EFFECT OF BLACK CUMIN CAKE (*NIGELLA SATIVA)* ON SHEEP PERFORMANCE.

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ABSTRACT:

The effect of *Nigella sativa* cake (NSC) (capsules after oil extraction) on growth performance of Ossimi lambs, nutritive values and feed conversion were studied in a feeding trial. The NSC was included at 0, 12.5, 25 and 37.5% of the tested diets replacing concentrate feed mixture (CFM) formulating four dietary treatments. The control diet consisted of 75% CFM + 25% sugar cane bagasse (SCB). Twenty four growing ossimi male lambs of 21 ± 1 kg live body weight were distributed into four similar groups. Each group was fed one of the four different dietary treatments in feeding period which lasted 90 days.

Results of digestibility revealed that NSC improved significantly ($P \leq 0.05$) organic matter (OM), crude protein (CP), crude fiber (CF) and nitrogen free extract (NFE). Nutritive values followed the same pattern. While, lambs daily gain, feed consumption and feed conversion were not significantly affected. Economical evaluation was in favor of NSC diets especially at 37.5% level.

Key words: Ossimi lambs, *Nigella sativa* cake, digestibility, feed intake, growth performance, economical evaluation.

INTRODUCTION

The problem of fattening lambs in Egypt is probably due to some managerial factors mainly feeding cost. Considerable amounts of NSC become available as a by-product of oil industry. It contains high protein (Sharobeem, 1996 and Youssef *et. al.,* 1998). Also, it contains remaining oil after extraction and reasonable amount of NFE (Gabr *et. al*. 1998 and Abdel-al and Attia, 1993). It is expected that NSC is a suitable and cheep protein and energy source to be included in the farm animal rations. Therefore, NSC could be used successfully and economically for replacing sunflower meal protein (Awadalla, 1997), soybean meal protein (Gabr *et. al.,* 1998) and CFM (Youssef *et. al.,* 1998) in diets of growing lambs.

El-Ayek *et al.* (1998) and El-Ayek (1999) indicated that NSC is characterized by low degradation rate in the rumen of sheep and could participate successfully up to 50% of protein in formulating concentrate feed mixture in sheep rations. On the other hand, NSC improves feed intake, digestibility and nutritive values of most feeds for sheep (Zaki *et. al., 1998).* Ibrahim *et al.* (2003) indicated that NSC could be used safely and economically in cattle feeding.

The objective of this study was to evaluate the effect of incorporating NSC in formulating diets of growing lambs as a partial replacement of CFM on

nutrient digestibility, nutritive value, growth performance and economical evaluation.

MATERIALS AND METHODS:

This study was carried out at the Experimental Farm of Animal Production Department, Faculty of Agriculture, El-Minia University, Minia, Egypt. The tested diets (D1, D2, D3 and D4) represented four treatments in which NSC incorporated at levels of 0, 12.5, 25 and 50 % (Table 1). The chemical composition of the different ingredients and calculated tested diets are presented in Table (2).

Table (1). Formulation of the tested diets.

Diets	% on dry matter basis		
	Concentrate feed mixture* (CM)	Sugar cane bagasse (SCB)	Nigella sativa cake (NSC)
D_1	75.00	25.00	--
D_2	62.50	25.00	12.50
D_3	50.00	25.00	25.00
D_4	37.50	25.00	37.50

*Concentrate feed mixture (CFM) composed of 30% wheat middling, 20% undecorticated cotton seed cake, 22% wheat bran, 12% yellow corn, 9% rice germ, 4% molasses, 2% limestone and 1% common salt.

Table (2). Proximate analysis of ingredients and calculated values for diets used in growth trial.

Item	DM %	% on dry matter basis						
		OM	CP	EE	CF	NFE	Ash	GE, Mcal/kg
Ingredients								
CFM	90.03	89.55	13.74	2.36	15.55	57.90	10.45	
SCB	91.22	94.98	1.76	2.89	34.87	55.46	5.02	
NSC	92.13	90.26	12.42	6.09	37.64	34.11	9.74	
Diets								
D_1	90.33	90.91	10.75	2.49	20.38	57.29	9.09	4.14
D_2	90.59	91.00	10.58	2.96	23.14	54.32	9.00	4.18
D_3	90.85	91.09	10.42	3.43	25.90	51.34	8.91	4.23
D_4	91.12	91.17	10.25	3.89	28.66	48.37	8.83	4.27

Digestibility trials:

Four yearling male sheep of an average 40 kg live body weight were used to determine digestion coefficients and nutritive values of the tested diets. Each digestibility trial continued for 21 days (14 days as preliminary period and 7 days as total collection period of feces). Feces were weighted daily, mixed thoroughly and 10% representative samples were taken from each animal. Laboratory analysis of feeds and feces were carried out according to A. O. A. C. (1990) procedures. Digestion coefficient and feeding values of the tested diets were determined. Gross and digestible energy were calculated after Nehring and Haenlien (1973).

Feeding trial:

Twenty four growing Ossimi male lambs of 21 ± 1 kg live body weight (four months old) were distributed into four groups, each of 6 lambs. Each group was fed one of the experimental diets (D1, D2, D3 or D4) for 90 days;

diets were fed to cover the nutritional requirements of growing lamb according to NRC (1988). Animals were weighed every two weeks, the diet was offered twice daily at 9.0 a.m. and 4.0 p.m. into equal portions and adjusted according to body weight changes. Water was freely available along the experimental period. Daily gain, feed intake and feed conversion were calculated.

At the end of the experiment, simple economical evaluation was calculated for the tested diets assuming that the cost of one ton of CFM, NSC and SCB were 900, 300 and 50 L.E., respectively.

Statistical Analysis:

Data were statistically analyzed using the general linear model procedure adapted by SPSS (1997). The least significant differences (LSD) were used when the treatment effects were significant (Steel and Torrie 1980).

RESULTS AND DISCUSSION:

Evaluation of the tested diets:

Table (2) show NSC contains 12.42% CP and high levels of EE 6.0% and CF 37.64%. Comparing the four tested rations, their chemical composition were nearly similar especially CP and gross energy (GE). Table (3) showed significant improvement ($P \leq 0.05$) in the digestibility regarding OM, CP, CF and NFE when NSC was used. Nutritive values as total digestible nutrients (TDN), digestible energy (DE) and digestible crude protein (DCP) were significantly higher ($P \leq 0.05$) in *Nigella sativa* cake containing rations. While in general, the results were in favor of D_4. These results are in agreement with those reported by Awadalla (1997), El-Ayek *et al.* (1998) Gabr *et al.* (1998), El-Ayek *et al.* (1999) and El-Gaafarawy *et al.* (2003) who found that DM, OM, CP and CF digestibility and nutritive values (TDN, DE and DCP) of rations containing NSC were significantly higher than those of the control ration. The positive effect of NSC containing rations may be due to the medicinal effect of NSC oil, which affect rumen fermentation through the buffering regulation of rumen microbes and nutrient absorption through the lower gut.

Feed intake and growth performance:

Data in Table (4) indicated that lambs daily gain, feed consumption and feed conversion were not significantly affected when NSC was included in the ration. However, average daily gain and feed conversion were significantly improved while, feed consumption was insignificantly decreased when NSC was added. This improve may be due to the decreased protein degradability in the rumen and the improve in the nutritive values as found by El-Ayek (1999) who reported that microbial protein was reduced when NSC was added. These results are in accordance with those obtained by Khan *et al.* (1996) and El-Ayek *et al.* (1999).

Table (3). Digestibility coefficients and nutritive values of the tested diets (on DM basis).

Item	Diets				±SE
	D_1	D_2	D_3	D_4	
Digestion coefficients %:					
DM	63.29	63.85	65.72	66.14	0.73
OM	61.22[c]	72.06[b]	71.60[b]	77.11[a]	0.80
CP	64.54[b]	74.88[a]	76.32[a]	78.23[a]	0.85
EE	74.95	77.76	77.00	76.93	0.74
CF	54.10[b]	64.82[a]	66.86[a]	67.39[a]	0.79
NFE	67.22[b]	81.28[a]	79.16[a]	84.77[a]	0.92
Nutritive values:					
TDN, %	60.49[b]	72.25[a]	71.85[a]	75.06[a]	0.69
DE, Mcal/kg DM	2.61[b]	3.11[a]	3.10[a]	3.24[a]	0.03
DCP, %	6.94[b]	7.92[a]	7.95[a]	8.02[a]	0.11

a,b,c…. average in the same row having different superscripts differ significantly ($P \leq 0.05$).

Table (4): Effect of the tested diets on performance of growing lambs.

Item	**Diets**				**±SE**
	D1	**D2**	**D3**	**D4**	
Average initial body weight, kg.	22.00	19.30	20.46	19.56	1.62
Average final body weight, kg.	34.20	31.56	32.94	32.50	1.70
Total gain, kg.	12.20	12.26	12.48	12.94	0.28
Average daily gain, g.	135.56	136.22	138.67	143.78	3.11
Feed Consumption					
DM, kg.	89.14	81.06	82.58	80.68	0.78
TDN, kg.	53.92	58.57	59.33	60.56	0.62
DCP, kg.	6.19	6.42	6.57	6.47	0.04
Feed conversion/ kg gain:					
DM, kg.	7.31	6.61	6.62	6.23	0.06
TDN, kg.	4.42	4.78	4.75	4.68	0.03
DCP, g.	507	524	526	500	8.29

Economical evaluation and conclusion:

Data in Table (5) indicated that the total feed cost for lambs decreased with increasing the level of NSC in the rations. So, the profit above feeding cost was higher of rations containing NSC than the control ration. The corresponding values of relative percentage of feed cost/kg gain were 100, 81, 71 and 57 for D_1, D_2, D_3, and D_4 respectively.

In conclusion the diets containing NSC could be used economically and successfully for growing lambs to improve digestibility, nutritive values, feed conversion and economical efficiency.

Table (5). Economical evaluation of the experimental diets.

Item	D_1	D_2	D_3	D_4

Total intake as fed, kg:				
CFM	74.01	56.27	45.86	33.61
SCB	24.43	22.22	22.63	22.11
NSC	--	11.00	22.41	32.84
Total cost of feed, L.E	67.83	55.05	49.13	41.12
Cost/kg gain, L.E	5.56	49.49	3.94	3.18
Relative feed cost/kg gain	100	81.00	71.00	57.00

The price of one ton of CFM, SCB and NSC were 900 L.E, 50 L.E and 300 L.E. respectively.

REFERENCES:

A.O.A.C. (1990). Association of Official Analytical Chemists. Official methods of analysis. 13th ed. Washington , D.C., USA.

Abdel-al, M.S.E. and S.R. Attia (1993). Characterization of black cumin (*Nigella Sativa*) seeds. Alex. Sci. Exch. 14: 467.

Awadalla, I. M. (1997). The use of black Cumin seed *(Nigella Sativa)* Cake in rations of growing sheep. Egyptian. J. Nutr.and feeds, 1 (Special issue): 243.

El-Ayek, M.Y. (1999). Influence of substituting concentrate feed mixture by *Nigella Sativa* meal on: 1-Voluntry intake, digestibility, some rumen parameters and microbial protein yield with sheep. The 7th Scientific Conference in Feeding Animals (Ruminants, Poultry and Fish), Suez Canal Univ. 19-21 October.

El-Ayek, M.Y; A.A. Gabr and A.Z. Mehrez (1998). Utilization of diets supplemented with untreated or formaldehyde treated soybean, *Nigella Sativa* meals and concentrate feed mixture by sheep. Int. Cnf. On Anim. Prod. & Health in Semi-Arid Areas. Suez Canal Univ. 1-3 Sept. 273.

El-Ayek, M.Y; A.A. Gabr and A.Z. Mehrez (1999). Influence of substituting concentrate feed mixture by *Nigella Sativa* meal on: 2-Animal performance and carcass traits. The 7th Scientific Conference in Feeding Animals (Ruminants, Poultry and Fish), Suez Canal Univ. 19-21 October.

El-Gaafarawy, A.M; A.A. Zaki; Enas R.El- Sedfy and Kh.I. El-Ekhnawy (2003). Effect of feeding *Nigella Sativa* cake on digestibility, nutritive value, reproductive performance of Friesian cow and immune activity of their offspring. Egyptian J. nutr. and Feeds (special issue) 6: 539.

Gabr, A.A; S.A. EL-Ayouty; A.A. Zaki; F.F. Abou Ammo and E.S.I. El-Gabary (1998). Productive performance of lambs fed diets containing *Nigella Sativa* meal. Egyptian . J. Nutr. and Feeds. 1(2): 97.

Ibrahim, G.F.; G.E. Shahin and Kh.I. El-Ekhnawy (2003). Effect of adding *Nigella Sativa* cake to crossbred Friesian calves feeds on productive and physiological performance. Egypt. J. Appl. Sci. 18 (2): 1.

Khan, A.G; A. Azim; M.A. Nadeem and M.A. Khan (1996). Effect of growing fattening diets on the growth performance of in testified Afghani lambs. Small Ruminant Res. 25 (1): 39.

Nehring, K. and G.F.W. Haenlien (1973). Feed evaluation and ration calculation based on net energy. J. Anim. Sci., 36: 949.

NRC, (1988). National Research Council. Nutrient Requirements of Sheep, National Academy of Science. Washington, D.C., USA.

Sharobeem, S.F. (1996). Chemical characterization of *Nigella Sativa* cake protein and its biological effects on albino rats. Zagazig J. Agric. Res. 23 (3): 355.

SPSS (1997). Statistical Package for Social Science release 8.0 copyright (c), SPSS INC., Chicago, USA.

Steel, R.G. and J.H. Torrie (1980). Principles and procedures of Statistics. 2nd ed. Mc-Grow-Hill, Book Co. Inc., London. U.K.

Youssef, M.M.; A.M.Abdiene, R.M.Kattab, and S.A.Darwish (1998). Effect of *Nigella Sativa* cake on productive and reproductive performance of buffaloes. Egyptian. J. Nutr. & Feeds 1 (2): 73.

Zaki, A.A; M.F.A. El-Gamal and K.M. El-Gendy (1998). Effect of feeding *Nigella Sativa* meal on performance of buffaloes. Zagazig Vet. J. 26 (3): 85.

تأثير إضافة كسب حبة البركة على أداء الأغنام

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أجريت هذه الدراسة بمزرعة كلية الزراعة بالمنيا - جامعة المنيا بهدف دراسة تأثير استبدال جزء من العلف المصنع بكسب حبة البركة (الثمار كاملة بعد إستخلآص الزيت منها في المصانع الأهلية) على أداء الحملان الاوسيمى النامية ودراسة القيم الهضمية والغذائية لكسب حبة البركة وكذلك الكفاءة التحويلية للغذاء. استخدم في هذه الدراسة ٢٤ حمل من ذكور الاوسيمي متوسط وزن ا لجسم الحي ٢١ ± ١كجم في عمر ٤ شهور وزعت عشوائيا إلى أربعة مجموعات متماثلة (٦حملآن في كل مجموعة) غذيت المجموعة الأولى (مجموعة المقارنة) على ٧٥% علف مصنع + ٢٥ % مصاصة قصب، غذيت المجموعة الثانية على ٦٢.٥% علف مصنع + ١٢.٥% كسب حبة البركة + ٢٥% مصاصة قصب، غذيت المجموعة الثالثة على ٥٠% علف مصنع + ٢٥% كسب حبة البركة + ٢٥% مصاصة قصب، غذيت المجموعة الرابعة على ٣٧.٥%علف مصنع + ٣٧.٥% كسب حبة البركة + ٢٥% مصاصة قصب. استمرت التجربة لمدة ٩٠ يوما. أوضحت النتائج المتحصل عليها ما يلي:

- زيادة معنوية عند مستوى ٥% لمعاملات هضم المادة العضوية والبروتين الخام والألياف الخام والكربوهيدرات الذائبة في العلائق المحتوية على كسب حبة البركة مقارنة بعليقه المقارنة. كما وجد تحسنا معنويا في القيم الغذائية وميزان النيتروجين نتيجة إضافة كسب حبة البركة.

- لم يكن هناك أي اختلاف معنوي بين العلائق الأربعة في الزيادة اليومية للحملان وكذلك الغذاء المأكول وكفاءة تحويل الغذاء.
- أظهر التحليل الاقتصادي البسيط لهذه الدراسة أن استبدال العلف المصنع بكسب حبة البركة وخاصة بنسبة ٣٧.٥% كان الأفضل حيث خفض تكاليف التغذية وكذلك تكلفة إنتاج الكيلو جرام من النمو.
- نستخلص من هذه الدراسة أنه يمكن استبدال جزء من العلف المصنع بكسب حبة البركة بنجاح في علائق الحملان النامية حيث أنه يقلل من استخدام العلف المصنع المرتفع الثمن وبذلك يقلل من تكلفة التغذية ويؤدى إلى زيادة العائد الاقتصادي دون تأثير سلبي على الهضم والقيم الغذائية.