (Table 2). The chicks reared on rice hulls litter had significantly ($P<0.05$) the best value of feed conversion ratio at all periods among those reared on three types of litter where they needed less amount of feed to gain one unit of live weight. The interaction between type of coccidiostat and litter types was significant ($P<0.05$) and the chicks of Cygro reared on rice hulls had the best values of feed conversion.

Table 2: Effect of coccidiostats and litter types on performance of broiler chicks during experimental periods.

Traits	Coccidiostats					
	Stenorol			Cygro		
	Litter types					
	Rice hulls	Wheat straw	Wood shaving	Rice hulls	Wheat straw	Wood shaving
Weight gain (g) at:						
1- 28 days	1120 ±2.88^{d}	1055 ±2.89^{e}	1030 ±2.85^{f}	1185± 2.86^{a}	1170± 2.89^{b}	1155 ±2.78^{c}
28-42days	908± 4.4^{d}	855± 2.85^{e}	775 ±2.56^{f}	950 ±2.38^{a}	935 ±2.76^{b}	925 ±2.69^{c}
1- 42 days in grams	2028 ±7.26^{d}	1910± 5.77^{e}	1805± 5.01^{f}	2135± 5.37^{a}	2105± 5.68^{b}	2080 ±5.02
Feed intake (g) at:						
1-28 days	1938± 1.47^{e}	1941 ±9.90^{e}	1978 ±5.76^{d}	2038 ±10.25^{c}	2141 ±6.15^{b}	2207 ±10.59^{a}
28-42 days	2289± 13.77^{c}	2240 ±10.92^{d}	1968 ±11.81^{e}	2375 ±2.72^{b}	2375 ±1.94^{b}	2414 ±12.87^{a}
1-42 days	4226± 12.32^{d}	4181 ±20.75^{d}	3946 ±9.87^{e}	4414 ±11.74^{c}	4516 ±7.03^{c}	4620 ±22.78^{a}
Feed conversion ratio (g fed/g gain) at						
1-28 days	1.73± 0.01^{c}	1.84 ±0.02^{b}	1.92 ±0.03^{a}	1.72 ±0.4^{c}	1.83 ±0.01^{b}	1.91 ±0.05^{a}
28-42 days	2.52 ±0.02^{c}	2.62 ±0.04^{a}	2.54 ±0.05^{b}	2.50 ±0.03^{d}	2.54 ±0.05^{b}	2.61 ±0.07^{a}
1-42 days	2.08 ±0.04^{d}	2.19 ±0.03^{b}	2.18 ±0.04^{b}	2.07 ±0.01^{e}	2.14 ±0.02^{c}	2.22 ±0.03^{a}

Overall means effects

Traits	Coccidiostats		Litter types		
	Stenorol	Cygro	Rice hulls	Wheat straw	Wood shaving
Body weight gain					
1- 28 days	1068± 13.48^{B}	1170 ±4.56^{A}	1152 ±14.64^{A}	1112 ±25.78^{B}	1092 ±28.01^{C}
28-42days	846 ±19.45^{B}	937 ±3.91^{A}	929 ±9.62^{A}	895 ±17.98^{B}	850 ±33.59^{C}
1- 42 days	1914 ±32.39^{B}	2107 ±8.42^{A}	2082 ±24.21^{A}	2008 ±43.76^{B}	1942 ±61.57^{C}
Feed intake (g) at:					
1-28 days	1952 ±7.21^{B}	2128 ±24.86^{A}	1988 ±22.98^{A}	2041 ±44.99^{B}	2092 ±51.37^{C}
28-42 days	2166 ±50.21^{B}	2388 ±7.58^{A}	2332 ±20.20^{A}	2307 ±30.53^{B}	2191 ±69.88^{C}
1-42 days	4118 ±44.11^{B}	4516 ±30.87^{A}	4320 ±42.42^{A}	4349 ±75.46^{A}	4283 ±75.18^{B}
Feed conversion ratio (g fed/g gain) at					
1-28 days	1.83 ±0.03^{A}	1.82 ±0.04^{A}	1.72 ±0.01^{B}	1.84 ±0.02^{B}	1.92 ±0.03^{A}
28-42 days	2.56 ±0.02^{A}	2.55 ±0.03^{A}	2.51 ±0.02^{B}	2.58 ±0.02^{A}	2.58 ±0.03^{A}
1-42 days	2.15 ±0.04^{A}	2.14 ±0.5^{B}	2.07 ±0.01^{C}	2.17 ±0.02^{B}	2.20 ±0.03^{A}

$^{a-f}$ Means without common letters are significantly different (P< 0.05).

$^{A-C}$ Overall means without common letters are significantly different (P< 0.05).

Evaluation of the suitability of several litter materials for broiler chickens (Burke *et al.*, 1993 and Willis *et al.*, 1997) showed promising results regarding growth of broiler due to mix some wood shaving and leaves or wood shaving and newspapers. Also, El-Gendy and Ensaf (1999) indicated that rearing Pekin ducklings on wheat straw, rice hulls or wood shaving were significantly heavier than those reared either on Berseem or straw litter or reared in battery brooders. The application of Cygro or Stenorol using to stimulate growth and prevent coccidiosis in broiler chickens are consistent with those reported by Hooge *et al.* (1999) and Pesti *et al.* (1999a,b). The growth promoter effect of ionophores may be possibly related to its prophylactic medication property, which induce its effect on coccidiosis sporozoites (Fuller *et al.*, 1995).

D-Litter moisture

The coccidiostat and litter types had no significant effects on the moisture percentage of excreta and litter (Table 3). Similarly, the interactions between the two factors studied were not significant in the two traits studied. Similar results are presented by Nakaue *et al.* (1985); Brake *et al.* (1992) and Pesti *et al.* (1999c), however, they differ from those of some ionophores in which product -related decreases (Monensin; Fleet and Saylor, 1984) and increases (Lasalocis, Wheelhouse *et al.*, 1985) in water consumption and excreta moisture have been observed.

E- Carcass traits

The effect of adding ionophores coccidiostats showed that Cygro significantly ($P<0.05$) increased dressing and total edible parts %

It could be observed that using rice hulls as broiler litter lead to increase significantly ($P<0.05$) dressing % and total edible parts % .The enhancement of carcass traits was related to the improvement in body weight gains (Table 4). No significant ($P<0.05$) interactions between litter type and coccidiostats were found. Concerning to ionophores coccidiostats effects on carcass characteristics, Hossam *et al.*, (1993) and Abou-Zeid *et al.*, (1999) showed that lasalocid addition to diet caused significant increase in carcass characteristics. While Pesti (1999 b) found that semduramicin produced few meaningful effects on carcass characteristics.

F-Some physiological parameters of blood constituents.

Results of serum total protein, albumin, globulin and aspartate amino transferase (AST) show that no significant ($P<0.05$) differences were detected due to litter type or coccidiostat sources (Table 5). The serum constituent's values were within normal range for chickens as reported by Ali (1999) and El-Gendy *et al.* (2000). Since globulin was not statistically affected by supplemented diet with Cygro or Stenorol .it may be concluded that these prophylactic medications don't interfere with the development of immunity against coccidiosis. Also the activities of aspartate amino transferase (AST) can be used as indicator for kidney and liver function. Since the increase values of AST in serum happen when hepatic cells are damaged or their membrane disrupted.

Table 3: Effect of litter types and coccidiostats on excreta and litter moisture at 42 days.

Traits	Coccidiostats					
	Stenorol			Cygro		
	Litter types					
	Rice hulls	Wheat straw	Wood shaving	Rice hulls	Wheat straw	Wood shaving
Excreta moisture %	84.80 ±1.15	84.10 ±1.65	84.90± 1.35	84.67± 1.44	84.50± 1.60	84.47± 1.55
Litter moisture %	31.33± 1.05	32.43± 1.20	34.60 ±2.15	29.53± 2.87	32.80 ±2.17	30.23 ±1.16

Overall means effects

Traits	Coccidiostats		Litter types		
	Stenorol	Cygro	Rice hulls	Wheat straw	Wood shaving
Excreta %	84.60 ±1.25	84.54 ±1.27	84.73± 1.21	84.30± 1.41	84.68± 1.31
Litter moisture %	32.79 ±1.81	30.86 ±1.81	30.43 ±1.38	32.62 ±1.97	32.42 ±1.43

Table 4: Effect of and coccidiostat and litter types on carcass characteristics of broiler chicks at 42 days.

Traits	Coccidiostats					
	Stenorol			Cygro		
	Litter types					
	Rice hulls	Wheat straw	Wood shaving	Rice hulls	Wheat straw	Wood shaving
Dressing %	67.50± 0.16	67.30± 0.17	67.27± 0.14	68.43± 0.19	68.33± 0.15	68.20± 0.14
Giblets %	5.00 ±0.02	4.70 ±0.06	4.60 ±0.07	4.97 ±0.08	4.87 ±0.03	4.80 ±0.05
Total edible parts %	72.50± 0.24	72.00± 0.13	71.87± 0.19	73.40 ±0.16	73.20± 0.13	73.00± 0.13

Overall means effects

Traits	Coccidiostats		Litter types		
	Stenorol	Cygro	Rice hulls	Wheat straw	Wood shaving
Dressing %	67.36 ±0.17^{B}	68.32± 0.15^{A}	67.97± 0.22^{A}	67.82± 0.23^{AB}	67.73 ±0.22^{B}
Giblets %	4.77 ±0.09	4.88 ±0.08	4.98 ±0.03	4.78 ±0.05	4.70 ±0.06
Total edible parts %	72.12 ±0.13B	73.20± 0.19A	72.95± 0.23^{A}	72.60± 0.27^{B}	72.43± 0.27^{B}

$^{A-B}$ Overall means without common letters are significantly different (P< 0.05).

Table 5: Blood serum parameters of broiler chicks as affected by dietary coccidiostats and litter type at 42 days.

Traits	Coccidiostats					
	Stenorol			Cygro		
	Litter types					
	Rice hulls	Wheat straw	Wood shaving	Rice hulls	Wheat straw	Wood shaving
Total protein (g/100 ml)	3.7 ±0.10	3.73± 0.12	3.60± 0.16	3.77± 0.13	3.77± 0.15	3.67± 0.14
Albumin (g/100 ml)	1.53 ±0.12	1.50 ±0.11	1.67 ±0.17	1.60 ±0.10	1.47 ±0.13	1.53 ±0.15
Globulin (g/100 ml)	2.17 ±0.16	2.23 ±0.17	1.93 ±0.14	2.17 ±0.18	2.30 ±0.11	2.13 ±0.13
AST (U/100 ml)	5.03 ±0.31	4.94 ±0.22	5.04 ±0.14	4.57 ±0.23	4.94 ±0.29	4.94 ±0.24

Overall means effects

Traits	Coccidiostats		Litter types		
	Stenorol	Cygro	Rice hulls	Wheat straw	Wood shaving
Total protein (g/100 ml)	3.68± 0.16	3.73± 0.15	3.73± 0.19	3.75± 0.18	3.63± 0.17
Albumin (g/100 ml)	1.57 ±0.17	1.53 ±0.19	1.57 ±0.15	1.48± 0.16	1.60 ±0.18
Globulin (g/100 ml)	2.11 ±0.18	2.20 ±0.19	2.17 ±0.19	2.27 ±0.15	2.03 ±0.17
AST (U/100 ml)	5.00 ±0.35	4.84 ±0.26	4.80 ±0.27	4.94 ±0.31	4.99 ±0.29

Also increased values of AST may provide an indirect evidence for kidney nephorons damage and dysfunction in metabolic system of chicken, which are reflected negatively on performance. It could be concluded from the present results and discussion that broiler chicks successfully can rear under different litter types without any adverse effects. Also poultry men can use Cygro or Stenorol as coccidiostats to stimulate growth and prevent coccidosis in poultry farms.

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تأثير التغذية على علائق تحتوى على ستنرول أو سيجرو على أداء كتاكيت التسمين النامية على مواد فرشة مختلفة.

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استخدم في هذه الدراسة ٥٤٠ كتكوت أربورايكرز غير مجنس سن يوم وتم توزيع الكتاكيت عشوائيا إلى ٦ مجموعات بكل مجموعة ٩٠ كتكوت موزعة على ثلاث مكررات بكل مكرر ٣٠ كتكوت وتم توزيع الكتاكيت توزيعا عامليا ٢ X٣ حيث أستخدم مستحضر ستنرول أو سيجرو بمعدل ٣ ملليجرام مادة فعالة لكل كيلو جرام علف تحت ثلاث أنواع من الفرشة "سرسة الأرز أو قش القمح أو نشارة الخشب" ويمكن تلخيص النتائج المتحصل عليها فيمايلى.

- أعطت الكتاكيت المرباة على سرسة الأرز ومغذاة على عليقه تحتوى سيجرو أعلى عائد متحصل عليه لوزن الجسم مقارنة بالمحاميع الأخرى.
- أعطت الطيور المرباة على نشارة الخشب ومغذاة على عليقه تحتوى سيجرو أعلى قيم في استهلاك العلف خلال الفترة التجريبية بينما أعطت الطيور المرباة على سرسة الأرز ومغذاة عليقه تحتوى على ستنرول أقل قيم في العلف المستهلك.
- أعطت الكتاكيت المرباة على سرسة الأرز ومغذاة على عليقه تحتوى على سيجرو أفضل قيم لمعامل التحويل الغذائي مقارنة بالمحاميع الأخرى.
- أعطت الكتاكيت المرباة على سرسة الأرز أعلى قيم لوزن الذبيحة ونسبة الأجزاء المأكولة مقارنة بنظم الرعاية الأخرى.
- لم يؤثر مستحضر ستنرول أو سيجرو وكذلك نظم الرعاية على قيم البروتين- الألبومين-الجلوبولين الأسبارتيك أمينو ترانزفيريز في سيرم الدم.
- ويمكن أن نخلص من هذه الدراسة بأنه يمكن تربية كتاكيت التسمين بنجاح تحت نظم الرعاية المختلفة ويمكن لمربى الدواجن استخدام مستحضر سيجرو أو ستنرول كمنشط للنمو وللوقاية من مرض الكوكسيديا.