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EFFECT OF POLYETHYLENE GLYCOL AND/OR ENSILING TREATMENT ON THE DETANNIFICATION AND UTILIZATION OF *ACACIA SALGINA* AS A FEEDSTUFF FOR SHEEP.

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SUMMARY

Acacia saligna (*A. cyanophylla*) is a leguminous shrub naturally grown in the Egyptian desert, and it has an extremely important role in the urban eco-system because of its multipurpose usage. This study was designed to evaluate the nutritive value of *A. saligna* fodder cultivated in saline soils as a feedstuff for sheep fed fresh or in a silage form with or without polyethylene glycol (PEG) treatment.

The feeding trial was carried out with twenty growing male Barki sheep with initial live body weight of 21.85±1.50 kg. The animals were randomly divided into 4 groups (five animals each). Each animal was given 10 g barley per kg live body weight per day as an energy supplement, while, Acacia was given *ad libitum*. The daily portion in the experimental groups were as follows : (D1) control: barley and *ad libitum* fresh *Acacia saligna* (leaves & stems), (D2) barley and *ad libitum* fresh *Acacia saligna* plus polyethylene-glycol (PEG), (D3) barley and *ad libitum Acacia saligna* silage and (D4) barley and *ad libitum Acacia saligna* silage plus PEG.

The feeding trial was lasted for 90 days where animals were fed individually and fresh water was freely available. Apparent digestibility of and dietary nitrogen retention of experimental feeds were evaluated on four adult Barki sheep applying 4x4 latin square design experiment. Rumen fermentation kinetics as well as some rumen parameters monitored on three rumen-fistulated adult female sheep.

The results of apparent digestibility of nutrient, nutritive value, nitrogen retention, daily weight gain and dry matter intake of sheep fed diets D3 and D4 were significantly ($P<0.05$) higher than those fed D2 and D1. Ruminal ammonia-N, VFA concentration, rumen volume (?) and microbial protein synthesis were significantly ($P<0.05$) higher in animals fed Acacia silage with or without PEG than those fed fresh Acacia. The outflow rate of Acacia silage with or without PEG was significantly ($P<0.05$) lower than fresh Acacia. Animals fed Acacia silage either with or without PEG had more soluble and degradable fractions and less undegradable fractions of dry matter, organic matter and crude protein and had more effective degradability than those fed fresh Acacia leaves and stems.

Ensiling of green Acacia was proven economic and simple technique to enhance utilization of Acacia as a feedstuff for sheep, while PEG treatment could partially improve utilization of only fresh Acacia.

Keywords: *Acacia, fodder, shrubs, silage, sheep, intake, nutritive values, degradability, polyethylene-glycol*

INTRODUCTION

Trees and shrubs have long been considered important in the nutrition of grazing and browsing animals in the world, particularly where the quantity and quality of pastures are poor for long periods (Lefroy *et al.*, 1992). Foliage from trees and shrubs has the potential to provide both protein and energy supplements during the annual feed gap or during drought (Reed *et al.*, 1990). Several species of Acacia are recognized by graziers (?) for their feeding value during drought (Tanner *et al.*, 1990).

Acacia saligna is native naturally growing shrub in the North coast of Egypt. It has been widely acknowledged as a useful species for land conservation. More recently, several studies indicated that *Acasia saligna* is a potential source of green fodder for ruminants. This plant is less palatable or toxic to small ruminants and camels due to the presence of some plant secondary metabolites (so called anti-nutritional factors, ANF's) such as tannins, alkaloids, oxalates, saponins, etc. (El-Shaer *et al.*, 2005). These substances are natural metabolites produced and biosynthesized by plants and may be acutely or chronically toxic to animals causing major economic losses . to livestock producers (El-Shaer *et al.*, 2005).

Browsing of ruminants is restricted by its high content of tannins. The high level of tannins is negatively affect voluntary feed intake, digestibility and nitrogen retention of browse (Gilboa *et al.*, 2000). Condensed tannins (CT) can be categorized as a soluble, protein bound or fiber bound (Terrill *et al.*, 1992). Tannins bound to proteins or fiber in the leaves may cause their poor digestibility, while soluble tannins form complexes with dietary proteins following mastication (Vaithiyanathan and Kumar, 1993) as well as endogenous proteins including enzymes (Kumar and D'Mello, 1995).

Polyethylene glycol (PEG) is a polymer that binds tannins irreversibly over a wide range of pH, and reduces the formation of protein-tannin complex (Jones and Mangan, 1977).

The economic value of these species (?) to animal production will depend on when the nutrients are available (i.e. does foliage/seed/pod production match feed gap or drought) and the concentrations of essential nutrients and secondary compounds.

This study was conducted to improve utilization of *Acacia saligna* by different treatments (PEG or ensiling) as a feedstuff for sheep.

MATERIALS AND METHODS

This study was carried out at El-Nubaria Research Station of the Animal Production Research Institute, Egypt. Polyethylene glycol was used as a supplement of 20 g/kg dry matter (Howard et al., 2002). Barley grain was added 10 g/kg b.w.day^{-1} as an energy supplement during the experiment. The four experimental daily ration were (D1) control : barley and *ad libitum* fresh *Acacia saligna* (leaves & stems), (D2) barley and *ad libitum* fresh *Acacia saligna* plus PEG, (D3) barley and *ad libitum Acacia saligna* silage (fresh *Acacia saligna* plus 5 % molasses) and (D4) barley and *ad libitum* of *Acacia saligna* silage plus PEG. Fresh Acasia *saligna* was harvested daily and chopped fresh leaves and succulent stems were offered to animals *ad* *libitum* twice daily at 9.0 a.m and 4.0 p.m., while barley was given once daily at 10.0 a. m.

Twenty growing Barki male sheep with initial live body weight of 21.85±1.50 kg were used in this study. The experimental period lasted for 90 days. Animals were randomly divided into four groups (five animals each), where they were individually fed on experimental diets. Animals were weighed biweekly at before the morning meal. During the trial, amounts of feed offered and refusals for each animal were weighed daily and all animals had free access to fresh water. Four adult male Barki sheep (weighed 50.50 ± 2.00 kg) were ranked in a 4x4 latin squre design digestibility trials. Experimental animals were housed in four metabolic crates.

Sheep were kept on the experimental diets for a preliminary period of 21 days, followed by 7–days total feces and urine collection period. Sub samples (20%) of feces and urine were taken once daily and kept deep frozen (– 18 °C) until analyses.

Fecal samples were dried at 60 °C for 72 hrs. Feed and fecal samples were ground through 1 mm screen on a Wiley mill grinder and a sample of (50 g/treatment/sheep) was taken for analysis. The samples of feed and feces were analyzed for crude protein (CP), crude fiber (CF), Ether extract (EE) and ash, while the urine samples were analyzed to determine its nitrogen (N) content according to AOAC (1990). Values of the total digestible nutrients (TDN) were calculated according to the classical formula of Maynard *et al.* (1978) on a dry matter basis. Cell wall constituents were determined for neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) using Tecator Fibretic System according to Van Soest (1982). Hemicellulose and cellulose contents were calculated by the difference between NDF and ADF for hemicellulose and difference between ADF and ADL for cellulose.

Rumen fluid samples were taken at 0, 3 and 6 hrs after the morning meal from three rumen-fistulated adult female Osimi sheep (weighed 47.00 ± 2.0 kg) for each treatment. Collected rumen fluid was tested for pH using Orion 680 digital pH meter. Samples were strained through four layers of chesses cloth for each sampling time, while ammonia nitrogen (NH_3-N) was determined by using magnesium oxide (MgO) as described by the AOAC (1990). Total volatile fatty acid (VFA) concentration was estimated by using steam distillation methods (Warner, 1964). Rumen volume was determined by the colorimetric method using Cr-EDTA before and after, 3 and 6 hrs of feeding according to El-Shazly *et al.* (1976).

Ruminal degradation of dietary DM, OM and CP of the four different daily ration was determined using nylon bag technique using three fistulated sheep. Bags (6 cm X 12 cm and 53 µm pore size) containing 5 g of ground samples of each diet were incubated in the ventral part of the rumen and were removed after 3, 6, 12, 24, 48 and 72 h. After removal from the rumen bags they were washed in cold water with gentle squeezing until the water become clear. Zero time disappearance values were obtained by washing un-incubated bags in similar fashion (Ash, 1990). Bags were dried in oven at 60 °C for 48 hrs, and DM, OM and CP disappearance were recorded for each time

In situ degradation data for DM and CP were fitted to the equation of Ørskov and McDonald (1979): $P = a + b (1 - e^{-ct})$, where : P = degradation rate at time, a = intercept representing the portion of DM, OM or CP solubilized at initiation of incubation (time 0), b = portion of DM, OM or CP potentially degraded in the rumen, c = rate constant of degradation of fraction b, t = time of incubation.

The ruminally undegraded fraction M = 100 – (a+b), lag time (LT) was estimated according to McDonald (1981). The effective degradability (ED) for tested mixture were estimated from the equation of Ørskov and McDonald (1979) as follows: $ED = a + bc / (c + K)$, where: k = outflow rate assumed o be 0.05/h under the feeding condition in the current study.

Statistical analyses of the data were carried out according to Steel and Torrie 1981). Significance of the difference among values were calculated by using Duncan's Multiple Range Test (SAS, 999).

RESULTS AND DISCUSSION

hemical analysis and its composition

Chemical composition of the igredients are presented in Table 1. iowed that *Acacia* was similar in CP, E, NFE and cellulose contents with *cacia*+PEG, *Acacia* silage and *Acacia* lage+PEG, while *Acacia* was higher in M, CF, NDF, ADF and hemicellulose ontents than *Acacia* silage. onsequently, *Acacia* both in fresh and lage form with or without PEG ldition did not markedly change the P and NFE contents. Fresh *Acacia ıligna* contained 13.8 % total phenol ıd 10.3 % condensed tannin is likely to the value obtained by Degan *et al.* (1995) who estimated the total tannins as tannic acid equivalent (on DM basis) to be 11.3 % and condensed tannins as leucocyanidine equivalent to be 8.3 %.

Digestibility coefficients, nutritive values and nitrogen retention

Data in Table (2). pointed out that the dry matter intake were significantly ($P<0.05$) varied among the treatments. Therefore, the highest intake was recorded in D3 and D4 followed by D2 while animals fed D1 consumed the lowest amount of *Acacia* materials.

Results on apparent digestibility coefficients and nutritive value of the experimental diets are presented in Table (2). indicated that the digestion of all nutrients varied significantly among the four treatments. It appeared that the values of apparent digestibility of DM, CP, CF, EE and NFE for sheep fed D3 and D4 were higher than those values obtained by sheep fed D2 and D1. At the same time, all values of apparent digestibility coefficient in animals fed D2 were higher than those values obtained by sheep fed D1. This result might be due to that *Acacia* had relatively high tannin content (10.3 % DM). This result agrees with that obtained by Abou El-Nasr *et al.* (1996) who found that N digested poorly by sheep given *Acacia* hay could be attributed to condensed tannins (4-7 % DM). The supplementation of PEG to *Acacia* associated with enhanced digestible N, and N retention also increased (Decandia *et al.*, 2000). In the present study, the content of total phenols could provide as good prediction of the tannin effect.

Total digestible nutrients (TDN) and digestible crude protein (DCP) were significantly ($P<0.05$) higher for diets D3 and D4 than D2 and D1. Feeding

Table (1). Chemical composition and fiber fractions of experimental feeds (% on DM basis)

Item	BG*	Acacia	Acacia+PEG	Acacia silage	Acacia silage+PEG
DM	89.58	34.76	34.09	37.04	36.53
OM	94.79	89.83	88.78	86.36	86.06
CP	11.43	14.76	14.32	14.19	13.93
CF	8.11	25.45	24.63	21.82	21.74
EE	2.53	2.16	1.96	1.85	1.83
NFE	72.72	47.46	47.87	48.50	48.56
Ash	5.21	10.17	11.22	13.64	13.94
NDF	29.48	52.75	51.33	47.42	46.39
ADF	16.82	35.53	33.84	32.18	32.02
ADL	2.41	13.97	11.91	11.43	11.26
Hemicellulose	12.66	17.22	17.49	15.24	14.37
Cellulose	14.41	21.56	21.93	20.75	20.76
Total phenol	2.1	13.8	3.5	-	-
Condensed tannin	0.4	10.3	1.2	-	-

* BG = barley grain

Table (2). Feed intake, digestion coefficients, nutritive values and nitrogen utilization of experimental diets (mean±SE).

Item	D1	D2	D3	D4
DM intake (g/head/d)				
Acacia saligna	307.96±12.52^{c}	532.86±21.85^{b}	715.71±14.23^{a}	714.45±21.23^{a}
Total DMI, g	487.13±12.52^{c}	712.01±21.85^{b}	894.87±14.23^{a}	893.61±21.23^{a}
Apparent digestibility coefficients (%)				
DM	45.17±0.47^{c}	52.79±0.88^{b}	63.25±0.34^{a}	62.65±0.32^{a}
OM	48.10±0.53^{c}	54.73±0.35^{b}	64.09±0.72^{a}	63.30±0.57^{a}
CP	41.17±0.85^{c}	44.54±0.45^{b}	55.75±0.16^{a}	54.76±0.31^{a}
CF	38.05±0.99^{c}	50.50±0.84^{b}	61.35±0.24^{a}	62.20±0.42^{a}
EE	73.47±1.33^{c}	76.85±0.85^{b}	80.55±0.52^{a}	79.78±0.79^{a}
NFE	52.08±0.31^{c}	58.02±0.35^{b}	66.58±0.49^{a}	65.31±0.13^{a}
Nutritive values (%)				
TDN	46.53±0.27^{c}	51.70±0.62^{b}	58.66±0.29^{a}	57.73±0.33^{a}
DCP	5.57±0.22^{c}	6.06±0.19^{b}	7.61±0.15^{a}	7.35±0.26^{a}
Nitrogen retention (g/head/d)				
N-Intake	10.48±0.23^{c}	15.41±0.18^{b}	19.45±0.29^{a}	19.13±0.16^{a}
N-Absorbed (NA)	4.31±0.58^{c}	6.87±0.14^{b}	10.84±0.22^{a}	10.47±0.08^{a}
N-Retention (NR)	0.96±0.12^{c}	3.47±0.11^{b}	5.73±0.18^{a}	5.73±-.36^{a}
NR % of NI	9.16±0.12^{c}	22.53±0.24^{b}	29.44±0.49^{a}	29.79±0.26^{a}
NR % of NA	22.25±1.35^{c}	50.59±1.83^{b}	52.81±1.77^{a}	54.74±1.46^{a}

^{abc} Means within rows with different superscripts are significantly different (P<0.05).

Acacia silage with or without PEG supplementation improved the utilization of nutrients as compared to feeding fresh *Acacia* alone. While, fresh *Acacia* with PEG addition improved the utilization of nutrients as compared to feeding fresh *Acacia* alone also but it was less than *Acacia* silage with or without PEG supplementation. These results confirmed by the finding of Schmidt-Witty *et al.* (1994) who reported that saliva of camels entails a varying content of mucin glycoproteins which bound the surplus of tannins which impairs the digestion in the fore stomach when camels fed on plants in arid zones which mostly have higher content of tannins.

Data of nitrogen retention is presented in Table (2). Total nitrogen intake (NI), absorbed nitrogen (NA) and nitrogen retention (NR) in the case of feeding *Acacia* silage with or without PEG were higher ($P<0.05$) than that of the other two diets (D1 and D2). Animals in all diets exhibited positive nitrogen balance, while animals given *Acacia* silage with or without PEG were greater ($P<0.05$) positive nitrogen balance than animals given fresh *Acacia* with or without PEG. Animals given *Acacia* with PEG seem to retain slightly higher amount of N than those animals which were fed with *Acacia* without PEG supplementation (Table 2). Similar trends were obtained by Decandia *et al.* (2000) who found that diet with PEG increased the amount of digestible N and tended to increase N retention.

Rumen fluid parameters

Concentration of ruminal metabolites (ammonia-N and volatile fatty acids) were significantly ($P<0.05$) varied among the four experimental diets (Table 3). Animals fed *Acacia* silage with or without PEG (D3 and D4) showed the highest ammonia-N and VFA concentrations. While, animals fed fresh *Acacia* without PEG supplementation showed the lowest ammonia-N and VFA concentrations. Rumen volume and microbial protein synthesis for D3 and D4 groups were significantly ($P<0.05$) higher as compared to D2 and D1 groups. Animals fed *Acacia* silage with or without PEG (groups D3 and D4) showed the lowest outflow rate. While, those fed fresh *Acacia* without PEG had highest rate of outflow. Digestion in the rumen is coupled with microbial N synthesis. As expected, supplementation with forage legumes increased urinary purine derivatives, microbial N synthesis and the efficiency of microbial N synthesis. The rapid fermenting forage legumes may promote greater microbial N synthesis than their slow fermenting counterparts. The co-existence of increased ruminal microbial N synthesis in the face of a pH-dependent decreased in the digestion of fiber constituents is suggestive of a change in the composition of ruminal microbial population. It has been suggested that methanogenes live in an endosymbiotic relationship with ciliate protozoa (Nsahlai et al., 1998).

Estimates of ruminal degradation constants (a, b and c) fitted with rates of DM, OM and CP disappearance for *Acacia* fresh or silages (with or without PEG) are presented on Table (4). Predicted constants were less in fresh *Acacia* and fresh *Acacia* plus PEG as was compared to the *Acacia* silage and *Acacia* silage plus PEG for DM, OM and CP degradability. However, *Acacia* silage with or without PEG had more soluble, degradable fractions (a and b) and it has less undegradable fraction(s), and had more effective degradability

Table (3). Rumen fluid parameters of sheep fed the experimental diets (mean±SE).

Item	D1	D2	D3	D4
PH	6.54±0.08	6.57±0.02	6.47±0.11	6.45±0.05
NH_3-N (mg/100 ml)	14.31±0.26 [c]	15.75±0.17 [b]	16.98±0.29 [a]	17.32±0.23 [a]
Total VFA ml equv/100 ml)	6.87±0.21 [c]	7.68±0.14 [b]	9.11±0.19 [a]	8.98±0.11 [a]
Rumen volume (L)	3.04±0.05 [c]	3.36±0.12 [b]	3.98±0.09 [a]	4.01±0.07 [a]
Outflow rate(% hr)	6.36±0.06 [a]	6.04±0.03 [b]	5.43±0.1 [c]	5.38±0.09 [c]
Microbial protein synthesis (g/head/d)	4.57±0.12 [c]	7.72±0.17 [b]	13.83±0.41 [a]	14.11±0.62 [a]

[abc] Means within rows with different superscripts are significantly different (P<0.05).

Table (4). Degradation kinetics of DM, OM and CP for fresh *Acacia saligna* and Acacia silage (mean±SE).

Item	Acacia	Acacia+PEG	Acacia silage	Acacia silage+PEG
		DM		
a, %	8.11±0.37 [b]	11.38±0.59 [a]	8.03±0.71 [b]	8.72±0.57 [b]
b, %	37.14±0.59 [c]	42.41±0.51 [b]	58.58±0.49 [a]	57.41±0.52 [a]
a+b, %	45.25±0.79 [c]	53.79±0.58 [b]	66.60±0.23 [a]	66.13±0.19 [a]
c, %	0.045±0.002 [b]	0.046±0.002 [b]	0.061±0.002 [a]	0.061±0.002 [a]
U	49.75±0.78 [a]	41.21±0.58 [b]	28.40±0.23 [c]	28.87±0.19 [c]
EDDM 3, %	24.85±0.27 [c]	31.95±0.32 [b]	38.07±0.30 [a]	38.14±0.47 [a]
		OM		
a, %	8.48±0.44 [b]	10.91±0.20 [a]	6.12±0.16 [c]	7.79±0.40 [b]
b, %	32.89±0.02 [c]	40.44±0.53 [b]	54.25±0.34 [a]	53.55±0.26 [a]
a+b, %	41.37±0.45 [c]	51.35±0.66 [b]	60.37±0.30 [a]	61.34±0.20 [a]
c, %	0.046±0.001 [b]	0.042±0.002 [c]	0.064±0.002 [a]	0.062±0.002 [a]
U	53.63±0.45 [a]	43.65±0.66 [b]	34.63±0.30 [c]	33.66±0.20 [c]
EDDM 3, %	24.17±0.44 [c]	29.12±0.28 [b]	34.11±0.35 [a]	35.51±0.35 [a]
		CP		
a, %	1.29±0.19 [c]	2.66±0.32 [b]	4.82±0.19 [a]	5.47±0.38 [a]
b, %	22.92±0.42 [c]	25.82±0.18 [b]	29.40±0.33 [a]	28.79±0.52 [a]
a+b, %	24.21±0.54 [c]	28.48±0.39 [b]	34.22±0.39 [a]	34.26±0.30 [a]
c, %	0.029±0.002 [c]	0.045±0.002 [b]	0.048±0.002 [a]	0.050±0.001 [a]
U	70.80±0.54 [a]	66.53±0.39 [b]	60.79±0.39 [c]	60.74±0.30 [c]
EDDM 3, %	8.29±0.16 [c]	14.06±0.23 [b]	18.76±0.17 [a]	19.94±0.12 [a]

[abc] Means within column with different superscripts are significantly different (P<0.05).

a = soluble degradable fraction   b = degradable fraction

c = rate of degradability   U = ruminely undegradable fraction {100-(a+b)}

ED = effective degradability.

(ED) than fresh *Acacia* with or without PEG. These results were reflected to the effect of treatment on cell wall degradation. The change in the rate of degradation in the present study was significantly associated with the tannin effect, suggesting that the contribution of tannins to decrease in effective degradation was more a result of a delay in digestibility than reduction of the potentially degraded fractions. *In vitro* DM disappearance (IVDMD) for tree leaves has been found to decline parallel with the increase of tannin content (Kumar and Vaithiyanathan, 1990). Chiquette *et al.* (1988) showed by scanning and transmission electron microscopy that rumen bacteria formed multiple adherent microcolonies on high-tannin content leaf and stem surfaces of the plant, but these colonies did not penetrate into the plant tissues as effectively as did bacteria associated with low-tannin strains. These bacterial responses to high tannin content contributed to the reduction of DM disappearance and tannins might also inactivate the rumen microbial enzymes (Kumar and Singh, 1984). Horigome *et al.* (1988).reported marked inhibitory effect of tree leaf tannins on microbial enzyme activities. Rate of enzyme inhibition increased with the the higher degree of polymerization and they demonstrated that both the hydrolysable and condensed tannins had a negative influence on IVDMD, but the latter influence was more pronounced.

Feed intake and growth performance

Voluntary feed intake, growth performance and feed conversion rate of growing male sheep fed on the experimental diets are presented in Table (5). Results indicated that the highest total feed intake was found in the case of animals in D4 and D3 groups followed by those in D2; while the lowest total feed intake was found in D1. These were consequently, and significantly affected the live weight of growing sheep ($P<0.05$). Animals fed *Acacia* silage with or without PEG (groups D3 and D4) showed the highest total and average daily weight gain (150.41 and 153.60 g/day, respectively). While, animals fed fresh *Acacia* without PEG had lowest total weight gain. Therefore, the dry matter intake was not the limiting factor for weight gain, but the digestion and utilization of nutrients might be responsible for such body weight changes. Low performance of animals fed low-tannin forages has been explained as partly due to increased use of energy for the synthesis of urea in the liver for eventual excretion through urine (Nsahlai *et al.*, 1998). On the other hand, varied poor performance with high tannin species, among other factors, may be due to the deficiency of other nutrients (such as glutathione, glucose, cysteine) that conjugate the phenolic compounds in the process of detoxification in the liver (Cheeke and Palo, 1995). The most prominent effect of tannins on feed intake and digestibility is due to the production of tannin-protein complexes (Ben Salem *et al.*, 2000). In this study, preventing the formation of protein-tannin complexes by ensilaging or by adding PEG improved the performance of sheep, suggesting that the formation of protein-tannin complex has more negative than positive effects for sheep feeding on *Acacia*. In stall-fed goats fed with tannin-rich browse, the best supplement to increase feed intake and digestibility was a combination of protein-rich concentrate and PEG (Silanikove *et al.*, 1997). Such combination not only increase the availability of proteins from browse but also decreases the binding of dietary protein supplied in concentrates by tannins originating from browse

Table (5). Voluntary feed intake, growth performance and feed conversion of growing male sheep fed on the experimental diets (mean±SE).

Item	D1	D2	D3	D4
Initial body weight, kg	22.15±1.45	21.85±1.12	21.65±1.31	21.75±1.05
Final body weight, kg	25.53±0.87[c]	30.18±0.59[b]	35.15±0.62[a]	35.48±0.74[a]
Average daily gain, g/d	37.61±0.43[c]	92.63±0.25[b]	150.41±0.43[a]	153.60±0.76[a]
Average daily feed intake, g/d	537.53±4.59[c]	860.0±3.88[b]	1080.0±3.54[a]	1170.0±4.21[a]
Feed conversion	14.31±0.23[a]	9.28±0.19[b]	7.18±0.11[c]	7.62±0.07[c]
Daily feed cost (LE)	0.295	0.415	0.442	0.565
Feed cost/ kg daily weight gain	7.84	4.48	2.94	3.68

[abc] Means within rows with different superscripts are significantly different ($P<0.05$)

(Silanikove *et al.*, 1997). From the economic point of view, it can be declare that the cheapest two diets for producing 1 kg weight gain were D3 and D4 (2.94 and 3.68 LE, respectively). So, feeding fresh *Acacia* alone could not cover the nutrient requirements of the weight gain even if it supplemented with barley grain (200 g/d). In the meantime, it was clear that the differences in daily weight gain and feed cost for producing 1 kg gain between the silage form of *Acacia* with or without PEG treatment was the highest. So, it could be concluded from this study, that the optimal feed for sheep is the *Acacia* in silage form, but in that case the additional PEG had no additive value.

CONCLUSIONS

Acacia saligna shrubs showed a great potential as a fodder for growing sheep under arid and saline conditions of the Egyptian desert. There is a possibility for improving the intake and nutritive value of *Acacia* plant by ensiling process as compared to the fresh one, particularly together with PEG supplementation which enhanced palatability, consumption and utilization of the shrub and consequently improved animal performance.

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تأثير إضافة البولى إيثيلين جليكول أو السيلجة على تكسير التانينات لنبات الأكاسيا لإستخدامه كمادة علف للأغنام

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تهدف هذه الدراسة تأثير أستخدام نبات الأكاسيا الطازج أو مضاف اليه PEG او استخدامه في صورة سيلاج فقط او مضاف اليه PEG على الأغنام على المأكول ومعاملات الهضم والقيمة الغذائية ومدى أختفاء المادة الجافة والبروتين .

تم إجراء تجارب الهضم والقيمة الغذائية على الكباش تامة النضج بإستخدام صناديق الهضم . أما بالنسبة لتجارب *In situ* فقد تم تغذية ٣ نعاج مزودة بفسيولات للكرش على العلائق المختبرة .

١. عليقة الأولى (بمعدل ١٠ حرام شعير / كجم وزن حى)+ نبات الأكاسيا الطازج (كنترول)
٢. عليقة الثانية (بمعدل ١٠ حرام شعير / كجم وزن حى)+ نبات الأكاسيا الطازج مضاف اليه PEG
٣. عليقة الثالثة (بمعدل ١٠ حرام شعير / كجم وزن حى)+ سيلاج نبات الأكاسيا
٤. عليقة الرابعة (بمعدل ١٠ حرام شعير / كجم وزن حى)+ سيلاج نبات الأكاسيا مضاف اليه PEG

وكانت النتائج كالتالى : -

١ - زيادة معنوية ($P<0.05$) فى معاملات الهضم والقيمة الغذائية للعليقة الثالثة والرابعة .
٢ - زيادة معنوية($P<0.05$) فى الأحماض الدهنية الطيارة وحجم الكرش وانتاج البروتين المكروبى فى مجموعتى السيلاج سواء المعامل او الغير معامل بPEG.
٣ - زيادة معنوية ($P<0.05$) فى اختفاء المادة الجافة والعضوية والبروتين فى المعاملات بالسيلاج .
٤ - زيادة معنوية ($P<0.05$) فى الزيادة اليومية لغلانق السيلاج المضاف اليه PEG أو الغير مضاف.

مما سبق يتضح ان تغذية الأغنام على الأكاسيا المصنعة فى صورة سيلاج تحسن كمية الماكول من المادة الجافة بالأضافة تحسن الأستفادة من العليقة وكذلك قياسات التخمر فى الكرش ولم يتضح أن هناك دور واضح لأضافة PEG لسيلاج الأكاسيا ولكن كان له تأثير واضح غند إضافته الى المادة الخضراء.