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THE PERFORMANCE OF GROWING LAMBS FED COMPLETE RATIONS CONTAINING VARYING LEVELS OF WHOLE SOYBEAN OR SUNFLOWER SEEDS.

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ABSTRACT

Thirty Barki lambs of 6 months old and weighing 27.34 ± 2.14 kg LBW were used to investigate the effect of whole toasted soybean seed (SBS) and raw sunflower seed (SFS) levels in complete ration of growing male on their productive performance. Animals were divided into five groups (6 lambs each). Ration were basically formed of: yellow corn grain, soybean meal, wheat bran, peanut tops, molasses, common salt and limestone which mixed in different rations according to rate of adding oil seeds to the mixtures. The concentrations of different ingredients are illustrated in table (1). The experimental groups were allotted randomly to five tested complete rations: control (R1): without full fat seeds (CR), (R2) & (R3): containing 90 and 80% CR + 10% and 20% SBS, and (R4) and (R5): 90 and 80% CR + 10% and 20% SBS, respectively. The feeding trail was extending to 112 days. Feed intake, digestibility coefficients, nutritive values, nitrogen utilization, daily gain, liver and kidney functions, feed and economical efficiency were determined. Apparent digestibility coefficients of CP and EE ($P<0.05$) increased with increasing SBS and SFS levels in rations. On the contrary, the CF decreased ($P<0.05$) with increasing SBS and SFS levels in rations. The TDN, DCP DE and ME of SBS and SFS rations were higher ($P<0.05$) than those of the control ration were. Daily DMI expressed as kg/h/d or DM/kg $W^{0.75}$ was significantly ($P<0.05$) higher by lambs fed the control ration than those offered other tested rations. Lambs received SBS recorded significantly ($P<0.05$) higher average daily gain (ADG) than those received SFS rations. The (ADG) values were (199.86 & 221.85) vs. (207.50 & 198.70) g/day for 10 and 20% SBS and SFS, respectively, while lambs of the control recorded 179.50 g/day. Serum TP and Urea-N significantly ($P<0.05$) increased with including full fat seeds in lamb diets, while serum creatinine showed significant ($P<0.05$) decrease. Lambs fed full fat seeds had lower ($P<0.05$) levels of serum cholesterol and triglycerides than those fed the control ration. Feed and economical efficiency were markedly better with the 10 and 20% SBS and 10% SFS rations than other rations.

It is suggested that including full-fat soybean seeds up to 20% and 10% sunflower seeds in complete mixture rations, can efficiently improve the feeding value, digestibility coefficients and feed and economical efficiencies of growing lambs.

Keywords: Whole soybean seeds, whole sunflower seeds, complete ration, nutritive value, sheep.

INTRODUCTION

To improve dietary content directed towards the energy balance of growing ruminants, numerous studies have been done to evaluate the addition of fats or whole oilseeds to the animal rations. However, whole oil seeds were used as sources of fat (Palmquist and Jenkins, 1980) and have

shown advantage over pure fats in processing, mixing, and handling. Oilseeds are important sources of energy because of their high oil and protein content. Oilseeds were efficiently used successfully for feeding growing lambs after weaning when they need energy and protein to improve their metabolic efficiency (Eweedah *et al.*, 1996) and Negovanovic *et al.*, 1997).

Several studies had evaluated the feeding value of whole soybean (WSB) and sunflower seeds for sheep and goats (Phillips and Roberts, 1966 and Drackley *et al.*, 1985), and Varner and Woods, 1972 for steers. Both WSB and WFS are promising as supplements to replace part of the fattening rations because they contain 35 to 45% fat, 18 to 20% crude protein, and 32 to 36% acid detergent fiber (ADF) (McGuffey and Schingoethe, (1982). In addition, oil in seeds is encapsulated by seed coat (hulls) which had beneficial effects such as altering the rate of rumen bypass providing some degree of natural protection (Ekeren *et al.*, 1992). Inclusion of full fat seeds significantly increased the digestion coefficients of fat (Negovanovic *et al.*, 1997). The area cultivated by soybean (*Glypcine max*) and sunflower (*Helianthus spp.*) in Egypt averaged 12687 and 46401, feddans (Ministry of Agriculture, 2001), which produced 14885 and 44406 tons of seeds get increased the supply of whole soybean (WSB) or whole sunflower oilseed (WFS) available for oil production or feeding livestock on their by-products. The present study aimed to investigate the effect of replacing whole soybean or sunflower oilseeds to 10 or 20% of complete rations on digestibility coefficients, feeding values, N utilization and feed efficiency of growing lambs along with their effects on some blood serum metabolites and some parameters of fermentation in the rumen.

MATERIALS AND METHODS

The present study was conducted in the sheep and goat research unit, Abdel-Moneim Riyadh village, El- Bosstan – Noubaria, National Research Center. A feeding trail for 112 days was carried out using thirty Barki lambs of 6 months old and weighing 27.8 ± 2.14 kg LBW. Animals were divided into 5 groups (6 lambs each). All animals received pellted complete ration (CR) consisting: yellow corn grain 25%, soybean meal (44%CP) 15%, wheat bran 21.5%, peanut tops 30%, molasses 5%, common salt 1.5% and limestone 2.0% (Table 1). The experimental groups were allotted randomly to five tested rations: control (R1): complete ration, (R2 and R3): complete ration of which 10and 20% was replaced by whole toasted soybean seed WSBS (raw SBS toasted at 120C° for 15 minutes, and 25% moisture), (R4 and R5): complete ration of which 10 and 20% was replaced by whole sunflower seeds WSFS, respectively. The experimental rations were fed according to NRC (1985) to cover the DM requirements of animals. Daily feed allowances were offered in-group feeding at 8.00 a.m. and 4.00 p.m. in two equal portions. Feeds refused (if any) were daily collected and recorded. Offered amounts of feed mixtures were biweekly adjusted according to body weight change. Drinking water was freely available at all times. At the end of the feeding trails five digestibility trails were done using three animals chosen

randomly from each group to be subjected to digestibility and nitrogen balance trail for 14 successive days, 7 days as a preliminary period and during the other 7 days feces and urine were quantitatively collected and sampled. At the end of each digestibility trail, samples of rumen liquor were withdrawn from each animal by a stomach tube at 0, 3 and 6 hrs after feeding. Collected samples of rumen liquor were immediately measured for pH, NH_3 - N, concentration, while samples stored at (-18 to –20 C°) until total VFA'S was determined.

Blood samples were collected from each group (3 animals each) during the digestibility trail before feeding. Serum was separated and stored at (-18 to –20 C°) until assayed.

Table 1: Components and chemical analysis of the experimental rations (% DM basis)

Ingredients,%	CR 100% R1	Whole Soybean seeds		Whole sunflower seeds	
		10%	20%	10%	20%
		R2	R3	R4	R5
Yellow corn grain	25.00	22.50	20.00	22.50	20.00
Soybean meal 44%	15.00	13.50	12.00	13.50	12.00
Wheat bran	21.50	19.35	17.20	19.35	17.20
Peanut tops	30.00	27.00	24.00	27.00	24.00
Molasses	5.00	4.50	4.00	4.50	4.00
Common salt	1.50	1.35	1.20	1.35	1.20
Limestone	2.00	1.80	1.60	1.80	1.60
Total complete ration:	100	100	100	100	100
CR	100	90	80	90	80
Whole soybean seeds	0.00	10	20	0.00	0.00
Whole sunflower seeds	0.00	0.00	0.00	10	20
Total	100	100	100	100	100
Chemical composition					
CP	13.86	16. 17	18.49	14.09	14.33
CF	18.54	16.98	15.43	19.59	20.63
EE	4.32	5.69	7. 06	6.49	8.66
NFE	55.69	53.87	52. 05	52.69	49.69
OM	92.41	92.71	93.03	92.86	93.31
Ash	7.59	7.29	6.97	7.14	6.69

Chemical analysis:

Feeds:

Proximate chemical analysis of feeds, ingredients, feces and urine were done according to A.O.A.C. (1990), while digestible energy (DE) and metabolizable energy (ME) MJ/kg DM of the tested rations were calculated according to (MAAF, 1975) equations.

Rumen liquor:

pH meter was used to measure ruminal pH (HNNA instruments Hi 3424 microcomputer - pH meter). Ammonia-N concentration was determined

according to Conway (1957) method, and total VFA'S concentration according to Warner (1964).

Blood serum metabolites:

Serum total proteins (TP) was determined according to Henry 1964, albumin according to Doumas and Biggs 1972, urea according to Patton and Grouch (1977), Creatinine according to Bartels (1971), cholesterol according to Watson (1960) and Triglyecerids according to Bucolo and David (1973).

Statistical analysis:

The data of all traits were statistically analyzed according to Snedecor and Cochran (1980) in one way analysis of variance design using general linear model (GLM) procedure by computer program of Costat (1985) according to the model: $X_{ij} = \mu + A_i + e_{ij}$ where:
X_{ij} = represents observation, μ = Overall mean, A_i = effect of treatments (rations) and e_{ij} = experimental error (common error).

RESULTS AND DISCUSSION

Chemical composition:

Data in (Table 1) compared to the control ration show that, inclusion of SBS and SFS increased CP and EE contents of these rations, which due to the high CP and EE contents of SBS and SFS. This was mainly due to the high CP and EE contents of SBS and SFS, which were in average (16.17, 18.49, 14.09 and 14.33% CP) for 10 and 20% SBS, while these values were (5.69, 7.06, 6.49 and 8.66% EE) for 10 and 20% SFS, respectively, which were higher than those of the control ration. Similarly, OM content of SBS and SFS rations was slightly higher than control ration as the result of inclusion of full fat seeds.

Digestibility Coefficients and nutritive values:

Apparent digestibility coefficients of most nutrients ($P<0.05$) increased with increasing SBS and SFS in rations up to 20%, while CF digestibility coefficients decreased by increasing the levels of full fat seeds (Table 2). This is most probably due to the fibrous coat, which decreases seed digestibility. In addition, the oil of sunflower seeds is highly unsaturated containing linoleic acid in predominant proportion (Robertson, 1972). On the other hand, unsaturated fats are toxic to certain cellulolytic and methanogenic bacteria of the rumen (Galbraith and Miller, 1973 and Henderson, 1973), resulting in decreased fiber digestibility (Roberts and Mckirdy, 1964, Devendra and Lewis, 1974). The best values of CP and OM digestibility were obtained for lambs fed 20% SBS, while the lowest one was recorded for those fed control ration. Abdel Malak and Hamouda (2000) pointed out that feeding rabbits diets including SFS up to 10% significantly ($P<0.05$) increased the digestion coefficients of CP, EE and CF. Apparent digestibility of DM, OM and gross energy were not statistically different. In this respect, Johanson and McClure, (1973) fed sheep on ensiled mixed chopped corn plant material with 0, 4, 8, and 12% (DM basis) fat (partially hydrolyzed animal and vegetable fat). They found that, with the fat treated silages, the digestibility of DM, OM and cellulose in the 4% fat silage was significantly ($P<0.05$) lower than those for the control silage but the digestibility of the 8%

and 12% fat silages were not different from the control. While, Drackley *et al.*, 1985 used Holstein steers, to evaluate four isonitrogenous concentrate mixes containing: corn and soybean meal (CSM) as a positive control; corn, soybean meal and whole rolled oil-type sunflower seeds (SCS) as a negative control; SCS plus 3.5% additional limestone (SCL); and SCS with sunflower seeds treated with 2% calcium hydroxide (SCH). Digestibilities of DM, OM and lipids were not different among treatments.

The most consistent effect of unsaturated fat has been depressed fiber digestibility (Devendra and Lewis, 1974; Henderson, 1973 and Palmquist and Conrad, 1978). They found that unsaturated fatty acids were inhibitory to various species of cellulolytic and methanogenic ruminal bacteria. Eweedah et al., (1997) used Holstein bulls to evaluate four dietary treatment groups: (1) control; (2) full-fat toasted soybean diet; (3) sunflower seeds diet; and (4) protected fat diet. They reported that, CF digestibility decreased with increasing fat level, but the differences were not significant, while full fat soybean or whole sunflower seeds increased ($P<0.05$) digestion of fat.

Concerning the nutritive values, it was observed that total digestible nutrients % (TDN) and CP were significantly ($P<0.05$) affected by feeding treatments. The best values of TDN and DCP % (76.63 and 14.48%) were recorded with lambs fed the ration containing 20% SBS, while the lowest one was recorded for those fed the control ration (Table 2).

Results in (Table 2) showed that, nutritive values of experimental diets in terms of TDN, DCP, calculated DE and ME of SBS and SFS rations were ($P<0.05$) higher for the ration containing 20% soybean seeds (R3) than the control ration. While, the lowest value was reported for the rations containing 0 (control) and 10% whole sunflower seeds (R4). The superiority of these records was probably due to high amounts of oil mostly unsaturated fatty acids, with moderate amounts of protein for both SBS and SFS (Cheva – Isorakul and Tanglaweeipat, 1991 and Eweedah *et al.*, 1997).

Table 2: Digestion coefficients and nutritive values of the experimental rations, by sheep.

Item	CR 100% R1	Whole soybean seeds		Whole sunflower seeds	
		10%	20%	10%	20%
		R2	R3	R4	R5
Digestion coefficients (%):					
DM	71.53±1.20^{a}	72.86±1.46^{a}	76.15±1.76^{a}	69.58±1.39^{a}	71.25±2.01^{a}
OM	69.92±0.95^{a}	74.13±2.05^{a}	76.25±1.86^{a}	72.17±1.73^{a}	70.23±1.65^{a}
CP	70.20±1.17^{c}	75.16±1.68^{b}	78.32±1.74^{a}	71.45±1.83^{c}	73.18±2.10^{b}
EE	62.45±1.03^{b}	69.14±2.03^{b}	72.35±1.80^{a}	68.65±1.7^{c}	72.29±2.13^{b}
CF	53.19±1.12^{d}	60.93±1.74^{c}	57.32±1.54^{b}	51.27±1.28^{b}	48.73±1.16^{a}
NFE	73.82±1.02^{a}	74.51±2.10^{a}	77.63±2.15^{a}	73.68±1.95^{a}	74.66±1.86^{a}
Nutritive values:					
TDN%	65.05±1.07^{d}	71.48±2.25^{b}	76.63±2.14^{a}	68.96±1.58^{c}	71.71±2.02^{b}
DE (MJ/kg DM)*	1328.48	1408.47	1448.75	1371.23	1334.37
ME (MJ/kg DM)**	1089.35	1120.51	1187.98	1124.41	10.94
DCP%	7.45±0.98^{d}	12.15±0.74^{b}	14.48±0.80^{a}	10.07±0.68^{c}	10.94±0.63^{c}

DE and ME, calculated according to MAAF (1975) using equations being DE (MJ/kg DM) = Digestible organic matter (DOM X 19) & ME (MJ/kg DM) = DE X 0.82.

a, b, c and d Means with different superscripts on the same row are different at ($P<0.05$).

Feed intake:

Data presented in (Table 3) illustrate that the average daily DM intake expressed as g/h/d or g DM/kg W $^{0.75}$ was significantly (P<0.05) higher with lambs fed the control ration followed by the ration containing 10% SFS or 10% SBS than those offered other tested rations. On the other hand, average daily intake expressed as TDN and DCP were higher with lambs fed R3 & R4 rations than the other rations. In this respect, Negovanovic *et al.* (1997) pointed that, lambs fed rations with sunflower seed had slightly higher average daily gains, lower dry matter consumption compared with the lambs fed the control ration. Contrary, DM intake was not different among rations of steers fed sunflower seeds with additional calcium (Drackley *et al.*, 1985). Addition of calcium to rations containing unsaturated oils alleviated depressed fiber digestibility (Devendra and Lewis 1974; and Johanson and McClure 1973), and decreased antimicrobial activity of long chain fatty acids (Galbraith and Miller 1973). Palmquist and Jenkins (1980) postulated that this effect was due to formation of insoluble calcium salts or soaps of the inhibitory long-chain fatty acids, which remove bacterial inhibition by the acids. Abdel Malak and Hamouda (2000) mention that rabbits fed on diet containing 10 or 15% SFS consumed significantly (P<0.05) more feed than those fed on control group or 5% SFS.

Table 3: Performance of growing lambs fed different levels of whole full fat seeds in complete rations.

Item	CR 100% R1	Whole soybean seeds 10% R2	Whole soybean seeds 20% R3	Whole sunflower seeds 10% R4	Whole sunflower seeds 20% R5
No. of Animals	6	6	6	6	6
Duration of trail (days)	112	112	112	112	112
Av. Initial weight (kg)	27.17±1.44^{a}	27.80±1.92^{a}	27.50±2.05^{a}	27.28±1.34^{a}	26.95±1.84^{a}
Av. Final live wt. Kg	47.27±1.65^{a}	50.18±1.28^{a}	51.35±1.67^{a}	50.52±1.29^{a}	49.20±1.65^{a}
Av. Daily Gain (g)	179.50±1.67^{d}	199.86±1.07^{c}	221.85±1.44^{a}	207.50±1.96^{b}	198.70±1.19^{c}
Feed consumption):					
Complete ration (g/day)	1381.00	1243.13	1098.33	1250.17	1090.50
Whole fat seed (g/day)	----	108.50	215.67	102.60	220.45
Av. Daily DM intake (g)	1381.00	1351.63	1314.00	1352.77	1310.95
Av. Daily DM intake Kg W $^{0.75}$/h/d	116.05	111.64	112.51	114.36	110.90
Av. Daily intake:					
TDN (g)	898.34	966.14	1006.92	932.87	940.08
DCP (g)	102.88	164.22	190.26	190.61	187.86
Feed Efficiency:					
Kg DM/Kg gain	7.69	6.76	5.92	6.52	6.60
Kg TDN/Kg gain	5.01	4.83	4.54	4.50	4.73
Kg DCP/Kg gain	0.573	0.827	0.858	0.919	0.945
Feed cost/kg gain	2.37	2.38	2.19	2.31	2.50
Economic efficiency**	3.64	3.62	4.02	3.76	3.40

a, b, c and d Means with different superscripts on the same row are different at (P<0.05).

***Based on free market prices of feed ingredients, 2001, the cost of experimental rations was estimated as the total prices of one ton ingredients used in the complete ration mixture, whole soybean seeds, sunflower seeds, being, 334.5, 950.0 and 600 L.E., respectively and the price of one kg body weight on selling, 11.0 L.E.**

****Economical efficiency = a ratio between price of wt. gain and costs of feed consumed.**

Daily gain and Feed Efficiency:

Average weight gain increased (P<0.05) by increasing the levels of SBS or SFS up to 10 or 20% compared with the control group (Table 3). Therefore, lambs given SBS ration recorded higher average daily gain (ADG) than those received SFS rations. Values were (199.86 & 221.85) vs. (207.50 & 198.70) g/day for 10 and 20% SBS and SFS, respectively. Better results of recorded daily gain may be attributed to the higher DM, intake, CP content and higher nutrients digestibility and also, higher digestible or metabolizable energy content than the other rations. While lambs fed the control ration showed lower (P<0.05) ADG (179.50 g/day). On the other side, no significant differences were detected between ADG of 10 SBS and 20%. The reduction in daily gain of lambs fed 20% SFS, may be attributed to the decrease in feed intake, nutrients digestibility and feeding value. Eweedah *et al.* (1996) and, (Negovanovic *et al.*, 1997) who found that, lambs fed rations with sunflower seed had slightly higher average daily gains, lower dry matter consumption and better conversion.

Feed utilization efficiency as g TDN or DCP to give one kg gain for lambs fed ration R3 and R4 were (4.54 & 4.50 kg) and (0.858 & 0.945 kg), respectively, versus (5.01 and 0.573 kg) for those fed control (Table 3). However, lambs fed control ration (R1) appeared to have lower feed efficiency (5.01 kg TDN/kg gain). The higher or lower feed efficiency is usually dependent on the feed unit intake as well as daily gain. Feed costs per kg daily gain, feed efficiency and economical efficiency was better with R3 and R4 rations (20% SBS and 10% SFS) than ration containing 0 (control) or 20% SFS. In this respect. Eweedah *et al.*, (1996) pointed that, lambs receiving full fat soybean had better feed efficiency (P<0.05) than those receiving whole sunflower seeds or control diets. Abdel-Malak and Hamouda (2000) reported that, adding SFS level of 15% led to significant improvement in feed conversion of rabbits when compared to the control diet.

Ruminal Parameters:

These data are presented in table (4). It is clear that there were, no significant differences among treatments in pre-feeding (0 time) pH value, while the minimum values were observed at 3-hrs post-feeding which it tended to increase again at 6-hrs post-feeding for all dietary treatments.

Rumen pH was significantly (P<0.05) lower with R4 and with R5 at all hours. At most times measured, there were no significant differences in pH values among all groups at 0 time

Ruminal NH_3-N concentrations were significantly different after 3 hrs post-feeding. TheNH_3-N levels significantly (P<0.05) increased to reach the peak at 6-hrs post-feeding for all the rations. The lower of rumen NH_3-N level in R4 was due to its lower crude protein content compared with other rations.

The total VFA'S increased gradually from 0-hrs till 3-hrs then slightly reduced at 6 hrs.

In this respect, Drackley *et al.*, (1985) reported that, concentrations of ruminal NH_3-N were not statistically different among treatments, although means for steers fed SFS were generally higher and pH lower. Schingothe *et al.*, (1977) observed higher ruminal NH_3-N in cows fed sunflower meal than

those fed soybean meal, presumably due to increased solubility of sunflower protein. Ruminal pH, TVFA'S concentration were not affected by addition the dietary treatments (10% SFS or 6.7% SFS + 3.3% oil), while these treatments increased ruminal NH_3-N (El-Bedawy *et.al.* 1994). Eweedah *et al.,* (1996) pointed that, no significant differences among the experimental groups in rumen pH and concentration of VFA'S and NH_3-N concentration was slightly higher with the SFS diet than with the SBS meal or SBS fed to Marino sheep.

Table 4: Effect of the experimental rations on some ruminal parameters of lambs

Item	CR 100% R1	Whole soybean seeds		Whole sunflower seeds	
		10%	20%	10%	20%
		R2	R3	R4	R5
pH					
0 hr *	6.60±1.05[a]	6.82±1.06[a]	6.70±1.03[a]	6.69±1.04[a]	6.71±1.02[a]
3	5.73±1.03[a]	5.85±1.03[a]	5.68±1.05[a]	6.70±1.08[a]	5.42±1.07[a]
6	6.50±1.06[a]	6.43±1.04[a]	6.35±1.03[a]	6.45±1.06[a]	6.27±1.05[a]
NH3 – N (mg/100)					
0	16.23±1.23[a]	16.15±1.13[a]	16.25±1.10[a]	16.34±1.16[a]	15.68±1.17[a]
3	24.8±1.29[a]	25.03±1.11[a]	24.16±1.12[a]	24.81±1.20[a]	23.54±1.21[a]
6	25.02±1.47[a]	24.86±1.14[a]	24.65±1.19[a]	24.74±1.18[a]	24.76±1.28[a]
Total VFA'S (Meq/100 ml)					
0	8.66±1.12[a]	8.17+1.22[c]	8.06±1.30[a]	8.20±1.03[a]	8.13±1.24[a]
3	10.63±1.09[a]	10.20+1.17[a]	10.12±1.21[a]	10.51±1.12[a]	10.22±1.16[a]
6	9.48±1.21[a]	9.44+1.18[a]	10.32±1.05[a]	9.57±1.24[a]	9.22±1.08[a]

± a, b and c Means with different superscripts on the same raw are different at (P<0.05).
* Before feeding

Nitrogen Utilization:

As shown in (Table 5), the %apparent N utilization (NB/NI X100) was lower (P<0.05) for the control ration and 20% SFS (R5) than for other rations, while rations containing 10 and 20% SBS (R2 & R3) recorded higher values. On the other hand, similar N retention values were reported for the control ration (R1) and complete ration containing 10% SFS (R4). Therefore it is suggested that protein of soybean seeds could be more efficiently utilized either with 10 or 20% than sunflower seeds NH_3-N.

Table (5): Dietary nitrogen utilization of the experimental rations by sheep (g/h/day).

Item	CR 100% R1	Whole soybean seeds		Whole sunflower seeds	
		10%	20%	10%	20%
		R2	R3	R4	R5
N-balance (g/h/d):					
N. intake	32.65±1.3[b]	34.97±1.8[b]	38.87±2.0[a]	30.50±1.2[c]	32.61±1.4[b]
Fecal N.	12.82±0.92	12.57±1.0	12.81±1.0	11.76±0.90	12.96±1.1
Urinary N.	10.95±0.76	11.15±0.65	11.86±0.84	10.17±0.71	11.52±0.80
Retained N.	8.88±0.44[c]	11.25±0.67[b]	14.20±0.96[b]	8.57±0.42[c]	8.13±0.38[c]
Retained N% of intake	27.20±2.43[c]	32.17±2.65[b]	36.54±2.73[b]	28.10±2.19[c]	24.93±2.16[d]

NI = N Intake, FN = Fecal N, UN = Urinary N, ARU = Apparent retained N.
±a, b and c Means with different superscripts on the same column are different at (P<0.05).

Blood constituents:

Data presented in (Table 6), show that, the values of serum total protein significantly (P<0.05) increased with feeding SBS &SFS rations. This may be due to the ingested protein intake on the value of total protein in serum. The present results, generally, agree with those reported by Abdel-Moty, (1991); Abdel- Malak and Hamouda (2000) and Nikokyris *et al.*, (1999). The serum creatinine, showed a significant (P<0.05) decrease, whereas serum urea increased (P<0.05) with the increasing levels of SBS or SFS in the lamb diets. Similar results were obtained by Merck, (1974) and Abdel-Malak and Hamouda (2000), who revealed, a negative correlation between blood urea and creatinine levels.

Table 6: Effect of the experimental rations on some blood serum parameters of lambs.

Item	CR 100% R1	Whole soybean seeds		Whole Sunflower seeds	
		10%	20%	10%	20%
		R2	R3	R4	R5
T. Protein g/dl	7.60±1.04^{a}	7.89±1.23^{a}	8.65±1.12^{b}	7.95±1.25^{a}	8.96±1.22^{b}
Creatinine g/dl	1.32±0.54^{a}	1.63±0.73^{a}	1.22±0.65^{b}	1.31±0.45^{a}	1.27±0.55^{b}
Urea-N g/dl	15.50±0.67^{c}	15.86±0.37^{b}	17.95±0.56^{a}	16.14±1.21^{a}	17.81±1.31^{a}
Cholesterol g/dl	75.60±1.42^{a}	71.13±1.42^{b}	70.53±1.46^{b}	71.19±1.30^{b}	68.72±1.52^{b}
Trigelcerides g/dl	135±2.05^{a}	123±2.68^{b}	121±2.70^{b}	122±2.54^{b}	121±2.71^{b}

± a, b and c Means with different superscripts on the same row are different at (P<0.05).

The lambs fed full fat seeds had lower levels of serum cholesterol and trigelycerides (P<0.05) than those fed the control ration. In this respect, Nikokyris *et al.*, (1999) reported that, plasma TP, urea, levels and also serum total free cholesterol concentration were higher on day 58 of experiment for sheep fed ration containing 30% whole cotton seeds (WCS). On the contrary, Kozawa *et al.*, (1995) pointed that; there were no significant differences in blood biochemistry between the two groups (with or withcut WCS). Whereas, the concentration of blood urea N in without WCS and blood lipids with WCS were significantly increased.

It can be recommended that, replacing 20% of the complete rations with SBS or 10% SFS resulted in superior nutritional, better daily gain and feed efficiency, and economical efficiency, as compared with other groups could be recommended.

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تأثير مستوى بذور فول الصويا وعباد الشمس فى العليقة المتكاملة على المأكول و القيمة الغذائية و أداء الحملان النامية.

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استخدم فى هذه الدراسة ٣٠ حمل برقى عمر ٦ شهور و متوسط وزن حى ٢٧ + ٢,١٤ كجم لدراسة تأثير اضافة مستويات مختلفة من بذور فول الصويا المحمصة أو عباد الشمس الكاملة فى العلائق متاحة للحملان النامية على أدائها الإنتاجي. . قسمت الحيوانات إلى خمس مجموعات تجريبية (٦ حيوانات فى المجموعة). وزعت المجموعات التجريبية على العلائق المختبرة عشوائيا: عليقة (١) مجموعة المقارنة : علف متكامل بدون بذور زيتية – عليقة (٢) & (٣) تحتوى على ١٠% &٢٠% بذور فول صويا كاملة و عليقة (٤) & (٥) تحتوى على ١٠% &٢٠% بذور عباد الشمس على التوالى. امتدت تجربة تغذية إلى ١١٢ يوم حيث تضمنت تقدير كمية الغذاء المأكول و تجربة تمثيل غذائى لتقدير معاملات الهضم و القيمة الغذائية و ميزان الأزوت و الكفاءة الغذائية و كفاءة استخدام النيتروجين والزيادة اليومية ووظائف الكبد و الكلى للحيوانات وكفاءة تحويل الغذاء و الكفاءة الاقتصادية. أوضحت الدراسة أن معاملات الهضم الظاهري للبروتين و الدهن الخام قد زادت بزيادة مستوى بذور فول الصويا و عباد الشمس فى العلائق ، و على العكس من ذلك فقد انخفضت قيم الألياف المهضومة بدرجة معنوية بزيادة مستوى البذور الزيتية فى العلائق .زادت قيم المركبات المهضومة الكلية و البروتين المهضوم و الطاقة المهضومة و الممثلة للعلائق المحتوية على بذور فول الصويا و عباد الشمس معنويا (٥%) عن عليقه المقارنة .زاد المأكول اليومى من المادة الجافة معبرا عنها بالكجم/راس/يوم أو كجم مادة جافة منسوبة لحيز الجسم التمثيلى أكثر معنويا (٥%) مع الحملان التى غذيت على عليقة مقارنة عن العلائق المختبرة الأخرى .سجلت الحملان التى غذيت على بذور فول الصويا الكاملة أعلى زيادة يومية معنويا (٥%) عن مثيلاتها التى غذيت على علائق محتوية على بذور عباد الشمس و كان متوسط النمو المحقق (١٩٩,٨٦& ٢٢١,٨٥) جم/يوم للحملان التى غذيت على علائق تحتوى على بذور فول الصويا مقابل (٢٠٧,٥٠ & ١٩٨,٧٠) جم/يوم بالنسبة للعلائق المحتوية على ١٠ & ٢٠% بذور عباد الشمس الكاملة على التوالى ، بينما سجلت الحملان التى غذيت على عليقة المقارنة (١٧٩,٥٠)جم/يوم .- زادت قيم البروتين الكلى و اليوريا نيتروجين فى السيرم معنويا بزيادة مستوى البذور الزيتية فىعلائق الحملان، بينما انخفض مستوى الكرياتنين و الكوليسترول و الجليسريدات الثلاثية معنويا فى علائق الحملان التى غذيت على بذور زيتية كاملة مقارنة بالحملان التى غذيت على عليقة المقارنة.كانت الكفاءة الغذائية و الاقتصادية أفضل بالنسبة للعلائق التى تحتوى على ١٠ & ٢٠% بذور فول الصويا و ١٠% بذور عباد الشمس من العلائق الأخرى.

من هذه الدراسة يمكن أن نوصى باستخدام بذور فول الصويا المحمصة حتى ٢٠% وبذور عباد الشمس عند مستوى ١٠% حيث تستطيع تحسين كفاءة المأكول و القيمة الهضمية و الكفاءة الغذائية و الاقتصادية لذكور الحملان النامية.