Egyptian J. Nutrition and Feeds (2003) 6 (1) : 37 - 47

PERFORMANCE OF GROWING LAMBS FED DIFFERENT FULL FAT SEEDS IN COMPLETE RATIONS.

M.M . Shoukry [1]; I..M. Awadalla, [1]; M.I., Mohamed[1] and A.M. Soliman.[2]

[1]Animal Production Department, National Research Center, Dokki, Giza, Egypt.

[2]Animal Production Research Institute, Agriculture Research Center, Dokki, Giza, Egypt.

SUMMARY

Thirty Barki lambs of 6 months old and weighing 27.50 + 2.96 kg LBW were used. Animals were divided into five groups (6 lambs each). The experimental groups allotted randomly into five tested complete rations: control (R1): without full fat seeds, (R2) and (R3): containing 10% and 20% whole cottonseeds (WCS), respectively, (R4) and (R5): containing 10% and 20% whole flaxseeds (WFS), respectively. The feeding trial extending to 112 days, feed intake, digestibility coefficients, nutritive values, nitrogen utilization, daily gain, feed and economical efficiency were determined. Apparent digestibility coefficients of CP and EE ($P<0.05$) increased with increasing WCS and WFS levels. On the contrary the DCF ($P<0.05$) decreased with increasing WCS and WFS levels in rations. TDN, DCP, DE and ME values of WCS and WFS rations were ($P<0.05$) higher values than control ration. Daily DMI expressed as kg/h/d or DM/kg $W^{0.75}$ was significantly ($P<0.05$) higher with lambs fed control ration than those given other tested rations. Lambs received WCS recorded highly ($P<0.01$) average daily gain (ADG) than those received WFS rations, the realized (ADG) were (198 and 195) vs. (185 and 180) g/day for 10 and 20% for WCS and WFS, respectively, while lambs of control group recorded (179) g/day. No differences among the experimental treatments were found in serum TP, albumin, globulin and creatinine, while lambs fed full fat seeds had lower ($P<0.05$) levels of serum urea-N, cholesterol and triglycerides than those fed the control ration. Lambs fed R3, R4 and R1 rations showed markedly better feed efficiency than that R2 and R5. Economic efficiency was better with the lambs fed R5, R1 and R3 rations than other rations. It is suggested that full-fat cotton seeds especially as 20% and flax seeds as 10% to complete mixture ration, can efficiently improve the dietary value, digestibility coefficients and feed and economic efficiency of growing lambs.

***Key words**: Whole cottonseeds, whole flaxseeds, complete ration, nutritive value, Sheep.*

INTRODUCTION

Oilseeds are important sources of energy and protein because of their high oil and protein content (Kronfeld *et al.*, 1980 and Schauff *et al.*, 1992). Oilseeds were efficiently used for feeding growing lambs after weaning that are need to energy and protein to improve their metabolic efficiency utilization (Eweedah *et al.*, 1996 and Barwic *et al.*, 1997). Some studies (Utley and Mc-Cormick, 1980; Moor *et al.*, 1986) have evaluated the feeding value of whole cottonseed seeds (WCS) for steers, and Barwic *et al.*, 1997, evaluate the feeding value of whole flaxseeds (WFS) for pigs. The high energy values of WCS and WFS are due to primarily to its high fat content (24.32 and 34%), and they are also higher in CP and ADF (21 and 27.1%) for WCS and (22 and 7.40%) for

WFS, respectively (Song *et al.*,1995 and Luginbuhi *et al.*, 2000) . Since WCS and WFS are relatively of a high fiber and potentially a high-energy feedstuffs, They are commonly included in rations for growing lambs. Whereas, supplemented oils or fats disturb ruminal fermentation, decrease fiber digestibility and lower animal performance, however whole oilseeds can be fed without observable ruminal inhibition, probably because of a slow release of the oil into ruminal contents (Coppock and Wilks, 1991). However, digestibility and feeding values for WCS (NRC, 1985, Utley and Mc-cormick 1980 and Moore *et al.*, 1986) are based on data from studies with cattle, steers or sheep at relatively low intakes. Increasing intake results in depression of digestibility of dietary components. Oil in seeds is encapsulated by seed coat (hulls) which had beneficial effects such as altering the rate of rumen by-pass providing some degree of natural protection for use in growing animal rations (Ekeren *et al.*, 1992). Inclusion full fat seeds increased significantly the digestion coefficients of fat (Eweedah *et al.*, 1997). Lambs fed rations with sunflower seed had slightly higher average daily gains, lower dry matter consumption and better conversion (Negovanovic *et al.*, 1997). Barwic *et al.*, 1997 suggested that, full fat flaxseeds, especially as an 8% to complete mixture for fattener's animals. The amount of cotton (*Gossypium spp*) and flax (*Linum usitiatimum*) grown in Egypt averaged 788812 and 16476, feddans in 1998 – 1999, which produced 26751.5 and 10548 ton seeds, respectively, and increased the supply of whole cottonseed (WCS) or whole flaxseed (WFS) available for oil production or feeding livestock (Ministry of Agriculture 2001). These fat seeds contain high levels of CP and TDN and requires no processing, which makes it a very desirable by-product feed (Poore and Rogers, 1995). Although (WCS) and (WFS) have been widely used in cattle feeding systems (Ochrimenko 1993; Poore and Rogers, 1995), its use for small ruminants, especially for meat of goats and lambs, has not been fully explored.

The present study aimed to investigate the effect of including different levels (10 and 20%) whole cotton and flax oilseeds in the ration on digestibility coefficients, feeding value, blood and rumen parameters, feed and economical efficiency of growing lambs.

MATERIALS AND METHODS

The present study was conducted at the Sheep and Goat Research Unit, Abdel-Moneim Riyadh village, El-Bosstan – Noubaria, National Research Center. A feeding trial for 112 days was carried out on thirty Barki lambs of 6 months old and weighing 27.5 $\pm$ 2.96 kg LBW. Animals were divided into five groups (6 lambs each). The experimental groups allotted randomly into five complete pelleted rations as shown in Table (1): control (R1): not containing full fat seeds, while (R2) and (R3): included 10% and 20% whole cottonseeds (WCS) and (R4) and (R5): containing 10 and 20% whole flax seeds (WFS), respectively. 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 trials were carried out; three animals chosen randomly from each group to be subjected to digestibility and nitrogen balance trial using individually metabolic cages for 14 successive days, where 7 days were a preliminary period and 7 days for feces and urine collection. At the end of each trial, 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 determined for pH, NH_3-N, concentration, while VFA'S samples were stored at (-18 to –20 c°) until determined. Blood samples were collected from each group before feeding (O hr) during the digestibility trial (3 animals each). Serum was separated and stored at (-18 to –20 c°) until assayed. Animals were given the different experimental rations to cover their requirements according to NRC (1985). Each animal was given daily diets individually.

Chemical analysis of feeds and feces:

Proximate chemical analysis of feeds, 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 measured ruminal pH (Hanna 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)method.

Blood serum metabolites: Serum total proteins (TP) were 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 triglyecerides according to Bucolo and David (1973).

Statistical analysis:

The data for 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 SAS (1985) as 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).

Duncan's Multiple Range Test (1955) was used for testing the significant differences between means (if any).

RESULTS AND DISCUSSION

Chemical composition:

Data in Table (1) show that, replacement of WCS and WFS increased EE content of rations. This was mainly due to the high EE content of WCS and WFS which in average about (6.18 and 9.05%) and (7.28 and 10.16%) for 10 and 20%WCS and WFS, respectively, and more than control ration. Also, crude protein content of WFS was higher than control or WCS rations. On other hand, CP and CF content of WCS and WFS rations were slightly higher than control ration as the result of replacement of full fat seeds.

Digestibility Coefficients:

Apparent digestibility coefficients of CP, EE and CF ($P<0.05$) increased with increasing WCS and WFS levels, while OM and NFE digestibility coefficients not affected by increasing the levels of full fat seeds. However DM digestibility did not differ significantly among all tested rations Table (2). Opposite results were reported in ewe lambs by Moore *et al.*, (1986) they pointed that addition of WCS to chopped wheat straw diets (4%), fiber digestion was decreased and DE intake by steers was not improved over diets without added fat. Luginbuhl *et al.*, (2000) reported that, addition of WCS resulted in linear decreases in apparent digestibility coefficients of DM significantly, while DCP was not affected by WCS level. Including, WCS in diets

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

Ingredients	(CR)	Whole Cotton seed		Whole flax seeds	
		10%	20%	10%	20%
	R1	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
Lime stone	2.00	1.80	1.60	1.80	1.60
Total complete ration:	100	100	100	100	100
Whole cottonseeds	0.00	10	20	0.00	0.00
Whole flaxseeds	0.00	0.00	0.00	10	20
Total	100	100	100	100	100
Chemical composition					
CP	13.86	14.61	15.37	14.46	15.06
CF	18.54	18.64	18.73	17.43	16.37
EE	4.32	6.18	9.05	7.28	10.16
NFE	55.69	53.17	49.66	53.52	51.39
Ash	7.59	7.40	7.19	7.31	7.06

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

Item	(CR)	Whole cotton seed		Whole flax seeds		±SE
		10%	20%	10%	20%	
	R1	R2	R3	R4	R5	
Digestion coefficients(%):						
DM	71.5	70.6	72.8	71.5	71.9	2.65
OM	69.9	71.9	72.7	73.8	72.5	NS
CP	70.2^{c}	73.2^{b}	75.4^{a}	70.0^{c}	72.1^{b}	3.46
EE	62.5^{b}	61.6^{b}	65.8^{a}	58.7^{c}	60.5^{b}	NS
CF	53.2^{d}	60.4^{c}	63.7^{b}	63.8^{b}	66.4^{a}	1.23 *
NFE	73.8^{a}	72.2^{a}	74.3^{a}	73.2^{a}	73.6^{a}	1.12 *
Nutritive values:						
TDN%	65.1^{a}	73.98^{a}	72.76^{a}	65.9^{a}	65.45^{b}	1.10 *
DE (MJ/kg DM)*	1329	1367	1381	1326	1377	1.22 *
ME (MJ/kg DM)**	1089	1120	1132	1089	1118	1.16 *
DCP%	7.5^{c}	8.44^{a}	8.86^{a}	7.9^{b}	7.9^{b}	0.43 *

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

of lactating dairy cows (5, 15, and 25%) increased digestibility of NFE and energy without depressing fiber digestibility (Smith *et al.*, 1981). The same results were obtained by sheep (Morrison, 1959). Ochrimenko (1993) with goats mentioned that, addition of about 10% linseed increased crude fat and crude protein digestibility, while 20% to 30% linseed significantly decreased digestibility of crude fiber and NFE.

Results in Table (2) showed that TDN, DCP, DE and ME of WCS and WFS, rations were higher ($P<0.05$) values than for the control ration, the superiority of these records probably due to high OMD of these rations more than control ration. Similar results were obtained by Utley and McCormick (1980), they reported that, apparent DMD and calculated TDN were greater significantly for diets of finishing steers containing 14% WCS supplement than for the control diets. However, each pair of rations (R2 and R4) and (R3 and R5) was found to be partially isonitrogenous and isocaloric since they contained exactly similar digestible and metabolizable energy and digestible crude protein with the tendency to be closer to the values of control ration (R1).

Feed intake:

Data presented in Table (3) illustrated that average daily DM intake expressed as kg/h/d or g DM/kg $W^{0.75}$ was significantly ($P<0.05$) higher with lambs fed control ration than those offered other tested rations. In this respect Moor *et al.*, (1986) pointed that, addition of WCS to chopped wheat straw diets (4%), and DE intake by steers was not improved over diets without added fat. On the other hand, Negovanovic *et al.*, (1997) pointed that lambs fed rations with full fat seeds had lower dry matter consumption. Luginbuhi *et al.*, (2000) found that, adding WCS by, 8, 16 or 24% increased feed intake significantly. Drackley *et al.*, (1985) used Holstein steers, to evaluate four isonitrogenous concentrate mixes containing: corn and soybean meal 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; and SCS with sunflower seeds treated with 2% calcium hydroxide. Digestibilities of DM, OM and lipids were not different among treatments.

Daily gain and Feed Efficiency:

Lambs received WCS ration recorded higher ($P<0.01$) average daily gain (ADG) than those received WFS rations (Table 3). Values were (198 and 195 g/day) vs. (185 and 180 g/day) for 10 and 20% WCS and WFS, respectively, while lambs fed control ration showed lower ($P<0.05$) ADG (179 g/day). On other side, no significant differences between ADG of adding 10 or 20% full fat seed in lamb rations. But R2 and R3 rations that contained 10 and 20% WCS had achieved higher daily gain ($P<0.05$) than those rations contained flaxseeds (R4 and R5). These finding are in agreement with Eweedah *et al.*, (1996) and Negovanovic *et al.*, (1997) they found that, lambs fed rations with sunflower seed had slightly higher average daily gains, lower dry matter consumption and better conversion. Concerning feed efficiency as DM and TDN/kg gain lambs fed R2, R3 and R4 markedly performed better than those fed R1 and R5 Table(3). Feed costs per kg gain, feed efficiency and economical efficiency was better with the R2, R3 and R4 rations than control ration (Table3). In this respect, Luginbuhi *et al.*, (2000), pointed that, adding WCS to diets for growing goats, had detrimental effects on animal performance, and based on the possible negative effects of dietary EE and

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

Item	(CR)	Whole cotton seed		Whole flax seeds		±SE
		10%	20%	10%	20%	
	R1	R2	R3	R4	R5	
Av. Initial weight (kg)	27.2	27.8	27.0	27.8	27.8	2.34
Av. Final live wt. (Kg)	47.3^{c}	50.1^{a}	48.8^{b}	48.5^{b}	47.9^{c}	NS
Av. Daily Gain (g)	179^{c}	198^{a}	195^{a}	185^{b}	180^{b}	1.46 *
Feed consumption:						
Av. Daily DM intake (g)	1381^{a}	1329^{c}	1238^{d}	1229^{e}	1365^{b}	3.28 * *
Av. Daily DM intake (Kg w $^{0.75}$/h/d), g	116^{a}	110^{b}	105^{b}	102^{c}	113^{a}	2.17 *
Av. Daily intake						
TDN (kg)	0.89^{b}	0.90^{b}	0.85^{c}	0.82^{d}	0.92^{a}	0.05 *
DCP (g)	102.9^{c}	112.2^{a}	109.7^{b}	97.1^{d}	114.1^{a}	2.25 *
Feed Efficiency:						
Kg DM/Kg gain	7.69^{a}	6.70^{b}	6.35^{c}	6.63^{b}	7.58^{a}	0.81 *
Kg TDN/Kg gain	5.01^{a}	4.54^{b}	4.38^{b}	4.45^{b}	5.09^{a}	0.00 *
G DCP/Kg gain	0.57^{a}	0.50^{b}	0.53^{b}	0.47^{c}	0.57^{a}	0.00 *
Feed cost/kg gain	4.6^{c}	4.7^{c}	5.1^{b}	4.4^{d}	5.7^{a}	0.00 *
Economic efficiency**	4.27^{b}	4.68^{a}	4.48^{a}	4.51^{a}	3.71^{d}	0.54 *

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 were estimated as the total prices for R1, R2, R3, R4 and R5 being, 335, 350, 375, 360 and 385, respectively. While, whole cottonseed and whole flaxseeds being, 550.0 and 600 L.E., respectively and the price of one kg body weight on selling, 11.0 L.E.**

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

economics should dictate whether to use WCS in feeding program. Lambs fed rations containing sunflower seeds had slightly higher average daily gains, lower dry matter consumption and better conversion (Negovanovic *et al.*, 1997); Barwic *et al.*, (1997) suggested that, full fat flaxseeds, especially as an 8% to complete mixture for fattener' s animals. The higher or lower feed efficiency is usually dependent on the feed unit intake as well as daily gain. Feed efficiency was better with R3, R4 and R1 than R2 and R5, while, feed costs per kg gain was better with R4, R1 and R2 than R3 and R5. Economic efficiency was better with R5, R1 and R3 rations than R4 and R2 rations. 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. Negovanovic *et al.*, (1997) pointed that lambs fed rations with sunflower seed had slightly higher average daily gains, lower dry matter consumption and better conversion. Also, Abdel-Malak and Hamouda (2000) reported that, adding sunflower seeds level of 15% led to significant improvement in feed conversion of rabbits when compared to the control diet.

Ruminal Parameters:

Data of rumen parameters are presented in Table(4). Ruminal pH values, NH_3-N and total VFA'S concentrations showed that, using WCS and WFS in complete rations of sheep had no significant effect, after 3 or 6 hrs post feeding. In this respect, El-Bedawy *et.al.*, (1994) pointed that ruminal pH, TVFA'S concentration were not affected by adding 10% or 6.7% sunflower seeds + 3.3% oil. Also, Kozawa *et al.*, (1995) mentioned that, pH, NH_3-N and TVFA'S concentration of rumen fluid showed no significant differences between the experimental groups of cows fed on rations with or without whole cottonseeds.

Nitrogen Utilization:

Data in Table (5) indicated that the %apparent N utilization (NB/NI X100) was currently lower ($P<0.05$) for the control ration and the ration containing 20% WFS (R5) than for other rations, while rations containing 10 and 20% WCS (R2 and R3) were recorded the higher values. Similar N retention values were recorded for the control ration (R1) and complete ration containing 10% WFS (R4). Therefore, it is suggested that protein of cottonseed could be more efficiently utilized either with 10 or 20% than whole flaxseeds.

Clinical Biochemistry:

As shown in Table (6) no significant differences among the experimental treatments in serum total protein, albumin, globulin and creatinine, while lambs fed full fat seeds had lower ($P<0.05$) levels of serum urea-N, cholesterol and triglycerides than those fed the control ration. In this respect, Nikokyris *et al.*, (1999) reported that plasma TP, urea, albumin and globulin levels and also serum total free cholesterol concentration were higher on day 58 of experiment for sheep fed ration containing 30% WCS. Kozawa *et al.*, (1995) pointed that there were no significant differences in blood biochemistry between the two groups (with or without WCS), a significant differences did not occur in all items. However, Luginbuhi *et al.*, (2000) found that adding WCS increased significantly levels of serum urea-N.

It could be concluded that, replacing 20% of the complete rations with WCS or 10% WFS resulted in superior nutrition, better daily gain and feed efficiency and economic efficiency, as compared with other groups.

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

Item	(CR)	Whole Cotton seed		Whole flax seeds		±SE
	R1	10% R2	20% R3	10% R4	20% R5	
pH						
0 hr *	6.6	6.4	6.7	6.5	6.3	1.01 NS
3	5.7	5.6	5.7	5.7	5.4	1.02 NS
6	6.5	6.5	6.7	6.3	6.2	1.12 NS
NH_3 – N (mg/100)						
0	16.2	16.3	16.5	15.8	15.9	1.24 NS
3	24.8	25.4	25.2	23.2	24.5	1.36 NS
6	25.0	24.5	24.8	24.5	24.6	1.42 NS
Total VFA'S (Meq/100 ml)						
0	8.6	8.5	8.6	8.3	8.2	1.13 NS
3	10.6	10.5	10.3	9.27	9.4	1.21 NS
6	9.5	9.6	9.9	9.3	9.3	1.23 NS

*** Before feeding**

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

Item	(CR)	Whole Cotton seed		Whole flax seeds		± SE
	R1	10% R2	20% R3	10% R4	20% R5	
N-balance						
N. intake	30.6^{b}	31.1^{a}	30.5^{b}	28.4^{c}	32.9^{a}	0.36 *
Fecal N.	12.8^{a}	11.0^{b}	11.9^{a}	11.2^{b}	12.4^{a}	0.16 *
Urinary N.	10.95^{b}	9.6^{c}	9.1^{d}	9.7^{c}	12.3^{a}	0.12 *
Retained N.	6.95^{d}	10.5^{a}	9.5^{b}	7.5^{d}	8.2^{c}	0.17 *
RN,% of intake	22.40^{d}	33.8^{a}	31.1^{b}	26.4^{c}	24.9^{d}	0.26 *

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

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

Item	(CR)	Whole Cotton seed		Whole flax seeds		± SE
	R1	10% R2	20% R3	10% R4	20% R5	
T. Protein (g/dl)	7.6	7.5	7.8	7.6	7.5	1.18NS
Albumin (g/dl)	3.9	3.8	3.9	3.8	3.8	1.13NS
Globulin (g/dl)	3.5	3.3	3.9	3.8	3.3	1.08NS
Creatinine (g/dl)	1.3	1.1	1.2	1.1	1.2	1.04NS
Urea-N (g/dl)	15.5	12.9	13.2	13.4	13.8	2.63NS
Cholesterol (g/dl)	75.6^{b}	70.9^{b}	70.0^{b}	70.1^{b}	69.5^{b}	0.63*
Triglycerides (g/dl)	135^{a}	114^{b}	112^{b}	115^{b}	111^{b}	0.82*

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

REFERENCES

Abdel – Malak, N.Y. and I.A. Hamouda (2000). Rabbit growth performance and some blood parameters as affected by using sunflower seed in their diets. Egyptian J. Rabbit Sci., 10: 61-73.

A.O.A.C. (1990). Association of Official Analytical Chemists of Official Methods of Analysis, 15th ed., Washington, D.C.

Bartels, H. (1971). Colorimetric determination of creatinine. Clin. Chem. Acta, 32: 81 .

Barwic, T.; F. Brzoska and R. Gasior (1997). Influence of dietary full-fat seeds on fatty acid composition and cholesterol content in *Longissimus dorsi* muscle of pigs. European Association for Animal Production (EAAP) – 48th Annual Meeting, Vienna. Poster ph N2.23.

Bucolo, G. and M. David (1973). Determination of triglycrides. Clin. Chim., 19: 476 .

Conway, E.J. (1957). Micro-diffusion analysis and volumetric error. 4th Edition Grosyb Cockowood and Son Lts., London.

Coppock, C.E. and D.L. Wilks (1991). Supplemental fat in high-energy rations for lactating cows. Effects on intake, digestion, milk yield and composition. J. Anim.Sc. 69: 38276.

Doumas, B.T. and H.G. Blggs (1972). Standard methods of chemical chemistry. Vol. 7, Academic Press, New york.

Drakckley, J.K.; A.K. Clark and T. Sahlu (1985). Ration digestibility and characteristics in steers fed sunflower seeds with additional calcium. J. Dairy Sci., 68: 356-367.

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

Ekeren, P.A.; D.R. Smith; D.K. Lunt and S.B .Smith (1992). Ruminal bio-hydrogenation of fatty acids from high-oleate sunflower seeds. J. Anim. Sci., 70: 2574 - 2580.

Eweedah, N.; L.Rozsa; J.Gundel and J. Varhegyi (1997). Comparison of full-fat soybean, sunflower seed and protected fat as fat supplements for their effect on the performance of growing – finishing and carcass fatty acid composition. Acta – Veterinaria – Hungaria, 42: 151 -- 163.

Eweedah, N.; J. Varhegyi; J.Gundel and L. Rozsa (1996). A note on the use of some oilseeds in compound feeds for lambs digestibility, rumen fermentation, nutritive value and degradability. Allattenyesztes-es-Takarmanzas, 45: 589 – 596.

Henry, E.J. (1964). Colorimetric Determination of Total Protein and Calcium. Clin. Chem. Principles and Techniques. Harper - Row, Newark, P. 182.

Kozawa, K.; N. Kawamura; A. Takahashi; Y. Kato and M. Sakai (1995). Influence of dietary cottonseeds on milk production of dairy cows in early lactation. Res. – Bulletin of the Acichi-ken Agricultural – Research Center, 27: 297- 301.

Kronfeld, D. S; S. Donoghue; J.M. Naylor; K. Johanson and C.A. Bradley(1980). Metabolic effects of feeding protected tallow to dairy cows. J. Dairy Sci. 63: 545 – 556.

Luginbuhi, J.M.; M.H., Poore and A.P., Conrad (2000). Effect of level of whole cottonseed on intake, digestibility and performance of growing male goats fed hay-based diets. J. Anim. Sci., 78 (6) 1677.

MAAF (1975). Ministry of Agriculture, Fisheries and Food Energy Allowances and Feeding System for Ruminants. Technical Bulletin, 99 London, H.M. 50.

Ministry of Agriculture (2001). Ministry of Agriculture and Land Reclamation. Economic Affairs Sector .

Morrison, F.B. (1959). Feeds and feeding. 22nd ed. Morrison Publ. Co. Ithaca NY.

Moore, J.A.; R.S.Swingle and W.H., Hale (1986). Effects of whole cottonseed, cottonseed oil or animal fat on digestibility of wheat straw diets by steers. J. Anim. Sci. 63: 1267.

Negovanovic, D.; M.P. Petrovic; D. Ruzic; S. Josipovic; S. Djordjevic-Milosevic and S. Trenkovska (1997). Whole sunflower seed in ration of fattened lambs. EAAP– 48th Annual Meeting, Vienna. Poster PhN 2.19.

Nikokyris, P.N.; K. Kandylis and K., Deligianmis (1999). Effects of varying levels of dietary free gossypol in whole cottonseed on physiological responses of growing-fattening lambs. J. Sci. Food and Agriculture, 79: 1969 – 1981.

N. R .C.(1985). Nutrient Requirements of Sheep National and Academy Press, 16th Edition. Washington. D.C.

Ochrimenko, W.I. (1993). Apparent digestibility of linseed in weathers and in Saco dry matter degradation in fistulated goats. Kongressband 1993 Hamburg. Vortrage zum Generalthema des 105. VDLUF A Kongresses (20 – 25 September). Hamburg: Qualital und Hygiene von Lebensmitteln in Production und Verabeitung. 673 – 676.

Patton, C. J. and S.R. Grouch (1977). Colorimetric determination of urea. Anal. Chem. 49, 464 – 469.

Poor, M.H. and G. Rogers (1995). Feeding whole cottonseed and other cotton by-products to beef cattle. Vet., Med. 90: 1077 – 1087.

SAS (1985). User's Guide, statistics, version 5. Statistical Analysis System. Inst.Cary. NC.

Schauff, D. J.; J. P. Elliott; J. H. Glark and J.K. Drackly (1992). Effects of feeding lactating dairy cows diets containing whole sunflower and tallow. J. Dairy Sci., 75: 1923 – 1935.

Smith, N.E.; L.S., Collar; D.L.Bath; W.L., Dunkley, and A.A., Franke (1981). Digestibility and effects of whole cottonseed fed to lactating cows. J. Dairy Sci. 64: 2209 – 2215.

Snedecor, G.W. and W. G. Cochran (1980). Statistical Methods .7th Ed. Allied Pacific, Bombay.

Song, M.K.; T.Y. Chung and J.S. Sim (1995). Effect of supplementation of different types of flaxseed on in – vitro degradation rumenal fermentation characteristics of whole tract digestibility of the diets by sheep. Korean J. Anim. Sci., 37: 159 – 166.

Utley, P.R. and W.C. McCormick (1980). Evaluation of protein sources in whole shelled corn-based steer finishing diets. J. Anim. Sci. 50: 323.

Warner, A. C. I. (1964). Production of volatile fatty acids in the rumen methods of measurements. Nutr. Abst. And Rev. 34: 339.

Watson, D. (1960). A simple method for determination of serum cholesterol. Clin. Chem. Acta., 5: 637.

Zinn R. and A. Plascencia (1993). Interaction of whole cottonseed and supplemental fat on digestive function in cattle. J. Anim. Sci., 71: 11 – 17.

أداء الحملان النامية المغذاة على علائق متكاملة تحتوى على مستويات مختلفة من بذور القطن أو الكتان الكاملة .

محسن محمود شكرى[١]، ابراهيم محمد عوض الله[١] ، ممدوح ابراهيم محمد[١] و أحمد على محمد سليمان[٢]

١ – قسم الإنتاج الحيواني – المركز القزمي للبحوث – الدقي – الجيزة – مصر .

٢ – معهد بحوث الإنتاج الحيواني – مركز البحوث الزراعية – الدقي – الجيزة – مصر .

استخدم فى هذه الدراسة ٣٠ حمل برقى عمر ٦ شهور و متوسط وزن حى ٢٧,٥ ± ٢,٩٦ كجم . قسمت الحيوانات إلى خمس مجموعات تجريبية (٦ حيوانات فى المجموعة) . وزعت المجموعات التجريبية على الخمس علائق المتكاملة المختبرة عشوائيا : ١ – مجموعة المقارنة : عليقه متكاملة بدون بذور زيتية . المجموعتين ٢ و ٣ تحتوى على ١٠% و ٢٠ % على التوالى بذرة قطن كاملة – و المجموعتين ٤ و ٥ تحتوى على ١٠% و٢٠ % على التوالي منها بذرة كتان كاملة.امتدت تجربة التغذية إلى ١١٢ يوم حيث تضمنت تقدير كمية الغذاء المأكول و تجربة هضم و القيمة الغذائية و ميزان الأزوت و معدلات النمو و الكفاءة الغذائية و الاقتصادية ووظائف الكبد و الكلى للحيوانات و كان من النتائج المتحصل عليها من هذة الدراسة :

–زادت معاملات الهضم الظاهري للبروتين و الدهن الخام بزيادة مستوى بذور القطن و الكتان الكاملة المستعمل فى العليقة .و على العكس من ذلك فقد انخفضت قيم الألياف المهضومة بزيادة مستوى البذور الزيتية فى العليقة .زادت قيم المركبات المهضومة الكلية و البروتين المهضوم و الطاقة المهضومة و الممثلة للعلائق المحتوية على بذور القطن و الكتان معنويا (٥%) عن عليقه المقارنة .زادت كمية المادة الجافة المأكولة معنويا معبرا عنها بالكجم/راس/يوم أو كجم مادة جافة منسوبة لحيز الجسم التمثيلى معنويا (٥ %) مع الحملان التى غذيت على عليقة مقارنة عن العلائق المختبرة الأخرى .سجلت الحملان التى غذيت على بذور قطن كاملة أعلى زيادة يومية معنويا (٥%) عن مثيلاتها التى غذيت على علائق محتوية على بذور كتان و كان متوسط النمو المحقق (١٩٨ و ١٩٥) مقابل (١٨٥ و١٨٠) جم/يوم بالنسبة للعلائق المحتوية على ١٠ و ٢٠% بذور قطن و بذور كتان كاملة على التوالى ، بينما سجلت الحملان التى غذيت على عليقة المقارنة (١٧٩)جم/يوم .– بالنسبة للسيرم :لا توجد فروق معنوية بين المعاملات التجريبية فى محتواها من البروتين الكلى و الألبيومين و الجلوبيولين و الكرياتنين ، بينما انخفضت مستويات اليوريا نيتروجين و الكوليسترول و التراى جليسريدات معنويا فى الحملان التى غذيت على بذور زيتية كاملة مقارنة بالحملان التى غذيت على عليقة مقارنة .

كانت الكفاءة الغذائية محسوبة كمادة جافة و مركبات كلية مهضومة/كجم نمو فى الحملان المغذاة على العليقة الثالثة و الرابعة و المقارنة أفضل أداء بدرجة واضحة عن الحملان التى غذيت على العليقة الثانية و الخامسة. كانت الكفاءة الاقتصادية أفضل للعليقة الخامسة يليها عليقة المقارنة ثم العليقة الثالثة .

من هذه الدراسة يمكن أن نوصى باستخدام بذور القطن عند مستوى٢٠% وبذور الكتان عند مستوى١٠% حيث تستطيع تحسين كفاءة المأكول و القيمة الهضمية و الكفاءة الغذائية و الاقتصادية لذكور الحملان النامية.