

GROWTH PERFORMANCE OF SHAMI KIDS FED A SALT TOLERANT PLANT UNDER SEMI-ARID CONDITIONS IN SINAI, EGYPT

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SUMMARY

This study aimed to investigate the effect of the using a salt tolerance plant (*Koicha*) as replacement to barseem hay in rations with different roughage: concentrate ratios for feeding Shami kids. The study was carried out (during 2009) at South Sinai. Twenty four male Shami kids (about six months old and 25 kg average live body weight) were employed. The kids were divided into three groups (eight each) to study the effect of replacing barseem hay with *Kochia indica* within different roughage: concentrate ratio. The three groups (G) were assigned to feed the following rations, 40% barseem hay: 60% concentrate feed mixture (CFM) for G1, 40% *Kochia*: 60% CFM for G2 and 60% *Kochia*: 40% CFM for G3. *Kochia* was cultivated in salt-affected soil within the station and irrigated with underground salt water (about 6000 ppm). The experiment lasted for four months. The rations were offered once a day at morning and water was free choice. Economic indicator was calculated as the return of kg gain according to the prevailing Egyptian local prices.

The results showed that the highest value of DM intake was obtained for G2 during the first two months (828 g/h/d and 80 g / kg w^{0.75}). The average daily gain (ADG) values were 83, 117 and 67 g/h for G1, G2 and G3, respectively. The same trend was obtained during the second period. During the whole period (four months), ADG in G2 of (125 g/h/d) was higher ($P < 0.05$) than those of G1 and G3 of 92 and 75 g/h/d, respectively. The final body weight of kids was higher ($P < 0.05$) in G2 (40 Kg) than those of G1 and G3 (36 and 34 kg, respectively). The nutritive values in G2, measured as TDN and DCP were higher ($P < 0.05$) (68.1 and 10.3, respectively) than those of G1 (64.3 and 9.9, respectively). Feed conversion of both DM and TDN in G2 (14.42 and 9.76, respectively) were better than those in G3 (17.10 and 10.50, respectively). Feed cost and economic indicator showed that kids in G2 had the highest feed cost and the highest return.

It conclusion feeding Shami kids on 40% *koicha* and 60% CFM has no adverse effect on ADG and tended to gain higher economic return.

Keywords: *Koicha*, Shami goats, roughage: concentrate ratio, economic indicators

INTRODUCTION

Goats are considered one of the most important components of livestock in Egypt. Hence, they gain an economic importance. The total goat's population in Egypt is about 4.2 million heads (FAO, 2010). The shortage of animal feeds in Egypt is the main constraint for further development of animal production.

Moreover, areas cultivated with barseem are diminishing due to the state trend to replace it with wheat (Ahmed *et al.*, 2001 and Shehata *et al.*, 2001). Many researchers (Mehrez *et al.*, 2001, Ahmed, 2003 and Shehata, 2006) indicated that roughage: concentrate ratio has important role on metabolic parameters and productive performance of goats.

Utilization of salt-tolerant plants as an animal feed component in salt affected lands could be an appropriate option for providing alternative feed resource particularly in summer and autumn seasons when the other conventional forage resources are in shortage (Fahmy *et al.*, 2009 and El Shaer, 2010).

The present study was conducted to evaluate the effect of using a salt tolerant plant (*Koicha*) as a replacement to barseem hay in Shami kids' rations with different roughage: concentrate ratios.

MATERIALS AND METHODS

This study was carried out at South Sinai Research Station, Desert Research Center, Ministry of Agriculture, Egypt. Twenty four male Shami kids (about six months old and 25kg average live body weight) were used during year 2009. The kids were divided into three groups (G) (eight each) to study the effect of replacing barseem hay with *Kochia*, Burningbush, Summer Cypress (*Kochia indica*) within different roughage: concentrate ratios on growth performance of Shami kids. The three studied rations were fed as follows:
G1: 40% barseem hay: 60% concentrate feed mixture (CFM).
G2: 40% *Kochia*: 60% CFM.
G3: 60% *Kochia*: 40% CFM.

Kochia was cultivated in salt-affected soil in South Sinai Research Station and irrigated with underground salt water (about 6000 ppm). The used CFM composed of, cottonseed cake (25%), maize (38%), wheat (25%), soybean (5%), molasses (3%), limestone (2.5%) and salt and minerals (1.5%). The chemical analysis of studied rations is presented in Table (1). Kids were fed for two weeks, as a transitional period, on the assigned rations before the start of the experimental work.

Kids were weighed at the beginning of the experiment and then biweekly. The experiment lasted for four months. Feeding requirements for the three studied groups were adjusted according to NRC (1981) every two months (the first and the second period). The rations were offered once a day at morning and water was made available all day round. In addition, at the end of feeding trial three kids from each group were used for digestibility trials, to evaluate the three studied rations. Chemical analysis of the feeds and feces was calculated according to A.O.A.C. (1995).

Economic indicator:

Economic indicator was calculated as a return of kg. gain of selling kids minus feeding cost during four months according to the Egyptian local prices, where one ton of barseem hay = 1500 Egyptian pound (LE), CFM = 2000 LE and the cost of one tone of fresh Kochia forage cultivation, harvesting and any other cost = 300 LE while one kg live body weight of kids sold for 30 LE. Data were statistically analyzed using General Linear Model (GLM) Procedure SAS (2003).

RESULTS AND DISCUSSION

The current results in Table (2) showed that kids consumed approximately similar daily amount of dry matter (DM). The highest value of DM intake was obtained for G2 during the first two months (828 g/h/d and $80 \text{ g} / \text{kg w}^{0.75}$). During the second two months the feed intake as g/h/d and as $\text{g}/\text{kg w}^{0.75}$ for kids was not differed among the three studied groups. These results are similar to that obtained by Ahmed (2003) and Shehata *et al.* (2003) on local Egyptian kids and lambs fed different roughage: concentrate ratios.

The obtained results in Table (3) indicated that replacing hay with Koicha during the first period maintained the average daily gain (ADG) of kids significantly different ($P < 0.05$) in favor of feeding Koicha (G2) than G1 and G3. The ADG values were 83, 117 and 67 g/h for G1, G2 and G3, respectively. The same trend was obtained during the second period. The whole period (4 months), the ADG in G2 of 125 g/h/d was significantly ($P < 0.05$) higher

than those of G1 and G3 of 92 and 75 g/h/d, respectively. The final body weight was significantly ($P < 0.05$) higher in G2 (40 Kg) than those of G1 and G3 (36 and 34 kg, respectively). These results indicate that the positive improvement in production performance might due to the ratio of roughage: concentrate (40:60) in G1 and G2. Digestibility, feeding value and consequently the growth performance, which is similar to the results obtained by Abdelhamid *et al.* (1999) and Ahmed (2003).

Results of the digestibility trials (Table 4) showed that digestibility of most nutrients (DM, OM, CP, EE and NFE) were significantly ($P < 0.05$) higher in G2 than those of G1. While, digestibility of CF was not significant deferent among the three studied rations. The nutritive values of G2, measured as TDN and DCP were significantly ($P < 0.05$) higher (68.1 and 10.3) than those of G1 (64.3 and 9.9, respectively). These results are similar to those obtained by Mehrez *et al.* (2001) on Rahmani lambs and Ahmed (2003) on Zairaibi kids. The improvements in digestibility of all nutrients and nutritive values in G2 than G1 may be due to introducing kochia as fresh forage.

The feed conversion based on DM, TDN and DCP of Shami kids was presented in Table (5). Feed conversion of both DM and TDN in G2 (14.42 and 9.76) were better than those (17.1 and 10.5) in G3. This result is agreement with the results obtained by Gado (1992), who observed a positive effect of body weight changes with decreasing forage: concentrate ratio. However, the feed conversion based on DCP was lower in G1 and G3 than in G2. Generally, Ahmed *et al.* (2009) show that feed conversion was better in fresh forage than its hay.

Results of feed cost and economic indicator in Table 5 showed that kids in G2 had the highest feed cost and the highest return. Replacing barseem hay with Kochia tended to economic be more, which led to high return. Moreover, increasing roughage ratio in G3 led to decreasing in feed cost than in G2, but with lower economic return.

CONCLUSION

It could be concluded that, the average daily gain (ADG) was significantly higher in kids fed 40% koicha and 60% CFM than the ADG of kids fed 40% barseem hay and 60% CFM or 60% koicha and 40% CFM. Replacing barseem hay with Kochia gained higher economic return. Moreover, increasing koicha ratio from 40% to 60% in ration led to

decrease feed cost, but with lower economic return.

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Table 1. Chemical analysis of the studied rations

Item	Composition, % DM basis						
	DM	OM	CF	CP	EE	NFE	ASH
CFM	90.30	84.15	16.45	13.90	3.35	60.45	5.85
Kochia, TS	33.60	83.00	12.20	29.10	2.80	38.90	17.00
Barseem hay	88.93	80.10	28.93	11.22	2.09	45.86	11.90
Rations:							
R 1	90.22	91.00	21.16	13.37	3.05	53.42	9.00
R 2	65.22	91.61	19.97	13.20	2.92	55.52	8.39
R 3	51.89	90.89	21.97	12.35	2.61	54.96	8.11

CFM = Concentrate feed mixture.

Table 2. Dry matter (DM) intake in gram (g) per head (h) per day (d) for the three studied groups of Shami kids

Items	Groups		
	G1	G2	G3
The first period (Two months)			
Concentrate (C)	500	500	325
Roughage (R)	330	328	500
Total DM intake, g/d	830	828	825
DM intake, % BW	3.3	3.3	3.2
DM intake, g/kg w ^{0.75}	76	80	73
R/C ratio	40:60	40:60	60:40
The second period (Two months)			
Concentrate	600	620	380
Roughage	400	440	560
Total DM intake, g/d	1000	1060	940
DM intake, % BW	3.3	3.5	3.3
DM intake, g/kg w ^{0.75}	86	86	87
R/C ratio	40:60	40:60	60:40
The whole period (Four months)			
Concentrate	550	560	353
Roughage	365	384	530
Total DM intake, g/d	915	944	883
DM intake, % BW	3.3	3.4	3.25
DM intake, g/kg w ^{0.75}	81	83	80
R/C ratio	40:60	40:60	60:40

R/C = roughage: concentrate.

G1: 40% barseem hay: 60% concentrate feed mixture (CFM),

G2: 40% Kochia: 60% CFM,

G3: 60% Kochia: 40% CFM.

Table 3. Growth performance ($X \pm SE$) of Shami kids during the two different studied periods for the three studied groups (n=8 / group)

Items	Groups		
	G1	G2	G3
The first period (Two months)			
Initial BW(kg)	25 \pm 0.95	25 \pm 0.69	25 \pm 0.61
Final BW (kg)	30 \pm 0.87	32 \pm 0.76	29 \pm 0.59
Total gain (kg)	5 ^b \pm 0.17	7 ^a \pm 0.20	4 ^b \pm 0.21
Daily gain (g)	83 ^b \pm 2.79	117 ^a \pm 3.35	67 ^b \pm 3.57
The second period (Two months)			
Initial BW (kg)	30 \pm 0.87	32 \pm 0.76	29 \pm 0.59
Final BW (kg)	36 ^b \pm 0.92	40 ^a \pm 0.93	34 ^b \pm 0.70
Total gain (kg)	6 ^b \pm 0.11	8 ^a \pm 0.20	5 ^b \pm 0.17
Daily body gain (g)	100 ^b \pm 1.75	133 ^a \pm 3.35	83 ^b \pm 2.77
The whole period (Four months)			
Initial BW (kg)	25 \pm 0.95	25 \pm 0.69	25 \pm 0.61
Final BW (kg)	36 ^b \pm 0.92	40 ^a \pm 0.93	34 ^b \pm 0.70
Total gain (kg)	11 ^b \pm 0.17	15 ^a \pm 0.29	9 ^b \pm 0.20
Daily gain (g)	92 ^b \pm 1.35	125 ^a \pm 2.40	75 ^b \pm 1.69

BW = live body weight, Means in the some row with different superscripts differ significantly at ($P < 0.05$).

G1: 40% barseem hay: 60% concentrate feed mixture (CFM),

G2: 40% Kochia: 60% CFM,

G3: 60% Kochia: 40% CFM.

Table 4. Digestibility and feeding values of rations fed to Shami kids in the three studied groups (n = 3 / group)

Items	Groups		
	G1	G2	G3
Digestion coefficient (%)			
DM	65.3 ^a \pm 1.24	69.1 ^b \pm 1.10	62.23 ^c \pm 1.33
OM	68.5 ^a \pm 0.79	72.2 ^b \pm 1.05	65.02 ^c \pm 1.27
CF	60.2 ^a \pm 0.63	62.7 ^a \pm 0.89	60.76 ^a \pm 0.30
CP	75.1 ^a \pm 0.31	77.7 ^b \pm 0.46	68.94 ^c \pm 1.20
EE	77.1 ^a \pm 0.34	79.2 ^b \pm 0.42	71.39 ^c \pm 0.96
NFE	69.6 ^a \pm 1.08	74.0 ^b \pm 1.48	67.54 ^a \pm 1.03
Nutritive value (%)			
TDN	64.3 ^a \pm 0.74	68.1 ^b \pm 0.98	60.4 ^c \pm 1.16
DCP	9.9 ^a \pm 0.05	10.3 ^b \pm 0.06	8.5 ^c \pm 0.15

Means in the some row with different superscripts differ significantly at ($P < 0.05$).

G1: 40% barseem hay: 60% concentrate feed mixture (CFM),

G2: 40% Kochia: 60% CFM,

G3: 60% Kochia: 40% CFM.

Table 5. Feed conversion and economic indicator for Shami kids within different the three studied groups (n=8/group)

Items	Groups		
	G1	G2	G3
Feed conversion			
Kg DM/kg gain	15.63	14.42	17.10
Kg TDN/kg gain	10.20	9.76	10.50
Kg DCP/kg gain	1.37	1.47	1.46
Economic indicators			
Feed cost (h/day/LE)	1.7	1.81	1.72
Total feed cost (h/ 120 day / LE)	204	217	206
Return from weight gain (h/LE)	330	450	270
Economic return (h/LE)	126	236	64

h= head and LE= Egyptian pound.

G1: 40% barseem hay: 60% concentrate feed mixture (CFM),

G2: 40% Kochia: 60% CFM,

G3: 60% Kochia: 40% CFM.

كفاءة نمو الجداء الشامى المغذاه على نبات متحمل للملوحة تحت الظروف الشبة جافه فى سيناء ، مصر

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تهدف الدراسة الى تحديد تأثير استخدام النباتات الملحي (الكوخيا) فى تغذية الماعز الشامى كبديل لدريس البرسيم فى العليقة واستخدمت نسب مختلفة من الخشن والمركز. أجريت هذه التجربة فى محطة بحوث جنوب سيناء، مركز بحوث الصحراء. تم استخدام عدد 24 من ذكور جداء الماعز الشامى (عمرها حوالى 6 شهور ومتوسط وزن 25 كجم) خلال عام 2009. قسمت الجداء الى ثلاث مجموعات (8 فى كل مجموعة) لدراسة تأثير احلال دريس البرسيم بنبات الكوخيا انديكا مع نسب مختلفة من الخشن : المركز. وكانت الثلاث علائق هي: العليقة الاولى تتركب من 40% دريس برسيم و60% علف مركز. كانت العليقة الثانية تتركب من 40% كوخيا و60% علف مركز. العليقة الثالثة تتكون من 60% كوخيا و40% علف مركز. استمرت التغذية لمدة 4 شهور. كانت العلائق تقدم مرة واحدة صباحا مع توفر الماء للشرب فى اى وقت. اجرى تقدير لمؤشر اقتصادى هو العائد من تقدير بيع الزيادة الوزنيه فى الجداء مطروحا منه تكاليف التغذية خلال فترة التجربة (4 شهور) اعتمادا على الاسعار المحلية. اظهرت النتائج ان اعلى قيمة مادة جافه مأكوله كانت فى المجموعة الثانية خلال اول شهرين (828 جم / راس/ يوم و 80 جرام مرفوعة للوزن اس 0.75). كان قيم متوسط العائد فى الوزن هي 83 و 117 و 67 جرام للراس للمجموعات الثلاثة على الترتيب. كان نفس الاتجاه فى نتائج الفترة الثانية. خلال الفترة كامله (4 شهور)، كان متوسط العائد اليومى فى المجموعة الثانية (125 جرام / راس / يوم) اعلى معنويا عن 92 و 75 جرام / يوم فى المجموعة الاولى والثالثة على الترتيب. كان الوزن النهائى للجداء اعلى معنويا فى المجموعة الثانية (40 كجم) عن المجموعة الاولى والثالثة (36 و 34 كجم على الترتيب). كانت القيمة الغذائية فى المجموعة الثانية والتي قيست على DCP و TDN اعلى معنويا فى المجموعة الثانية (68.1 و 10.3 على الترتيب) بالمقارنة بالمجموعة الاولى (64.3 و 9.9 على الترتيب). كان معامل تحويل الغذاء على اساس المادة الجافة و المواد الكلية المهضومة فى المجموعة الثانية (14.42 و 9.76 على الترتيب) افضل من تلك (17.1 و 10.5 على الترتيب) فى المجموعة الثالثة. اظهر المؤشر الاقتصادى ان المجموعة الثانية اعلى فى تكاليف التغذية واعلى فى العائد الاقتصادى. وقد تم استخلاص ان الزيادة الوزنية اليومية كانت تختلف معنويا فى الجداء التى غذيت على 40% كوخيا و60% علف مركز عن العائد اليومى فى الوزن للجداء التى غذيت على 40% دريس برسيم و60% علف مصنع او 60% كوخيا و40% علف مصنع. احلال دريس البرسيم بالكوخيا ادى الى عائد اقتصادى اعلى. علاوة على ذلك زيادة نسبة الكوخيا من 40% الى 60% فى العليقة ادى الى انخفاض تكاليف التغذية ولكن مع عائد اقتصادى منخفض.