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IMPACT OF FEEDING SOME FODDER TREES AND TREATED CROP RESIDUES ON BARKI LAMBS PERFORMANCE UNDER SEMI-ARID AREA OF EGYPT

M. M. Eissa, W. M. A. Sadek, A. R. Khattab, A. EL-Wakeel. EL. and A. M. Saber

Animal Production Research Institute, ARC, Dokki, Giza, Egypt

SUMMARY

Thirty Barki lambs with average body weight of 9.77 ± 0.50kg, 3 months age were divided randomly by weight into three equal groups, to study the effect of supplementary values of tree fodder (Cassava or Prosopis) with ammoniated wheat straw on growth performance, blood metabolic, feed efficiency and economic efficiency of growing Barki lambs. The crude protein (CP) requirements of growing sheep (NRC, 1985) were covered from concentrate feed mixture (CFM) 40%. The other 60% of CP was covered from: berseem hay in the first group (G_1), 50% Prosopis +50% a treated wheat straw in second group (G_2), 50% Cassava +50% a treated wheat straw in third group (G_3). The feeding trails lasted for 16 weeks. The obtained results showed that the crud protein (CP) content were noticeably higher with G3 (15.56%) than those of G1 (14.61%) or G2 (14.10%). the content of DM, OM and NFE were higher (93.55, 88.53 and 51.97%) in berseem hay ration compared with the other experimental rations. Moreover, the lowest value of CF (42.21%) was recorded with berseem hay ration and the highest value (48.12%) was detected with G3. On the other hand, the content of Hemi-cellulose was more in G3 compared with other groups G2 and G1 (19.10 vs.8.70 and 6.10% of DM, respectively). Cellulose was higher (23.5% of DM) with G2 than the other G1 and G3 (16.00 and 9.5% of DM, respectively). The differences in EE, NDF and ADL were of fewer values. The methane production with second combination Cassava: treated wheat straw was more than first combination Prosopis: treated wheat straw (12 vs.10ml/200 mg DM, respectively). Whereas, fist combination was contained more condensed tannins (CT), compared with second combination (23 vs. 20 g/kg DM, respectively). The highest value of final body weight (FBW) and total body gain (TBG) were recorded with G3 (31.33 and 21.41 kg, respectively) then G1 (30.74 and 20.90 kg, respectively) but, lowest values were detected with G2 (27.94 and 18.18 kg, respectively) and the differences were significant. Similarly, in daily body gain (DBG) this improvement could be attributed to increase in dry matter intake (DMI, g/h/d) in G1 and G3 compared with G2 (942 and 804 vs. 738, respectively). Most tested blood parameters were significantly affected by dietary treatments. The economic efficiency (EE) was better with G3 then G2, compared with G1. Accordingly, feeding Cassava or Prosopis (leaves & twigs) with ammoniated wheat straw at 60% (instead of berseem hay) + 40% concentrate feed mixture level has better impact on growing Barki lambs either for growth rate or feed conversion efficiency and economic values.

Keywords*: *Barki sheep, legume trees, growth performance, economic efficiency.

INTRODUCTION

Feed shortage will be increased in the next decades due to the expected global climate changes which will lead to increase desertification in many arid and semi-arid areas of the world that leads to; accelerate soil erosion by wind and water; increasing salinity in water wells and soil with rain drop. These phenomena will lead to despair the natural range plant cover. Halophytes are widely distributed in high density in these areas under harsh conditions. This refers to their high resistance to salinity in water and/ or soil especially during dry periods preventing soil erosion. So, feeding halophytes is a feasible solution to minimize the expected problems of feed shortage in such areas. The suitable halophytic forage species that show better adaptability and chances of establishment are *Prosopis juliflora* and *Cassava*. *Prosopis juliflora* is one of the rangeland trees that can grow in a wide range of soil and climatic conditions. It is a genus of trees and shrubs in the legume family (*Leguminosae*, subfamily *Mimosoideae*), native to arid and semi-arid regions of the Americas, it is a valuable multipurpose resource that provides timber, firewood, livestock feed, human food, shade, shelter and soil improvement (Pasiecznik *et al.*, 2001). Cassava (*Manihot esculenta Crantz*) is a perennial woody shrub of the family *Euphorbiaceae*. It originated in South America and is extensively cultivated as an annual crop in the tropics and sub-tropics for the dual purposes of tuberous roots as a source of energy for humans and animals and foliage as a feed for animals. *Cassava* foliage is recognized as a source of undegraded protein with a high content of digestible nutrients for both non-ruminants and ruminants (Wanapat, 2001). The foliage can be used as a supplement for animals in either fresh or wilted form or as hay (Phengvichith & Ledin, 2007 and Wanapat *et al.*, 1997). The use of fodder trees and shrubs to solve the attendant problems of low productivity in small ruminant production has received research attention in recent times (El Shaer, 2010). However, such trees and shrubs foliage are generally rich in ant-nutritional factors, particularly tannins (Makkar, 2003). Feeding a mixture of these fodder shrubs could minimize and overcome the problems of palatability and toxic effects (Lowry, 1990, Yusran and Teleni, 2000, Anbarasu *et al.,* 2001, Patra *et al.*, 2002 and El Shaer, 2010).

Thus, this study aimed at evaluating the possible effects of feeding a mixture of *Prosopis juliflora* or *Cassava* shrubs with ammoniated wheat straw on growing performance and economic return of Barki lambs in semi-arid areas of Egypt.

MATERIAL AND METHODS

This study was conducted at Animal Production Research Station, Borg El Arab, belonging to Animal Production Research Institute, Agricultural Research Center, Egypt.

Thirty Barki lambs, selected from Borg El Arab Station Herd, with an average age of 3 months and 9.77±0.50 kg body weight were used. The animals were divided randomly according to body weight into three similar groups, 10 lambs each. The animals were weighed at the beginning then biweekly. Animals were fed for two weeks as a transitional period on the tested experimental rations before the start of the experimental work. Feeding the experimental rations lasted for 16 weeks. The crude protein (CP) requirements of growing sheep (NRC, 1985) were covered from concentrate feed mixture (CFM) 40%. The other 60% of CP was covered from: berseem hay in the first group (G_1), 50% *Prosopis* +50% treated wheat straw in second group (G_2), and 50% Cassava 50% treated wheat straw in third group (G_3).

The animals were fed in groups. The berseem hay and treated wheat straw (by injecting ammonia) were cultivated in Borg El Arab Experimental Station, while *Prosopis* and *Cassava* (leaves & twigs) were harvested along the sub-roads from Alexandria governorate during June and July in the summer to dry in shadow. The CFM consisted of 25% undecortecated cotton meal, 43% yellow corn, 25% wheat bran, 3.5% molasses, 2% limestone, 1% common salt and 0.5% minerals mixtures. The rations were offered in two equal meals at 8 a.m. and at 3.0 p.m. Water was available at all times.

The chemical composition of the tested ingredients consumed by Barki lambs is shown in Table (1). Acid detergent fibre (ADF) and neutral detergent fiber (NDF) were analyzed by the Van Soest method (Van Soest, 1965). Anti-nutrients determination: Tannin content was determined using the method described by Makkar (2003). Phytin was extracted and precipitated according to the method of Reed (1995). Quinones and glycosides content were determined using the procedure of Reed *et al.* (2000). Alkaloid was obtained by Harbone (1973) method while saponin was assayed by the test described by Wilson (1992).

Table 1.Chemical composition and cell wall constituents (% on DM basis) of feed ingredients

Item	DM	Chemical composition						Fiber Fraction		
		OM	CP	CF	EE	NFE	Ash	NDF	ADF	ADL
Berseem hay	95.12	89.59	10.64	38.54	1.03	39.38	10.41	55.89	43.27	37.16
Prosopis Juliflora	70.39	93.30	17.52	30.70	2.72	42.36	6.70	57.41	42.69	39.23
Cassava	44.39	88.26	22.94	28.05	2.92	34.35	11.74	35.49	26.29	19.47
A treated Wheat Straw	98.00	89.00	9.86	48.23	3.90	27.07	11.00	35.42	30.22	27.33
CFM*	91.20	93.90	15.70	14.23	3.13	60.84	6.10	43.00	17.30	5.80

* Concentrate feed mixture (CFM) consists of 25% undecortecated cotton meal, 43% yellow corn, 25% wheat bran, 3.5% molasses, 2% limestone, 1% common salt and 0.5% minerals mixtures.

Collected samples of (*Prosopes Juliflora*, and *Cassava*) were pooled and then dried in shadow, then sieved to pass through 1mm sieve and stored in airtight polythene bags for further analysis. Similarly, samples of wheat straw were treated by injecting ammonia in the Borg El Arab Livestock Research Station. Samples of feeds were analyzed according to A.O.A.C (1995).

According to previous chemical analysis of two fodders leaves & twigs viz (*Prosopes Juliflora* and *Cacava*) and treated wheat straw were then mixed in different combinations in different proportions and subjected to *in vitro* dry matter degradability as described by A.O.A.C (1995). This analysis was done to list the optimum tree fodder- crop residue combinations that gave the highest degradability. At the end of this analysis, based on the statistical analysis, a total of two promising combinations to determine methane concentration the gas was analyzed with a portable GASMET DX4030 gear using the CO_2 Technique, which measure the CO_2 content and then calculate the ration CH_4/CO_2 (Patra *et al*., 2006).

Blood samples were collected from the jugular vein once before feeding (3 animals in each) at the end of experimental period and centrifuged at 4000 rpm for 20 min. Part of the separated serum was directed to enzyme activity determination, while the other part was stored frozen at -20°C till the biochemical analysis. Commercial kits were used for colorimetric biochemical determination.

Economic efficiency was calculated, as total output/ total input according to the local prices (where one ton BH = 1600 L.E.; CFM = 2800 L.E.; *Cassava* = 500 L.E.; *Prosopis Juliflora* = 500 L.E.; Treated wheat straw = 710 L.E.; Kg live body weight of lambs = 50 L.E.

Data were statistically analyzed using One-Way Layout with Means Comparisons Procedure SAS (2003).

RESULTS AND DISCUSSION

Chemical composition:

The chemical composition of the experimental rations is presented in Table (2). It could be observed that CP content were noticeably higher with G3 (15.56%) than those of G1 (14.61%) or G2 (14.10%). the content of DM, OM and NFE were higher (93.55, 88.53 and 51.97%) in berseem hay ration compared with the other experimental rations. Moreover, the lowest value (42.21) of CF was recorded with berseem hay and the highest value (48.12) was detected with G3. On the other hand, the content of Hemi-cellulose **was** more in G3, compared with other groups G2 and G1 (19.10 *vs.*8.70 and 6.10% of DM, respectively). Cellulose was higher (23.5%) with G2 than the other G1 and G3 (16.00 and 9.5%, respectively). The differences in EE, NDF and ADL were of fewer values. Nearly similar results were reported by Ben Salem *et al.* (2005), Fulkerson *et al.* (2008) and Afaf *et al.* (2010) on berssem hay. Shaker *et al.* (2014) on some salt tolerant fodder shrubs mixture. The variation among data in the literature could be due to the age of the leaves at harvest, the soil type and fertility as well as the agro-ecological system under which the trees were grown. According to Maasdorp *et al.* (1999), the plant species or variety, soil, climate, grazing, plant fraction and stage of maturity at sampling affect the nutritive value of forages. The non-fiber carbohydrates (NFC) were ranged from 28.81 to 38.61% in the presented experimental rations. Wheeler, (2003) reported that, the NFC levels in the total ration dry matter should not fall bellow 20 to 25% nor go above 40 to 45%. Rations formulated for 35 to 37% NFC should avoid metabolic disturbances. The levels of ANF's (anti-nutritional factors) are varied from plant to plant and from season to season (El-Shaer *et al.,* 2005). The condensed tannins (CTs) concentration ranged from 23 to 30 g/kg DM as shown in Table (4). Until a few years ago, CTs were regarded as useless compounds with only negative effects on intake, digestion, production and reproduction in animals. Recent studies had confirmed that CTs may also had positive effects in ruminants (Barry and McNabb, 1999 and Barry *et al.,* 2001). The ideal CTs concentration for ruminant nutrition has been suggested to be in the range 20 to 40 g/kg DM, increase the absorption of essential amino acids from small intestine and increased wool growth, milk secretion and reproductive rate without affecting voluntary feed intake, thus improving the efficiency of food conversion (Kumar, 2003).

Table 2. Chemical composition, cell wall constituents and phenols compounds of experimental ratios

Item	Groups		
	G1	**G2**	**G3**
DM	93.55	87.00	80.28
Chemical composition:			
OM	88.53	82.98	85.93
CP	14.61	14.10	15.56
CF	42.21	44.26	48.12
EE	3.21	3.54	3.58
NFE	25.50	21.08	18.67
Ash	11.47	17.02	14.07
Fiber fraction % of DM:			
NDF	32.10	38.70	38.10
ADF	26.00	30.00	19.00
Hemi-cellulose*	6.10	8.70	19.10
Cellulose **	16.00	23.50	9.50
ADL	10.00	6.50	9.50
NFC***	38.61	26.54	28.69
NFC/NDF	1.20	0.69	0.75
Phenols compounds g/kg DM:			
TP	16.70	40.27	39.90
TT	2.80	15.60	16.40
CT	0.20	23.00	20.00

* Hemi-cellulose = NDF-ADF
**Cellulose = ADF-ADL
***Non fiberous carbohydrates%= OM% - (CP%+NDF%+EE%), Calsamiglia et al., 1995.

Methane production:

Data of methane production are presented in Figure (1). The results indicated that the methane production with second combination *Cassava*: treated wheat straw more than first combination *Prosopis*: treated wheat straw (12 *vs.*10ml/200 mg DM, respectively). Whereas, fist combination was contained more condensed tannins (CT) compared with second combination (23 *vs.* 20 g/kg DM, respectively). Through feeding of tanniferous browse plants, it has been found to decrease methane production, which is beneficial for sparing of energy loss as methane (Babayemi *et al.*, 2004 and Abdu *et al.*, 2012) as an integrated part of carbohydrate metabolism (Demeyer and Van Nevel 1975). In this respect, Waghorn *et al.* (2002) showed that many types of forages known to contain condensed tannins had been shown to decrease methane production both *in vivo* and *in vitro*. So, it is beneficial for sparing of energy loss as methane. There was also a 16% reduction in methane production in lambs fed on Lolium pedunculatus, which is due to the presence of condensed tannins.

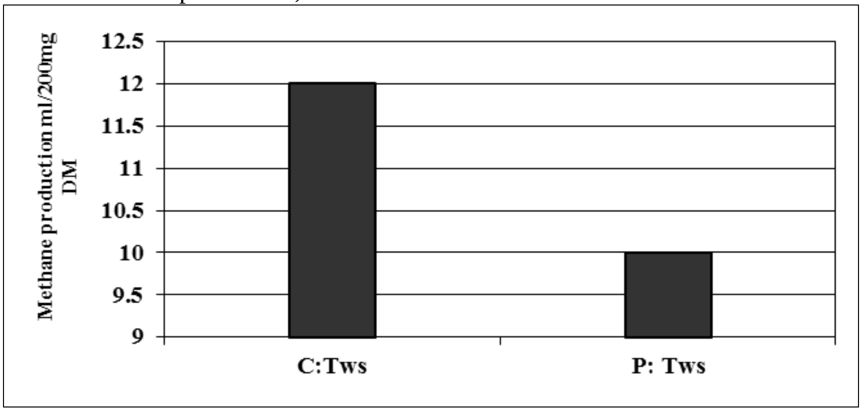

Fig. 1. Methane production from the experimental rations

Performance of growing Barki lambs:

As for growth performance, the obtained data in (Table 3 and Figure 2) indicated that the highest value of final body weight (FBW) and total body gain (TBG) was recorded with G3 (31.33 and 21.41 kg, respectively) then G1 (30.74 and 20.90 kg, respectively) but, lowest values were detected with G2 (27.94 and 18.18 kg, respectively) and the differences were significant. Similarly, in daily body gain (DBG). This improvement could be attributed to increase in dry matter intake (DMI, g/h/d) in G1 and G3 compared with G2 (942 and 804 *vs.* 738, respectively). Similar results had been obtained by Aganga and Tshwenyane (2003) on Tswana goats fed forage tree legumes as supplements. They found that average daily gain slightly higher with significant increase in feed intake, conversion ratio. Low CT levels in several plant species, e.g. *Acacia albida* pods (Nsahlai *et al.*, 1999), *Lotus pedunculatus* (Barry *et al.*, 1986) and *Acacia cyanophylla Lindl*. (syn. *Acacia saligna*) foliage (Ben Salem *et al.*, 2003) increased daily gain in sheep given protein-rich diets. This effect was ascribed to increased levels of post-ruminally available proteins.

Table 3. Growth performance of Barki lambs fed the experimental rations

Item	Groups		
	G1	G2	G3
No. of lambs	10	10	10
Feeding period, weeks	16	16	16
Initial weight, (kg)	9.84±0.27	9.76±0.32	9.92±0.35
Final weight, (kg)	30.74±0.28[a]	27.94±0.65[b]	31.33±0.18[a]
Total gain, (kg)	20.90±0.08[a]	18.18±0.38[b]	21.41±0.40[a]
Daily body gain, (g)	174±0.64[a]	152±3.14[b]	178±3.36[a]
Daily feed intake:			
Berseem hay	567	-	-
Prosopis Juliflora	-	224	-
Cassava	-	-	242
A treated wheat straw	-	214	241
CFM	375	300	321
Total DMI (g/h/d)	942	738	804
DMI as %BW	3.74	3.11	3.16
DMI g/kg $BW^{0.75}$	83.80	68.59	70.91
R/C	1.51	1.46	1.51

a-b Means in the same row with different superscripts differ significantly at $P<0.05$.

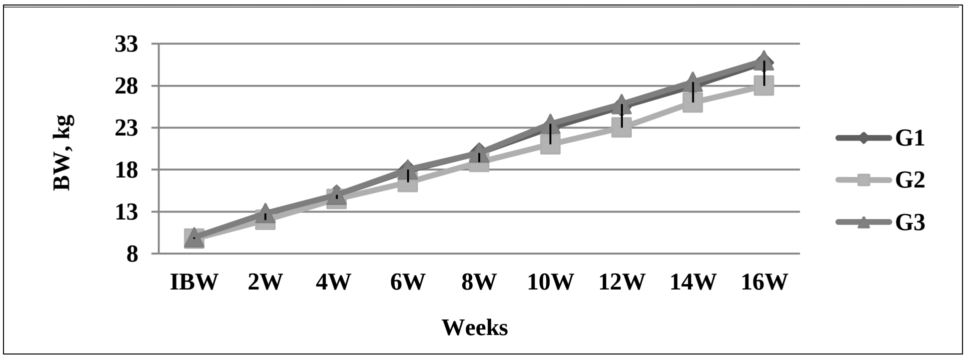

Fig. 2. Effect of experimental treatments on change in weight of Barki lambs

Blood parameters:

Data of blood serum parameters are presented in Table (4). The results indicated that most tested blood parameters were significantly affected by dietary treatments.

Serum total protein (TP) and albumin (A) were tended to be lower with G2 and G3 than G1 without significant (P>0.05) among them. Globulin concentration and A/G ratio showed no significant differences between G1 and G3, but both were significantly higher (P>0.05) than those G2. While the highest values of glucose, serum urea, cearatinine and cholesterol concentrations were recorded (P>0.05) with G1 (60.01, 46.26, 1.95 and 72.08, respectively) in Barki lambs rations. However, the highest value of triglycerides was shown with G2 (P>0.05), nevertheless the differences between G1 and G3 were insignificant. These findings are in accordance with those reported by Asker (1998) and Abdel- Halim (2003). Moreover, Shaker *et al.* (2008) working on growing Barki lambs and Badawy *et al.* (2002) on growing Barki lambs and Baladi kids reported that feeding fresh *Acacia* lowered TP, A and G values. The reduction of TP in animals fed salt shrubs might be owing to the high content of tannins in these plants. In agreement, Muller *et al.* (1989) and Reed *et al.* (1990) reported that high content of tannins in acacia probably decreases the digestibility of crude protein. Coles (1986) found that poor absorption of dietary constituents from the intestinal tract leads to hypoproteinemia. Tannins can reduce digestibility of protein and carbohydrate by inhibiting digestive enzymes and by altering permeability of the gut wall (Streeter *et al.,* 1993). Moreover, Ortiz *et al.* (1993) reported that tannins could adversely influence digestibility and absorption of nutrients such as proteins and amino acids, carbohydrates and lipids and also the activity of digestive enzymes. The obtained results are in harmony with those reported by Ismail *et al.* (2003) and Shaker *et al.* (2008).

The results (Table, 4) indicated also small fluctuations among groups rations in concentrations of ALT and phosphorus without significant differences, but the differences were significant with AST and calcium. The lowest values of ALT and calcium were recorded with G1 (17.33 u/l, and 171.80 mg/dl, respectively). Generally, all obtained values are in line of blood parameters with findings of Shaker *et al.* (2014) when studied the effect of feeding salt tolerant fodder shrubs mixture on physiological performance of small ruminant.

Table 4. Effect of feeding experimental rations for Barki lambs on some blood serum parameters

Items	Groups		
	G_1	G_2	G_3
Glucose , mg/dl	60.01±0.51^a	42.89±0.96^b	39.77±0.79^c
Total protein, g/dl	7.11±0.45	6.21±0.48	6.91±0.16
Albumin(A), g/dl	2.80±0.19	3.26±0.14	2.96±0.17
Globulin(G), g/dl	4.31±0.42^a	2.95±0.34^b	3.95±0.15^a
A/G ratio	0.66±0.08^b	1.13±0.09^a	0.75±0.06^b
Urea, g/dl	46.26±0.51^a	26.20±0.42^c	32.18±0.45^b
Creatinine mg/dl	1.95±0.16^a	1.01±0.15^b	1.65±0.14^a
Cholesterol, mg/dl	72.08±1.16^a	52.48±1.27^b	68.28±1.19^b
Triglycerides mg/dl	71.32±1.22^b	81.48±1.37^a	72.90±0.66^b
AST, u/l	29.50±0.59^b	36.20±0.46^a	31.40±0.84^b
ALT, u/l	17.33±1.20	19.22±1.91	18.54±0.74
Calcium, mg /dl	171.80±1.94^c	191.80±1.17^b	200.10±1.65^a
Phosphorus, mg/dl	5.30±0.91	4.92±0.82	4.02±0.73

a-c Means in the same raw with different superscripts differ significantly at P<0.05.

Economic efficiency:

Economic efficiency (EE) estimated as price of gained weight divided by cost of feed consumed for that gain, are presented in Table (5). The replacement of berseem hay by *Cassava* or *Prosopis* (leaves & twigs) with a treated wheat straw, it had effect on economic efficiency. This is expected as feed intake increased and price of feed unit increased by the increasing of CFM and berseem hay in G1 compared with price of feed unit in G2 and G3. The obtained results indicated that the cost of consumed feed was reduced with using of mixture from Prosopis or Cassava (leaves & twigs) with a treated wheat straw (1.214 and 1.341L.E/h, respectively) compared to berseem hay (2.094 L.E/h). Therefore, the feed cost /kg gain was reduced with substitution of berseem (G1) by Prosopis or Cassava with a treated wheat straw in rations and the values were 12.03, 7.99 and 7.53 for G1 (berseem hay), G2 (Prosopis with a treated wheat straw) and G3 (Cassava with a treated wheat straw). Thus, the economic efficiency was the highest (6.64%) due to feeding Cassava with a treated wheat straw (G3) followed by G2 (6.26%) and lastly G1 (4.15%). Similar results were observed by Ahmed et al. (2001) with substitution of Teosinte by Kochia silage and Maged *et al*. (2014) with substitution of berseem by Kochia in dairy goat's rations. Eissa *et al*. (2015) indicated that the economic efficiency was much better with combinations of Cassave and a treated wheat straw along with Prosopis Juliflora or Acacia Saligne than control (berseem hay 60%+40% CFM).

Table 5. Feed conversion and economic efficiency of growing Barki lambs fed the experimental rations

Item	Groups		
	G1	**G2**	**G3**
Total gain, (kg)	20.90±0.08[a]	18.18±0.38[b]	21.41±0.40[a]
Daily body gain, (g)	174±0.64[a]	152±3.14[b]	178±3.36[a]
Total DMI (g/h/d)	942	738	804
CP intake (g/h/d)	138	104	125
Feed efficiency:			
kg DM /kg gain	5.4	4.8	4.5
kg CP/kg gain	6.60	5.72	5.84
Economic efficiency:			
Cost of consumed feed, L.E/h	2.094	1.214	1.341
Price of weight gain, L.E	8.70	7.60	8.90
Feed cost/ kg gain, L.E	12.03	7.99	7.53
Economic efficiency, %	4.15	6.26	6.64

Market price (LE)/Ton fresh of ingredients: BH = 1600 LE; CFM = 2800 LE; *Cassava* = 500 LE; *Prosopis Juliflora* = 500LE; Treated wheat straw = 710 LE; Kg live body weight of lambs = 50 LE.

CONCLUSION

In mountainous, arid, semi-arid and humid zones, shrub and tree foliage is the only feed for ruminants most of the year, so the exploitation of their full nutritional potential is vital for achieving enhanced animal productivity. A wide range of these plant species are good sources of proteins, some others are high in energy or minerals. Accordingly, feeding *Cassava* or *Prosopis* (leaves & twigs) with ammoniated wheat straw at 60% (instead of berseem hay) + 40% concentrate feed mixture level has better impact on growing Barki lambs either for growth rate or feed conversion efficiency and economic values.

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تأثر تغذية مخاليط مختلفة من الأشجار العلفية مع مخلفات المحاصيل المعاملة على الأداء الإنتاجى للحملان البرقى فى المناطق الشبه قاحلة فى مصر.

محمد محمد عيسى، وليد ماهر أمين، أحمد رجب خطاب،

معهد بحوث الانتاج الحيوانى، مركز البحوث الزراعية- الدقى – الجيزة- مصر

أجري هذا البحث علي الحملان البرقى لاختبار تأثير التغذية على شجيرات علفية مع تبن القمح المعامل بالأمونيا علي معدلات النمو وكفاءة التحويل الغذائى والكفاءة الاقتصادية ، ولتحقيق هذا الهدف البحثي تم استخدام ٣٠ حولي برقى عمر ٣ شهور وبمتوسط وزن ٩.٧٧±٠.٥٠ كجم في ثلاث مجموعات متساوية (١٠ بكل مجموعة) ، وقد أعطي العلف المركز ليغطي ٤٠% من مقررات الـ NRC للأغنام لعام (١٩٨٥) ، أما ٦٠% الأخري فكانت من دريس البرسيم (مج١) ، مخلوط من البروسوبس + تبن القمح المعامل بالامونيا بنسبة (٥٠:٥٠) (مج٢) وأخيرا مخلوط من الكاسافا + تبن القمح المعامل بالامونيا بنسبة (٥٠: ٥٠) (مج٣)، واستمرت التجربة لمدة ١٦ أسبوع ، وقد اوضحت النتائج زيادة نسبة البروتين الخام (CP) مع مج٣ (١٥.٥٦) بالمقارنة مع مج١ (١٤.٦١) و مج (١٤.١٠). بينما المادة الجافة (DM)، المادة العضوية (OM) والمستخلص الخالى من الأزوت (NFE) كانت اعلى مع مج١ مقارنة بالمجموعتين التجريبيتين الأخريين. لالياف الخام (CF) سجلت اعلى القيم مع مج١ (دريس البرسيم)، ومن ناحية اخرى زادت مج٣ فى محتواها من الهيموسيليلوز مقارنة بـ مج٢ و مج١ (١٩.١٠ الى ٨.٧٠ و ٦.١٠، على التوالى). كانت مج٢ الاعلى فى محتواها من السيليلوز (٢٣.٥% من المادة الجافة) مقارنة بمحتوى مج٢ و مج٣ (١٦.٠٠و ٩.٥% من المادة الجافة، على التوالى). بينما كانت الاختلافات طفيفة فى المحتوى من (المستخلص الخالى من الدهنEE ، مستخلص الألياف المتعادل NDF ومستخلص اللجنين ADL) . زاد إنتاج الميثان مع مخلوط الكاسافا + تبن القمح المعامل بالامونيا مقارنة بمخلوط البروسوبس + تبن القمح المعامل بالامونيا (١٢ الى ١٠ مل/ ٢٠٠ مجم مادة جافة، على التوالى). زاد محتوى التانين (CT) فى المخلوط الثانى الكاسافا + تبن القمح المعامل بالامونيا (٢٣ جم/كجم مادة جافة) مقارنة بالمخلوط الأول البروسوبس + تبن القمح المعامل بالامونيا (٢٠جم/ كجم مادة جافة). زاد وزن الجسم النهائى (FBW) و معدل النمو (TBW) فى مج٣ (٣١.٣٣ و ٢١.٤١ كجم، على التوالى) تلتها مج١ (٣٠.٧٤ و ٢٠.٩٠ كجم، على التوالى) وكان اقلها مج٢ (٢٧.٩٤ و ١٨.١٨، على التوالى)، وكذلك معدل النمو اليومى (DBW) وقد ترجع هذه الاختلافات الى زيادة المأكول كمادة جافة فى مج١ و مج٣ (٩٤٢ و ٨٠٤ جرام مادة جافة /راس/ يوم) مقارنة بـ مج٢ (٧٣٨. جرام مادة جافة /راس/ يوم). اظهرت المعاملات تأثيرات معنوية على اغلب مقايس الدم تحت الدراسة. الكفاءة الاقتصادية كانت أفضل مع مج٣ ثم مج٢ مقارنة بمجموعة الكنترول مج١.

بناء على تلك النتائج، فان تغذية مخلوط من اوراق وعيدان الكاسافا او البروسوبس مع تبن القمح المعامل بالامونيا بنسبة ٦٠% + ٤٠% علف مركزة يعتبر بديل أقتصادى جيد لدريس البرسيم فى علائق الحملان البرقى تحت ظروف المناطق الشبه قاحلة وله تأثير جيد على معدلات النمو ومعدلات التحويل الغذائى.