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Broiler Male Rabbit Trats as Affected by Tafla Supplementation under Sup-Trobical Conditions of Egypt

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ABSTRACT

The present work was performed to study the effect of Tafla supplementation on the performance of growing rabbits during hot summer season. Exposing growing New Zealand White (NZW) rabbits to severe heat stress (Temperature humidity index = 24.7) during the hot period of year adversely affected their growth traits.

The final live body weight, daily body gain and daily feed intake were significantly ($p< 0.01$) increased by supplementation the Tafla at levels of 0, 10, 20, 30 or 40 g per kg diets. Also feed conversion and water intake were significantly ($p < 0.05$) improved by using the previous supplementation. The final margin was increased by Tafla supplementation than the control group. Rectum temperature and respiration rate not affected by supplementation the Tafla at levels of 0, 10, 20, 30 or 40 g per kg per kg diets.

Carcass and non carcass component were affected by supplementation the Tafla at levels of 0, 10, 20, 30 or 40 g per kg diets. The serum total protein, albumin, ALT and AST were significantly ($p<0.05$) affected while the serum globulin, urea, creatinine, RBCs, WBCs and Hb were not affected by using the Tafla at levels of 0, 10, 20, 30 or 40 g per kg diets .

Key words: Rabbits, clay or Tafla clay, growth, carcass, blood components and picture

Introduction

There are many factors effected in economic intensive rabbits production such as environmental and nutritional condition. The environmental condition play an important elements in production cycle. The domestic rabbits is a homoeothermic mammal. It has a high metabolic rate under developed sweat glands and slow heat loss. The thermo neutral zone of growing rabbits (6-12weeks of age) is 15-18 C (Rafai *et al.,* 1972) The high temperature in hot climate conditions affects negatively growth performance and feed intake (Samoggia *et al.,* 1987 ; Ayyat *et al.,* 1997 ; Marai *et al.,* 1999; 2000, 2001 and 2006; Abdel – Monem 2001 and Daader *et al.,* 2003). From another point of view the natural additives of rabbits feeding become more importuned to rabbits productions and product the rabbits clean meant (Lebas *et al.,* 1986 and cheeke, 1987).

Alleviation of heat stress may be achieved by ameliorating the environment, reducing the animal's heat production and /or helping the animals to dissipate the heat load. The latter includes physical, physiological and nutritional techniques (Marai *et al.,* 1994). Supplementation with natural tafla (clay) may be used as a nutritional technique to enhance growth rate through improving the digestibility of dry matter and protein (Kirilov and Burikhonov, 1993), organic matter and nitrogen-free extract (Chesmedzhiev *et al.,* 1981), by increasing the reactive surface area of nutrients and so promoting the action of digestive enzymes in the digestive tract (Pulatov *et al.,* 1983).

Egypt has a subtropical climate and numerous studies have been carried out on the effects of heat stress in the hot summer and its alleviation in growing male rabbits (Habeeb *et al.,* 1994; Marai *et al.,* 1994, 1999 and Tharwat *et al.,* 1994).

The present work aimed to study the growth performance of NZW growing male rabbits as affected by heat stress in Egyptian summer heat and its alleviation by supplementation natural clay at 0, 10, 20, 30 or 40 g of the diet.

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Materials and Methods

This study was carried out at a Private Farm in Zagazig city, Sharkia Governorate, Egypt. Fifty New Zealand White (NZW) weaned male rabbits of 35 days of age were randomly allotted to 5 treatment groups of nearly equal average weight with 10 animals in each. The first group (control group) was fed a basal diet, while the second, third fourth and fifth ones were fed the same diet supplemented with 0, 10, 20, 30 or 40 g tafla (clay) per kg diets, respectively, for 8 weeks.

Averages of ambient temperature and relative humidity at midday inside the rabbitry building during the experimental period were 27.45C and 75.3% in the hot period, respectively. The basal diet consisted of 28% alfalfa hay, 18% barley, 18% soybean meal (44%), 25% wheat bran, 6% yellow corn, 3 % molasses, 1.1% limestone, 0.3% sodium chloride, 0.6 % vitamin and mineral premix. The basal diet contained of 18.18 % crude protein, 13.43% crude fiber, 2.29% ether extract, 2656.00 digestible energy (kcal/kg).

All rabbits were kept under the same managerial, hygienic and environmental conditions. The rabbits were reared in wire cages as groups, in a well-ventilated building, fresh water was automatically available all the time by stainless steel nipples fixed in each cages. All rabbit cages were equipped with feeders and nipples. During the experiment the total artificial light was about 16 hours/day.

The rectal temperature and respiration rate were measured in rabbits once every two weeks at 9-11 a.m. Respiration rate was recorded by a hand counter, which counts the frequency of the flank movement per minute. Internal body temperature was taken by medicine thermometer inserted into the rectum for 2 minutes at depth of 2 cm. At the end of the experimental period three male rabbits from each group were randomly taken for slaughter, after complete bleeding, pelt, visceras and tail were removed and the carcass and some carcass components were weighted. The blood samples were collected from rabbits during the slaughter and the plasma was separated by centrifugation at 3000 rpm for 20 minutes and kept in a deep freezer at -20 C until the time of analysis. Total protein, albumin, creatinine and urea concentrations in plasma were estimated using commercial kits (Bio Merieux, France) according to the procedure outlined by the manufacturer. The globulin values were obtained by subtracting the values of albumin from the corresponding values of total protein.

In order to study the combined effects of temperature and humidity, temperature humidity index (THI) was calculated according to the formula of Marai *et al.* (2001a) as follows:

THI= db C^o -{(0.31-0.31RH) (db C^o -14)}, where db C^o = dry bulb temperature in Celsius and RH = RH % /100. The estimated values of THI were classified as follows: <22.2 = absence of heat stress, 22.2 – <23.2= moderate heat stress, 23.3 –<25.5 = severe heat stress and 25.5 and more = very severe heat stress.

The data of body weight, daily body gain, biochemical analysis, rectal temperature and respiration rate were analyzed statistically according to Snedecor and Cochran (1982) as following: $x_{ij} = \mu + T_i + e_{ij}$ where, μ = general mean, T_i = fixed effect of i^{th} treatments=(1, ... ,5) and e_{ij} = random error . Differences among means were tested by Duncan's multiple range test (Duncan , 1955)

Results and Discussion

Temperature – humidity index values (THI) were estimated 25.1 at hot periods, indicated exposure to severe heat stress during the hot period (23.3-25.5). Marai *et al.* (1996) found that NZW rabbits were under severe heat stress during the summer season in Egypt.

The obtained results indicated that there was non-significant difference in the initial live body weight of growing male rabbits in all experimental groups. The final live body weight and daily body gain were significantly (p< 0.01) increased by supplementation using the Tafla at levels of 20, 30 or 40 g per kg diets compared with control. Rectum temperature and respiration rate not affected by supplementation the Tafla clay at levels of 10, 20, 30 or 40 g per kg diets (Table 1).

Table 1: Feed intake, feed conversion, water intake, live body weight, live gain weight and some physiological parameters of growing NZW rabbits as affected by Tafla (clay) supplementation under Egyptian summer conditions

Items	Control	10 g /Kg	20 g /Kg	30 g /Kg	40 g /Kg	Sig.
Feed intake (g/day)	83.7 ^{c} ±1.8	94.2 ^{b}±2.4	99.9 ^{b}±2.9	101.6 ^{a} ±3.4	103.1 ^{a} ±3.6	**
Feed conversion	5.06 ^{b} ±0.09	4.66 ^{a} ±0.07	4.58 ^{a} ±0.09	4.62 ^{a} ±0.07	4.64 ^{a} ±0.1	*
Water intake (ml /day)	126.4 ^{b} ±4.3	142.1^{a} ±3.8	151.6 ^{a} ±4.6	155.9 ^{a} ±5.1	163.2 ^{a} ±4.9	*
			Growth performance			
Live body weight at:						
W o	630.4±9.02	640.8±7.1	635.9±11.4	638.7±10.2	641.5±13.2	NS
W4	1139.3 ^{c}±17.8	1215.9^{b} ±18.1	1263.5 ^{a} ±24.4	1299.2 ^{a}±19.7	1337.1 ^{a}±30.5	**
W8	1554.7 ^{c}±31.6	1773.3^{bc} ±40.3	1857.9 ^{b}±43.6	1869.7 ^{a} ±51.1	1885.4 ^{a}±57.4	**
Live gain weight at:						
G0-4	18.18^{b}±0.52	20.54^{b}±0.73	22.41^{ab}±0.91	23.59^{a}±0.83	24.84^{a}±1.13	**
G4-8	14.84^{b}±0.46	19.91^{a}±0.77	21.23^{a}±0.78	20.38^{a}±0.45	19.58^{a}±0.55	**
G0-8	16.51 ^{b} ±0.49	20.22 ^{ab} ±0.96	21.82^{a} ±1.04	21.98 ^{a} ±0.69	22.21^{a} ±0.83	**
			Physiological parameters			
Rectum temperature	40.2±0.09	39.7±0.08	39.8±0.07	39.9±0.09	39.9±0.08	NS
Respiration rate (RR)	116.7±2.7	116.2±2.9	116.4±2.1	115.8±2.0	115.6±2.2	NS
RR/RT	2.90	2.93	2.92	2.90	2.90	
RT%	100	98.76	99.00	99.25	99.25	
RR%	100	99.57	99.74	99.23	99.06	
			Profit analysis			
Feed cost (LE)	9.37	10.55	11.19	11.38	11.55	
Return (LE)	13.86	16.99	18.33	18.47	18.66	
Margin (LE)	4.49	6.44	7.14	7.09	7.11	

*Price : Experimental diet = 2.0 LE per kg diet , growing male rabbits live body weight = 15.0LE per kg , Margin per head == Return from body gain – feed cost . Other head costs were assumed constant . N S = not significant, * (p< 0.05) and **(p< 0.01) . Means a, b and c in the same row bearing different letters , differ significantly (p< 0.05).*

Treatment of heat-stressed growing NZW male rabbits with supplementation Tafla at levels of 0, 10, 20, 30 or 40 g per kg diets was significantly ($p< 0.01$ or 0.05) improved the daily feed intake, feed conversion and water intake than in the control group (Table 2), similar to that obtained by Marai *et al.,* (1999 and 2001b)in growing rabbits and Gabr *et al.,* (2003), who reported that live body weight and body weight gain in growing animals were significantly ($p < 0.05, 0.01$) increased by using Tafla clay at levels 10, 20, 30 and 40 g per kg diet as compared with the control group while, the rectal temperature, and respiration rate were not affected. Improving body gain by addition of Tafla clay might be interpreted by its role in decreasing rate of passage (Grim, 1968 ; Abd El-Baki *et al.,* 1988 and 2001 and Nower *et al.,* 1993), increasing digestibility and absorption in animals (Abd El- Baki *et al.,* 1988) and its reaction with dietary protein framing a complex which has a positive effect on protein degradability and improving nitrogen utilization (Britton *et al.,* 1978). Ensminger and Gieseking (1941)

The final margin was increased by supplementation the Tafla clay at levels of 10, 20, 30 or 40 g per kg diets than the control group (Table 1). The best margin obtained for growing male rabbits was in the group fed on the diet supplemented with 40 g Tafla clay per kg diet.

Carcass and non carcass component were affected significantly by supplementation the Tafla at levels of 0, 10, 20, 30 or 40 g per kg diets (Table 2). The same trend was observed by Marai *et al.,* (1999). The data in Table 3 showed that the serum total protein, albumin, ALT and AST were significantly ($p<0.05$) affected while the serum globulin, urea , creatinine, RBCs, WBCs and Hb were not affected by supplementation the Tafla at levels of 0, 10, 20, 30 or 40 g per kg diets as. These results agreed with those obtained by Nowar *et al.,* (1993) and Abd El-Baki *et al.,* (2001), who showed that serum GPT was increased by addition Tafla to animals feed.

It may be concluded that treatment of growing male NZW rabbits under summer hot stress by Tafla at levels 40 g/Kg improve the growth rate, body gain and final margin.

Table 2: Carcass traits of growing NZW rabbits as affected by tafla (clay) supplementation under Egyptian summer conditions

Items	Control	10 g /Kg	20 g /Kg	30 g /Kg	40 g /Kg
Pre-slaughter body weight	1554.7	1773.3	1857.9	1869.7	1885.4
Carcass weight	932.82	1134.91	1217.64	1215.31	1219.66
Carcass weight %	100	121.66	130.53	130.28	130.75
Dressing %	60	64.00	65.54	65.00	64.69
Fore part weight	230.4	287.8	281.4	277.1	283.5
Fore part weight %	100	124.91	122.14	120.27	123.05
Intermediate part weight	215..3	295.9	343.5	339.2	343.3
Intermediate part weight %	100	137.44	159.54	157.55	159.45
Hind part weight	281.7	343.3	380.9	380.7	372.4
Hind part weight %	100	121.87	135.21	135.14	132.20
Prime cuts weight	497	639.2	724.4	719.9	715.7
Prime cuts %	100	128.61	145.75	144.85	144.00
Head weight	121.80	124.90	128.64	130.50	130.10
Head weight %	100	102.55	105.62	107.14	106.81
Liver weight	55.90	53.91	54.10	58.31	60.50
Liver weight %	100	96.44	96.78	104.31	108.23
Kidney weight	12.10	12.40	12.00	11.90	11.96
Kidney weight %	100	102.48	99.17	98.35	98.84
Kidney fat weight	15.60	16.70	17.10	17.60	17.90
Kidney fat weight %	100	107.05	109.62	112.82	114.74

Table 3: Blood parameters and picture of growing NZW rabbits as affected by tafla (clay) supplementation under Egyptian summer conditions

Items	Control	10 g /Kg	20 g /Kg	30 g /Kg	40 g /Kg	Sig
Total protein (g/100ml)	$6.4^{b}\pm0.80$	$6.9^{a}\pm0.48$	$6.9^{a}\pm0.91$	$7.3^{a}\pm0.63$	$7.1^{a}\pm0.67$	**
Albumin (g/100ml)	$3.1^{b}\pm0.21$	$3.6^{a}\pm0.26$	$3.8^{a}\pm0.16$	$4.0^{a}\pm0.28$	$3.9^{a}\pm0.20$	*
Globulin (g/100ml)	3.3 ±0.11	3.3 ±0.14	3.1 ±0.15	3.1 ±0.18	3.2 ±0.16	NS
Kidney function:						
Creatinine	1.4±0.72	1.4±0.64	1.5±0.49	1.7±0.91	1.5±0.87	NS
Urea-N	54.4 ±4.3	53.9 ±4.6	56.5 ±3.4	55.2 ±3.7	57.1 ±3.5	NS
Liver function :						
AST(ul)	$15.0^{b}\pm2.3$	$16.5^{a}\pm2.5$	$16.0^{ab}\pm2.9$	$17.1^{a}\pm2.8$	$16.9^{a}\pm3.1$	*
ALT(ul)	$9.3^{b}\pm1.8$	$11.1^{a}\pm1.7$	$11.4^{a}\pm1.4$	$11.7^{a}\pm2.1$	$11.9^{a}\pm1.9$	*
Blood picture :						
RBCs	40.2±0.09	39.7±0.08	39.8±0.07	39.9±0.09	39.9±0.08	NS
WBCs	116.7±2.7	116.2±2.9	116.4±2.1	115.8±2.0	115.6±2.2	NS
HB	13.1±0.41	12.9±0.45	12.7±0.36	13.2±0.39	13.0±0.28	NS

Means bearing different letters in the same column within each classification, differ significantly (P≤0.05).
*** = P<0.01, * = P<0.05 and NS = not significant*

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