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EFFECT OF USING SCREENING BERSEEM SEED AS A SOURCE OF PROTEIN INSTEAD OF LINSEED MEAL IN FATTENING LAMB RATIONS

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ABSTRACT

Sixteen Rahmani rams average 25 kg were randomly distributed into four similar groups, four in each. The first group received concentrate diet containing linseed meal and rice straw (RS) *ad-libitum*, the 2nd group received concentrate diet containing ground berseem seeds (G-BS) and RS, the 3rd group received concentrate diet containing ground berseem seeds soaked in urea solution (BS-U) plus rice straw *ad-libitum* and the 4th group received concentrate diet containing ground berseem seeds soaked in EM1 (BS-M) plus RS *ad-libitum*.

Intake from concentrate, roughage and concentrate roughage ratio (kg/h/d on dry matter basis) were almost similar in all experimental rations, however, total DMI slightly decreased with the group fed G-BS compared to others.

The rations containing BS-U and BS-M had the highest ($P<0.05$) digestibility values for DM, OM and gross energy digestibility compared to G-BS and control diet, except OM digestibility in control rations. The digestibility of EE was increased with added both treated or untreated screening seeds compared to control diet. No significant differences were detected for digestibilities of CP, CF, NFE, and CWC's among all treatment with replacement linseed meal with screening seeds. The values of TDN% and DE Mcal/kg were increased with added treated screening seeds compared to untreated seeds or control diet. . However no significant difference were found in DCP% among all experimental diet.

The values of pH, TVFA's, acetic acid and valeric acid molar proportion were not significantly different ($P<0.05$) among all experimental diets. Propionic acid and butyric acid proportion were lower ($P<0.05$) with animals fed treated or untreated SBS than control diet however, iso-butyric acid and iso-valeric were significantly higher ($P<0.05$) compared to different experimental diets except iso-butyric with added BS-M. The concentration of TN, TPN, NPN, NH_3-N and MPN were not significant ($P>0.05$) among all experimental rations. Blood serum values of TP, Albumin, globulin, NH_3-N, alkaline phosphates, ALT, AST and blood urea nitrogen were not significant differ with replacement linseed meal with SBS.

Average daily gain and total gain of the control group were not significantly different. Feed conversion as kg DM / kg gain, kg TDN / kg gain, Mcal DE / kg gain and g DCP / kg gain were not significantly different among all experimental groups. In conclusion these results indicated that replacement of linseed meal in the lambs fattening diets, would improve the revenue and production efficiency.

Keywords: Screening Berseem Seeds (S-BS), crushed screening berseem seeds and treated with urea (BS-U), sheep, digestibility, feeding value.

INTRODUCTION

There is a big gap for animal nutrition in Egypt between the requirements of ruminants and the available amounts of feeds, which is

equivalent to 3 millions tons of TDN (about 5 millions ton of dry matter) as reported by Hathout and El-Nouby (1990). This gap could be covered by the use of different sources of agricultural by-products and the use of new or nontraditional feeds. Screening berseem seeds quickly by pass and resistant digestion in both the rumen and intestine unless they are processed. The resistance of screening berseem seed (SBS) to microbial and enzymatic digestion may be due to the high content of lignin in the seed hull (about 8% on DM basis). On the other hand, SBS had higher content of CP and fat. Crushing has been the primary processing method used to improve utilization of the nutrients within this highly lignified seed hull. The processing method would need to be gentle enough to allow the whole screening berseem seed to remain largely intact and undegraded by ruminal digestion, but severe enough that the seed contents would be accessible to intestinal enzymatic degradation and absorption. The method proposed involved a mild chemical treatment with urea solution as alkaloids treatment and biological treatment.

The objectives of this study were to determine the effects of a physical, chemical and biological treatment on whole screening berseem seed (SBS) as replacement of linseed cake in sheep ration on feed intake, nutrient digestibility and some blood & rumen parameters.

MATERIALS AND METHODS

This study was conducted at El-Serw Experimental Station belonging to the Animal Production Research Institute, Agriculture Research Center, Ministry of Agriculture, Egypt. During screening berseem seeds about 6-8% of up normal seeds and grass seeds are produced. Produced screening berseem seeds (SBS) contain different type of BS and different grass seeds. Screened seeds were treated with three methods, in the 1st seeds were ground through a roller mill to fracture the seed coat (G-BS), the 2nd methods 100 kg whole seeds were soaked in 150 litter urea solution (4% w/v) for 8hr after that dried then the seeds were ground through a roller mill, until all seed hulls were cracked (BS-U) and the 3rd method, whole seeds were treated with microbial solution (EM1) for 10 days (20 Litter EM1/ ton S-BS) in shaded area, during this period suitable moisture in seeds (30%) were maintained by water spraying when needed that, then sun dried, then the seeds were crushed (BS-M). The solution of EM1 an abbreviated designation from term "Effective Microorganisms" containing different type of microorganisms, most of these microorganisms have been used in food processing and in the field of medicine, prepared by Ministry of Agriculture. It is a yellowish-brown liquid with pleasant odor and sweet sour taste and pH 3.5 ± 0.3. Chemical composition of feed ingredients, concentrate mixture and experimental rations are shown in Tables 1,2 and 3. Each Kg of premix contains 97% Nacl, 0.35% Zn, 0.2% Mn, 0.2 Fe, 0.15% Mg, 0.03% Cu, 0.007% I, 0.0005% Co and 0.002% Se, 7511 IU/g Vit. A and 8800 IU/g Vit. D3

Sixteen Rahmani lambs weighing on average 25 kg were randomly distributed into four similar groups, four in each. Animals were adapted for the experimental rations two weeks before data collection. Animals were weighed every two weeks during 120-day experimental period. Screening berseem

seed were added to concentrate diet in place of linseed meal (LSM) at 100% on DM basis since they were nearly similar in CP content. Four concentrates of diets were formulated to replace SBS (treated or untreated) instead of linseed meal on DM basis Table (2). The control group received diet contained concentrate mixture (20% linseed cake) at 2% of live body weight according to the biweekly body weight and rice straw was offered *ad-libitum*. The tested groups were fed the control ration, but linseed meal replaced by G-BS, BS-U or BS-M for Groups 2, 3 and 4, respectively. Daily concentrate diets were group fed at two times daily in equal portions at 08:00 a.m. and 18:00 p.m. Drinking water was offered free excess. The residuals of the rations from provide day was collected to determine the actual amount of food consumed.

Four digestion trials were carried out at the end of the experimental period using three replicates. Three animals of each group were individually placed in metabolic cages for 13 days, where five days were for adaptation, while the other eight days were for feces and urine collection. The residuals of rations were collected to determine the actual amount of feed intake. During the digestion trial, animals were fed at 08:30 and 18.30 hrs, while, samples were collected at 07.30 p.m. Chemical compositions of feeds and feces were determined according to A.O.A.C. (1990). Gross energy value (GE) was determined for both feed and feces by using Gallen Kump ballistic bomb calorimeter (Catalog No. (CBB: 330-1010). At the end of the digestibility trial, rumen fluid samples were collected by using stomach tube before feeding and after 3 and 6hrs post feeding for two consecutive days. Ruminal pH, Total VFA's concentration was analyzed according to Kromann *et al.* (1967) molar proportions of VFA's (Erwin *et al.* 1961), nitrogen fractions (A.O.A.C. 1990), microbial protein (Shultz and Schultz, 1970), ammonia-nitrogen (Conway, 1978) were determined.

Blood samples were withdrawn from the left jugular vein before morning feeding at the end of feeding trail (three animals of each group). Plasma total protein, albumin, urea-N, ammonia-N, blood urea nitrogen (BUN), creatinine, aniline transaminase (ALT) and aspartate transaminase (AST) and alkaline phosphates were determined using commercial kits (Biomeriex 69280 Marcy-1, Etoile, France®).

Statistical analysis was carried out using SAS (1996). Blood, digestibility and performance data were analyzed as one-way analysis of variance according to the following model: $Y= \mu + x_i + e_{ij}$. Where: (Y= observation, μ= mean, x_i the effect of treatment for 1=1-4, 1 control, 2 = G-BS, 3 = BS-U and 4 = BS-M, and e_{ij} = experimental error). Rumen data were statistically analyzed as two-way analysis of variance according to the following model: $Y= \mu + x_i + xj + x_{ij} + e_{ijk}$. Where: - (Y= observation, μ= mean, x_i the effect of treatment for 1=1-4, 1 control, 2 = G-BS, 3 = BS-U and 4 = BS-M, x_j the effect of sampling time for 1=1-3 1 before feeding and 2 = 3 hrs post feeding and 3 = 6 hrs post feeding and e_{ijk} = experimental error). Duncan's Multiple Range Test (Duncan, 1955) was used to separate the means when the main effect was significant.

RESULTS AND DISCUSSION

Chemical composition:

Composition of concentrate mixture, G-BS, BS-U, BS-M, rice straw and the experimental rations are presented in Tables (1, 2 and 3).

Table (1): - Chemical composition of different ingredients.

Item	Linseed meal	Yellow corn	Wheat bran	Molas.**	G-BS	BS-U	BS-M	Rice straw
				Chemical compositions on DM basis%.				
DM	91.50	90.28	90.49	69.27	90.42	88.73	88.56	90.01
OM	88.46	88.95	94.08	83.76	91.75	91.55	91.55	81.75
CP	36.09	8.87	15.02	4.35	37.33	38.56	37.60	4.17
CF	9.02	5.06	11.97	0.00	17.11	16.92	16.94	45.57
EE	1.78	5.21	2.96	1.46	9.07	9.02	9.04	1.08
NFE	41.57	69.81	64.13	77.95	28.24	27.05	27.97	30.93
Ash	11.54	11.05	5.92	16.24	8.25	8.45	8.45	18.25
				Cell wall constituents %.				
NDF	38.94	22.39	49.32	0.00	33.45	33.09	33.21	78.49
ADF	29.86	17.68	34.88	0.00	29.79	29.11	29.25	63.36
ADL	4.62	2.13	3.67	0.00	8.02	8.06	8.03	5.87
Cellulose	25.24	15.55	31.21	0.00	21.77	21.05	21.22	57.49
H.Cell. *	9.08	4.71	14.44	0.00	3.66	3.98	3.96	15.13
GE Mcal /kg	3.552	4.034	3.320	3.393	4.424	4.508	4.500	3.335

***Hemi cellulose ** Molasses G-BS= ground berseem seeds BS-U= screening berseem seeds soaked in urea solution BS-M= seeds were treated with microbial solution (EM1)**

These data show that, the screening berseem seeds (SBS) had slightly higher percentage of CP and NFE compared to linseed cake, (Table 1). Treated screening seeds with urea solution or EM1 led to slightly decrease DM, OM, CF, NFE, NDF, ADF and cellulose, however, CP, hemi-cellulose and gross energy were increased compared to untreated screening seeds. The data in Table (2) show that, with added screening seeds to concentrate mixture decreased DM, CF, NFE, NDF and cellulose, however, EE, ADL and gross energy were increased compared with concentrate mixture containing linseed meal. The total mixed rations in Table (3) show that, the nutrients content of experimental diets were almost similar in percentage of DM, OM, CP, CF, EE, NFE, ash and CWC's.

Digestibility and nutritive value

The digestion coefficient of nutrients and nutritive values of the experimental diets are shown in Table (4). The rations containing BS-U and BS-M had the highest ($P<0.05$) digestibility values for DM, OM and gross energy digestibility compared to G-BS and control diet, except OM digestibility in control rations. Theses results are in good agreement with

those reported by (Aldrich *et. al.* 1997a,b). The increase in dry matter digestibility was due to increased digestibility of OM, cellulose and ADF contents, (Abou Hussein *et. al.* 2003).

Table (2): Formulation and chemical composition of different experimental concentrates.

Item	CFM-1	CFM-2	CFM-3	CFM-4
		Ingredients %		
Linseed meal	20	--	--	--
S-BS	--	20	--	--
BS-U	--	--	20	--
BS-M	--	--	--	20
Yellow corn	34	34	34	34
Wheat bran	35	35	35	35
Molasses	5	5	5	5
Limestone	3	3	3	3
Sodium chloride	2	2	2	2
Premix	1	1	1	1
		Chemical compositions %.		
DM	90.01	89.79	89.46	89.42
OM	85.05	85.71	85.67	85.67
CP	15.71	15.96	16.20	16.01
CF	7.71	9.33	9.29	9.30
EE	3.24	4.69	4.68	4.69
NFE	58.39	55.73	55.50	55.67
Ash	14.95	14.29	14.33	14.33
		Cell wall constituent's %		
NDF	32.66	31.56	31.49	31.52
ADF	24.19	24.18	24.04	24.07
ADL	2.93	3.61	3.62	3.61
Cellulose	21.26	20.57	20.42	20.46
Hemi-cellulose	8.47	7.38	7.45	7.45
GE Mcal/kg	3.414	3.588	3.605	3.603

CFM: Concentrate feed mixture.

Table (3):Chemical composition of actually consumed experimental rations.

Item	Control	G-BS	BS-U	BS-M
		Chemical compositions %		
DM	90.01	89.88	89.68	89.66
OM	83.73	84.13	84.10	84.10
CP	11.09	11.24	11.39	11.27
CF	22.86	23.82	23.79	23.82
EE	2.38	3.25	3.24	3.24
NFE	47.40	45.82	45.68	45.77
Ash	16.27	15.87	15.90	15.90
		Cell wall constituents %		
NDF	50.99	50.32	50.28	50.32
ADF	39.86	39.84	39.76	39.79
ADL	4.11	4.51	4.52	4.51
Cellulose	35.75	35.33	35.24	35.28
Hemi cellulose	11.13	10.48	10.52	10.53
GE Mcal/kg	3.383	3.487	3.497	3.496

G-BS= ground berseem seeds, BS-U= screening berseem seeds soaking in urea solution and BS-M= seeds was treated with microbial solution (EM1).

The digestibility of EE was increased with added both treated or untreated screening seeds compared to control diet. These results may be due to higher EE content in the seeds. Treatment of SBS could improve the passage of fatty acids to small intestine Aldrich *et. al.* (1997a). Similar results were obtained with added soybean seeds (Abo-Donia *et. al.* 2003), sunflower seeds (El-Bedawy *et. al.* 1994) and canola seeds (Aldrich *et. al.* 1997a,b). No significant differences were detected for digestibilities of CP, CF, NFE, and CWC's among all treatments with replacement of linseed meal with screening seeds in spite of decreased digestibility of CF and NFE with replacement G-BS. In agreement with the results of this study, Aldrich *et. al.* (1997b) in a trail with steers found that, the digestibility coefficient of N, CF, NFE, and CWC's

Table (4):Digestion coefficients, cell wall constituents and nutritive value for different experimental diets.

Item	Control	G-BS	BS-U	BS-M	± SE	P>
Nutrients digestibility (%)						
DM	69.61^{b}	70.03^{b}	71.62^{a}	72.35^{a}	0.421	*
OM	73.25^{a}	71.58^{b}	73.09^{a}	73.10^{a}	0.378	*
CP	66.31	65.96	66.30	66.06	3.802	ns
CF	63.37	61.24	63.15	63.37	1.524	ns
EE	70.12^{b}	75.19^{a}	76.34^{a}	76.25^{a}	0.613	*
NFE	79.79	78.09	79.78	79.68	1.199	ns
Energy	81.69^{b}	80.06^{b}	84.36^{a}	84.52^{a}	0.634	*
Cell wall constituents (%)						
NDF	68.24	67.03	67.95	68.02	1.008	ns
ADF	64.07	62.59	65.14	65.23	1.551	ns
ADL	5.21	4.66	5.01	5.00	0.682	ns
Cellulose	70.23	69.08	72.02	72.13	1.733	ns
Hemi-cellulose	83.17	83.49	78.59	78.57	1.896	ns
Nutritive value (%)						
TDN	63.41^{b}	63.26^{b}	64.53^{a}	64.56^{a}	0.312	*
DCP	7.36	7.40	7.50	7.44	0.420	ns
DE Mcal/kg	3.537^{b}	3.512^{b}	3.809^{a}	3.788^{a}	0.210	*

a and b: Means in the same row with different superscripts are significantly different (P<0.05).

did not differ significantly between the control and the other to groups fed on diet contained canola seeds treated with alkaline hydrogen peroxide. Present data also show that, no significant differences were found among values of different experimental rations for CP, CF, NFE, and CWC's.

In regard to nutritive values, data in Table (4) show that TDN% and DE Mcal/kg values increased with added treated screening seeds compared to untreated seeds or control diet. These results may be due to higher EE digestibility in the seeds. However no significant difference were found in DCP% among all experimental diet.

Dry matter intake

Data presented in (Table 5) show that, intake of concentrate, roughage and concentrate roughage ratio (kg/h/d on dry matter basis) during feeding trial were almost similar in all experimental ration, however, total DMI slightly decreased with group fed G-BS compared to others. Feed intake of TDN, DE

and DCP kg/h/d were similarly in different experimental groups. Intake of DM, TDN, DE and DCP / kg live body weight and weight 0.75 were similarly in different experimental groups. These results illustrate quite clearly that replacement of LSM by screaming berseem seeds in any form did influence feed intake and its fermentation in the rumen as will be discuses later were in accordance with those found by Aldrich *et. al.* (1997a) who reported that addition of canola seeds (like as form of screened seeds) did not significantly affect feed intake for lactating cows.

Table (5) : Effect of full replacement of linseed meal with screening berseem seeds in fattening lambs diets on DM and nutrients intake.

Item	Control	G-BS	BS-U	BS-M
CFM-1 (kg)	0.768	0.000	0.000	0.000
CFM-2 (kg)	0.000	0.755	0.000	0.000
CFM-3 (kg)	0.000	0.000	0.775	0.000
CFM-4 (kg)	0.000	0.000	0.000	0.769
Rice straw (kg)	0.512	0.503	0.516	0.513
C/R ratio	1: 1.5	1: 1.5	1: 1.5	1: 1.5
Concentrate (%)	60.00	60.02	60.03	59.98
Roughage (%)	40.00	39.98	39.97	40.02
Total DMI (kg/h/d)	1.280	1.258	1.291	1.282
TDNI kg/h/d	0.812	0.795	0.833	0.828
CPI g/h/d	141.95	141.40	147.04	144.48
GEI Mcal/h/d	4.330	4.387	4.515	4.482
DCPI g/h/d	94.13	93.27	97.49	95.44
DMI / kg LBW (kg)	0.051	0.051	0.051	0.051
DMI / $W^{0.75}$ (kg)	0.085	0.085	0.085	0.085
TDNI / kg LBW (kg)	0.032	0.032	0.032	0.032
TDNI / $W^{0.75}$ (kg)	0.054	0.054	0.054	0.054
DEI / kg LBW (Mcal)	0.172	0.177	0.179	0.180
DEI / $W^{0.75}$ (Mcal)	0.288	0.296	0.299	0.298
DCPI / kg LBW (g)	3.74	3.75	3.82	3.82
DCPI/ $W^{0.75}$ (g)	6.25	6.27	6.35	6.31

Rumen Parameters

Results in Table (6) clearly show that, pH values were significantly increased ($P<0.05$) among treatments with feeding SBS treated or untreated compared to control group at zero time however, no significant effects on ruminal pH among different experimental rations at 3 and 6hr post feeding. Concentrations of TVFA's were significantly decrease among treatments with added SBS at zero time however the values increased at 3hr post feeding compared to the control diets. These results are in a good agreement with those (Kajikawa *et. al.* 1991). The values of pH and TVFA's were not affected with added 10% whole cottonseed in steers ration Malcolm and Kiesling (1990), and feed 1.5 kg raw or heated rapeseed to cows (Emanuelson *et. al.* 1991). These results were agreement with the present study.

Results of TN, NPN, NH_3-N, TPN and MPN are shown in (Table 6). Fed diet contained BS-S in placed of LSM increased TN, NPN, NH_3-N and MPN concentration in the rumen compared to all treatments. At the same time, TPN was decreased with fed BS-U compared to the different treatments. No

significant differences were found among treatments at different times. Increase ammonia nitrogen and NPN with feed BS-U and BSM due to treated urea and EM1 that was highly degradability in the rumen. Balckwelder *et. al.* (1998) show that, NH_3-N decreased with replacement soybean meal in lactating cows diet containing 12% whole cottonseed. However, Hussein *et. al.* (1996) found was that NH_3-N was not affected with added canola seeds in beef steers diet.

Table (6): Effect of full replacement of linseed meal with screening berseem seeds in fattening lambs diets on pH, TVFA's and nitrogen fractions in the rumen (mg/dl).

Item	Time	Control	G-BS	BS-U	BS-M	P>
pH	0	6.53±0.089^b	6.62±0.089^a	6.64±0.089^a	6.60±0.089^a	*
	3	6.85±0.089	6.89±0.089	6.82±0.089	6.85±0.089	ns
	6	6.75±0.089	6.81±0.089	6.77±0.089	6.78±0.089	ns
VFA's meq/dl	0	11.70±0.631^a	10.67±0.631^b	10.67±0.631^b	11.01±0.631^b	*
	3	11.03±0.631^b	12.14±0.631^a	12.35±0.631^a	12.51±0.631^a	*
	6	11.99±0.631	11.09±0.631	11.24±0.631	11.44±0.631	ns
TN mg/dl	0	123.76±7.671	119.08±7.671	128.68±7.671	123.84±7.671	ns
	3	147.11±7.671	139.38±7.671	135.79±7.671	144.24±7.671	ns
	6	109.40±7.671	105.17±7.671	109.46±7.671	108.01±7.671	ns
NPN mg/dl	0	38.15±2.784	36.97±2.784	42.49±2.784	39.20±2.784	ns
	3	40.20±2.784	40.78±2.784	48.64±2.784	43.21±2.784	ns
	6	36.18±2.784	35.76±2.784	40.20±2.784	37.38±2.784	ns
NH_3-N mg/dl	0	10.27±0.271	9.75±0.271	13.19±0.271	11.73±0.271	ns
	3	10.20±0.271	9.63±0.271	13.98±0.271	11.95±0.271	ns
	6	10.03±0.271	9.48±0.271	13.22±0.271	11.55±0.271	ns
TPN mg/dl	0	85.61±7.534	82.11±7.534	86.19±7.534	84.64±7.534	ns
	3	106.91±7.534	98.60±7.534	87.14±7.534	101.04±7.534	ns
	6	73.22±7.534	69.41±7.534	69.25±7.534	70.63±7.534	ns
MPN mg /dl	0	60.52±4.399	56.65±4.399	62.04±4.399	62.87±4.399	ns
	3	65.70±4.399	64.99±4.399	67.79±4.399	66.32±4.399	ns
	6	55.88±4.399	53.85±4.399	57.73±4.399	56.05±4.399	ns

a, and b: Means in the same row with different superscripts are significantly different (P<0.05).
± = Standard error (SE). TN = total protein nitrogen. NPN = Non protein nitrogen. TPN = True protein nitrogen.
MPN = Microbial protein nitrogen.

Regarding the molar proportions of the individual VFA's Table (7) show that, no significant effects on ruminal acetic acid and valeric acid among different experimental rations. Propionic acid was lower (P<0.05) with feeding treated or untreated SBS than the control diet. The lowest value was recorded with fed BS-U than those feed G-BS and BS-M. Although, decrease values of butyric acid were recorded with feed SBS compared to the control diet, the differences were not significantly except BS-U significantly decreased compared to control diets. On the other hand, iso-butyric acid and iso-valeric were significantly higher (P<0.05) compared to different experimental diet except iso-butyric with added BS-M. The molar proportions (%) of the individual VFA's (acetic, propionic, butyric iso-butyric, valeric, iso-valeric and acetic: propionic ratio) are within the range reported by (Abou-Akkada and Blackburn 1963). Molar proportion of acetic acid and valeric acid were not affected with feeding crushed and treated canola seeds with

hydrogen peroxide or crushed untreated seeds (Hussein *et. al.* 1996). On the other hand, proportions of propionic acid and iso-butyric acid were taken the same trend, where decreased with feeding whole cottonseed to fattening steers (Malcolm and Kiesling (1990) and whole canola seeds when feed to fattening lambs (Huard *et. al.* 1998). The improvement of rumen fermentation might be due to increasing the number of rumen cellulolytic bacteria and/or palatable feed, higher energy, protein and/or vitamins contents (Abdel-Gawad 2003).

Table (7): -Effect of full replacement of linseed meal with screening berseem seeds in fattening lambs diets on VFA's fractions (%).

Item	Control	G-BS	BS-U	BS-M	± SE	P>
Acetic	58.67	58.60	58.60	58.57	0.073	ns
Propionic	25.33^{a}	24.93^{b}	24.43^{c}	24.73^{b}	0.073	*
Butyric	12.00^{a}	11.80^{ab}	11.50^{b}	11.77^{ab}	0.105	*
Iso-Butyric	1.20^{b}	1.20^{b}	1.50^{a}	1.40^{ab}	0.082	*
Valeric	1.60	1.67	1.70	1.73	0.069	ns
Iso-Valeric	1.20^{c}	1.80^{b}	2.27^{a}	1.80^{b}	0.071	*

a, b and c: Means in the same row with different superscripts are significantly different (P<0.05).

Blood Parameters

Regarding to the blood constituents before feeding Table (8) is within the normal range (El-Sayed 1991 and Abo-Donia *et al* 2003). The values of total protein (TP), Albumin, globulin and NH_3-N mg/dl were slightly increased with replacement of SBS with linseed cake, but the differences were not significantly. Alkaline phosphates, aniline transaminase (ALT) and aspartate transaminase (AST) did not significantly differ with replacement of linseed meal with SBS. Blood UN was unaffected when feed lactating cows soybean meal or whole cottonseed (Brrazaa *et. al.* 1991), and feeding raw or heated whole soybean seeds (Abo-Donia *et. al.* 2003). Serum protein value was affected by, season, species, healthy status, nutritional status of animal and dietary protein consumption (Kummar *et. al.* 1980). The present values of serum ALT, AST and alkaline phosphates were similar to those obtained by (El-Sayed 1991).

Table (8): Effect of full replacement of linseed meal with screening berseem seeds in fattening lambs diets on some blood constituents.

Item	Control	G-BS	BS-U	BS-M	± SE	P>
TP (mg/dl)	6.12	6.32	6.20	6.30	0.171	ns
Albumin (mg/dl)	3.01	3.02	2.79	3.09	0.107	ns
Globulin (mg/dl)	3.11	3.30	3.41	3.21	0.180	ns
Albumin / Globulin	0.98	0.92	0.83	0.97	0.068	ns
NH_3-N (mg/dl)	0.43	0.46	0.52	0.44	0.43	ns
BUN (mg/dl)	16.23	16.01	16.53	16.21	0.521	ns
ALT (u / L)	17.02	17.21	17.42	17.19	0.389	ns
AST (u / L)	26.53	26.50	27.76	26.60	0.725	ns
Alkaline phosphates (u/L)	35.42	35.34	35.51	35.36	0.441	ns

Means in the same row with different superscripts are significantly different (P<0.05).
BUN = Blood urea nitrogen. ALT = Aniline transaminase. AST = Aspartate transaminase.

Growth performance and feed conversion

Data presented in Table (9) concerning growth performance showed that total gain (kg) and ABG (g/h/d) were not significantly different in control group compared to the other groups. Although, daily intake of TDN and CP were increased than nutrients requirement according to NRC, the amounts of nutrient intake were almost similar in all tested diets. Also, full replacement of SBS instead of LSM as source of protein in tested diets did not affect significantly on growth performance. The present results agree with Aldrich *et. al.* (1997b) in trail with steers found that, the ADG was not significantly different between the control and the other two groups fed on diet contained canola seeds treated with alkaline hydrogen peroxide. The same trend was also observed by Hussein *et. al.* (1996) on steers fed canola seeds.

Data of feed conversion in (Table 9) show that, kg DM / kg gain, kg TDN / kg gain, Mcal DE / kg gain and g DCP / kg gain were not significantly different among all experimental groups. Those data was show by (Malcolm and Kiesling 1990, El-Sayed 1991, Hussein *et. al.* 1996 and Aldrich *et. al.* 1997a).

Economical evaluation

Although, the price of TDN was increased with replacement BS compared with linseed meal, the cost of DCP unit was decreased. The rations cost as price / kg were decreased with replacement of BS with linseed meal. Also, total revenue was increased with replacement of BS with linseed meal by (6.96, 6.83 and 6.69%) for group S-BS, BS-U and BS-M, respectively (Table 10).

Table (9) :- Effect of full replacement of linseed meal with screening berseem seeds in fattening lambs diets on growth and feed conversion.

Item	Control	G-BS	BS-U	BS-M	±SE
Growth performance					
Initial BW (kg)	25.12	24.80	25.16	24.90	0.188
Initial BW ($W^{0.75}$)	11.22	11.11	11.23	11.15	0.192
Final BW (kg)	49.10	48.10	49.56	49.44	0.117
Final BW ($W^{0.75}$)	18.55	18.26	18.68	18.64	0.120
Duration (day)	120	120	120	120	
Total gain (kg)	23.98	23.30	24.40	24.54	0.642
ADG (g/h/d)	200	194	203	205	0.005
Feed conversion					
Kg DM/ kg Gain	6.41	6.48	6.35	6.27	0.101
Kg TDN/ kg Gain	4.06	4.09	4.10	4.05	0.015
Mcal DE / kg Gain	21.668	22.594	22.205	21.917	0.124
g DCP/ kg Gain	470	479	472	465	5.053

Means in the same row with different superscripts are significantly different (P<0.05).
±SE- Standard error

Table (10) :- Economical evaluation of the tested diets.

Item	Control	G-BS	BS-U	BS-M
Price of total intake LE	1.42	1.40	1.44	1.43
Price of kg rations LE	0.59	0.50	0.51	0.52
Price of kg TDN LE	0.65	1.76	1.81	1.78
Price of kg DCP LE	5.61	4.85	4.74	4.87
Ration cost / kg gain	3.03	2.51	2.52	2.53
Revenue (L.E)	7.47	7.99	7.98	7.97

Based on market prices at the beginning of the experiment, the prices (LE/Ton) were (linseed meal 850, price of screening berseem seeds (SBS) 400, SBS treated with urea 420, SBS treated with EM1 425, yellow corn 650, wheat bran 550, molasses 140, limestone 60, common salt 120, CFM1 608, CFM2 518, CFM3 512, CFM4 523 and rice straw 120LE/Ton.

Revenue (L.E) = Price of kg LBW LE (10.50) - Ration cost per kg gain

It is therefore could be concluded that using S-BS, BS-M and BS-U as replacement of linseed meal in the lambs fattening diets, would improve the revenue and production efficiency.

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REFERENCES

Abdel-Gawad, M. M. H.; (2003). Response of lactating buffaloes to whole cotton and canola oilseeds. Ph.D. Thesis, Department of Animal Production. Faculty of Agriculture, Cairo University, Giza, Egypt.

Abo-Donia, F. M. A.; S. A. Ibrahim; H. M. El-Shabrawy and A. M. A. Salama (2003). Milk production and composition of Friesian crossbred cows fed rations containing different sources of energy. The 9th Scientific Conference on Animal Nutrition 14-17 October 2003-Horgada. P. 507.

Abou Hussein, E.R.M.; E.A. Gihad; T. M. El-Bedawy and M.H. Abdel-Gawad (2003). Effect of dietary oilseed supplement on nutrient utilization, milk yield and composition of lactating buffaloes. . The 9th Scientific Conference on Animal Nutrition 14-17 October 2003-Horgada. P. 539.

Abou-Akkada, A. R. and T.H. Blackburn (1963). Some observations on the nitrogen metabolism of rumen proteolytic bacteria. J. Gen. Microbial., 3: 461.

Abou-Raya, A. K. (1967). Animal and Poultry nutrition. 1st ed. Dar El-Maarif, Cairo (Arabic Text Book).

Aldrich, C.G.; N. R. Merchen; J. K. Drackley; G. C. Fahey; Jr., and L. L. Berger (1997a). The Effects of chemical treatment of whole canola

seed on intake, nutrient digestibilities, milk production, and milk fatty acids of Holstein cows. J. Anim. Sci. 75:512.

Aldrich, C.G.; N. R. Merchen; J. K. Drackley; S. S. Gonzalez; G. C. Fahey; Jr., and L. L. Berger (1997b). The Effects of chemical treatment of whole canola seed on lipid and protein digestion by steers. J. Anim. Sci., 75:502.

A. O. A. C. (1990). Association of Official Analytical Chemists. Official Methods of Analysis .15 eh ed. AOAC, Washington DC.

Blackwelder, J. J.; Hopkins,B.A.; Diaz,D.E. Whitlow,L.W. and Brownie, C. (1998). Milk production and plasma gossypol of cows fed cottonseed and oilseed meals with or without rumen undegradable protein. J. Dairy Sci., 81:2934.

Brrazaa, M.L.; Cobbock, C.E.; Brooks, K.N.; Willks, D.L.; Saunders, R.G. and Latimer, G.W. (1991). Iron sulphate and feeding pelleting to detoxify free gosypol in cotton seed diets for dairy cattle. J. Dairy Sci., 47: 3457.

Conway, E. J., (1978). Microdiffusion analysis and volumetric error. 4th Ed. The McMillaon Co., N.Y.

Duncan. D. P. (1955). Multiple range and multiple tests. Biometrics, 11: 1.

El-Bedawy, T.M.; A.M. Abd El-Gawad; M.A. Gabra and F.A. Scander (1994). Full fat sunflower seeds oil as fat supplement for dairy cows. Egypt. J. Anim. Prod., 31 (suppl.): 147

El-Sayed, M. (1991). Performance of growing ruminants on high energy density diets. Ph. D. Thesis. Ain-Shams Univ. Fac. of Agriculture.

Emanuelson, M.; Murphy, M. and Lindberg, J. E. (1991). Effect of heat treated and untreated full fat rapeseed and tallow on rumen metabolism, digestibility, milk composition and milk yield in lactating cows. Animal Feed Science and Technology, 34:291.

Erwin, E. S., G. J. Marco and E. Emery. (1961). Volatile fatty acids analysis of blood and rumen fluid by gas chromatography. J. Dairy Sci., 44: 1768.

Goering, H. K. and P. J. Van Soest. (1970). Forge fiber analysis (apparatus, reagents, procedure and some applications). Agric. Hand book 379, USDA, Washington, DC.

Hathout, M. K. and H. M. El-Nouby (1990). Practical application of crop residues treatment in Egypt. 3rd Int-Symp., on Feed Manufacture and Quality Control. PP. 337

Huard, S.; H. V. Petit; J. R.Seoane and R. Rioux (1998). Effect of mechanical treatment of whole canola seeds an performance, diet digestibility and rumen parameters of lambs feed grass silage. Can. J. Anim. Sci. 78:657.

Hussein, H. S.; Merchen, N. R. and Fahey, G. C. (1996). Effect of forage percentage and canola seed on ruminal protein metabolism and duodenal flows of amino acids in steers. J. Dairy Sci., 79:98.

Kajikawa, H.; Odai, M.; Saitoh, M. and Abe, A. (1991). Effect of whole cottonseed on ruminal properties and lactation performance of cows with different rumen fermentation patterns. Animal Feed Science and Technology, 34:203.

Kromann, R.P.; J. E. Meyer; and Stielau, W. J. (1967). Steam distillation of volatile fatty acids in rumen digesta. J. Dairy Sci., 50:73.

Kummar, N.; U. B. Singh and D. N. Verma (1980). Effect of different levels of dietary protein and energy on growth of male buffalo calves. Ind. J. Anim. Sci., 51: 513.

Malcolm, K. J. and Kiesling, H. E. (1990). Effects of whole cottonseed and line yeast culture on rumen fermentation and fluid passage rate in steers. J. Anim. Sci., 68:1965.

SAS (1996). SAS Procedure Guide. Version 6.12 Edition. SAS Institute Inc., Cary, NC, USA.

Shultz, T. A. and E. Shultz. (1970). Estimation of rumen microbial nitrogen by three analytical methods. J. Dairy Sci., 52: 781.

تأثير استخدام البذور ناتج غربلة البرسيم كمصدر للبروتين بديلا لكسب الكتان في علائق حملان التسمين

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تهدف هذة الدراسة إلى استخدام البذور ناتج غربلة البرسيم (العقابة) كبديل لكسب الكتان وذلك بعد معاملتها فيزيقيا أو كيميائيا أو بيولوجيا ودراسة تأثير ذلك على أداء حملان التسمين. استخدم في هذة الدراسة ستة عشر حولي رحماني متوسط أوزانها ٢٥ كجم وزعت عشوائيا إلى أربعة مجاميع متساوية. المجموعة المقارنة تناولت علف مركز يحتوى على كسب الكتان مع قش الأرز، والمجموعة الثانية تناولت علف مركز يحتوى على بذور العقابة المطحونة كبديل لكسب الكتان مع قش الأرز، والمجموعة الثالثة تناولت علف مركز يحتوى على بذور العقابة مطحونة بعد المعاملة بمحلول اليوريا ٤% مع قش الأرز والمجموعة الرابعة تناولت علف مركز يحتوى على بذور العقابة مطحونة بعد المعاملة بمحلول بكتيري EM1 ينتج بوزارة الزراعة المصرية.

دللت النتائج إلى عدم وجود تغير في المأكول اليومي من العلف المركز أو قش الأرز أو المأكول من المادة الجافة الكلية فيما عدا المجموعة التي تناولت البذور المطحونة حيث قل فيها المأكول من المادة الجافة بشكل طفيف.

نتائج الهضم المتحصل عليها أشارت إلى وجود زيادة معنوية في معاملات هضم كل من المادة الجافة والعضوية عند التغذية على العلائق المحتوية على بذور العقابة المعاملة باليوريا و EM1 مقارنة بالبذور غير المعاملة والعليقة المقارنة فيما عدا هضم المادة العضوية للعليقة المقارنة. كما زاد معامل هضم مستخلص الأثير في العلائق المحتوية على عقابه البرسيم المعاملة وغير المعاملة. في حين لم تظهر فروق معنوية بين المجاميع لمعاملات هضم كل من البروتين الخام والألياف الخام والمستخلص الخالي من ألا زوت وكذلك CWC's . وفى حين زادت المركبات الغذائية المهضومة والطاقة المهضومة مع إضافة بذور العقابة لم تظهر فروق معنوية بين المجاميع للبروتين المهضوم. نتائج معامل التحويل الغذائي المحسوبة على أساس كجم مادة جافة أو مركبات غذائية مهضومة أو كميجا كالورى كطاقة مهضومة وذلك مقابل كجم زيادة وزنية لم تظهر اختلافات معنوية بين المجاميع المختبرة كذلك لم تظهر اختلافات معنوية لمعدل النمو اليومي جم / راس / يوم.

أوضحت النتائج المتحصل عليها عدم وجود اختلافات معنوية في درجة حموضة الكرش أو الأحماض الدهنية الكلية الطيارة أو الاسيتات والفاليرات في حين انخفض تركيز البروبيونات والبيوتيرات في الكرش عند التغذية على بذور العقابة. كما أشارت النتائج الي عدم وجود اختلافات معنوية بين المجاميع بالنسب لتركيز نتروجين البروتين الكلى، نتروجين البروتين الحقيقي ونتروجين البروتين الميكروبي، بينما انخفض نتروجين المواد الأزوتية غير البروتينية ونتروجين الامونيا عند التغذية على العقابة.

بينت نتائج سيرم الدم عدم وجود اختلافات معنوية عند التغذية على بذور العقابة مقارنة بكسب الكتان لكل من البروتين الكلى،الالبيومين، الجلوبيولين، نتروجين اليوريا الامونيا وكذا أنزيمات الفوسفاتيز القاعدي وكل من ALT and AST .

من محصلة النتائج سالفة الذكر يمكننا القول بأنة من الممكن استخدام بذور عقابه البرسيم كمصدر للبروتين في علائق حملان التسمين ولرخص سعرها سوف يؤدى ذلك إلى عائد اقتصادي جيد.