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EFFECT OF SUPPLEMENTATION WITH *NIGELLA SATIVA* SEEDS ON NUTRITIVE VALUES AND GROWTH PERFORMANCE OF OSSIMI SHEEP

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ABSTRACT

Two experiments were carried out, the first was a digestibility trial on 9 Ossimi male rams divided into 3 equal groups; control which fed basal diet formed of 75% concentrate mixture and 25%wheat straw, the second group (T1) was fed the basal diet plus 100 mg *Nigella Sativa* seeds /kg body weight/ day, while the third group was fed on basal diet plus 200 mg *Nigella Sativa* seeds /kg body weight/day. Digestibility coefficients of different nutrients and nutritive values of the tested experimental rations were determined. The results indicated that digestibility values of dry matter (DM), ether extract (EE), and nitrogen free extract (NFE) increased (P<0.01) as a result of *Nigella Sativa* seeds supplementation in T1 and T2 compared to the control. Also, results illustrated that values of total digestible nutrients (TDN), metabolisable energy (ME) and digestible crud protein (DCP) recorded significant (P<0.01) increase in T1 and T2 compared to the control.

The second experiment included 15 Ossimi male lambs assigned randomly into three equal groups; control, T1 and T2 which fed the same above. Animals' body weights were recorded biweekly and the amount of rations was adjusted throughout the experimental period according to body weights changes. Also, feed conversion efficiency and economic evaluation of experimental tested rations were calculated. Results indicated that body weight gain of lambs recorded the highest values in T2 followed by T1 and the lowest values recorded in the control group. In addition, the results showed positive improvement in the values of feed efficiency in T1 and T2 compared with the control treatment. Cost evaluation showed better output with treated animals than control and that increasing *Nigella sativa* level maintain profit but not in significant manner.

From the present results it can conclude that *Nigella Sativa* seeds supplementation to the rations of sheep led to positive effect on the nutritive values of the rations, which positively reflected on growth performance.

Key wards: *Nigella sativa seeds, Nutritive values, Growth performance, Sheep.*

INTRODUCTION

Sheep population in Egypt estimated as 5.5 millions heads (**Ministry of Agriculture, 2008).** There are a large number of feed additives for inclusion in animal diet to improve animal performance. The World Health Organization (WHO) encourages using medicinal herbs and plants to substitute or minimize the use of chemicals through the global trend to go back to natural nutrients. Different studies showed a beneficial effect of using *Nigella Sativa* seeds as feed additives in ruminants' diet on most productive parameters. Several investigators illustrated that *Nigella Sativa* seeds supplementation had a beneficial effect on the efficiency of feed utilization as a result of improving digestion coefficients of different nutrients in the diet **(Abd El Gahni, 2003; Mohamed *et al*, 2003 and Randa, 2007)**, on body weight gain of goat **(Mostafa, 1998 and Randa, 2007)** of sheep **(Abd-El Ghani, 2003 and Sanad, 2000)** and of cattle **(Castro *et al,* 1995 and El-Saadany *et al,* 2008).**

The objectives of the present study was to evaluate the effect of *Nigella sativa* seeds

supplementation on feed nutritive values of rations and growth performance of Ossimi sheep.

MATERIALS AND METHODS

First experiment:

A total number of nine Ossimi male rams averaged 42.8±1.29 kg live body weight and at eight months old were randomly assigned, according to the level of *Nigella Sativa* seeds powder supplementation, into three equal (n=3) experimental groups as follow:

Control= Basal diet (75% concentrate mixture+25%wheat straw), T1 = Basal diet + 100 mg *Nigella Sativa* seeds /kg body weight/daily and T2 = Basal diet+200 mg *Nigella Sativa* seeds /kg body weight/daily. The digestible experiment lasted for 3 weeks.

The experimental groups were housed and fed separately in three cages. The concentrate mixture, consisted of (20% Soya bean meal, 41%wheat bran, 36% corn, 2.0% limestone, 0.5% sodium chloride and 0.5% premix). Fresh water was available all the day. Fecal samples were collected at the last week of the experimental period twice daily at 07:00 am and 16:00 pm directly from the rectum of each animal then it was stored at -5 °C until analysis. Samples of fecal and experimental rations were dried at 105 °C in a forced air oven for 3 hours or until reached a constant weight to determine dry matter (DM). Proximate chemical analysis was applied according to **A. O. A. C (1980).** Organic matter (OM) and nitrogen free extract (NFE) were calculated. Digestibility coefficients of DM, OM, CP, CF, EE and NFE were determined using acid insoluble ash (AIA%) as natural marker according to **Vankeulen and Young (1977)**. The nutritive values as total digestible nutrients (TDN), digestible crude protein (DCP) and metabolisable energy (ME) of the experimental rations were calculated.

Second experiment:

A total number of 15 Ossimi male lambs at 4-5 months of age and 23.20± 0.23kg live body weight were assigned into three equal groups. The first as control. T2 supplemented with *Nigella Sativa* seeds powder at rate 0.23 to 0.25% of feed intake and T2 at rate 0.46 to 0.50% throughout the experiment. All groups were fed separately for four months. Each treatment was fed in group. Lambs were fed on concentrate feed mixture (75%) and wheat straw (25%) to cover the daily requirement of dry matter intake (3.5 - 4.0% /body weight) and total digestible nutrients (TDN) for body weight (BW) and average daily gain (ADG) of lambs according to **NRC (1985).** Animals' body weights were recorded biweekly and the amount of rations was adjusted throughout the experimental period according to body weight changes. Total body weight gain, daily gain, feed efficiency and economic evaluation of different tested rations were calculated. Fresh water was freely available during all the day time.

Statistical analysis.

The results were statistically analyzed using the General Linear Model **(SAS, 1998)** for complete randomized design. Productive parameters were performed by methods of analysis of variance. All statements of significant difference are based on the 0.05 or 0.01 probability levels. Significant differences among treatments means were analyzed using **Duncan (1955)**. The following model was used.

(1)Effect of treatments on digestibility coefficient and nutritive values in experiment 1.

$$Y_{ij} = \mu + Ti + E_{ij}$$

Where,

Y_{ij} = Experiment observations.

μ = The overall mean

Ti= The effect of dietary treatment.

i= 1,----- 3 for treatment traits

E_{ij} = The experimental error.

(2):Effect of treatments and age on some productive traits in growing lambs.

$$Y_{ij}k = \mu + Ti + M_j + (TM)_{ij} + e_{ij}k$$

Where

$Y_{ij}k$ = The trait of study.
μ = The overall mean.
Ti = The treatment effect, where:
i = 1 : 3 for treatment traits;
M_j = The time (age or period) effect.:
J =1 : 5 for period traits;
$e_{ij}k$ = The random error

RESULTS AND DISCUSSION

First experiment:

Data of nutrients digestibility coefficients of different nutrients and nutritive values as total digestible nutrient (TDN), digestible crude protein (DCP) and metabolisable energy (ME) of the experimental rations are presented in Table (1). However, the analysis of variance of these traits are presented in Table (7). The digestibility values of dry matter (DMD), organic matter (OMD), crude protein (DCP), ether extract (EED), crude fiber (CFD) and nitrogen free extract (NFED) were increased (P<0.01) with the two levels of *Nigella Sativa* seeds compared to the control group. These results are in agreement with **Zeid (1998)**; **Allam *et al*., (1999), Mohamed *et al*.,(2003), and Randa (2007)**whom found highly significant positive effect of *Nigella Sativa* seeds on digestibility coefficient of most nutrients in the tested diets for goats.

The present results indicate that the mean values of TDN &ME (M cal /Kg of DM) and DCP were significantly (P<0.01) higher in T1 and T2 compared with the control. The associated values of TDN and ME were increased by 11.1% in T1 and 11.3% in T2, while values of DCP were increased by 16.9% in T1 and 20.8% in T2 compared to the control treatment (Table 1). The improvement in TDN, ME and DCP values in T1 and T2 may be due to the significant increase of digestibility coefficients of CP, EE, CF and NFE in response to *Nigella Sativa* seeds supplementation. These results are in agreement with **Allam *et al*., (1999)**; **Abd El-Ghani (2003); Mohamed *et al*.,(2003) and Randa (2007)**whom found a positive significant effect of *Nigella Sativa* seeds or its products supplementation on the nutritive values of tested rations.

Second experiment:

The increase in body weight of *Nigella sativa* treated groups started to be increased significantly (P<0.01) from the second month till end of experiment more than body weight of control group (Table, 2). High level of *Nigelle sativa* had insignificant minor increase in growth rate than the low level. The increases in body weight by the end of the 4 months were 4.3% and 6.1% in T1 and T2, respectively compared to the control treatment. Whereas, the interaction between treatments and age was not significant (Tables 2&8).

Data in Tables (3 and 4) showed the effect of *Nigella Sativa* seeds on total gain and daily gain of experimental male lambs. Whereas, the analysis of variance of these traits are presented in Table (8). Total gain and daily gain of male lambs recorded insignificant differences at one month post-treatment, while it showed highly significant (P<0.01) increase after 2, 3 and 4 months in T1 and T2 in comparison with the control treatment. These results are in agreement with those obtained by **Mostafa (1998)** and **Sanad (2000)**. The improvement in body weight, total gain and daily gain as a result of *Nigella Sativa* seeds supplementation may be due to the significant positive effect of *Nigella Sativa* seeds on TDN, ME and DCP values (Table, 1).

The effects of *Nigella Sativa* seeds on total dry matter intake (DMI) and feed efficiency during the experimental period are shown in Table (5). The present results indicate that the mean values of the total dry matter intake for the experimental rations during the experimental period (4 months) were almost the same. Feed conversion was improved in (T1) by 8.9% and 10.1% in T2 compared with the control treatment(Table, 6). Also, data in Table (6) illustrate the effect of *Nigella Sativa* seeds supplementation on economic evaluation of experimental rations. Total feed costs were estimated as 199.94 206.84 and 193.04LE for T1, T2 and control, respectively. Accordingly, the estimated

Table (1): Effect of *Nigella Sativa* seeds supplementation on nutrients digestibility and nutritive values of experimental rations.

Items	Treatments.			Sig. Among Treatments
	C LSM±SE	T1 LSM±SE	T2 LSM±SE	
Digestibility coefficients (%)				
DM	61.79±0.23[b]	68.65±0.23[a]	69.94±0.23[a]	**
OM	58.77±0.16[b]	68.25±0.16[a]	69.03±0.16[a]	**
CP	61.04±0.27[b]	70.34±0.27[a]	71.40±0.27[a]	**
EE	72.00 ±0.37[b]	74.56±0.37[a]	74.74±0.37[a]	**
CF	53.04±0.31[b]	60.64±0.31[a]	60.21±0.31[a]	**
NFE	65.29±0.27[b]	72.97±0.27[a]	73.42±0.27[a]	**
Nutritive values TDN (%)	64.44±0.20[b]	71.53±0.20[a]	72.74±0.20[a]	**
ME(M cal./kg DM)	2.32±0.002[b]	2.58±0.002[a]	2.62±0.002[a]	**
DCP(%)	8.75±0.04[b]	10.23±0.04[a]	10.57±0.04[a]	**

C=(Control) Basal diet(75%concentratemixture+25%wheatstraw).
T1 = Basal diet + 100 mg/kg/body weight/daily *Nigella Sativa* seeds
T2 = Basal diet+200 mg/kg/body weight/daily *Nigella Sativa* seeds.
a, b, Means within the same row followed by different superscript are significantly different **(P<0.01)

Table (2) Effect of *Nigella Sativa* seeds supplementation on body weight (kg)of Ossimi male lambs during the experimental period.

Items	Experimental Periods (P)					Sig. among riods:P
	At beginning LSM±SE	1 Months Post-treat. LSM±SE	2 Months Post-treat. LSM±SE	3 Months Post-treat. LSM±SE	4 Months Post-treat. LSM±SE	
C	23.24±0.31	29.57±0.26	34.73±0.25[b]	38.80±0.31[b]	41.90±0.28[b]	**
T1	23.20±0.31	29.92±0.26	35.42±0.25[a]	40.12±0.31[a]	43.71±0.28[a]	**
T2	23.68±0.31	30.12±0.26	35.58±0.25[a]	40.44±0.31[a]	44.49±0.28[a]	**
Sig. Among Treatments: T	NS	NS	**	**	**	Sig. of T×P NS

C= (Control) Basal diet (75% concentrate mixture+25%wheat straw).
T1 = Basal diet + 100 mg/kg/body weight/daily *Nigella Sativa* seeds.
T2 = Basal diet+200 mg/kg/body weight/daily *Nigella Sativa* seeds
a, b, Means in the same column under the same period followed by different superscript are significantly different. NS= Not significant** (P<0.01)=Highly significant.

economic output were 180.26, 210.26 and 209.36 L.E. for control, T1 & T2, respectively. This result indicate that although the higher concentrationof *Nigella sativa* seeds haven't significant enhance of growth, but the improved digestibility values and consequently feed conversion efficiency kept T2 output more than T1 output, though difference was minor. These results are in agreement with **El-Ayek *et al.*, (1998)** whom reported that feeding *Nigella Sativa* meals led to low feed cost/kg gain.

Table(3): Effect of *Nigella Sativa* seeds supplementation on monthly total body weight gain (kg) of Ossimi male lambs during the experimental period.

Items	Experimental Periods (P)				Sig. Among Periods:P
	1 months Post-treat. LSM±SE	2 months Post-treat. LSM±SE	months Post-treat. LSM±SE	4 months Post-treat. LSM±SE	
C	6.35±0.23	5.15±0.29[b]	4.07±0.39[b]	3.09±0.24[b]	**
T1	6.72±0.23	5.50±0.29[a]	4.69±0.39[a]	3.59±0.24[a]	**
T2	6.44±0.23	5.45±0.29[a]	4.85±0.39[a]	4.05±0.24[a]	**
Sig. Among Treatments: T	NS	**	**	**	Sig. of T×P NS

C= (Control) Basal diet (75% concentrate mixture+25%wheat straw).
T1 = Basal diet + 100 mg/kg/body weight/daily *Nigella Sativa* seeds.
T2 = Basal diet+200 mg/kg/body weight/daily *Nigella Sativa* seeds.
a, b, Means in the same column under the same period followed by different superscript are significantly different. NS= Not significant** (P<0.01)=Highly significant.

Table (4): Effect of *Nigella Sativa* seeds supplementation on daily gain(g/day) of Ossimi male lambs during the experimental period.

Items	Experimental Periods (P)				Sig. Among Periods:P
	1 months Post-treat. LSM±SE	2 months Post-treat. LSM±SE	3 months Post-treat. LSM±SE	4 months Post-treat. LSM±SE	
C	211.2±0.01	171.9±0.01[b]	135.7±0.01[b]	103.9±0.01[b]	**
T1	223.8±0.01	183.6±0.01[a]	156.4±0.01[a]	119.6[a]±0.01[a]	**
T2	214.7±0.01	181.7±0.01[a]	161.7±0.01[a]	121.6[a]±0.01[a]	**
Sig. Among Treatments: T	NS	**	**	**	Sig. of T×P NS

C= (Control) Basal diet (75% concentrate mixture+25%wheat straw).
T1 = Basal diet + 100 mg/kg/body weight/daily *Nigella Sativa* seeds.
T2 = Basal diet+200 mg/kg/body weight/daily *Nigella Sativa* seeds.
a, b, Means in the same column under the same period followed by different superscript are significantly different. NS= Not significant** (P<0.01)=Highly significant.

Table (5): Effect of *Nigella Sativa* seeds supplementation on Feed efficiency of Ossimi male lambs during the experimental period.

Traits	C	T1	T2
Initial body weight(Kg)	23.24	23.20	23.68
Final body weight(Kg)	41.90	43.71	44.49
Total gain (kg)*	18.66	20.51	20.81
Total dray matter intake (Kg)	144.00	144.27	144.47
Feed efficiency**	0.130	0.142	0.144

C= (Control) Basal diet (75% concentrate mixture+25%wheat straw).
T1 = Basal diet + 100 mg/kg/body weight/daily *Nigella Sativa* seeds.
T2 = Basal diet+200 mg/kg/body weight/daily *Nigella Sativa* seeds.
*Total gain= Final body weight- Initial body weight.
** Feed efficiency= Total gain/ Total dray matter intake.

Table (6):Economic evaluation of the experimental treatments .

Traits	C	T1	T2
Initial body weight(Kg)	23.24	23.2	23.68
Final body weight(Kg)	41.9	43.71	44.49
Total gain (kg)*	18.66	20.51	20.81
Total dray matter intake (Kg)	144	144.27	144.47
Feed conversion (FC)	7.72	7.03	6.94
Improvement (%)	100%	108.9%	110.1%
Total fed cost/head/LE	193.04	199.94	206.84
Gain price/LE	373.3	410.2	416.2
Output/LE	180.26	210.26	209.36

FC=Feed intake/kg gained
Gain price 20 LE per kg
Output= Gain price-feed cost

Table (7): Analysis of variance of digestibility coefficients of nutrients and nutritive values of experimental rations.

S.O.V	D.f	Mean square								
		Digestibility coefficients						Nutritive values		
		DM	OM	CP	EE	CF	NFE	TDN	ME	DCP
Treatments(T)	2	66.37**	98.08**	98.15**	13.32**	54.5**	440.72**	55.45**	0.095**	2.80**
Experimental error	6	1.263	9.83	1.05	1.03	6.35	3.27	1.02	0.001	0.24

S.O.V=Source of variance D.f=Degree of freedom **(P<0.01)=Highly significant affect

Table (8) : Analysis of variance of body weight (kg), body weight gain (Kg) and daily gain(g/day) of Ossimi male lambs.

S.O.V	Mean square				
	Df	Body weight	Df	Dily gain	Monthly total gain
Treatments (T)	2	35.888**	2	40.7**	27.4**
Age (P)	4	1470.602**	3	92.4**	88.7**
Interaction (T×P)	8	0.158 NS	6	1.2 NS	0.95 NS
Experiment error	60	0.5835	48	0.84	0.65

S.O.V=Source of variance D.f=Degree of freedom NS=Not significant, **(P<0.01)=Highly significant
NS = Not significant.

From the present results it can be concluded that *Nigella sativa* seeds supplementation in the rations led to positive effect on the nutritive values of the rations, which was reflected on growth performance of sheep.

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