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EFFECT OF OIL, TAFLA AND SODUM BICARBONATE AS FEED SUPPLEMENTATION ON GROWING COMMERCIAL LAMBS PERFORMANCE.

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ABSTRACT : Fifty weaned commercial lambs males of 5 months of age and 20.89 Kg body weight. were used in the present study. The lambs were randomly allotted to 10 groups with 5 animals in each. The one group was fed concentrate diet ad libitum (as control). The other groups were fed control diet supplemented with cotton seed oil at levels of 1, 2, 3 and 4% per kg diet in groups (2, 3, 4 and 5) , tafla at levels of 2, 4 and 6% per kg diet in groups (6,7 and 8) and bicarbonate sodium at levels of 100 or 200 ppm /kg diet in groups (9 and 10) . The present study aimed to investigate the effect of previous treatments on growth performance, profit and carcass traits of commercial lambs males .

The results obtained showed that final live body weight and daily weight gain (during the whole experimental period) were significantly ($p < 0.05$ and 0.01) increased, also, the feed efficiency, margin and dressing percentage were improved when treated lambs with cotton seed oil at levels of 1, 2, 3, and 4% per kg diet , tafla at levels of 2, 4 and 6% per kg diet and bicarbonate sodium at levels of 100 and 200 ppm /kg diet as compared with the control group, while the rectum temperature, wool temperature and respiration rate not affected by using the same previous treatments. Water intake was decreased in lambs treated with cotton seed oil, but increased by using tafla and bicarbonate sodium.

INTRODUCTION

In Egypt, the increasing in human population and the rise their standards of living is associated with increasing the demands of animal products. This gap between meat production and consumption is bridged by finding out the possible means for increasing and improvement of meat production from all animals.

Egyptian local lambs are efficient in converting energy / protein of high or full concentrate ration into live body gain weight . Daily gain on these rations reaches 200- 250 gm in a growth fattening period of 80 – 85 days.

Tow stages of growth are considered most efficient in the life – span of a ruminant animals. These are during liquid feeding and from weaning to just before the full maturation of the rumen. In the latter stage, high – quality dry feeds mostly concentrates are fed, since ruminants utilize concentrates with maximum efficiency. Among ruminants, sheep have the advantage of being of small size.

When adding 2% bentonite to either high-concentrate or high – roughage rations, it was found that lambs growth was improved specially with high roughage rations containing urea (Martin et al , 1969). El-Hakim et al., (1994) revealed that addition of bentonite to lamb diets at 2.5 or 7.5 % levels improved digestion coefficient of nutrients. Similary (Pond , 1984) found that when supplementing Suffolk lambs fed corn soyabean meal with 2% clinoptilotite improved daily gain with 11.5%.

Fattening lambs on full concentrate ration is a new trend. Some workers suggest that it is more efficient than the normal (roughage + concentrate) type of feeding (El-Serafy, 1990 and Shehata and El-Sayed, (1994).

Sodium bicarbonate (Na HCO3) is a common feed additive used alter rumen fermentation and thus improve the performance of animals (Magliad et al., 1987). Sodium bicarbonate supplementation stimulate the appetite (Erdman et al., 1980), increase live body weight and gain (Magliad et al., 1987 and Marai et al ., 1994).

The present study was carried out to investigate the growth performance, some physiological traits, profit and carcass trait effect of commercial lambs as affected by using full concentrate diets without or with some feed additives.

MATERIALS AND METHODS

This work was conducted in the Department of Animal Production, Faculty of Agriculture, Zagazig University. The experimental work was carried out at privet farm in Abohamad city Sharkiaa governor.

A total number of 50 weaning male lamb with equal body weights (20.89 ±0.47) was used in the present study. The average of body weight in the different groups were nearly similar. All groups were fed ad libitum on a concentrate diet (as pelts) contained 18 % crude protein. The diets composition show in table 1. The daily consumption values of feed were recorded and water was offered freely to all animals and water consumption was estimated daily.

Animals were weighted at two successive days at the beginning of the experiment , then at 15 days intervals. Lambs were housed in semi- open sheds all over the experimental period. Physiological measurements which are rectal temperature and wool temperature were estimated and respiration rate was measured three times at 8.00,12.00 and 16.00 h for one day every week, during the experimental periods.

Rectal temperature (RT)was measured by inserting YSI Electronic Telethermometer Model 46 using 15-176-22 probe (designed for measuring RT) to the depth of 5-6 cm into the rectum, left for two minutes and read to the nearest 0.°C .The wool temperature was measured on wool surface of the upper part of the hind-quarter using 15-176-324 of the robe . Respiration rate was counted by the consistent flank movements per one minute . All measurements were taken within a range of time that did not exceed 2.3 minutes for each animal.

Three representative lambs from each group were slaughtered for studying carcass traits . Before slaughter , the lambs were fasted for 16 hours . After slaughter , the carcasses were chilled , dissected into wholesale cuts (legs , lion , rack , shoulder , neck and brisket) , weighed and their weights were recorded . Legs , lion , rack and shoulders were considered as prime cuts .The following weights were recorded : slaughter weight , hot carcass, abdominal fat, kidney , lever, lung, eye muscle, head and digestive tract.

(full and empty). The dressing percentages were calculated as : hot carcass weight relatively to slaughter weight, (hot carcass

weight +liver + heart + kidneys relatively to slaughter body weight) . Percentage of prime cuts (legs , lion , rack and shoulders) were also estimated relatively to carcass weight.

The data of body weight, daily body gain, rectum 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,.....,10) and e_{ij} = random error . Slaughter data were analysed by analysis of covariance according the following model: $x_{ij} = \mu + T_I + b\ (x - X) + e_{ij}$ where, μ, T_I and e_{ij} are as defined in the previous model, b = Regression coefficient of Y on x (slaughter weight), and X is the arithmetic mean of the x (slaughter weight). The differences between experimental groups were separated by Duncan s multiple range test Duncan, (1955).

RESULTS AND DISCUSSION

Results obtained in Table 2 showed that, average final live body weight was significantly ($P < 0.05$) increased by 1.95 , 5.7, 11.96, 7.65, 16.55, 26.29., 22.95, 12.8 and 18.08%, and daily weight gain (during the whole experimental period) was significantly ($P < 0.01$) increased by 12.03, 20.96, 26.8, 27.84, 44.33, 62.2, 66.32, 37.11 and 42.96%, when treated commercial lambs with cotton seed oil at levels 1, 2, 3, and 4% / kg diet , tafla at levels 2, 4 and 6% per kg diet and bicarbonate sodium at levels 100and 200 ppm /kg diet, respectively, as compared with the control group. Similar results were obtained by Pond (1984 and 1985), Nowar et al., (1993), El-Hakim et al., (1994), Abdel-Hafez (1997). And Mahgoub and Early (2000), while Pajak et al., (2000) reported that lambs diet containing various levels of energy no significant effect in daily live weight gain and feed utilization. The increase in live body weight and live body gain by using sodium bicarbonate stimulate the appitie and fibre digestibility and elevate volatile fatty acids production (Erdman et al 1980) and improve the feed intake (Maglad et al., 1987) prevent depression in rumen PH (Snyder et al., 1983). Improvement of body gain weight by addition of tafla may be due to its role in decreasing rate of food passage that increase each of ion exchange capacity, digestibility and

absorption, in addition to its reaction with dietary protein forming a complex which has positive effect on protein degradability and improvement of nitrogen utilization that are reflected in the increase in body gain weight (Ayyat and Marai, 1997).

Rectum temperature, wool temperature and respiration rate not affected by using cotton seed oil at levels 1, 2, 3, and 4% per kg concentrate diet , tafla at levels 2, 4 and 6% per kg concentrate diet and bicarbonate sodium at level 100and 200 ppm /kg concentrate diet.

Water intake decreased by 1.9, 3.8, 4.64 and 5.63%, with cotton seed oil at level 1,2,3 and 4% per kg diet , while increased by 2.75, 13.87 and 15.03% with tafla at level 2,4 and 6%/kg diet, , respectively. Also, sodium bicarbonate at level 100 and 200 ppm/kg diet increased water intake by 7.62 and 11.26% , respectively, when compare with the control group as showed in Table 2 . The same trend was obtained by Marai et al., (1994), Abdel Hafaz (1997) and Marai et al., (1999). The decrease in water intake with oil supplementation may be due to the decrease in dry matter intake (Marai et al., 1999) and digestibility of feed as reported by Devendra and Lewis (1974).

Data in Table 2 showed that feed efficiency (kg gain/ kg DM) was improved by using cotton seed oil at levels 1, 2, 3, and 4% per kg diet, tafla at levels 2, 4 and 6% per kg diet and bicarbonate sodium at level 100and 200 ppm /kg diet. The best feed efficiency recorded in group treated with 4% cotton seed oil. The improve observed in the traits with cotton seed oil supplementation may be attributed to the low wasted heat due to the specific dynamic action of the oil digestion in comparison with that of the digestion of each of the components of the other diets (Marai, et al., 1999). Improvement of feed efficiency by using cotton seed oil results to the increase in gross energy intake which leads in turn to the increase in body weight gain and the increase of daily body gain resulted to the increase of insulin level which increases with the increase of energy intake as reported by Waghorn et al, (1987).

Data in Table 2 showed that feed cost was increased in groups treated with tafla 2, 4 and 6 % and sodium bicarbonate at level 100 and 200 ppm/kg diet. This increasing in feed cost due to the

increasing in feed intake. Margin was increased by 24.58, 40.95, 47.40, 54.14, 78.52,111.19, 111.40, 58.69 and 65.44 with treated lambs by cotton seed oil at levels of 1, 2, 3, and 4% per kg diet , tafla at levels of 2, 4 and 6% per kg diet and bicarbonate sodium at levels of 100 and 200 ppm /kg diet, respectively as compared with the control group as shown in table 2. The best final margin recorded in groups treated with 4 and 6% tafla.

Dressing percentage was increased with 1.94, 2.59, 1.57, 9.45, 6.51, 11.08, 11.8, 0.78 and 2.97% by using cotton seed oil at levels 1, 2, 3, and 4% per kg concentrate diet , tafla at levels 2, 4 and 6% / kg concentrate diet and bicarbonate sodium at level 100and 200 ppm /kg concentrate diet respectively when compared with control group as shown in Table 3 , also hot carcass weight and embity weight were increased with the same previous treatments. Similar results were obtained by Pond, (1985) and Abdel-Hafez, (1997).

It could be concluded that treatement commercial lambs with tafla at levels 4 and 6% per kg diet is very effective with fattening on full concentrate diets.

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Table 1. Ingredients of lambs diets, chemical composition % and feeding value

Items	%
Corn	83.00
Soya bean meal	15.00
Calcium carbonate	1.4
Sodium chloride	0.5
Minerals and vitamins	0.1
Chemical composition %	
Dry Matter	90.38
Crude Protein	16.15
Ether Extract	1.92
Crude Fiber	2.28
NFE	76.10
Ash	3.55
Feeding value:	
TDN	55.50
SV	34.30
DCP	11.94

Table 2. Growth performance, rectum temperature, wool temperature, respiration rate, feed efficiency (kg gain/ kg DM), water intake and profit analysis of growing commercial lambs as affected by some supplementation ($\bar{x} \pm SE$).

Items	control	Cotton seed oil 1%	Cotton seed oil 2%	Cotton seed oil 3%	Cotton seed oil 4%	Sig.
Body weight						
Initial weight (1)	21.3±1.61[a]	20.35±1.04[a]	20.4±1.89[a]	21.8±1.39[a]	20.1±1.73[a]	NS
At 90 days of experiment (2)	31.54±2.33[a]	29.5±1.66[a]	32.2±2.85[a]	31.8±0.86[a]	31.5±2.21[a]	NS
At 150 days of experiment (3)	35.95±2.78[a]	36.65±2.47[ab]	38.0±3.11[abc]	40.25±1.34[ab c]	38.7±2.21[ab c]	*
Body gain						
From 1 to 2	112.67±14.55[a]	101.67±11.12[a]	131.11±12.37[a]	111.11±11.11[a]	126.67±19.44[a]	N.
From 2 to 3	73.5±13.75[a]	119.17±14.88[a bc]	96.67±14.34[a b]	140.83±10.41[a bc]	120.0±5.65[a bc]	S
From 1 to 3	97.00±12.11[a]	108.67±11.94[ab]	117.33±11.5[ab]	123.0±6.20[ab]	124.0±11.13[ab]	*
Some physiological parameters						**
Rectal Temperature	39.22±0.15	39.38±0.16	39.36±0.15	39.48±0.11	39.82±0.45	NS
Wool Temperature	36.8±0.58	36.5±0.23	36.42±0.18	36.14±0.80	36.44±0.54	NS
Respiration rate	76.2±5.03	80.2±3.51	79.4±2.62	83.6±0.75	83.0±2.39	NS
Water intake	3020.0	3140.0	3410.0	3036.6	3380.0	
Feed efficiency(kg gain/ kg DM)	0.13	0.18	0.20	0.21	0.23	
Feed Cost (L.E)	64.8	62.72	63.89	66.32	64.05	
Return	131.85	146.25	158.4	165.15	167.4	
Margin (L.E)	67.05	83.53	94.51	98.83	103.35	

Table 2. (continued)

Items	Taphla 2%	Taphla 4%	Taphla 6%	Bicarbonate sodium 100 ppm	Bicarbonate sodium 200 ppm	Sig.
Body weight						
Initial weight (1)	20.9±1.10^{a}	21.8±1.98^{a}	20.0±2.14^{a}	20.6±1.78^{a}	21.65±1.03^{a}	NS
At 90 days of experiment (2)	32.4±1.07^{a}	35.35±3.63^{a}	33.0±3.06^{a}	32.9±2.53^{a}	34.2±1.65^{a}	NS
At 150 days of experiment (3)	41.9±0.92$^{ab\ c}$	45.4±3.5^{c}	44.2±2.47$^{ab\ c}$	40.55±2.32$^{ab\ c}$	42.45±1.68^{abc}	*
Body gain						
From 1 to 2	127.78±35.34^{a}	150.56±18.35^{a}	144.44±11.39^{a}	136.67±17.36^{a}	139.44±19.37^{a}	N.S
From 2 to 3	158.33±52.64^{bc}	167.5±17.7^{c}	186.67±18.56^{c}	127.5±13.54$^{a\ bc}$	137.5±12.5$^{a\ bc}$	*
From 1 to 3	140.0±6.8^{bc}	157.33±11.47^{c}	161.33±7.04^{c}	133.0±10.12^{bc}	138.67±12.9^{bc}	**
Some physiological parameters						
Rectal Temperature	39.66±0.29	39.42±0.12	39.58±0.13	39.14±21	39.42±0.13	NS
Wool Temperature	35.46±0.48	37.20±0.65	36.4±0.76	36.44±0.39	36.4±0.51	NS
Respiration rate	76.6±1.25	79.8±3.31	77.0±3.03	76.4±4.86	77.2±2.52	NS
Water intake	3103.2	3439.0	3274.0	3750.0.0	2960.0	
Feed efficiency(kg gain/ kg DM)	0.20	0.22	0.21	0.18	0.18	
Feed Cost (L.E)	69.3	70.8	76.06	73.15	76.27	
Return	189	212.4	217.8	179.55	187.2	
Margin (L.E)	119.7	141.6	141.74	106.4	110.93	

Prices: Experimental diet =0. 60 LE per Kg.(control diet, taphla and bicarbonate sodum), 0.63 LE per Kg. (1%cotton seed oil diet) , 0.66 LE per Kg.(2%cotton seed oil diet) , 0.69 LE per Kg.(3%cotton seed oil diet) and 0.72 LE per Kg.(4%cotton seed oil diet) – Lambs live body weight = 9.0 LE per Kg – Margin per head= Return from body gain – feed cost. Other head costs were assumed constant . N S = not significant , * ($p< 0.05$) , ** ($P< 0.01$) , *** ($P < 0.001$) . Means in the same row bearing different (s) differ significantly ($p< 0.05$).

Table 3. Carcass and non carcass components of growing commercial lambs as affected by some supplementation.

Items	control		Cotton seed oil 1%		Cotton seed oil 2%		Cotton seed oil 3%		Cotton seed oil 4%	
	Weight kg	%	Weight kg	%	Weight kg	%	Weight kg	%	Weight kg	%
Slaughter weight	35.95	-	36.65	-	38.0	-	40.05		38.70	
Hot carcass	18.33	-	19.23	-	19.88	-	20.75		21.60	
Empty carcass	17.61	-	18.55	-	19.24	-	19.91		20.89	
Dressing	-	51.00	-	51.99	-	52.32	-	51.8	-	55.82
Abdominal fat	0.19	1.04	0.18	0.96	0.22	1.13	0.18	0.88	0.12	0.57
Liver weight	0.55	2.98	0.52	2.69	0.5	2.49	0.59	2.82	0.56	2.57
Kidney weight	0.17	0.93	0.16	0.81	0.14	0.69	0.25	1.21	0.15	0.68
Tail weight	1.74	9.5	2.21	11.49	1.90	9.56	2.61	12.58	2.27	10.49
Head weight	2.77	15.09	2.92	15.16	3.28	16.51	2.65	12.79	2.73	12.63
Heart weight	0.26	1.4	0.23	1.19	0.24	1.22	0.20	0.96	0.22	1.01
Lung weight	0.67	3.67	0.41	2.14	0.39	1.97	0.48	2.31	0.50	2.3
Eye muscle weight	0.67	3.63	0.56	2.92	0.8	4.02	.0.89	4.36	0.89	4.14
Full digestive canal	8.19	44.66	6.44	33.5	5.97	30.02	6.43	30.99	6.63	30.69
Empty digestive canal	3.86	21.07	4.29	22.3	4.01	20.18	4.49	21.62	3.64	16.84

Table 3. (continued)

Items	Taphla 2%		Taphla 4%		Taphla 6%		Bicarbonate sodium 100 ppm		Bicarbonate sodium 200 ppm	
	Weight kg	%	Weight kg	%	Weight kg	%	Weight kg	%	Weight kg	%
Slaughter weight	41.9	-	45.4	-	44.2	-	40.55	-	42.45	-
Hot carcass	22.76	-	25.72	-	25.2		20.85		22.29	
Empty carcass	22.02	-	24.99	-	24.53		20.02		21.55	
Dressing	-	54.32	-	56.65	-	57.02	-	51.43	-	52.51
Abdominal fat	0.21	0.94	0.200.5	0.77	0.18	0.71	0.22	1.06	0.26	1.18
Liver weight	0.56	2.45	7	2.22	0.51	2.03	0.62	2.95	0.59	2.65
Kidney weight	0.18	0.79	0.16	0.62	0.16	0.65	0.21	0.98	0.15	0.67
Tail weight	3.07	13.47	2.83	10.99	2.72	10.8	2.26	10.86	2.32	10.43
Head weight	2.79	12.25	2.72	10.57	3.02	12	2.94	14.12	3.08	13.83
Heart weight	0.17	0.76	0.17	0.66	0.23	0.93	0.25	0.85	0.21	0.96
Lung weight	0.50	2.2	0.38	1.48	0.47	1.85	0.48	2.32	0.48	2.14
Eye muscle weight	0.97	4.25	0.88	3.41	0.92	3.67	0.68	3.24	0.10	4.48
Full digestive canal	6.60	28.98	7.26	28.22	6.74	26.74	6.6	31.64	7.43	33.33
Empty digestive canal	3.52	15.48	4.58	17.81	4.71	18.69	3.46	16.61	4.65	20.85

تأثير الزيت والطفلة وبيكربونات الصوديوم كإضافات غذائية على أداء الحملان التجارية النامية

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قسم الإنتاج الحيواني – كلية الزراعة – جامعة الزقازيق

استخدم ٥٠ حمل تجاري مفطوم عمر ٥ شهور ومتوسط وزن ٣٠٫٨٩ كيلوجرام في هـذه الدراسـة. حيث وزعت الحملان عشوائيا في ١٠ مجاميع تجريبية وفي كل مجموعة ٥ حـيوانات. واحـدة من هذه المجاميع تم تغذيتها على عليقة مركزة للشبع (كمجموعة كنترول) بينما المجاميع الأخرى تم تغذيتها على عليقة الكنترول مضافا إليها زيت بذرة القطن بمستوى ١ ، ٢ ، ٣، ٤% لكل كيلو جرام عليقة في المجاميع (٢ ، ٣ ، ٤) والطفلة بمستوى ٢-٤-٦% لكـل كـيلو جرام عليقة في المجاميع (٥ ، ٦ ، ٧) وبيكربونات الصوديوم بمستوى ١٠٠ – ٢٠٠ جـزئ في المليون لكل كيلو جرام عليقة في المجاميع (٩ ، ١٠). وتهدف هذه الدراسة بحـث تأثير المعاملات السابقة على أداء النمو والكفائة الاقتصادية وصفات الذبيحة في ذكور الحملان التجارية.

والنـتائج المتحصـل عليها أظهرت أن وزن الجسم الحي والزيادة في وزن الجسم قد ارتفـع معـنويا على مستوى ٠٫٠٥ و ٠٫٠١ على التوالي كما تحسن كلا من كفاءة تحويل الغذاء و العائد الاقتصادي وصفات الذبيحة عندما تم معاملة الحملان بواسطة زيت بذرة القطن بمستوى ١-٢-٣-٤% لكل كيلو جرام عليقة والطفلة بمستوى ٢-٤-٦% لكل كيلوجرام عليقة وبـيكربونات الصـوديوم بمسـتوى ١٠٠-٢٠٠ جزئ في المليون لكل كيلو جرام عليقة عند المقارنة بمجموعة الكنترول (التي تتغذي على المركزات دون إضافات).

بيـنما وجد أن درجة حرارة المستقيم ودرجة حرارة الصوف ومعدل التنفس لم يتأثروا بالمعـاملات السـابقة. كمـيات الماء التي تناولتها الحملان قد انخفضت في المجاميع التي تم تغذيـتها على عليقة تحتوى على زيت بذرة القطن بينما زادت في المجاميع التي تم معاملاتها بالطفلة وبيكربونات الصوديوم.