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IMPACT OF AGRO-INDUSTRIAL BY-PRODUCTS ON SHEEP PERFORMANCE UNDER SEMI ARID CONDITIONS

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ABSTRACT

The current study was carried out at Maryout research station, Desert Research Center, Egypt. This experiment aimed at investigating substitution by 20% or 40% of concentrate feed mixture in Barki sheep rations by mixture (1:1) of date seeds and olive pulp that treated by 4% lime solution and incubated for 4 weeks to study their effects on growth performance, blood constituents and wool characteristics. Thirty Barki male lambs (5 months age) with average live body weight of 27.98±1.97 kg were assigned into three similar groups to be fed randomly on the experimental rations. The tested rations were, clover hay 30% plus CFM 70% (control, C), replace 20% (T1) and 40% (T2) of CFM in control ration by the same part of mixture of treated date seeds and olive pulp.

Blood serum was analyzed to determine total protein (TP), albumin, Globulin Glucose, total lipids (TL) and urea. The serum electrolytes in terms of, Sodium (Na), potassium (K), and Calcium (Ca) concentrations were analyzed. Wool samples from 10 cm^2 patch of mid-side position were taken from each animal. Ten staples were taken randomly from each wool sample to measure staple length. Five hundred fibers from each sample were used to calculate the average fiber diameter and its standard deviation as well as medullated fiber percentage.

Results indicated that, the best feed conversion were recorded for the control group followed by Treatment 1 (T1) group and then Treatment 2 (T2) group. There was a linear decrease in the average daily gain with increasing the percentage of concentrate mixture substitution by the mixture of treated date seeds and olive pulp. Sampling time for all the experimental rations except T1 have significant ($P<0.05$) effect on blood glucose concentrations. The experimental rations have no significant effect on blood serum total protein concentration. However, sampling time showed significant ($P<0.05$) effect only for lamb group fed on ration T2. The experimental rations have no significant effect on blood urea concentration. Results showed that staple strength was higher significantly ($P<0.05$) in control group (21.54 N/Ktex) than T2 group (18.74 N/Ktex). The same trend was found for point of break compared to the other two groups (45.42, 34.41, and 33.16%), respectively.

In conclusion, 20 or 40% of CFM could be replaced by a mixture of lime treated date seeds and olive pulp (1:1) in Barki lambs rations with slight improve for some wool characteristics and without adverse effect on some blood parameters.

Keywords: Sheep, agro-industrial, biochemical metabolites, blood electrolytes, coat characteristics

INTRODUCTION

The lack of sufficient feeds to meet the nutritional requirements of existing animal population is one of the most critical problems of animal production in Egypt. Date seeds and olive pulp as agro-industrial by-products have been demonstrated by many investigators as acceptable feedstuffs for sheep and goats (Khamis *et al*. 1989; Salem *et al*., 1989; Aguilera *et al*., 1992; Abd El-Gawad *et al*., 1995; Kandil, 1997 and Youssef *et al*., 2001).

The date seed forms about 10 to 30% of fruit weight. Hence, large amounts of date seeds are commonly used in desert areas as a source of feed energy. It is cheap and can be offered to animals in crushed or ground form. Olive pulp is the residue obtained at the mill by pressing or extracting the oil by organic solvents and it is available in appreciable quantities in Egypt. Morgan and Trinder, (1980) and Razzaque and El-Shekh Omar (1982) found that olive pulp contains sufficient quantities of potassium, copper, manganese, zinc, calcium and vitamin E to meet the daily requirements of sheep and goats. Olive cake is particularly rich in lignin and poor in cell content. Nefzaoui (1983). Sansoucy (1987) reported that the crude olive cake (about 35% of olive fruits) is a mixture of olive skin, some tissue, seeds, water and oil that obtained after extraction of oil from olive fruits.

Khamis (1988) noticed a decrease in the average daily gain of lambs fed rations contained either date seeds or olive pulp being 108 and 95g/d, respectively compared to 119g/d for those fed control ration. Khattab (2000) recommended that feeding desert shrubs with 25% ground barley grains plus 75% ground date seeds as energy supplement to cover maintenance energy requirements appeared to be the most nutritive diets for Barki lambs. This diet can successfully provide sufficient digested nutrients (TDN and DCP) and characterized by reasonable DM intake in arid and semi-arid areas, with appreciable reduction in feeding cost by 59% for fattening lambs.

Abou El-Nasr and El-Kerdawy (2003) found that daily weight gain was not significantly affected in ram lambs fed a mixture of by-products, although the DM intake was reduced compared with control (46.6 vs. 57.6 $g/kg^{0.75}$). Moustafa (2003) concluded that olive cake could be successfully used in formulating concentrate mixtures of growing lambs up to 25% especially when traditional feed ingredients are not available and expensive. Abd El-Shaffy (1991) fed lactating Baladi goats on three diets; 1) CFM and rice straw, 2) 30% of CFM was replaced by mixture of by-products (date seeds, orange wastes, pea pods, potatoes leep and sunflower meal), 3) 60% of CFM was replaced by that mixture. Blood TP, globulin and A/G ratio were higher in groups fed by-products than control while albumin and urea were lower. El-Sayed (1994) reported that blood serum constituents such as total protein, albumin, globulin, and Urea were not affected when sheep were fed a diet containing date seeds compared with those fed traditional rations under semi arid condition.

MATERIALS AND METHODS

Study area and animals management

The current study was carried out at Maryout research station, Desert Research Center located 35 km southwest of Alexandria, Egypt. Thirty healthy Barki male lambs (5 months age) with average live body weight of 27.98±1.97 Kg were assigned into three similar groups according to body weight (10 lambs in each) in a growth trial that started in September, 2007 and lasted for 100 days. Each group was housed separately in shaded pen (5 X 6 meter) and assigned to receive one of the three experimental rations.

Experimental rations

Three experimental rations were formulated using date seeds and olive pulp treated with 12% lime for 4 weeks, Control (C): 30% clover hay + 70% CFM, Treatment 1 (T1): 30% Clover hay + 50% CFM + 10% treated date seeds (TDS) + 10% treated olive pulp (TOP), Treatment 2 (T2): 30% Clover hay + 30% CFM+ 20% TDS + 20% TOP. (CFM consisted of 35% un-decorticated cotton seed cake, 33% wheat bran, 22% yellow corn grains, 4% rice bran, 3% molasses, 1% salt and 2% limestone). The quantities of rations offered to each group were adjusted biweekly during the experiment at about 4% of average body weight.

Fresh water was available to animals in free choice all day. Body weight changes and daily gain were recorded for each animal. The efficiency of feed conversion into live weight was calculated (kg DM/kg gain). The chemical composition of the experimental rations (Table, 1) was determined according to A.O.A.C. (1990).

Table (1): Chemical composition (DM basis) of feed ingredients and experimental rations

Item	Feed ingredients				Experimental rations		
	Hay	CFM[1]	Treated date seeds[2] (TDS)	Treated olive pulp[3] (TOP)	C[4]	T1[5]	T2[6]
Chemical composition, %							
DM	86.57	91.47	92.55	92.75	89.94	90.10	90.26
Ash	9.59	6.12	6.35	8.01	7.19	7.39	7.60
OM	90.41	94.84	93.65	91.99	92.81	93.11	92.71
CP	13.21	14.08	6.85	8.50	13.82	12.54	11.25
CF	24.42	12.91	12.31	28.31	16.36	17.40	19.32
EE	2.31	5.54	2.07	2.02	4.57	4.01	3.16
NFE	50.47	61.31	72.42	53.16	58.06	58.36	58.64
Fiber fraction, %							
NDF	74.67	52.91	53.65	61.38	59.44	60.08	60.73
ADF	47.18	21.40	46.96	47.76	29.13	32.42	35.70
ADL	7.80	9.76	11.43	20.23	9.17	10.02	10.87
HC.	27.49	31.51	6.69	13.62	30.31	27.66	25.03
C.	39.38	11.64	35.53	27.53	19.96	22.40	24.83

[1] Concentrate feed mixture consists of 35% un-decorticated cotton seed cake, 33% wheat bran, 22% yellow corn grains, 4% rice bran, 3% molasses, 1% salt and 2% limestone.
[2] Date seed treated by 12% lime for 4 weeks.
[3] Olive pulp treated by 12% lime for 4 weeks.
[4] Control ration: 30% clover hay + 70% CFM.
[5] 30% clover hay + 50% CFM + 10% TDS + 10% TOP.
[6] 30% clover hay + 30% CFM+ 20% TDS + 20% TOP.

Chemical Feed analysis

Chemical composition (DM, OM, CP, CF, EE and NFE) of feeds was determined according to the procedure of A.O.A.C. (1990). Neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) were analyzed using the procedure of Van Soest *et al*. (1991). Hemi-cellulose (HC) and cellulose (C) were calculated by difference, where HC= NDF – ADF, and C = ADF - ADL.

Blood sampling criteria

Blood samples (collected via jugular vein puncture, using a clinical needle) were taken at the end of digestibility trials at times 0, 1, 2, and 4 hours post feeding from the jugular vein of each animal. Blood samples were allowed to clot and sera were separated by centrifugation at 3000 rpm for 20 min. Sera were frozen at −20°C until assayed for serum components. Blood sample of lambs were collected from the jugular vein biweekly directly after parturition until waning.

Serum biochemical analysis

Blood serum was analyzed to determine the following parameters: total protein (TP), albumin as described by Doumas *et al*. (1971). Globulin concentration was calculated by difference. Glucose and total lipids (TL) were determined according to Trinder, 1969, and Roeschlau *et al*., (1974), respectively. The serum electrolytes in terms of, Sodium (Na), potassium (K), and Calcium (Ca) concentrations were analyzed by using colorimetric Kits (Spectrum, Egypt) according to Tietz, (1976).

Wool characteristics

At the end of trail, wool samples from 10 cm^2 patch of mid-side position were taken from each animal as close as possible to the skin surface using fine scissors.

Chemical and Physical wool analysis

Chemical composition (DM, CP, and sulfur) of wool samples was determined according to the procedure of A.O.A.C. (1990). Ten staples were taken randomly from each wool sample to measure staple length to the nearest 0.5 cm using a ruler till the dense part of the staple (Chapman, 1960) . Five hundred fibers from each sample were used to calculate the average fiber diameter and its standard deviation as well as medullated fiber percentage using optical fiber diameter image analyzer (LEICAQ 500 MC) with lens 4/0.12.

Statistical analyses

The results of raw data were statistically analyzed were conducted using SAS (1998) software program. One way ANOVA of GLM procedure of SAS was used in each experiment. Differences in means among groups were compared by Duncan's Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Chemical composition of the experimental rations

Date seeds and olive pulp treated with 12% lime for 4 weeks were incorporated as a mixture (1:1) in growing lambs rations to replace 20 and 40% of CFM. The chemical composition of feed ingredients and experimental rations are presented in Table (1). The CP content in concentrate feed mixture (CFM) was the highest compared with other treated date seeds (TDS) or treated olive pulp (TOP) being 14.08, 6.85 and 8.50%, respectively. On the other hand, crude fiber content of TOP was the highest value compared with CFM and TDS being 28.31, 12.91 and 12.31, respectively.

Nitrogen free extract content was the highest in TDS (72.42%). As in Table (1), the TOP had the highest values of ADF and ADL contents (47.76% and 20.23%, respectively).

The most of chemical composition of rations formulated with TDS and TOP (20 or 40%) was nearly similar to the control one (C) except CP and EE which increased with increasing replacement level. Average of CP% were 13.82, 12.54 and 11.25 and those of EE% were 4.57, 4.01 and 3.16 for C, T1 and T2 rations, respectively. However, ash, CF, ADF a experimental mixture being (94.91 and 94.21%), (12.92 and 12.03%), (4.01 and 3.45%) and (60.58 and 60.29%), respectively for T1nd ADL were increased by increasing the level of replacement. The percentage values of C, T1 and T2 for these components were respectively 7.19, 7.39 and 7.60 for ash, 16.36, 17.40 and 19.23 for CF; 29.13, 32.42 and 35.70 for ADF and 9.17, 10.02 and 10.87 for ADL.

Chemical composition demonstrated that replacement with TOP and TDS resulted in reducing the feeding value of ration these results were in agreement with finding of Khattab (2000) and Hassan and Irhaif (2009) but contrast with those of Chaudhry (2000). However, still these rations introduce to the animals large portion of these requirements with cheaper materials.

Live body weight changes and feed conversion

Data in Table (2) showed that, no significant differences were found between lambs fed control ration and those fed T1 regarding final weight (kg), total gain (kg) and average daily gain being (45.20 and 45.40 g/d), (17.60 and 16.40 g/d) and (176 and 164), respectively. While feeding lambs on T2 ration significantly (P<0.05) decreased final weight, total gain and average daily gain by (10.77, 26.14 and 26.14%), respectively compared with those fed control ration. These results agree with those found by Sooud *et al*. (1989).

Table (2): Effect of experimental rations on Barki lambs performance

Items	Experimental rations			±SE
	C	T1	T2	
Feed intake (as fed), g/h/d:				
Clover hay	461	438	399	-----
Concentrate feed mixture	1077	731	400	-----
Treated by-products*	------	292	532	-----
Total	1538	1461	1331	-----
Nutrient intake (as DM), g/h/d:				
DM	1383	1316	1201	-----
TDN	1046	937	804	-----
DCP	141	119	99	-----
Body weight:				
Initial weight, kg	27.60	29.00	27.33	1.45
Final weight, kg	45.20[a]	45.40[a]	40.33[b]	1.78
Total gain, kg	17.60[a]	16.40[a]	13.00[b]	0.70
Average daily gain, g/d	176[a]	164[a]	130[b]	7.01
Feed conversion:				
kg DM /kg gain	7.86	8.02	9.24	-----
TDN; kg/kg gain	5.94	5.71	6.18	-----
DCP; g/kg gain	801	726	762	-----

***Mixture of alkali treated date seeds and olive pulp (1:1) and replaced CFM by 20% in T1 and 40% in T2.**

a,b,c values in the same raw with different superscripts are significantly different (P<0.05).

The decrease in average daily gain might be due to the reduction in dry matter intake with increasing the substitution level as in Table (2). These results are in agreement with the findings of Mioč *et al*. (2007). Feed conversion expressed as DM kg/ kg gain, TDN kg/ kg gain and DCP gm/ kg gain are shown in Table (2). Results indicated that, the best feed conversion were recorded for the control group followed by T1 group and then T2 group. It could be concluded that replacement level of 40% resulted in reducing feeding quality.

The present results were within the range reported by Youssif *et al*., (2001), Abou El-Nasr and El-Kerdawy (2003) and Al-Ani and Farhan (2009). Increasing the inclusion level of olive pulp (10% to 20%) in ration resulted in reduce live body weight, average daily gain and feed conversion in sheep (Hathout *et al*., 1977 and Eraso *et al*., 1978, El-Shorafa and Faqih, 1982 and Moustafa, 2003).

Blood biochemical metabolites

Some serum metabolites of Barki lambs fed the experimental rations are presented in Table (3).

Table (3): Blood metabolites of Barki lambs fed on experimental diets

Items	Sampling time (h)	Experimental rations			± SE
		C	T1	T2	
Glucose, mg/dl	0	73.06^{Ba}	75.27^{Ba}	75.51^{Ba}	2.62
	1	82.36^{Ba}	82.55^{ABa}	71.67^{Ba}	
	2	83.69^{Ba}	79.61^{ABa}	71.55^{Ba}	
	4	101.02^{Aa}	87.72^{Ab}	92.88^{Aab}	
Total protein, g/dl	0	6.66^{Aa}	6.99^{ABa}	6.68^{Ba}	0.22
	1	7.29^{Aa}	7.25^{ABa}	7.60^{Aa}	
	2	6.98^{Aa}	6.68^{Ba}	6.45^{Ba}	
	4	7.19^{Aa}	7.34^{Aa}	7.23^{ABa}	
Albumin, g/dl	0	4.25^{Ba}	4.23^{Ba}	4.30^{Aa}	0.16
	1	4.55^{ABa}	4.49^{ABa}	4.62^{Aa}	
	2	4.86^{Aa}	4.50^{ABa}	4.53^{Aa}	
	4	4.60^{ABa}	4.75^{Aa}	4.63^{Aa}	
Globulin, g/dl	0	2.41^{ABa}	2.76^{Aa}	2.38^{Ba}	0.18
	1	2.74^{Aa}	2.77^{Aa}	2.98^{Aa}	
	2	2.12^{Ba}	2.18^{Ba}	1.92^{Ba}	
	4	2.60^{ABa}	2.59^{ABa}	2.60^{ABa}	
A/G ratio	0	1.79^{Ba}	1.54^{Ba}	1.82^{Ba}	0.17
	1	1.70^{Ba}	1.62^{ABa}	1.56^{Ba}	
	2	2.35^{Aa}	2.07^{Aa}	2.38^{Aa}	
	4	1.79^{Ba}	1.85^{ABa}	1.81^{Ba}	
Urea, mg/dl	0	68.43^{ABa}	63.10^{Aa}	68.43^{ABa}	7.22
	1	54.26^{Ba}	63.69^{Aa}	49.84^{Ba}	
	2	84.68^{Aa}	71.87^{Aa}	70.04^{ABa}	
	4	78.75^{Aa}	69.90^{Aa}	75.27^{Aa}	
Total lipids, g/dl	0	453.20^{Aa}	431.86^{Aa}	486.04^{Aa}	75.68
	1	303.77^{Ab}	556.65^{Aa}	341.54^{Ab}	
	2	382.59^{Aa}	438.42^{Aa}	444.99^{Aa}	
	4	392.32^{Aa}	420.68^{Aa}	448.60^{Aa}	

Within row, means having different small letters are different significantly.
Within column, means having different capital letters are different significantly.
*** = (P<0.05).**

Feeding lambs on the experimental rations showed in significant differences in blood glucose concentration. Sampling time for all the experimental rations except T1 have significant (P<0.05) effect on blood glucose concentrations. Where, 4hrs recorded the highest value for both control and T2 (101.02 and 92.88 mg/dl, respectively), while the lowest values recorded at zero-time (73.06 mg/dl) for control and 2hrs for T2 (71.55 mg/dl). High blood glucose content after 4hrs resulting from all diets could be due to high content of energy and iso-energitic diets used. Average blood glucose values for the animals had formulate rations were somewhat lower than control one except at zero and 1 hr of sampling time and this in contrast with finding of Bhattacharya and Waner (1968). However glucose showed the lowest level in lambs of group T2 at 1 &2hrs after feeding, but restored a reasonable level at 4 hrs after feeding. This ration with 40% replacement was found to contain the largest percentage of CF, ADF and ADL, but the lowest value of EE. It might indicate that the ration of T2 group needed more energy for digestion and absorption which in turn consumed more glucose. After 2-3 hours of feeding digested materials began to produce glucose again.

The experimental rations have in significant effect on blood serum total protein concentration. However, sampling time showed significant (P<0.05) effect only for lambs fed on ration T2. It can be noticed that, blood total protein concentration for these lamb was high at 1hr (7.60 g/dl) but low values recorded at 2hr after feeding (6.45 g/dl). These results agree with findings by El-Sayed (1994).

The experimental rations have insignificant effect on blood urea concentration. However, sampling time has significant effect only for control ration, where the lowest value recorded at 1hr after feeding (49.84 mg/dl) in T2 and the highest value recorded at 2hrs after feeding (84.68 mg/dl) in control group. The present results of serum urea values for the different experimental treatments are within the normal values for sheep and in agreement with those obtained by El-Ashry *et al.* (1997).

As show in Table (3) total lipids levels in blood serum of the studied animals were not differed significantly among the studied groups neither at 0 hr nor at 4 hr post feeding. Total lipids were within the normal concentrations which are in agreement with the findings of Potter *et al*. (1993). On the other hand sheep fed T1 ratio had higher (P≤ 0.05) total lipids level than sheep fed T2 ration or the traditional ration (C) at 1 hr after feeding. This might be du to positive associative effects when different forage sources were fed in combination, which usually not occurs when one forage supplies a nutrient. This result was consistent with those reported by Potter *et al*. (1993) and Matsuura (2001) who found that saponins from different sources causing lower serum cholesterol levels in a variety of animals as several dietary saponins was found to have a hypocholesterolaemic action (Francis *et al*, 2002). Also, it causes a delaying of the intestinal absorption of dietary fat by inhibiting pancreatic lipase activity (Han *et al*., 2000). On the other hand, tannins play a considerable role in lipids digestibility by complexing with fatty acids (Romero *et al*., 2000) causing a decrease in cholesterol absorption and increase in fat excretion (Bravo *et al*., 1993).

Blood electrolytes concentration

Some serum electrolytes concentrations of Barki lambs fed the experimental rations are presented in Table (4). Sodium levels in blood serum of the studied animals were not differed significantly among the studied groups all time post feeding. Sodium was within the normal concentrations which were in agreement with the findings of El Shaer *et al*. (2005).

Blood potassium and calcium concentrations were within the normal levels, which are in agreement with the findings of Eid (1998) on sheep. Sheep in group T2 had lower ($P \leq 0.05$) Ca level than groups at 0 hr (4.84). On the other hand, sheep of group T2 had higher ($P \leq 0.05$) Ca level than other groups at 4 hr post feeding.

Generally, these hypocalcemia in T2 could be attributed to the presence of high levels of condensed tannins in date seeds and olive pulp (agro-industrial by-products) because tannins can disturb the absorption of minerals by chelation of them within the gastrointestinal tract of the animal (Cowieson *et al*., 2004) and / or increase the endogenous losses of the minerals such as Ca (Mansoori and Acamovic, 1997). There were no adverse effect on biochemical metabolites and blood electrolytes; this indicated that animals were in a good health as result of inclusion of organic wastes supplemented by date seeds and olive pulp (agro-industrial by-products) in sheep fattening diets under desert condition.

Table (4): Least square means ± SE of blood electrolytes Barki lambs fed on experimental diets

Items	Sampling time (h)	Experimental rations			± SE
		C	T1	T2	
Na (nmol/l)	0	186.52^{Aa}	189.86^{Aa}	144.64^{Aa}	19.97
	1	173.48^{Aa}	182.32^{Aa}	183.48^{Aa}	
	2	166.09^{Aa}	165.94^{Aa}	147.39^{Aa}	
	4	157.70^{Aa}	147.53^{Aa}	158.84^{Aa}	
K (nmol/l)	0	9.69^{Aa}	9.90^{Aa}	11.09^{Aa}	1.20
	1	7.10^{Aa}	8.09^{Aa}	7.36^{Ba}	
	2	6.50^{Aa}	8.23^{Aa}	9.25^{ABa}	
	4	8.60^{Aa}	10.07^{Aa}	8.91^{ABa}	
Na/K ratio	0	19.10^{Aa}	19.06^{Aa}	14.08^{Ba}	3.60
	1	24.51^{Aa}	22.50^{Aa}	25.03^{Aa}	
	2	27.44^{Aa}	23.72^{Aab}	16.07^{ABb}	
	4	18.46^{Aa}	14.85^{Aa}	17.97^{ABa}	
Ca (nmol/l)	0	6.45^{Aab}	8.15^{Aa}	4.84^{Ab}	0.91
	1	6.36^{Aa}	6.14^{Aa}	6.34^{Aa}	
	2	6.75^{Aa}	6.18^{Aa}	6.25^{Aa}	
	4	7.09^{Aa}	6.35^{Aa}	7.17^{Aa}	

Within row, times having different small letters are differing significantly.
Within column, treatments having different capital letters are differing significantly.
*** = ($P<0.05$).**

3. Wool characteristics:

Resultes in Table (5) showed that lambs of C group had significant ($P<0.05$) higher values of stable strength and point of break than lambs of groups T1 and T2 were (21.54, 19.94, 18.74 N/Ktex) and (45.42, 34.41, 33.16%), respectively. In addition, lambs of group C had higher; but insignificant fiber diameter. These result may be due to staple strength might be attributed to the treatments (T1 and T2) and related with increase in fiber diameter. These findings agree with previous studies by Thompson (1998) and Thompson and Hynd (2009) who found that an increase of 1 µm in minimum fiber diameter was associated with an increase in staple strength of about (5 N/ktex). There is significant correlation between the point of break and fiber diameter. Supplying a high protein diet after a period of weight loss increased wool growth and fibre diameter. This changed the position of break along the staple and increased the fibre diameter at the point of break from 13.0 to 13.9 mu m without affecting staple strength (Schlink *et al*., 1998) .The lower value breaking point, the better it can be used more efficiently in the wool industry.

There were insignificant differences between experimental groups in the other wool characteristics (fiber diameter, staple length, staple elongation, and type percentage of medulla, medullated fibers and percentage non-medullated fibers (Table, 5). Present findings might be due to there was insignificant difference between groups in sulfur content of wool. Previous results refer to that there is insignificant effect for experimental rations on the most wool characteristics.

Table (5): Least squares means ± SE content of sulfur and some wool characteristics in experimental groups

Items	Experimental rations			± SE
	C	T1	T2	
Sulfur of wool, mg	5.31[a]	5.87[a]	5.23[a]	0.34
CP%	68.21[b]	66.90[b]	72.04[a]	1.08
Fiber diameter, µm	27.25[a]	25.36[a]	24.57[a]	1.30
Staple length, cm	7.34[a]	6.97[a]	6.31[a]	0.82
Staple Strength, N/Ktex	21.54[a]	19.94[ab]	18.74[b]	4.21
Staple elongation, %	18.58[a]	17.45[a]	18.21[a]	2.75
Point of staple break, %	45.42[a]	34.41[b]	33.16[b]	4.75
Kemp, %	3.13[a]	3.56[a]	2.92[a]	1.54
Continues, %	0.85[a]	1.08[a]	1.08[a]	0.51
Interrupted, %	0.38[a]	0.27[a]	0.42[a]	0.19
Fine, %	3.56[a]	3.47[a]	2.83[a]	0.84
Medullated fibers, %	8.11[a]	7.95[a]	8.31[a]	1.12
Non-medullated fibers, %	91.91[a]	92.25[a]	91.79[a]	5.54

Values with different superscripts within the same row are different significantly ($p<0.05$).

In conclusion, no adverse effect on biochemical metabolites and blood electrolytes, this indicated that animals were in a good health as result of inclusion of organic wastes supplemented by date seeds and olive pulp (agro-industrial by-products) in sheep fattening diets under desert condition. Adding to positive associative effects when different forage sources were fed in combination, which usually occurs when one forage supplies a nutrient. In addition 20 or 40% of CFM could be replaced by a mixture of lime treated date seeds and olive pulp (1:1) in Barki lambs rations with slight improve for some wool characteristics and without adverse effect on some blood parameters.

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تأثير نواتج التصنيع الزراعى العرضية على أداء الأغنام تحت الظروف شبه الجافة

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أجريت هذه الدراسة بمحطة بحوث مريوط التابعة لمركز بحوث الصحراء والواقعة عند الكيلو 35 جنوب الإسكندرية بغرض معرفة مدى تأثير التغذية على النواتج العرضية للتصنيع الزراعى (نوى البلح وكسب الزيتون) بعد معاملتها بمحلول هيدروكسيد الكالسيوم بتركيز (4 %) ولفترات تحضين مختلفة ثم استخدام مخلوط من نوى البلح وكسب الزيتون المعاملين سابقا للإحلال بنسبة (20 - 40%) من العلف المركز وتكوين عليقتين متساويتين في البروتين والطاقة وتم دراسة تأثير هذه العلائق على أداء الأغنام النامية ومكونات الدم وبعض العناصر المعدنية الكبرى وصفات الغطاء فى المجموعات المعاملة مقارنة بالمجموعة الكنترول.

أظهرت النتائج بأن المعاملة بهيدروكسيد الكالسيوم أدت إلى انخفاض في محتوى كسب الزيتون من الألياف الخام، وحققت المعاملة (12%) أقل نسبة ألياف مقارنة بباقى المعاملات التجريبية والكنترول حيث كانت (27.67%.) كما أظهرت النتائج بأن أفضل معامل تحويل للغذاء سجل فى مجموعة المقارنة يليها المعاملة الأولى ثم الثانية. كما أظهرت النتائج أن أعلى معدل نمو يومى سجل فى الحملان المغذاة على عليقه الكنترول (176جم/يوم) دون فرق معنوى مع المجموعة المغذاة على عليقة المعاملة الأولى (164جم/يوم) بينما كان الأقل فى المجموعة المغذاة على المعاملة الثانية (130جم/يوم). والذى كان انعكاس لنسبة البروتين الخام لهذه المعاملات التجريبية حيث كان (13.82- 12.54- 11.25%) لنفس المجموعات على الترتيب.

لم يظهر فى المجموعتين المعاملتين أي اختلاف معنوي عن مجموعة المقارنة في تركيز مكونات الدم (الجلوكوز، البروتين الكلي، الالبيومين، الجلوبيولين، اليوريا). كذلك كان تركيز بعض العناصر فى الدم فى مستواها الطبيعى وتتفاوت فيما بينها فى وقت سحب العينة فى بعض الأحيان وخاصة فى عنصر البوتاسيوم حيث كان أعلى تركيز عند صفر من التغذية وأعلى قيمة بعد ساعة من التغذية (11.09- 7.39) بينما أظهرت نسبة الصوديوم إلى البوتاسيوم اتجاه معاكس لما سبق وكانت هذه الاختلافات معنوية.

نستخلص من هذه الدراسة انه تحت الظروف البيئة الصحراوية يمكن الإستفادة من مخلفات التصنيع الزراعي (نوى البلح وكسب الزيتون) فى علائق الأغنام وذلك بعد معاملتهما كيماويا بهيدروكسيد الكالسيوم (12%) حيث يمكن أن تساعد فى تقليل الفجوة الغذائية وخاصة إنها لا تؤثر على مكونات الدم والعناصر الكبرى وتحسن من بعض صفات غطاء الجسم نسبيا وخاصة فى نقطة القطع.

قام بتحكيم البحث

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