J.Animal and Poultry Prod., Mansoura Univ., Vol.4 (3): 133 - 147, 2013

Effect of sprouted corn grains on leucaena tree pruning and olive tree pruning diets for desert goats under Sinai conditions

Helal, H. G. and Mona M. Hassan
Department of Animal & Poultry Nutrition, Desert Research Center, Mataria, Cairo, Egypt. *Corresponding author:godahassan@yahoo.com

ABSTRACT

This study was conducted to evaluate alfalfa (*Medicago sativa)* [control], with two unsprouted leucaena (*Leucaena leucocephala)* (LTP) and olive tree pruning (*Olea europaea*) (OTP) and also to study the effect of new sprouts technique (planting) of white corn grains on (LTP) and (OTP) as media to produce green fodder in dry seasons. Twenty five desert male goats (21 months old) with average 23.42±0.91kg live body weight. The animals were randomly divided into five groups of 5 animals each to receive one of the following experimental roughages: T1: alfalfa hay (control), T2: unsprouted leucaena trees pruning (LTP), T3: unsprouted olive trees pruning (OTP), T4: sprouted pruning leucaena trees (SLTP) and T5: sprouted pruning olive trees (SOTP). Goats were used in feeding trial lasted for fourty five days. The metabolism trial was conducted after the feeding trial to get the most nutritious sprouts green fodder (SGF) with concentrate feed mixture (CFM). Results showed that dried leucaena trees pruning (T2) and olive trees pruning (T3) had lower contents of CP, ash, NFE, C.CHO, sodium and potassium, with higher contents of CF, NDF, ADF and hemicellulose compared with that of alfalfa hay (T1). On the other hand, CP, ash, EE, C.CHO, sodium and potassium contents were higher; while, OM, CF, NDF, ADF and hemicellulose content was lower in sprouted than unsprouted leucaena and olive trees pruning. Goats fed sprouted treatments (T4 and T5) clearly recorded higher ($P \leq 0.05$) digestibility coefficients of CP, CF, EE, NFE, NDF, ADL, hemicellulose and C.CHO than unsprouted treatments (T2 and T3). TDN g/kg B.W was higher in goats fed T4 and T1 followed by T5, T2 and the lowest T3. Highest DCP g/kg B.W and DCP% were recorded by T4 compared with other rations; while, lowest values of DCP g/kg B.W and DCP% were recorded by T3. Also, goats fed sprouted roughages had improved ($P \leq 0.05$) values of total water intake and decreased urinary water execration. Sprouted corn seeds improved Na and K balance (g/kg BW). Goats fed sprouted roughages had higher ($P \leq 0.05$) values of total volatile fatty acids (VFA), ruminal ammonia (NH_3-N) concentration. Serum urea-N, creatinine, total proteins, albumin, globulin, and AST, cholesterol and potassium were significantly higher in goats fed T4 compared with other treatments reflecting good developed immunity.
Keywords: Sprouted corn grains, leucaena tree pruning, olive tree pruning, goats, digestibility, nutritive values, rumen and blood parameters.

INTRODUCTION

Small ruminant production is the main source of income of farmers living in the arid and semi-arid regions. These areas are characterized by low and erratic rainfall resulting in water scarcity leading to a low fodder potential. (Nefzaoui *et al*., 2012). Utilization of salt-tolerant plants as animal feeds in salt affected lands could be an appropriate option for alleviating the desertification problems and providing alternative good feed resources particularly in summer and autumn seasons when the other conventional forage resources are shortage (El Shaer, 2010). *Leucaena leucocephala* (leucaena) is a small, leguminous and native to tropics; this plants reproductive capacity is extremely strong, it is possible to produce 10–22 tons of edible dry matter (DM)/ha from leucaena (Palmer *et al*., 2010). Small holder farmers in the tropics often feed cut *Leucaena leucocephala* as chopped forage or as whole branches to penned goats. The potential attributes of leucaena are severely limited because of the presence of toxic mimosine, which have depilatory effect and cause enlarged thyroid and several other toxic effects in ruminants as well as non-ruminants (Ram *et al*., 1994).

Large areas are cultivated by olive trees, especially in Sinai and the North-Western Coast Zone, therefore, there are great amounts of olive by-products without beneficial usage and are considered as wastes. It has been estimated that each olive tree could produce 22 kg leaves and twigs per year and 25 kg olive cake per 100 kg olive fruits according to Nefzaoui (1995), who added that using olive trees by-products as animal feed could participate in solving the problems of feed shortage which is particularly realized at drought seasons and hence the selling price of animals products. Chemical composition is varied as a consequence of pruning severity, but always the fiber and lignin content is high and crude protein content is low. Olive pruning are distributed as fresh in many countries, but the low nutritive value of this by-product involves a low digestibility coefficient (Alibes and Berge, 1983).

New sprouts technique can be used for green fodder production of many forage crops for production of fresh forage from oats, barley, corn, wheat and other grains (Rodriguez-Muela *et al.*, 2004). It is a well-known technique for high fodder yield, year round production and least water consumption (Fazaeli *et al*., 2012). Sprouts fodder production requires only about 2-3% of that water used under field conditions to produce the same amount of fodder (Al-Karaki, 2010). Germination and sprouting activate enzymes that change the starch, protein, and lipids of the grain into simpler forms, for example, starch changes to sugars. There are some arguments about the sprouting grains for convenience of green forage production in sprouting system to compensate the feed resources for animals (Tudor *et al*., 2003). This technology may be especially important in the regions where forage production is limited (Bustos *et al.,* 2000).

This paper reports on updated a new sprouted technique with planting white corn grains on leucaena and olive tree pruning as media to produce green fodder in dry seasons which revealed improvement in palatability and feeding value of green fodder that fed to goats and study their effects on digestibility, some rumen and blood parameters in the arid and semi-arid regions.

MATERIALS AND METHODS

The field study was carried out at South Sinai Research Station located at Ras Sudr city, Desert Research Center (DRC) in South Sinai governorate, Egypt.

Plant material

Two salt-tolerant plants were separately cultivated in the salt-affected soil of the Research Station Farm and irrigated with underground saline water. They were namely: leucaena (*Leucaena leucocephala*) and olive (*Olea europaea*).Leucaena and olive were pruning contribution of leaf, green stem, bark and inedible stem on branches different basal diameters (0.5-1.5 cm) with heights of approximately1.0 -1.5 m and mechanically chopped into small pieces then air-dried for 15 days to reach 10-15% moisture then packed till used as bedding media.

Sprouting system

Production method for grains sprouts was tray method as described by Mohammadi *et al*. (2007) using about 10 cm thick layer of chopped dried output pruning of Leucaena and olive trees as a sprouting media. Cereal grains of local white corn (*Zea Mays L*.) were cleaned from debris and other foreign materials. Then the cleaned seeds were surface sterilized by soaking for 30 minutes in a 2% sodium hypochlorite solution to prevent the formation of mould. Planting trays and the growing cabinet also were cleaned and disinfected. The seeds were washed well from residues of bleach and re-soaked in tap water overnight (about 12 hours) before sowing. At the end of soaking period, soaked seeds were spread evenly on the top of dried output pruning of leucaena and olive media. Germination period on the media surface lasted about 15 days to get shoot sprouts, shoot length was 20-23 cm, seeding rate used in this experiment was about 10% density of roughage. Planting trays were irrigated with tap water once a day early in the morning to provide enough water to keep the seeds/ seedlings moist.

Feeding trial

Twenty five desert male goats (21 months old) with average 23.42 ±0.91kg live body weight and fed free in feedlot. The animals were randomly divided into five groups of (5 animals each) and fed one of following treatments:

T1: Alfalfa (*Medicago sativa*) hay (control).

T2: Unsprouted leucaena trees pruning (*Leucaena leucocephala*) (LTP).

T3: Unsprouted olive trees pruning (*Olea europaea*) (OTP).

T4: Sprouted pruning leucaena trees (*Leucaena leucocephala*) (SLTP).

T5: Sprouted pruning olive trees (*Olea europaea*) (SOTP).

All goats were housed in individual shaded pens and fed on nutritious unsprouted/or sprouts green fodder (SGF) with concentrate feed mixture (CFM) to cover 20 % of their maintenance requirements (according to the recommendations of Kearl, (1982). Concentrate feed mixture contained: 94.28 DM, 91.07 OM, 14.13 CP, 7.01 CF, 2.01 EE, 8.93 Ash, 67.88 NFE, 17.39 GE, MJ/kg DM, 62.34 NDF, 9.57 ADF, 52.77 hemicellulose, 37.66 C.CHO, 0.150 sodium and 0.170 potassium (as % DM basis). Drinking water was available to the animals.

Metabolism trial

At the end of the experimental feeding trial four animals from each group were randomly selected for the metabolism trial, fifteen day adaptation period followed by 5 days collection period. During the collection period, fecal and urine samples were collected daily (10% by weight of daily samples).

Daily water intake was calculated and recorded. Combined water was calculated as Fresh-Dry diet ml/kgBW. Metabolic water was calculated from TDN intake a yield of 0.6 gm water per gm TDN (Farid *et al*., 1986). At the end of collection period of the metabolism trial, rumen, liquor was sampled by stomach tube at 0, 3, 6 hours after feeding; blood samples were taken from jugular vein after feeding.

Analytical Methods

Chemical composition of feeds residues, faeces and urine were determined according to the A.O.A.C. (1997). Fiber fraction (NDF and ADF) were determined according to Goering and Van Soest (1970). Rumen total volatile fatty acids (TVFA's) were tested (Warner, 1964) and ammonia nitrogen values were also evaluated (A.O.A.C. 1997). Sodium (Na) and potassium (K) were determined in feed, refusal, feces, urine and drinking water by using the standard flame photometry (Jackson, 1958). Blood serum samples were assayed for total protein (Armstrong and Carr 1964) and albumin (Doumas *et al*. 1971). Globulin was obtained by substracting the albumin values from the total proteins values. Serum creatinine (Henry, 1965) and urea (Patton and Crouch, 1977) were determined too. All blood serum analysis was measured using Jenway spectrophotometer (UK) and using

Statistical analysis

General linear model procedure was used for statistical analysis through SAS (1998). The used design was one way analysis differences in mean values between groups were compared by Duncan's multiple Range tests (1955).

RESULTS AND DISCUSSION

Chemical composition:

As shown in Table 1 dried leucaena trees pruning (T2) and olive trees pruning (T3) had lower contents of CP, ash, NFE, C.CHO, sodium and potassium, with higher contents of CF, NDF, ADF and hemicellulose compared with that of alfalfa hay (T1). On the other hand, CP, ash, EE, C.CHO, sodium and potassium content was higher; while, OM, CF, NDF, ADF and hemicellulose contents were lower in sprouted than unsprouted leucaena and olive trees pruning. This finding may be attributed to increase of the activity of sprouted corn hydrolytic enzymes which catabolized starch to soluble sugars for use in respiration and cell-wall synthesis during the germination and early stage of plant growing and lead to improvements in chemical composition of leucaena and olive trees pruning (Chavan and Kadam, 1989). Meanwhile, sprouted leucaena tree pruning (SLTP) had higher CP, CF, Ash, NDF, ADF, hemicellulose and GE but lower EE, NFE and C.CHO contents than sprouted olive trees pruning (SOTP).

Results in Table 1 also, revealed that sprouting corn grains on leucaena tree pruning as a media had increased CP content from 9.49 to 12.93%; EE from 2.17 to 2.66%; C.CHO from 30.43 to 36.28 and ash from 9.49 to 21.09%, and decreased CF from 34.07 to 24.50%; NFE from 44.78 to 38.85%; and GE from 17.50 to 15.59%. On the other hand, sprouting corn seeds on olive tree pruning (SOTP) as a media had improved CP content from 6.50 to 9.97%, EE from 3.05 to 4.04%; C.CHO from 25.80 to 45.21, ash content from 13.66 to 13.82% NFE from 28.92 to 54.47% sodium from 0.05 to 0.13% and potassium from 0.09 to 0.10% while decreased CF from 24.75 to 17.70%. The results are in conformity with Fazaeli *et al.* (2012), who reported that CP content was increased from 14.32 to 20.04 % in hydroponically barley fodder. Also, Al-Ajmi *et al*. (2009) found about 14 % increase of CP in hydroponically barley green fodder. But, Snow *et al*. (2008) reported a higher CP content (16.13%), in hydroponically barley fodder and the CP contents could be affected by the cultivation conditions in hydroponic systems. Moreover; Sneath and McIntosh (2003), evaluated the composition of sprouted barley and reported that the CP ranged from 11.38 to 24 percent; however, protein content may be influenced as a result of the nitrogen supplementation and other nutrients changes in sprouting grains. Moreover, Lorenz (1980) stated that the sprouting of grains causes increased enzyme activity, a loss of total DM, an increase in total protein, a change in amino acid composition, a decrease in starch, increases in sugars, a slight increase in crude fat and crude fiber, and slightly higher amounts of certain vitamins and minerals.

Table 1: Chemical analysis and cell wall constituents of feed ingredients (on DM basis)

Composition	Treatments				
	Alfalfa	**LTP**	**OTP**	**SLTP**	**SOTP**
Dry matter	91.83	92	93.72	92.43	92.63
Organic matter	84.18	90.51	86.34	78.94	86.18
Crude protein	12.36	9.49	6.50	12.93	9.97
Crude fiber	23.55	34.07	24.75	24.5	17.70
Ether extract	2.20	2.17	3.05	2.66	4.04
Ash	15.83	9.49	13.66	21.06	13.82
NFE	46.06	44.78	28.92	38.85	54.47
NDF	45.85	69.57	74.20	63.72	54.79
ADF	30.75	43.4	47.50	38.3	35.21
Hemicellulose	15.11	26.17	26.70	25.42	19.58
*C.CHO	54.15	30.43	25.80	36.28	45.21
GE MJ/kg DM	16.36	17.5	14.47	15.59	14.47
Sodium %	0.43	0.070	0.045	0.04	0.130
Potassium %	0.605	0.170	0.085	0.11	0.100

Gross energy: MJ/kg DM = (CP * 0.0226 + EE * 0.0407 + CF * 0.0192 + NFE * 0.0177) (MAFF, 1975), NFE: nitrogen free extract, NDF: natural detergent fiber, ADF: acid detergent fiber, * (C.CHO): converted carbohydrates calculated (NDF-100), GE: gross energy, alfalfa: *Medicago sativa*, LTP: unsprouted leucaena tree pruning (*Leucaena leucocephala*), OTP: unsprouted olive tree pruning, SLTP: sprouted leucaena tree pruning (*Leucaena leucocephala*), SOTP: sprouted olive tree pruning

Most of the increases in nutrients are not true increases; they simply reflect the loss of DM, mainly in the form of carbohydrates, due to respiration during sprouting. As total carbohydrates decreases, the percentage of other nutrients increases. The increase in EE could be due to the production of chlorophyll associated with plant growth (Mayer and Poljakoff-Mayber 1975). Generally, changes affected the proportion of the other nutrients such as protein that could be shown a higher percentage (Morgan *et al*., 1992).

Digestibility coefficients and nutritive values:

Feed intake and digestion coefficient

Feed intake, digestion coefficients and nutritive values are presented in Table 2. It is clear that total dry matter intake (g/ kg BW) revealed significant (P≤0.05) differences. Goats fed the alfalfa hay (T1) recorded the highest total dry matter intake (TDMI) of CFM and roughage compared with other four treatments. However, sprouted leucaena tree pruning (SLTP) and Sprouted olive tree pruning (SOTP) had higher (P≤0.05) TDMI than unsprouted (LTP) and (OTP).It may be attributed to increasing palatability of sprouted roughages than unsprouted; the results are also in conformity with Fayed (2011) and Fazaeli *et al.* (2011). Who reported that the animals that had received the control diet (barley grains) had higher (P≤0.05) dry matter intake than those fed sprouted barley green fodder.

Data obtained from the digestible trial (Table 2) revealed that goats fed T1 (alfalfa hay) recorded the highest (P≤0.05) values of DM, OM, CP, EE, NFE, NDF and ADF digestibility coefficients comparable with the two untreated roughages (LTP and OTP); while, there were no significant differences between goats fed T1 and those fed T2 (LTP) in CF, hemicellulose and C.CHO digestibility coefficients.

Goats fed sprouted treatments (T4 and T5) clearly recorded higher (P≤0.05) digestibility coefficients of CP, CF, EE, NFE, NDF, ADL, hemicellulose and C.CHO than unsprouted treatments (T2 and T3).

Treatment groups performed as well as control group; which may be attributed to fresh grains sprouts have been reported to have highly soluble protein and amino acids in response to the enzymatic transformations during early plant growth (Dikshit and Ghadle, 2003) and increase in the bioactive catalysts which assist in the digestion and metabolism of feeds and the release of energy (Shipard, 2005). Fayed (2011) summarized that feeding sprouted grains provided animals with living feed which has a rich supply of enzymes which results in all nutritional components being highly digestible and extremely nutritious.

When the nutritive values expressed as TDN g/kg B.W and DCP g/kg B.W or DCP%, a significant differences (P≤0.05) was detected among groups. It was higher in animals fed T4 (38.13) and T1 (37.01) followed byT5, T2 and the lowest value was obtained from goats fed T3. Highest DCP g/kg B.W (5.25) and DCP% (11.84) were recorded by T4 compared with other rations; while the lowest values of DCP g/kg B.W (1.67) and DCP% (4.01) were recorded by T3. Results are in the same trend with those found by (Fayed, 2011 and Helal, 2012), they recorded that nutritive values are improved when sprouted barley on dried *Acacia saligna*, *Tamarix mannifera* or rice straw as a media were higher than those for untreated roughages.

Generally, digestibility coefficients of all nutrients were significantly (P≤0.05) higher in sprouted roughages SLTP (T4) compared with other groups and increased total digestible nutrients (TDN g/kg B.W), digestible crude protein (DCP %) than that of untreated and treated OTP respectively.

Table 2: Average daily feed intake, digestion coefficient and nutritive value of goats fed the Sprouted fodder.

Items	Treatments					
	T1	T2	T3	T4	T5	± SE
No. of animals	4	4	4	4	4	
Live body weight	25.29	25.94	25.75	25.00	25.15	2.22
Dry matter intake g/ kg BW						
Concentrate feed Mixture	10.63	10.61	10.41	10.43	10.74	1.21
Sprouted fodder	44.57 a	29.63 b	21.02 b	31.89 b	29.91 b	2.25
Total	55.20 a	40.24 b	31.44 b	42.32 b	40.65 b	2.34
Digestion coefficients %						
DM	73.69 a	55.87 c	52.12 c	66.35 b	54.45 c	1.72
OM	75.94 a	54.95 c	54.31 c	67.49 b	56.80 c	1.61
CP	81.63 a	71.70 bc	68.39 c	78.65 ab	74.57 ab	3.04
CF	64.32 a	59.36 a	44.11 b	63.03 a	60.89 a	1.97
EE	48.03 c	60.76 b	52.03 bc	77.39 a	63.07 b	3.64
NFE	81.80 a	52.75 c	52.84 c	67.06 b	56.64 c	3.00
NDF	70.03 a	49.46 b	44.32 b	64.30 a	62.61 a	2.66
ADF	72.71 a	42.88 c	44.30 c	59.12 b	64.24 ab	3.99
Hemicellulose	64.61 a	67.53 a	52.40 b	70.06 a	59.82 ab	3.18
C.CHO	76.78 a	65.85 ab	46.23 c	69.73 ab	59.89 b	4.09
Nutritive values						
Total digestible nutrient intake						
g/kg BW	37.01 a	22.64 ab	16.88 b	38.13 a	27.78 ab	3.96
% of intake	65.17 a	50.84 bc	41.48 c	60.96 ab	67.00 a	2.78
Digestible crude protein intake						
g/kg BW	5.19 a	5.18 a	1.67 b	5.25 a	2.75 b	0.60
% of intake	10.09 b	8.79 c	4.01 e	11.84 a	6.67 d	0.36

T1: berceem alfalfa (control ad-lib); T2: dried untreated leucaena tree pruning ad-lib (LTP) as control; T3: dried untreated olive tree pruning (OTP) as control; T4: sprouted white corn grains on dried leucaena tree pruning ad-lib (SLTP); T5: sprouted white corn grains on dried olive tree pruning (SOTP). a, b,c:means with different superscripts in the same row differ significantly (p≤0.05), otherwise no differences were detected.

Nitrogen utilization and minerals balance:

As shown in Table 3 nitrogen intake (NI g/kg B.W) was significantly (P≤0.05) higher in T1 (1175.27) followed by T4 (1158.62) while the lowest was recorded for T3 (392.52). The higher nitrogen intake may be due to high content of crude protein in alfalfa hay and sprouted luceana (SLTP). Goats fed T1 had more (P≤0.05) nitrogen in feces and urine while goats fed T3 had lower (P≤0.05) amounts of total nitrogen excretion compared with other groups. Goats fed SLTP retained higher (P≤0.05) nitrogen than the other treatments. Digested nitrogen was higher in groups fed T1 and T4 with no significant differences. This finding may be related to higher improvement in CP intake and its digestibility in sprouted luceana (SLTP) compared with other experimental roughages. Similar results were reported by Fayed (2011).

Data on sodium (Na^+) and potassium (K^+) utilization revealed that Na^+ intake; excretion and balance (g/kg BW) were significantly (P≤0.05) different among experimental groups. Highest (P≤0.05) values of Na^+ and K^+ intake and excretion were for T1 as compared with other groups. However, highest values of Na^+ and K^+ balance (g/kg BW) were recorded by goats fed T4 compared with other groups. Sprouted roots absorb nutrients from the media for the continued growth and life, which leads to reduced organic matter of the media with increase the mineral; Also, Morgan *et al.* (1992) found that ash content of sprouts increased from 2.1 in original seed (barley) to 5.3 at 8 day with increasing trace minerals. Meanwhile, Sneath and McIntosh (2003) found that Ca, P, K and Mg respectively ranged 0.07-0.13, 0.30-0.31, 0.48-0.60 and 0.12 to 0.40 percent; Fe, Zn, Mn and Cu ranged 81-168, 21-34, 21-27 and 6-11mg/kg, respectively in hydroponic barley fodder.

Table 3: Nitrogen utilization and minerals Balance goats fed the Sprouted fodder.

Items	Treatments					
	T1	T2	T3	T4	T5	± SE
Nitrogen utilization (mg/head/day)						
Nitrogen intake (NI)	1175.27[a]	636.10[b]	392.52[b]	1158.62[a]	649.42[b]	98.03
Fecal nitrogen (FN)	216.02[ab]	152.02[bc]	115.42[c]	252.17[a]	168.32[abc]	29.65
urinary nitrogen (UN)	869.42[a]	387.82[c]	297.40[c]	600.15[b]	339.625[c]	49.12
Total nitrogen excretion (TNE)	1085.47[a]	539.92[c]	371.12[c]	852.32[b]	507.97[c]	67.96
Nitrogen retention (NR)	176.22[ab]	96.17[ab]	21.35[b]	306.27[a]	141.45[ab]	66.84
NR % of nitrogen intake	14.90	15.85	5.50	24.27	21.17	5.72
Fecal N% of nitrogen intake	18.35[c]	23.97[abc]	28.52[a]	21.50[bc]	25.45[ab]	1.86
Urinary N% of nitrogen intake	79.57	66.65	80.82	54.20	53.37	9.93
Digested nitrogen (DN)	959.25[a]	484.05[b]	277.10[b]	906.40[a]	481.07[b]	72.72
DN % of nitrogen intake	81.65[a]	79.07[a]	73.17[b]	80.45[a]	73.17[b]	0.98
Minerals Balance (g/kg BW)						
Sodium						
Sodium Intake	0.257[a]	0.102[a]	0.075[c]	0.100[a]	0.082[bc]	0.007
Feces Sodium excretion	0.022[a]	0.017[ab]	0.012[bc]	0.010[c]	0.012[bc]	0.002
Urine Sodium excretion	0.225[a]	0.072[b]	0.045[b]	0.060[b]	0.045[b]	0.008
Total Sodium excretion	0.242[a]	0.085[b]	0.062[b]	0.072[b]	0.060[b]	0.009
Sodium Balance	0.012[ab]	0.017[ab]	0.0100[b]	0.027[a]	0.017[ab]	0.005
Potassium						
Potassium Intake	0.357[a]	0.095[b]	0.065[c]	0.087[bc]	0.065[c]	0.007
Feces Potassium excretion	0.020[a]	0.015[b]	0.0100[c]	0.010[c]	0.010[c]	0.001
Urine Potassium excretion	0.317[a]	0.057[b]	0.027[c]	0.035[bc]	0.017[c]	0.009
Total Potassium excretion	0.335[a]	0.072[b]	0.042[bc]	0.042[bc]	0.027[c]	0.009
Potassium Balance	0.022	0.022	0.022	0.042	0.037	0.016

T1: berceem alfalfa (control ad-lib); T2: dried untreated leucaena tree pruning ad-lib (LTP) as control; T3: dried untreated olive tree pruning (OTP) as control; T4: sprouted white corn grains on dried leucaena tree pruning ad-lib (SLTP); T5: sprouted white corn grains on dried olive tree pruning (SOTP). a, b,c:means with different superscripts in the same row differ significantly (P≤0.05), otherwise no differences were detected

Water balance

Data of Table 4 showed that water intakes (in terms of drinking, combined and metabolic water) were varied (p≤0.05) among goats groups. Water intake was (P≤0.05) higher in goats fed T1 compared with the other four groups; however, goats in T2, T3, T4 and T5 tended to consume comparable amounts of water without significant differences. The highest amount of total water consumption was recorded (342.32 ml/kg/BW) for goats fed T1 compared with other groups. May be due to increasing of dry matter intake (Table 2) and high content of sodium and potassium (Table 3) in alfalfa fed to goats in T1. While there were no significant differences in total consumption of water among other groups. These results are in conformity with Bhatti *et al.* (2009). On the other hand, goats fed T1 had the highest significant total water excreted (189.22) compared with the other sprouted groups that had not significant differences between them. These findings are in agreement with Eid (2003) and Allam *et al*. (2006) on animals fed similar dietary rations; they reported that feeding animals' salt tolerant fodders of high ash content push animals to increase excretion of urine. Water balance was higher (P≤ 0.05) in T1 (153.20) followed by T4 (52.32) while; the lowest values were recorded by T3 (32.63) which mainly me be attributed to the pattern of water consumption and total water intake (Eid, 2003 and Allam *et al*., 2006).

Table 4: Water balance (ml/kg/BW) of goats fed the sprouted fodders

Item	Treatments					±SE
	T1	T2	T3	T4	T5	
Drinking water	204.36[a]	46.04[b]	34.05[b]	47.83[b]	40.03[b]	11.35
Combined water	96.96[a]	12.12[cb]	7.23[c]	17.45[b]	8.79[c]	2.19
Metabolic water	41.00[a]	19.61[b]	14.44[c]	24.04[b]	19.77[b]	1.66
Total water intake	342.32[a]	77.78[b]	66.82[b]	89.33[b]	68.60[b]	13.83
Fecal water	36.52[a]	5.55[bc]	3.53[bc]	5.90[b]	3.12[c]	0.78
% of Intake	18.99[a]	12.26[b]	8.09[b]	12.42[b]	7.88[b]	1.48
Urinary water	152.59[a]	32.44[b]	28.66[b]	34.15[b]	31.07[b]	7.03
% of Intake	75.67	71.54	77.56	73.76	77.56	6.70
Total water excreted	189.12[a]	37.98[b]	34.19[b]	40.05[b]	34.19[b]	7.45
% of Intake	94.66	83.80	85.44	86.18	85.44	7.75
Water balance	153.20[a]	39.79[b]	32.63[b]	52.32[b]	34.41[b]	7.67
% of Intake	76.21[b]	85.66[ab]	82.67[ab]	110.98[a]	87.01[ab]	9.34

T1: berceem alfalfa (control ad-lib); T2: dried untreated leucaena tree pruning ad-lib (LTP) as control; T3: dried untreated olive tree pruning (OTP) as control; T4: sprouted white corn grains on dried leucaena tree pruning ad-lib (SLTP); T5: sprouted white corn grains on dried olive tree pruning (SOTP). a, b,c:means with different superscripts in the same row differ significantly (P ≤0.05), otherwise no differences were detected

Rumen parameters:

Data of rumen total volatile fatty acids (TVFA,s) and ammonia-nitrogen are given in Table 5. Rumen total volatile fatty acids (TVFA,s) revealed that concentrations of VFA,s increased after feeding and reaches its peak 3 hr. post feeding (Fayed, 2009). There was a significant (P≤ 0.05) increase in overall total volatile fatty acids (TVFA,s) concentrations; where animals in T4 showed the greatest values being (10.83 meq/100ml); while, the lowest concentration was recorded for T3 (7.27 meq/100ml). It might be a reflection to rich energy and organic matter of fodder fed to small ruminants that provided higher concentrations of rumen metabolites which naturally improved rumen function and digestibility (Bonsi *et al*., 1995).

The increase in TVFA,s concentration with sprouted barley may be due to that sprouts provide a good supply of vitamins, enzymes which serve as bioactive catalysts to assist in metabolism of feed and the release of energy (Shipard 2005; Fayed, 2011 and Helal, 2012).

Goats in T1 and T4 recorded the highest insignificant overall ammonia-nitrogen value (31.84 and 31.82 mg/100ml) compared to the other experimental groups. This is may be due to high content of CP and CP intake inT1 and T4 (Table 1) fed to animals in these groups (Norton, 2003). Other researchers reported an increase in rumen ammonia N with increase in CP supplementation (Bohnert *et al*., 2002 and Salisbury *et al.*, 2004). Additionally, the total ammonia concentration was higher (P≤0.001) for the fresh barley sprouts supplements than for the barley grains and control poor quality roughage (Dung *et al*., 2010). On the other hand, Hassan (2009) found that ruminal microbial protein synthesis requires an adequate supply of nitrogen to achieve maximum efficiency.

Table 5: Ammonia-nitrogen and total volatile fatty acids of goats fed the sprouted fodders.

Criteria	Time	Treatments					
		T1	**T2**	**T3**	**T4**	**T5**	**overall mean**
* TVFA,S							
	0	6.22±0.63^{ab}	6.73±0.63^{ab}	5.53±0.63^{c}	8.81±0.63^{a}	7.78±0.63^{ab}	7.09±0.26^{c}
	3	12.83±0.91^{a}	9.95± 1.05^{ab}	9.11±0.91^{b}	12.42±0.91^{a}	9.98±0.91^{ab}	10.80±0.26^{a}
	6	9.30±0.59^{a}	8.55±0.59^{ab}	7.29±0.59^{b}	9.54±0.59^{a}	8.81±0.59^{ab}	8.70±0.25^{b}
overall m.		9.45±0.32^{b}	8.36±0.34^{d}	7.27±0.32^{c}	10.38±0.34^{a}	8.85±0.32^{bc}	
NH3-N							
	0	21.98± 0.46^{c}	25.52± 0.46^{b}	21.30± 0.46^{c}	28.52± 0.46^{a}	25.67± 0.46^{b}	24.57±0.23^{c}
	3	38.98± 0.59^{a}	31.24± 0.59^{b}	26.06± 0.59^{c}	37.20± 0.59^{a}	31.21± 0.59^{b}	32.94±0.22^{a}
	6	34.51±0.56^{a}	28.12±0.56^{b}	24.03±0.56^{c}	29.79±0.56^{b}	28.50±0.56^{b}	28.99±0.22^{b}
overall m.		31.82±0.28^{a}	28.29±0.28^{b}	23.79±0.28^{c}	31.84±0.31^{a}	28.46±0.28^{b}	

TVFA,S; Total volatile acids meq/100ml.; NH3-N; Ammonia nitrogen mg/100ml..
T1: berceem alfalfa (control ad-lib); T2: dried untreated leucaena tree pruning ad-lib (LTP) as control;
T3: dried untreated olive tree pruning (OTP) as control; T4: sprouted white corn grains on dried leucaena tree pruning ad- lib (SLTP); T5: sprouted white corn grains on dried olive tree pruning (SOTP). a, b,c:means with different superscripts in the same row differ significantly (P ≤0.05), otherwise no differences were detected

Blood parameters:

Serum urea-N, creatinine, total proteins, albumin, globulin, AST, cholesterol and potassium were significantly higher in goats fed T4 compared with other treatments. The high level of globulin of sprouted seeds treatments may indicate good developed immunity status (Ibrahim *et al.,* 2001). This is in accordance with the results reported by Kumar *et al*. (1980) who found a positive correlation between dietary protein and plasma protein concentration. This was probably due to the high level of CP content in T4. The lowest value of serum urea and creatinine were recorded by T3. These results are in harmony with those reported by Fayed (2011). Additionally, Elisabetta *et al*. (2009) induced that integration with hydroponically germinating oat in partial substitution of the complete feed does not modify biochemical and hematological parameters and seems to produce an improvement in animal.

Serum minerals revealed that goats fed T1 had highest (P≤0.05) values of Sodium (mg/dl) being 148.78 as compared with other studied groups (Table 6). On the other hand, serum potassium concentration of goats fed T1 revealed similar insignificant values of sprouted roughages (T3 and T4). Similar results are in the same trend with those found by El-Essawy *et al*. (2011).

Table 6: Blood metabolites changes of goats fed the sprouted fodders.

Item	Treatments					±SE
	T1	T2	T3	T4	T5	
Urea (mg/dl)	36.95[bc]	39.76[ab]	33.18[c]	43.37[a]	37.13[bc]	1.51
Creatinine (mg/dl)	1.34[ab]	1.27[ab]	1.17[b]	1.46[a]	1.30[ab]	0.06
Total protein (g/dl)	6.33[a]	5.91[a]	3.66[c]	6.57[a]	5.21[b]	0.22
Albumin (g/dl)	2.34[b]	2.41[b]	2.05[c]	2.66[a]	2.30[b]	0.06
Globulin (g/dl)	3.34[b]	3.49[ab]	2.68[c]	4.01[a]	3.61[ab]	0.18
ALT (U/L)	13.05[a]	8.21[c]	6.82[d]	9.52[b]	8.05[cd]	0.41
AST (U/L)	18.18[a]	17.24[ab]	14.93[b]	20.09[a]	17.46[ab]	0.90
Cholesterol (mg/dl)	61.65[bc]	66.97[b]	56.22[c]	75.08[a]	63.51[b]	1.87
Triglycerides (mg/dl)	49.66[a]	35.80[bc]	31.30[d]	39.11[b]	33.53[cd]	1.24
Sodium (mg/dl)	148.78[a]	134.07[c]	128.61[d]	140.90[b]	133.00[dc]	1.67
Potassium (mg/dl)	4.37[ab]	3.60[b]	3.38[b]	4.73[a]	3.82[ab]	0.30

T1: berceem alfalfa (control ad-lib); T2: dried untreated leucaena tree pruning ad-lib (LTP) as control; T3: dried untreated olive tree pruning (OTP) as control; T4: sprouted white corn grains on dried leucaena tree pruning ad-lib (SLTP); T5: sprouted white corn grains on dried olive tree pruning (SOTP). a, b,c:means with different superscripts in the same row differ significantly (p≤0.05), otherwise no differences were detected

CONCLUSION

It could be concluded that we can produce green fodder as alfalfa hay replacer especially in dry season by sprouting white corn grains on roughages like *leucaena leucocephala* and olive tree pruning as a media to produce green fodder with high nutritive value for the animals and environment-friendly as well as to reduce the cost of feeding by utilizing dried desert with simple methodology using crop sprouts and employ to produce forage feed instead of causing pollution.

REFERENCES

Al-Ajmi, A., A. Salih, I. Kadhim and Y. Othman (2009). Yield and water use efficiency of barley fodder produced under hydroponic system in GCC countries using tertiary treated sewage effluents. Journal of Phytology, 1(5): 342-348.

Alibes, X. and Ph, Berge. (1983). Valorización de los subproductosdel olivarcomoalimentos para los rumiantes. FAO, Rome.

Al-Karaki, G. N. (2010). Hydroponic green fodder: alternative method for saving water in dry areas. Proceedings of the "Second Agricultural Meeting on Sustainable Improvement of Agricultural and Animal Production and Saving Water Use. September 2010, Sultanate of Oman.

Allam, Sabbah M.; Youssef, K. M.; Ali, M. A. and Abo Bakr, S. Y. (2006). Using some fodder shrubs and industrial by-products in different forms for feeding Goats in sinai. J Agric. Sci. Mansoura Univ., 31: 1371-1385.

A.O. A. C. (1997). Official Methods of Analysis. 16th Ed. Assoc. Office. Anal. Chem., Arlington, VA.

Armstrong, W.D. and C.W. Carr (1964). Physiological chemistry. Laborator Direction, 3 rd ed., P. 75, Burges bublishing Co. Minneapolis, Minnestota. Artificially Grown Barley Fodder by Sheep. Indian J. Small Rumen, 4(2): 63-68.

Bhatti, J. A., M. Younas, M. Abdullah, M. E. Babar and H. Nawaz. (2009). Feed intake, weight gain and haematology in nili-ravi buffalo heifers fed on mott grass and berseem fodder substituted with saltbush (*atriplex amnicola*). Pakistan Vet. j., 2009, 9 (3): 133-137.

Bohnert, D.W., C.S. Schauer, S.J. Falck and T. DelCurto (2002). Influence of rumen protein degradability and supplementation frequency on steers consuming low-quality forage: I. Ruminal fermentation characteristics. J. Anim. Sci., 80: 2978-2988.

Bonsi, M. L. K., P. O. Osuji and A. K. Thuah (1995). Effect of supplementing tef straw with different level of Leucaena or sasbania on the degradability of tef straw, sesbania, leucaena, tagaste and vernonia and certain rumen and blood metabolites in Ethopianmenz sheep. Anim. Feed Sci Technol 52; 101-129.

Bustos, C. D. E., E. L. Gonzalez., B. A. Aguilera and G. J. A. Esptnoza (2000). ForrajeHidropónico, Una Alternativa para la Supplementation Caprina En el Semi desire to Queretano. XXXVIII. Reunión Nacional de Investigación Pecuaria. Puebla, México, 383 PP.

Chavan, J. and S.S. Kadam (1989). "Nutritional improvement of cereals by sprouting." Critical Reviews in Food Science and Nutrition, 28 (5): 401-437.

Dikshit, M. and Ghadle, (2003). Effect of sprouting on nutrients, anti-nutrients and in vitro digestibility of MACS.13 soybean variety. Plant Food Hum.Natr, 58: 1-11.

Doumas, B., Wabson, W. and Biggs H. (1971). Albumin standards and measurement of serum with bromocresol green. Clin, Chem., Acta.

Duncan, D.B., (1955). Multiple ranges and multiple. F. tests Biometrics. 11, 1-42.

Dung D.D., I.R. Godwin and J.V. Nolan (2010). Digestive characteristics, ammonia nitrogen and volatile fatty acids levels, in sheep fed oaten chaff supplemented with. grimmett barley grain, freeze-dried or fresh barley sproutes. Journal of animal and veterinary Advances 9 (19): 2493-2501.

Eid, E. Y. A. (2003). Feed utilization and performance of animal fed the natural and cultivated fodder shrubs in Sinai. Ph D. Thesis, Fac. of Agric. Cairo univ. Egypt.

El- Essawy, A.M., E.Y. Eid, Afaf, M. F., Ahlam R. A., H. G. Helal & H. M. El Shaer (2011). Influence of feeding fodder beet with different forages as nitrogen sources under saline conditions on Barki rams performance in southern Sinai. Egyptian J. Nutrition and Feeds. 14(2): 191- 205.

Elisabetta, M., R. Marco., M. Fabrizio., R. Giuseppe., M. Giuseppe and Z. Antonia (2009). Improvement of sheep welfare and milk production fed on diet Containing hydroponically germinating seeds. Ital.J.Anim.Sci., 8 (Suppl. 2); 634-636.

El Shaer, H. M. (2010). Halophytes and salt tolerant plants as potential forage for ruminants in the Near East region. Small Ruminant Res. 91: 3-12.

Farid, M. F.A.; H.M. Abou El-Nasr and N.I. Hassan (1986). Effect of dietary available carbohydrate level on feed and nitrogen utilization in sheep given urea in the drinking water. World Rev. of an0mal Prod., 12:3.

Fayed, M. Afaf (2009). In-vitro and in-vivo evaluation of biological treated salt plants. American-Eurasian J. Agric. & Environ. Sci., 6: 108-118.

Fayed, M. Afaf (2011). Comparative Study and Feed Evaluation of Sprouted Barley Grains on Rice Straw Versus Tamarix Mannifera on Performance of Growing Barki Lambs in Sinai Journal of American Science, 7(1), 954-961.

Fazaeli H., H. A. Golmohammadi., A. A. Shoayee., N. Montajebi and Sh. Mosharraf (2011). Performance of Feedlot Calves Fed Hydroponics Fodder Barley J. Agr. Sci.Tech. 13: 367-375.

Fazaeli H., H. A. Golmohammadi., S.N. Tabatabayee and M. Asghari-Tabrizi (2012). Productivity and Nutritive Value of Barley Green Fodder Yield in Hydroponic System. J. Agr. Sci. Tech. 16 (4): 531-539.

Goering, H.K. and P.J. Van Soest (1970). Forage fiber analysis. Agricultural Handbook, No. 379, USDA, Washington. DC, U. S. A.

Hathout, M.K and H.M. El-Nouby (1990). Practical application of crop resdues treatment in Egypt. 3rd International Symposium on feed Manufac and quality control, pp, 337-347.

Hassan, A. A. (2009). Effect of some Enrichment and Nawaz biological treatments on a melioration utilization of *Atriplex nummularia* fed by sheep. Egyptian J. Nut. And Feed. (12): (3 Special Issue): 553-566.

Helal, H. G. (2012). Sprouted barley grains on rice straw and *acacia saligna* and its effect on performance of growing barki lambs in sinai. Proc. of the 5th Animal Wealth Research Conf. in the Middle East & North Africa1-3: 331-346.

Henry, R.J. (1965). Clinical Chemistry. Principles and technics, P. 293.

Ibrahim, A. Fathia ,Hoda, M. El-Hosseiny and I. M. El-Sayed (2001). Effect of using sprouted barley by recycle process of agriculture residues on feeding value, rumen activity and some blood constituents of crossbred sheep. Egyptian J. Nutrition and feeds, 4 (Special Issue) 265-273.

Jackson, M.L. (1958). Soil Chemical Analysis. Constable and Company, Ltd, England.

Kearl, L.C. (1982). Nutrient requirements of ruminants in developing countries. Utah Agric. Exp. St., Utah State Univ. Logan, UT, U. S. A.

Kumar, N.U., S. 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.

Lorenz, K. (1980). "Cereal sprouts: composition, nutritive value, food applications." Crit. Rev. Food Sci. Nutr. 13 (4): 353-385.

MAFF (Ministry of Agriculture Fisheries and Food) (1975). Energy Allowances and Feeding Systems for Ruminants. Technical Bulletin no. 33. London: HMSO.

Mayer, A. M. and A. Poljakoff-Mayber (1975). The Germination of Seeds. 2nd Edition, Pergamon Press, Toronto.

Mohammadi, F., Thanaa and M.M. F. AbdalLah (2007). Effect of four seed sprouts on rice straw and spent mushroom media of rice straw to be used as agreen fodder.Egyptian J. Nutrition and feeds, 10 Special Issue: 679-691.

Morgan, J., R.R. Hunter and R. O'Haire, (1992). Limiting factors in hydroponic barley grass production. In the proceeding of the 8th International congress on soil less culture, pp: 241-261.

Nefzaoui, A. (1995). Feeding value of Mediterranean ruminant feed resources Syria 12-23 March 1995. Institut National de la Recherche Agronoique de Tunisia Rue Hedi Karray 2049 Ariana, Tunisie.

Nefzaoui, A., H. Ben Salem and M. El Mourid (2012). Innovations in small rumi feeding systems in arid Mediterranean areas. EAAP-European Federation of Animal Science Volume 129, pp: 99-116**.**

Norton, B.W. (2003). The Nutritive value of tree legumes. In: Forage Tree Legumes In Tropical Agriculture, Gutteridge R.C and Shelton H.M, (eds). pp.43.Palmer,B., Raymond Jones, Somsak Poathong & Jeerasak Chobtang (2010).The value of Leucaena leucocephala bark in leucaena-grass hay diets for Thai goats. Trop Anim. Health Prod. 42:1731-1735.

Patton, C.J., and Crouch S. R. (1977). Enzymatic determination of urea by calorimetrically Method Anal. Chem., 49: 464.

Ram, J.J., Atreja, P.P., Chopra, R.C., Chhbra, A., (1994). Mimosine degradation in calves fed a sole diet of *Leucaena leucocephala* in Indian. Trop. Anim. Health Prod. 26, 199- 206.

Rodriguez-Mulea, C., Rodriguez, H. E., Ruiz, O., Flores, A., Grado, J. A. and C. Arzola (2004). Use of Green Fodder Produced in Hydroponic System as Supplement for lactating Cows during the Dry Season. Proceeding of American.

Salisbury, M.W., C.R. krehbiel, T.T. Ross, C.L. Schultz and L.L. Melton, (2004). Effects of supplemental protein type on intake, nitrogen balance and site and extent of digestion in white face wethers consuming low-quality grass hay. J. Anim. Sci., 82: 3567-3576.

SAS (1998). User guide: statistics version 6, 4th ed., Vol. 2 SAS Institue Inc., Cary. NC. USA.

Shipard, I. (2005). How can I grow and use sprouts as living food? Stewart publishing.

Sneath, R. and F. McIntosh, (2003). Review of hydroponic fodder production for Beef cattle. Department of Primary Industries: Queensland Australia 84. McKeehen, pp: 54.

Snow, A.M., A.E. Ghaly and A. Snow (2008). A Comparative Assessment of Hydroponically Grown Cereal Crops for the Purification of Aquaculture Wastewater and the Production of Fish Feed. American Journal of Agricultural and Society of Animal Science, 56: 271-274.

Tudor, G., Darcy, T., Smith, P. and F. Shallcross (2003). The Intake and Live Weight Change of Drought Master Steers Fed Hydroponically Grown, Young Sprouted Barley Fodder (Auto Grass). Department of Agriculture Western Australia.

Warner, A.C.J. (1964). Production of volatile fatty acids in the rumen methods of Measurements Nutr. Abst. and Rev. 34: 339.

تاثير انبات حبوب الذرة الشامية على ناتج تقليم اشجار الزيتون والليوسينا كعلائق للماعز الصحراوي تحت ظروف سيناء.

حسن جوده هلال و منى محمدعلي حسن
قسم تغذية الحيوان والدواجن، مركز بحوث الصحراء، المطرية، القاهرة، مصر

تهدف الدراسة الحالية الى مقارنة دريس البرسيم (مجموعة ضابطة) بنوعين منفردين من نواتج تقليم اشجار الليوسينيا والزيتون، وكذلك دراسة تأثير انبات حبوب الذرة الشامية على ناتج تقليم اشجار الليوسينيا واشجار الزيتون على اداء الماعز الصحراوي. استخدم عدد٢٥ ذكر ماعز صحراوي (متوسط وزن البداية٢٣.٤٢ ± ٠.٩١ كجم)، عمر حوالي ٢٤ شهرا، حيث تم تقسيمها الى خمس مجموعات (٥ حيوانات للمجموعة). تم تغذية الخمس مجموعات التجريبية على الخمس اعلاف الخشنة التالية حتى الشبع وهي: المجموعة الاولى دريس برسيم حجازي (مجموعة ضابطة)، المجموعة الثانية ناتج تقليم اشجار الليوسينيا الجافة غير المعامل، المجموعة الثالثة ناتج تقليم اشجار الزيتون الجافة غير المعامل، المجموعة الرابعة ناتج تقليم اشجار الليوسينيا الجافة بعد تنبيت حبوب الذرة عليها، المجموعة الخامسة ناتج تقليم اشجار الزيتون الجافة بعد تنبيت حبوب الذرة عليها، وبناء عليه:-

تم اجراء تجربة تغذية علي الماعز استمرت ٤٥ يوما، تلتها تجربة هضم لتقدير معاملات الهضم للاعلاف التجريبية الخشنة وكانت اهم النتائج:-

اظهرناتج تقليم اشجار الليوسينيا والزيتون الجاف (غير المعامل) انخفاض محتواها من البروتين الخام، الكربوهيدرات المتحولة، الرماد الخام، المركبات الكلية الذائبة، الصوديوم والبوتاسيوم مع ارتفاع محتواها من الالياف الخام، مكونات الالياف و الهميسليلوز مقارنة بدريس البرسيم.

ادى انبات حبوب الذرة على ناتج تقليم اشجار الليوسينيا والزيتون الجاف الى تحسن محتواها من البروتين الخام، الكربوهيدرات المتحولة، الرماد الخام، مستخلص الاثير، الصوديوم والبوتاسيوم مع انخفاض محتواها من من الالياف الخام، مكونات الالياف و الهميسليلوز مقارنة بنواتج التنقليم الجافة غير المعاملة.

سجلت الماعز المغذاه على المعاملات المنبت عليها حبوب الذرة نفس قيم معاملات الهضم لكل من البروتين الخام، الالياف الخام و الهميسليلوز المسجلة للمجموعة المغذاه على دريس البرسيم في حين سجلت المجموعة الرابعة اعلى معامل هضم لمستخلص الاثير.

سجلت الماعز المغذاه على المجموعة الرابعة (نواتج تقليم الليوسينيا المنبت عليها حبوب الذرة) اعلى مركبات كلية مهضومة تلاها المجموعة الاولى (دريس برسيم)، المجموعة الثانية (ناتج تقليم ليوسينيا غير معامل) واقلها المجموعة الثالثة (ناتج تقليم زيتون غير معامل).

سجلت الماعز المغذاه على نواتج التقليم المنبت عليها حبوب الذرة تحسن لقيم ماء الشرب الكلية مع انخفاض افراز الماء من خلال البول مع تحسن لقيم ميزان الصوديوم والبوتاسيوم (جم/كجم وزن جسم) مقارنة بمجموعة الكنترول.سجلت الماعز المغذاه على نواتج التقليم المنبت عليها حبوب الذرة اعلى قيم معنوية للاحماض الدهنية الطيارة وتركيز امونيا الكرش.سجلت الماعز المغذاه على نواتج تقليم الليوسينيا المنبت عليها حبوب الذرة اعلى قيم معنوية لتركيزات البروتين الكلي، الالبيومين، الجلوبيولين، اليوريا، الكرياتينين والبوتاسيوم في السيرم مقارنة بباقي المجاميع التجريبية. وبناء عليه يمكن الاستفادة من نواتج تقليم اشجار الليوسينيا أواشجار الزيتون الجافة كبيئة لانتاج الاعلاف الخضراء عن طريق استغلال عملية انبات حبوب الذرة عليها دون حدوث اي آثار ضارة للماعز الصحراوي المرباه تحت ظروف الجفاف في المناطق الصحراوية.

قام بتحكيم البحث

أ.د / عبد الحميد محمد عبد الحميد	**كلية الزراعة – جامعة المنصورة**
أ.د /سعيد احمد محمود	**كلية الزراعة – جامعة كفر الشيخ**