EFFECT OF FEEDING SHRUBS HAY AS NON- TRADITIONAL FODDER AND SOURCE OF PROTEIN ON PERFORMANCE AND MILK PRODUCTION OF SHEEP

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SUMMARY

This study aimed to use of Leuceana leucocephala lam. hay (L.H) for ruminant it's effects on performance, milk production and composition as a partial replacer of concentrate feed mixture(CFM)in sheep ration. A total of 16 mature rams (40 – 45 kg live body weight) were used in digestion trial, arranged as (4x4) Latin square design and twenty eight growing Saidi male lambs were used in growth trial. Animals in each trial were randomly divided into four groups according to their body weight. On the other hand, twenty four ewes were used in milk yield trail. Four diets were used in all experiments. Ration 1 (R1, CFM +wheat straw), ration 2 (R2, CFM+ wheat straw +20% Leuceana hay), ration 3 (R3, CFM+ wheat straw +40% Leuceana hay) and ration 4 (R4, CFM+ wheat straw +60% Leuceana hay) CFM and wheat straw were used in R1, R2, R3 and R4 as 3 % and 1% of live body weight, respectively ,while Leuceana hay percentages were used to cover a partial of protein from CFM.

Diets containing Leuceana hay had higher dry matter (DM), organic matter (OM), crude protein (CP), crude fiber (CF), ether extract (EE), nitrogen free extract digestibility (NFED), neutral detergent fiber digestibility (NDFD), acid detergent fiber digestibility (ADFD) and hemicelluloses digestibility coefficients (HMCD)compared to control diet, except R4 concerning neutral detergent fiber digestibility and hemicelluloses digestibility. There were significant differences (P<0.01 and P<0.001) in total digestible nutrients (TDN), digestible crude protein (DCP), digestible energy (DE) and metabolizable energy (ME) among the experimental rations except R4 in TDN. The average total and daily gain, feed consumption and feed conversion were in favor of diets containing Leuceana hay. The differences were significant (P<0.01 and P<0.05) among the different diets. Results of milk yield, fat percentage, protein percentage, total solids and fat corrected milk were higher in diets containing Leuceana hay compared to control diet. The differences were significant (P<0.05, P<0.01 and P<0.001) among different diets. Results obtained reveled that , feeding rams and ews rations containing LLH hay as a non-traditional ration and source of partial protein instead of CFM protein up to 60% appeared to have higher nutrient digestibility, increased daily gain and improved feed efficiency. Moreover, decreasing in feed cost would be achieved.

Keywords: Performance, digestibility, Leuceana leucocephala hay, milk yield, and total solids, fat corrected milk.

INTORODUCTION

Many trials have been conducted to test the value of Leuceana leaf for ruminants either as a sole diet (Yates, 1983) or as protein supplement to low and moderate-quality roughages (Moran *et al*., 1983 and Bonsi *et al*., 1995). In most trials it was found that supplemental protein from Leuceana leaves promoted high levels of animal production because Leuceana was capable of meeting the minimum N requirements for ruminants. Some amounts of protein in Leuceana may escape digestion in the rumen and provide additional protein for absorption in the small intestine (Norton *et al*., 1995; leng and Devendra, 1995). One of the most traditional fodders is Leuceana leucocephala L. (L.L). It has a deep top root system making it tolerant to drought. It often provides green fodder in the dry season. It is highly palatable and rich in protein. It fixes nitrogen in the soil, thus it builds up soil fertility. Its protein is of low rumen degradability (Suliman, 2001) cutting of Leuceana can be start for the first time after 15-18 weeks from cultivation. The first cut of plant could be taken at 24-30 inches height above the ground. Subsequent cuttings can be taken at 6-8 weeks intervals before shoots become fibrous (Gupta and Chopra, 1985).

Ferraris (1979) and Jones (1979) recorded a high yield of 20 ton dry matter/ha/year have been obtained with crud protein yield in excess of 3 ton /ha/year. Abo El-Nor (1987) found that

proximate analysis of 4 months age Leuceana (leaves plus branches) for DM was 29.83%, while the respective values for CP, CF, EE, NFE and ASH, on dry matter basis, were 27.93, 20.23, 9.45, 36.49 and 5.9%. The TDN, starch equivalent and DCP were 68.44%, 53.98% and 20.05%, respectively. (Abo-EL-Nor, 1991) found positive nitrogen balance when diets contained different proportions of L.L hay (0, 30 and 50% as replacer for concentrate feed mixture were fed.

Suliman *et al*. (2003) extracted that Leuceana leucocephala, the untraditional fodder could be used as feed for sheep. Replacing 25% of CFM by L.H on CP basis was promising in view of body weight gain, digestibility, N-balance feeding value and feed conversion of Leuceana hay (L.H) and Leuceana green forage L.G. Leuceana leucocephala has been shown as an important and cheap source of high quality feed for small ruminants (Adejumo and Ademosum, 1991). Animals with access to Leuceana leucocephala protein bank produced on average 0.85 kg of milk/day, a production 70 % higher than that obtained with animals grazed on pastures only but not different from the animals received both concentrate and pasture. Treatment did not affect milk composition (Clavero and Razz, 2008). Min *et al*. (2005) stated that dietary characteristics influence milk yield and milk composition of dairy goats, as well as body weight gain. Previous studies have also shown a positive correlation between both the amount and the concentration of metabolizable energy and either milk protein or yield. Casper *et al*. (1990), recently in Nigeria, there are no much extensive studies were carried out on the effect of forage diets on milk composition of WAD goats. Dupe *et al*. (2010) stated that the effect of diets containing (Leuceana leucocephala L.) on milk composition was reflected by crude protein (%, CP), total ash (%), total solid (%TS), solid-not-fat (% SNF) and lactose (%). The effect of diets on milk composition was significant ($P < 0.05$). Milk protein and fat ranged from 3.10 to 3.92 and 3.51 to 4.16% respectively. Lactose and total ash composition varied from 4.28 to 4.59% and 0.73 to 0.97%. Therefore, the objective of this study was to determine the effect of Leuceana leucocephala L. on milk composition and body weight gain of sheep.

MATERIAL AND METHODS

Digestibility trials were conducted to study digestibility, nutritive values, performance and milk production and composition of saidi lambs and ewes, fed different rations, farming area of Qena. The climate of this area is very dry tropical area with an average annual temperature of 39°C., with a hot season (summer) from June to November. Leuceana was used as a portions, source with percentages of 20, 40and 60% from crude protein of CFM.

Farming operation

The cultivated area received the usual agricultural treatments (Ploughing, harrowing twice, divided into rows of 60 cm width). Phosphorus (Superphosphate fertilizer 15.5% P_2O_5 was applied at rate of 250 kg/feddan). Seeds were obtained from the Agriculture Research Center belonging to Faculty of Agriculture, Minia University, seeds were soaked in boiling water at 100ºC for ten minutes (to break silent phase of seeds), followed by soaking the seeds overnight in cold water. The seeds were sown in 10th of April 2011at the rate of 2-4 seeds in each hill with 20cm spaces. Nitrogen fertilizer (Ammonium sulphate 16.5%N) was added after planting at the rate of 250kg/feddan. The plants were grown for 16 weeks after which plants were cut to insure building up a strong root that help getting powerful re-growth and shoots every 8 weeks. The cut plants were spread on the ground for drying and preserved as hay for feeding the experimental animals.

Animals

Digestion trial was conducted using a total of 16 mature rams (40-45) kg live body weight), arranged as 4x4 Latin square design. The experiment of performance was run using a total of twenty eight Saidi male lambs divided into four homogeneous groups each of seven lambs (n= 7 lambs) with six months age within 20.60±1.00 kg live body weight (LBW). The experiment of milk was conducted using a total of twenty-four Saidi ewes and were divided into four homogeneous groups each of six ewes(n=6ewes) with an average 40-50 kg live body weight and 3-3.5 years old, each regarding weight, age and milk production.

Treatments

Four rations were used in the previous experiments. Ration-1 (CFM+ wheat straw), ration-2 (CFM+ wheat straw +20% Leuceana hay), ration-3 (CFM+ wheat straw +40% Leuceana hay) and ration-4 (CFM+ wheat straw +60% Leuceana hay) CFM was used in R1, R2, R3 and R4 as 3 % of live body weight, also wheat straw was used as 1% of live body weight. In addition, Leuceana hay has covered 20, 40 and 60 % from protein of CFM for R2, R3 and R4, respectively. Weights of feeds offered are presented in table (1).

Table 1. Feed formula weights of different treatments

Feedstuff	R1	R2	R3	R4
CFM, kg.	133.70	91.10	67.34	33.25
Wheat straw, kg .(WSt)	30.96	28.03	28.88	34.10
Leuceana hay, kg (L.H.)	0.00	29.97	55.78	87.65
Total feed intake Kg	164.66	149.10	152.00	155.00

Digestibility Trails

The animals were kept in individual metabolic cages. Each trial lasted 21 days, 14 days for preliminary period followed by 7 days for feces and urine collection. Digestibility coefficients were estimated for rations containing 0, 20, 40 and 60% L.L.H instead of CP% of CFM. Animals were fed 3% CFM and 1% of their body weight wheat straw of their, rations offered twice daily in two equal portions at 10:00 am and 4:00 pm to each animal. Fresh water was available in front of each animal in each cage. Mineral blocks and vitamins mixture were fixed among cages to enable animals for slicking whenever is required. Before feeding, the total excreted feces were weighed and sampled (10% of the total daily collection) for drying on 60 °C oven for 24 hours. At the end of the collection period, the seven daily's fecal samples of each ram were ground and mixed and kept in tietly tied nylon bags for laboratory analysis.

Feeding trial

All animals were fed CFM and wheat straw with rate of 3% and 1% of live body, respectively. Rations were offered twice daily in two equal portions at 9:00 am and 3:00 pm. The amounts offered of the rations increased as body weight increased as body weight was progressed. Animals were allowed to drink fresh water all the time and weighed every two weeks before feeding. No abnormal health cases were observed along the experimental period (130 days).

Milking experiment

The animals were fed the pervious rations, all ewes were in the second lactation and the lactation trial was started from the 42^{th} to the 182^{th} day of lactation, which is usual period of milking in the region and after peak to carry out the experiment. The present study was carried out at the experimental farm of Animal production Department, Faculty of Agriculture, South Valley University, Qena during the period from April 2011 to December 2012.

Economical evaluation

Economical evaluation was done for the tested diet assuming that the price of one kg LBW gain of lambs was 30.00 Egyptian pounds (LE) and the price of one kg DM of CFM, wheat straw and L.L.H. was 2.40, 1.00 and 1.5 Egyptian pounds (LE). The cost of total dry matter intake DMI of CFM plus W.str (R1) or 20% L.L.H. (R2) or 40% L.L.H. (R3) or 60% L.L.H. (R4) were 351.84, 291.63, 274.17 and 295.38 (LE) respectively. The experiment was shut down when lambs achieved the marketing LB weight (40 - 45 Kg.).

Laboratory analysis

Determination of feeds, feces samples were carried out according to A.O.A.C. (2005). Determination for DM, CP, and CF, EE and ash contents according to A.O.A.C. (2005), acid detergent fibre (ADF) and neutral detergent fibre (NDF*) were according to* (Goering and Van Soest, 1970).

Individual milk samples, consisted of proportional volumes of morning and evening milk, were collected in order to evaluate milk composition (5 ml/Kg of produced milk.) A composed milk sample of each ewe was analyzed weekly. Fat percentage was determined by the standard Gerber method according to the British Standard Institute (1962). Protein percentage of milk was evaluated by Micro Kjeldahl technique (A.O.A.C, 1999). Total solids (TS) percentage of milk was determined gravimetrically using the method by Oser (1965). Solid not fat (SNF) was calculated by the difference (T.S%-fat %). Milk yield was corrected to 7% fat (Raaft and Salah 1962). 7% FCM=0.265xmilk yield (Kg) + 10.5 x fat yield (Kg), minerals were determined using an atomic absorption spectrophotometer and protein by a micro Kjeldahl procedure.

Statistical analysis

Data were analyzed using general linear model (G.L.M), SAS. System (2003). Comparisons among means were made as Duncan's multiple range test *(*Duncan**,** 1955). The effect of treatments was considered to analyze digestibility, performance and milk composition.

Data of digestion experiment were analyzed as following model:

$$Y_{ijk} = \mu + B_i + S_j + e_{jk} \text{ (model 1)}$$

Where

Y_{ijk}= observation of digestibility value.

μ = General mean or Common element to all individuals.

B_i=the effect due to the 1^{th} ration 1 = 1, (central), 2 (20% L.L.H), 3 (40% L.L.H), 4 (60% L.L.H).

S_j=the effect due to stage or period of digestion j^{th} stage j = 1, 2, 3 and 4.

$_{ejk}$ =Random error associated with I individual observation and assumed to be independently and randomly distributed $(0, \delta^2)$.

Data of feeding trial and milking experiment were analyzed according to the following model:

$$Y_{ij=} \mu + Ti + E_{ij} \text{ (model 2)}$$

Where:

Y_{ij} = Experiment observations;

μ = the overall mean;

Ti= the effect of dietary treatment;

i=R1, R2, R3 and R4, R1= control, 2= 20%, L.L.H, 3= 40% L.L.H and 4= 60% L.L.H

E_{ij} = the experimental error.

Significance among means of different factors and levels were detected according to Duncan's multiple range tests (Duncan's, 1955).

RESULTS AND DISCUSSION

Proximate analysis

Chemical analysis on dry matter basis indicated that the L.LH and CFM were rich in CP content, CFM contained greater percentage of NFE than L.LH which characterized by their high % of CF, NDF and ADF compared with CFM, therefore NFE decreased by increasing L.LH portions in the rations, while CF, NDF and ADF %increased by increasing L.LH portions in the rations Table 2. Murphy and Colucci, (1999). In the present study, *Leuceana Leucocephala* showed low percentage of NFE and greater CF%, NDF and ADF% compared with CFM, these results are due to the plants in tropical and subtropical areas high temperature decreased the soluble carbohydrate content of plants resulting in increased fiber content and decreased digestibility (Murphy and Colucci, 1999).

It's clear that L.LH contain greater portions of CP% these due to the leaves which represented from 21-30% of the whole plant, subsequent the CP% of edible parts (small stems and leaves) of the L.Leucocephala ranged from 14- 30% Kamseekhiew et al., (2001). These results due to the characterized of forage shrubs by (MARSS, 1997) and agree with those reported by (Labri *et al*., 1996 and Meissner *et al*., 1991). Ash percent was higher in CFM compared to L.LH this may be due to the dust with ingredients of CFM these results agree with (Suliman *et al*., 2004 and Suliman *et al*., 2001).

Nutrients digestibility

Digestibility coefficients of DM, OM, CP, CF, EE, NFE, NDF, ADF and HEMI of different rations are presented in Table (3). Highly significant (P>0.001) differences were observed in DM, OM, CP, CF, EE , NFE NDF, ADF and HEMI digestibility coefficients among rations. R2, R3 and R4 showed higher values compared with control ration in DM, OM, CP and NDF digestibilities. The lowest digestibility values for CF, EE, NFE, NDF and HEMI were detected in R4 compared to R1, R2 and R3. No significant difference was detected among all rations in OM and HEMI digestibility except R4 in hemicelluloses digestibility. Higher digestibility of DM, OM, CP and NDF were detected between R4, R3 and R2 compared to R1 (Table 3). It could be noticed that some nutrients had higher digestibilities with increasing L.LH levels (Table 3). In the present study DMD, OMD, CPD and NFED increased by inclusion L.LH in rations. These results are due to the increased of nutrients intake , quality of diet, quality of crude protein agree and best utilization and it's agree with those finding by Aregheore (2001) who reported that based on conventional measures of quality such as crude protein diet, the quality of the diet improved by the addition of *Leuceana Leucocephala L.*

The digestibility of nutrients increasing by increased L.LH in rations portion, digestibility coefficients of forage DM by the ruminants is the summation of the digestibility of the component tissues as affected by morphology, anatomy and chemical composition Murphy and Colucci (1999). Also, Karachi, (1998) showed that the digestibility of forages is affected by stage of maturity of the forage. Also, Mtenga and Shoo (1990) and Clavero and Razz (2003) showed that *Leuceana Leucocephala* supplementation increased protein intake and dry matter digestibility. CF, EE, NFE and ADF digestibilities, as source of energy in the diet, the digestibility of fibers depend on many factors such as level of energy in the ration, rumen PH, quality of fiber, type of grain and starch in CFM, therefore the low digestibility of fiber could also be due to the low quality of fiber in the diet (Chanjula, 2003).

Nutritive value

The nutritive value of different rations used expressed as TDN, DCP, DE (MJ/KGDM) and ME (MJ/KG DM) are presented in Table (3). Highly significant (P>0.001) differences were detected

among different rations concerning TDN, DCP, DE and ME, respectively. The highest value was recorded by R2 and R3 the figures were 66.37 and 65.71% feed respectively, while the lowest value was recorded by R4 the figure was 48.88%, while the intermediate value recorded by R1 (control ration), the figure was 58.05% for TDN. However, DCP, DE and ME were increased by inclusion of L.LH in rations from 20, 40 and 60% L.LH. Highly significant (P>0.001) differences were detected among different rations compared with R1 (control). These results can explained in view of chemical composition, increased of nutrients digestibility and voluntary intake accompanied increasing L.LH in rations. These results agree with those reported by Metnga and Shoo (1990) stated that L. Leucocephala supplementation increased protein intake and dry matter digestibility, improved nutrient status should have allowed for enhanced nutritive values as TDN, DCP and metabolizable energy utilization. According to Dutta *et al*. (1999), the higher consumption among supplemented group could be attributed to the higher out flow rate of both the liquid and solid phase of the rumen digest, probably due to enhanced cellulolysis, digestion of cell walls in the reticule rumen and metabolism.

Table 2. Proximate analysis of feeds and rations used in the experiment

Items	Chemical composition on dry matter basis							Fiber fraction		
	DM	OM	CP	CF	EE	NFE	ASH	NDF	ADF	HEM
Concentrate .feed mixture(CFM)	89.80	87.49	15.95	12.40	3.59	55.55	12.51	39.85	18.83	21.02
Wheat straw (W.Str.)	88.62	90.20	1.74	37.85	1.01	49.60	9.80	62.60	46.30	16.30
Leuceana leucocephala hay (L.H)	89.35	89.15	16.20	30.21	4.29	38.45	10.85	59.72	41.81	17.91
Rations										
R1 (CFM: W.Str.)	89.58	88.00	13.28	17.19	3.11	54.43	12.00	44.12	23.99	20.13
R2 (CFM : W.Str: L.H)	89.49	88.33	13.34	20.77	3.24	50.99	11.66	48.12	28.61	19.51
R3 (CFM : W.Str: L.H)	89.41	88.62	13.35	23.77	3.35	48.14	11.38	51.46	32.48	18.98
R4 (CFM : W.Str : L.H)	89.65	89.02	12.96	28.07	3.42	44.57	10.98	56.09	37.87	18.23

Where feed stuff ratio were (81.20 CFM : 18.80 W.Str) for R 1 , (61.10 CFM : 18.80 W.Str : 20.10 L.H) for R2, (44.30 CFM : 19.00 W.Str: 36.70 L.H) for R3 and (21.45 CFM : 22.00 W.Str : 56.55 L.H) for R4 .
The concentrate feed mixture (CFM) consisted of cotton seed meal 8%, rice gluten meal 7%, soybean meal 3%, wheat bran 21%, rice bran 18 % , ground maize 25 % , molasses 15 %, lime stone 2.5 % and salt 0.5 %).

Feeding trial

Average daily gain

The results of growth performance, body weight gain, feed consumption and feed conversion for lambs fed different rations are presented in Table 4. Highly significant differences (P>0.001) were found among lambs fed different rations in total gain, daily gain, feed consumption and feed conversion. No significant (P>0.05) differences were found among lambs fed all rations in initial body weight and final body weight. The greater body weight gain so as total or daily gain recorded by rations including L.LH., while the lowest body weight gain showed by lambs fed control ration (R1). Feed consumption as DMI was higher for control ration (R1) compared with other treatments, lambs fed R3 recorded higher TDN consumption followed by those fed R1, but the intermediate consumption showed by R2 and the lowest consumption of TDN showed by R4. However, DCP consumption was greater by those fed L.LH supplementation. Animals with access to the L.Leucocephala protein bank produced better body weight gain than those obtained by control (R1), nevertheless, lambs fed R4 exhibited the lowest growth rate than those fed other treatments (R2 and R3).these results can be explained in view of DM, OM and CP digestibilities and nutrive values as TDN

and DCP, DE and ME of R2, R3 and R4 which increased by increasing L.Lh in the diet (Table 3). The lowest feed intake as DM in rations containing L.LH compared with control one due to the variation in structural carbohydrate of CFM and plants , which increased cellulose , hemicelluloses and lignin, that make plants stems strong and leaves rough than early stage, subsequent the ratio of L.LH varied from 20.10% in R2 to 56.55% in R4 compared with CFM decreased from 81.20% for R1 to 21.45% for R4 (Table 2). Metnga and Shoo (1990) reported that L. Leucocephala supplementation increased protein intake and nutrients digestibility. This improved nutrient status should be allowed to enhanced body weight gain. These results agree with (Suliman *et al*., 2003)

Table 3. Least square means ± standard errors of nutrients digestibility coefficients and nutritive values for rams fed on different portions of Leuceana hay

Items	No.	Nutrients digestibility coefficients				± SE	Sig
		R1	R2	R3	R4		
DM	16	60.57^{b}	63.09^{b}	68.15^{a}	71.25^{a}	1.33	***
OM	16	62.40^{c}	66.02^{bc}	69.87^{ab}	73.33^{a}	1.38	***
CP	16	62.66^{c}	66.06^{b}	71.12^{a}	73.65^{a}	1.07	***
CF	16	35.54^{b}	61.05^{a}	66.01^{a}	33.54^{b}	3.27	***
EE	16	76.06^{ab}	84.57^{a}	85.63^{a}	69.64^{b}	3.19	**
NFE	16	71.49^{b}	75.83^{a}	70.44^{b}	53.86^{c}	1.33	***
NDF	16	43.15^{C}	54.19^{b}	62.43^{a}	67.39^{a}	1.79	***
ADF	16	31.53^{b}	58.57^{a}	54.64^{a}	27.34^{b}	2.04	***
HEMI	16	64.14^{a}	69.74^{a}	70.27^{a}	49.61^{b}	3.787	**
Nutritive Values							
TDN	16	58.05^{b}	66.37^{a}	65.71^{a}	48.88^{c}	1.14	***
DCP	16	7.70^{d}	8.71^{c}	9.58^{b}	10.06^{a}	0.12	***
DE(MJ/KGDM)	16	1185.6^{c}	1254.29^{bc}	1327.48^{ab}	1393.27^{a}	26.29	***
ME(MJ/KG DM)	16	972.19^{c}	1028.52^{bc}	1088.54^{ab}	1142.48^{a}	21.56	***

*DE**ME, calculated according to MAAF (1975) using equations being DE (MJ/Kg DM)=Digestible organic matter (DOM X 19) & ME (MJ/Kg DM)=DE X 0.82. A, b, c and d Means with different superscripts on the same row are different at ($p<0.05$). R1= control (CFM + wheat straw), R2= (CFM+ wheat straw + Leuceana hay), R3= (CFM+ wheat straw + Leuceana hay), and R4 = (CFM+ wheat straw + Leuceana hay), CFM was used in R1, R2, R3 andR4 as 3 % of live body weight. ^{a,b,c} Means denoted within the same row with different superscripts are significantly differ at $P<0.05$.
* Significant ($P<0.05$), ** significant ($P<0.01$), *** significant ($P<0.001$)

Table 4. Least square Means ± standard errors of growth performance and feed conversion of rams fed different levels of Leuceana Leucocephala hay

Items	No.	R1	R2	R3	R4	± SE	Sig
IBW (kg)	28	21.43	20.43	20.14	20.40	1.000	NS
FBW (kg)	28	42.71	44.57	44.71	42.57	0.960	NS
TG (kg)	28	21.36^{c}	24.14^{ab}	24.57^{a}	22.63^{bc}	0.530	***
DG (g)	28	164.0^{c}	186.0^{ab}	189.0^{a}	174.0^{bc}	0.004	***
Feed consumption:							
Total (DMI) kg	28	164.66^{a}	149.10^{d}	152.0^{c}	155.0^{b}	0.000	***
TDN (kg)	28	95.59^{b}	90.96^{c}	99.88^{a}	75.56^{d}	0.000	***
DCP (kg)	28	12.68^{d}	13.12^{c}	14.56^{b}	15.59^{a}	0.000	***
Feed conversion:							
DM (kg)/kg gain	28	7.82^{a}	6.18^{c}	6.20^{c}	6.86^{b}	0.69	***
TDN (kg)/kg gain	28	4.54^{a}	3.77^{b}	4.07^{b}	3.33^{c}	0.38	***
DCP (kg)/kg gain	28	0.60^{b}	0.55^{c}	0.59^{b}	0.69^{a}	0.11	***

R1= control (CFM + wheat straw), R2= (CFM+ wheat straw + 20% Leuceana hay), R3= (CFM+ wheat straw +40%Leuceana hay), and R4 = (CFM+ wheat straw +60% Leuceana hay), CFM was used in R1,R2, R3 andR4 as 3 % of live body weight. ^{a,b,c} Means denoted within the same row with different superscripts are significantly differ at $P<0.05$.
* Significant ($P<0.05$), ** significant ($P<0.01$), *** significant ($P<0.001$)

Feed efficiency

Feed conversion as kg DM, TDN or DCP/kg gain were highly significant differences (P<0.001) among all treatments. The better conversion was recorded by animals fed rations containing L.LH (R2,R3 and R4) compared with those fed control ration (R1) except R4 in DCP conversion which recorded the worst conversion for DCP Table 4 . These results can explained with the best gain which due to best nutrient digestibility and nutritive values of L.LH treatments in rations Table 3and the lowest intake of rations containing L.LH. These results agree with those finding by Metnga and Shoo (1990); Dutta *et al*. (1999) and Orden *et al*. (2000).

Economical evaluation

The economical efficiency of different rations is shown in Table (5). The cost of total feed intake was higher for lambs fed (R1), than other treatments. The values were 291.63 (R2), 274.17 (R3) and 245.38 (R4) £€ compared with lambs fed (R1) 351.84 £€.The best revenue was for lambs fed rations containing L.LH. The selling prices was 614.25 (R3) and 603.5£€ (R2) compared with 565.75 and 534.00 £€ for those fed on R4 and R1. The experiment was terminated when lambs reached LBW of 40 - 45 Kg LBW. Ration containing L.LH showed better economic efficiency because of the better daily gain and feed conversion efficiency than lambs fed control ration CFM (Table 5).

Milk production and its composition

The results of milk yield, fat, protein, lactose, total solid, ash, solid not fat percentages and fat corrected milk are presented in Table (6). Highly significant differences (P < 0.001) were detected among different rations concerning milk yield, fat percent, total solid and fat corrected milk and protein percent at (P<0.05). The highest values were recorded for animals fed rations R_2, R_3 and R_4 respectively for all previous traits compared with those fed (R1),

These results can explained in view of chemical composition, digestibility coefficients and nutritive values Table 1 and 2. These results due to increased intake of DM, OM, CP and NDF digestibility by increasing L.LH in ration therefore enhanced nutrients status subsequently milk production and composition. These results agree with those reported by Dupe *et al*. (2010) and Clavero and Razza (2008) who showed that animals with access to the

Leuceana leucocephala protein bank produced higher milk production. According to Mtenga and Shoo (1990) Leuceana leucocephala supplementation increased protein intake and nutrients digestibility. This improved nutrient status should have allowed for enhanced milk production and composition. Orden *et al*. (2000) showed that the faster flow rate of both solid and liquid ingest from the rumen contributed to efficient milk. Clavero and Razza (2003) showed that goats fed on Leuceana leucocephala + pasture recorded better total milk yield, fat, protein percent, total solid and ash compared with those fed on pasture + concentrate feed mixture. No significant differences were detected among treatments in lactose percent, ash and solid not fat.

CONCLUSION

Based on this study, it could be concluded that Leuceana leucocephala hay could be used as protein source instead of CFM protein up to 60% if we consider only for economic efficiency while up to 40% only when give attention to body weight gain and milk production

Table 5. The average calculating of economical coast of growth performance and feed conversion for rams fed on different portions of Leuceana hay

Economical evaluation	R1	R2	R3	R4
Total feed intake Kg	164.66	149.10	152.00	155.00
Total gain kg	21.36	24.14	24.57	22.63
Total cost of feed intake LE (b)	351.84	291.63	274.17	245.38
Price of total gain (a)	534.00	603.50	614.25	565.75
Revenue (a-b)	182.16	311.87	340.02	320.37
Economical efficiency (y)	0.52	1.07	1.24	1.31

1 kg CFM cost 2.4 LE, 1 kg W St cost 1.00 LE, 1 kg LH cost 1.5 LE, Price of 1 kg gain 25 LE
R1= control (CFM + wheat straw), R2= (CFM+ wheat straw + Leuceana hay), R3= (CFM+ wheat straw + Leuceana hay), and R4 = (CFM+ wheat straw + Leuceana hay), CFM was used in R1, R2, R3 andR4 as 3 % of live body weight.

Table 6. Least square Means ± standard errors of milk for ewes fed on different levels of Leuceana Leucocephala hay

Parameters	No.	R1	R2	R3	R4	± SE	Sig
Milk yield	24	475.83^{c}	510.00^{a}	498.33^{ab}	475.00^{b}	8.64	***
Fat %	24	7.17^{c}	7.72^{a}	7.47^{ab}	7.37^{bc}	0.09	***
Protein %	24	5.53^{b}	5.82^{a}	5.75^{ab}	5.62^{ab}	0.09	*
Lactose %	24	4.14	4.20	4.29	4.41	0.10	NS
Total solid	24	17.74^{b}	18.70^{a}	18.45^{a}	18.35^{a}	0.18	**
Ash %	24	0.95	0.97	0.95	0.96	0.04	NS
Solid not fat	24	10.58	10.99	10.98	10.98	0.14	NS
Fat corrected milk	24	443.53^{c}	548.62^{a}	523.95^{ab}	493.98^{b}	11.14	***

R1= control (CFM + wheat straw), R2= (CFM+ wheat straw +20% Leuceana hay), R3= (CFM+ wheat straw +40% Leuceana hay), and R4 = (CFM+ wheat straw +60% Leuceana hay), CFM was used in R1,R2, R3 andR4 as 3 % of live body weight. ^{a,b,c} Means denoted within the same row with different superscripts are significantly differ at P<0.05.
* Significant (P<0.05), ** significant (P<0.01), *** significant (P<0.001)

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تأثير التغذية على دريس بعض الشجيرات العلفية كعلف غير تقليدى على نمو وإنتاج اللبن في الأغنام .

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أجريت هذه الدراسة بمزرعة كلية الزراعة -قسم الإنتاج الحيواني – جامعة جنوب الوادي
تهدف هذه الدراسة إلي تقييم إضافة دريس نبات الليوسيانا للمجترات وتأثيره علي أداء النمو و إنتاج اللبن ومكوناته كإحلال جزئي محل العلف المركز في علائق الأغنام. وقد أستخدم عدد 16 كبش تام النمو بوزن حي 40-45 كجم في تجربة الهضم موزعة عشوائيا في مربع لاتيني 4 x 4 . كما أستخدم في تجربة النمو 24 حولي صعيدي موزعة في أربع مجموعات عشوائية طبقا لوزن الجسم (الوزن الحي). كما أستخدم في التجربتين (الهضم والنمو) عدد أربعة علائق:- العليقة الأولي (عليقه المقارنة) = علف مركز + تبن قمح ، و العليقة الثانية = علف مركز + تبن قمح + 20 % دريس ليوسيانا، والعليقة الثالثة = علف مركز + تبن قمح+ 40% دريس ليوسيانا والعليقة الرابعة = علف مركز + تبن قمح+ 60% دريس ليوسيانا وقد استخدم العلف المركز بنسبة 3% من وزن الجسم الحي علف مركز 14% بروتين وتبن القمح بنسبة 1% من وزن الجسم الحي. وكانت العلائق المحتوية علي دريس الليوسيانا أعلي في معاملات هضم المادة الجافة، والبروتين الخام ، والألياف الخام ، والدهن الخام ، والكربوهيدرات الذائبة ، والمركبات التي تذوب في المحاليل المتعادلة ، والمركبات التي تذوب في المحاليل الحامضية والهيميسيليلوز مقارنة بعليقه المقارنة (الكنترول) فيما عدا معامل هضم المركبات التي تذوب في المحاليل المتعادلة والهيميسيليلوز في العليقة الرابعة. كانت الاختلافات معنوية بين العلائق المختبرة عند مستوي (0.001 ، 0.0001) في المركبات الغذائية الكلية المهضومة، والبروتين الخام المهضوم، والطاقة المهضومة ، والطاقة الميتابولزمية، فيما عدا العليقة الرابعة في مجموع المركبات الغذائية الكلية المهضومة . كان معدل الزيادة الوزنية الكلية واليومية ، والعلائق المستهلكة ، والكفاءة التحويلية لصالح العلائق المحتوية علي دريس الليوسيانا وكانت الاختلافات معنوية عند مستوي (0.01 ، 0.05) بين العلائق المختلفة .

كانت نتائج محصول اللبن و % للبروتين ، % الدهن ، والجوامد الكلية ، ودهن اللبن المعدل أعلي في العلائق المحتوية علي دريس الليوسيانا مقارنة بعليقه المقارنة (الكنترول) وكانت الاختلافات معنوية بين العلائق المختلفة عند مستوى (0.001، 0.01، 0.05). تخلص هذه الدراسة إلي أنه يمكن الاستنتاج بأن دريس الليوسيانا يمكن استخدامه كمصدر للبروتين بدلا من بروتين العلف المركز حتي 60% . وكانت نسبة 40% أفضل من حيث الكفاءة ألاقتصادية والزيادة الوزنية و إنتاج اللبن.