Egyptian J. Nutrition and Feeds (2009) 12 (1) : 99-111

PERFORMANCE AND CARCASS TRAITS OF GOATS FED AGRO-INDUSTRIAL BY- PRODUCT SUPPLEMENTS AS FEED BLOCK.

K.M. Youssef

Animal and Poultry Nutrition Department, Desert Research Center, Mataria, Cairo, Egypt

(Received 3/2/2009, Accepted 24/3/2009)

SUMMARY

This work was carried out at the North Sinai region to study the effect of feeding agro-industrial by-product as feed block on goat performance and carcass traits. Thirty-six growing male Bedouin goats (3-4 months old and average body weight 15.4 kg) were randomly distributed into three treatment groups (12 animals in each). The groups were given one of the three supplements (3.0% of live body weight) in addition to urea treated wheat straw *ad libitum* as sole roughage. The control group (R1) was fed commercial concentrate feed mixture (CFM), whereas the second and third groups (R2 and R3) were fed with formulated feed mixture consisting of 25% wheat bran, 25% date seeds, 20% olive pulp, 14% soybean meal, 10% molasses, 2% urea, 2% limestone and 2% clay, respectively. The diet of R2 group was offered in form of block, while the diet of R3 group was offered in mash form. The feeding trial was conducted for 120 days followed by a digestibility trial using three animals of each group. At the end of the experiment, three animals from each group were slaughtered to test for some carcass traits. Results of the trial showed that total DM intake (g/kg BW) of animals fed ration R2 was similar to the intake by those fed control ration, but it was slightly higher than the intake by animals fed R3. Animals from the R1 group consumed less ($P<0.05$) amount of water (ml/ g DMI) as compared to those in R2 and R3. It appeared that male kids tended to utilize DM, OM and NFE better when they were fed on concentrate feed mixture (CFM), while CP and EE digestibilities improved in animals fed R3 than other groups. It was clear that CF digestibility tended to increase with feeding the R2 diet. The highest values ($P<0.05$) of total digestible nutrients (TDN) were recorded for ration R1 (62.5%). However, R2 ration had the highest value of digested crude protein (DCP) intake (105.5 g/head/ day and 3.9 g/kg BW). All of the animals were in positive N balance which did not differ significantly among treatments. Average daily weight gain (ADWG) for R1 and R2 (119.34 and 110.36 g, respectively), were significantly higher ($P < 0.05$) than that of R3 (89.72 g). Feed block supplement (R2) resulted in a decrease in feed cost/kg gain by 57.8 and 10.3% and increase in final margin LE/ head by 15.0 and 21.8% compared with control group (R1) and mash group (R3), respectively. Dressing percentage, on the basis of fasting weight, were higher ($P< 0.05$) either with or without offals in animals received feed block (R2) than those of R1 and R3 groups. Lean meat percentage of carcass was the highest ($P<0.05$) in animals fed R1 and R2 followed by R3 being the lowest. Bone percentage of R1 and R2 was similar, but

both groups were considerably lower ($P < 0.05$) than R3. The area of eye muscle was not significantly affected by treatment and ranged between 10.11 to 11.06 cm^2. Referring to results shown above, it could be recommended using feed block as feed supplement for growing kids.

Keywords: Feed block, agro-industrial by-products, goats, nutritive values, growth, carcass traits.

INTRODUCTION

Goats are raised mostly under harsh environments where feed shortage is the main constraint to their production traits. The available feed resources are often low in energy and digestible proteins, and fail in most cases to cover their maintenance requirements (Ben Salem and Nefzaoui, 2003). They can be better used by the animal if the rumen ecosystem for fermentative digestion can be balanced by supplying deficient nutrients mainly energy and nitrogen (Leng, 1990).

Whereas considerable amount of agro-industrial by-products (e.g. date stones, olive cake, molasses, sugar beet pulp etc.) are available in West Asian and North African regions (Salman, 1996, Hadjipanyaiotou, 1997, Ben Salem *et al*, 2003). However, these by-products are not efficiently utilized in animal nutrition. The past experience from inside and outside the region has shown that many unconventional but locally available by-products can be used successfully as alternative feed supplements for ruminants. Opportunity in the region exists to fill part of the gap between the supply and the demand of the feed resources through efficient utilization of these by-products. Attempts were made to improve nutrient utilization from these by-products by various means and feed block is one of them.

Therefore, the objective of this study was to evaluate the growth performance and carcass traits of growing Bedouin goats supplemented with agro-industrial by-products in different forms (feed block or mash) compared with a concentrate feed mixture with a basal diet of urea-treated wheat straw.

MATERIALS AND METHODS

The present experiment was carried out at the North Sinai region to study the effect of feeding agro-industrial by-products as feed block on goat performance and carcass traits.

Thirty – six male Bedouin goats, aging about 3-4 months old and 15.4 kg average live weight were used. The animals were divided randomly into three treatment groups with respect to their age and live body weight (12 animals in each). The animals of group 1 (R1) served as controls and were fed with a commercial feed mixture (CFM), while the animals of group 2 and 3 (R2 and R3) were fed with formulated by-products feed mixture either in block form (R2) or in mash form (R3).

The CFM contained, 35% not decorticated cotton seed cake, 30% wheat bran, 25% yellow corn grains, 4% rice bran, 3% molasses, 2% limestone and 1% salt. The formulated by-products feed mixture consisted of 25% wheat bran, 25% date seed, 20% olive pulp, 14% soybean meal, 10% molasses, 2% limestone, 2% clay and 2% urea. Urea and

molasses were dissolved in a small amount of water (100ml/kg DM) and sprayed onto the feed mixture (mash form). The feed mixture was set in a mould (20 × 10 cm) then pressed by hand or simple compressor. After demoulding, feed blocks were stored in a ventilated place and preferably not directly exposed to sunlight for one week in summer and two weeks in winter. Blocks were turned up side down from time to time to accelerate the drying (block form).

Animals were given one of the three supplements at the level of 3.0% of live body weight in addition to urea treated wheat straw *ad libitum* as sole roughage. Feeding the experimental rations lasted for 120 days during which the animals were group fed. They were individually weighed every week. Body weight changes recorded weekly and feed intake were recorded.

At the end of the feeding trial, three animals from each group were used in digestibility trials, placed individually in metabolic cages for fourteen days preliminary period followed by 7 days collection period. During the collection period feces and urine were quantitatively collected, sampled and kept for analysis. Dry matter intake and water consumption were determined.

At the end of the experimental period, three animals from each group were chosen and slaughtered to study some carcass traits.

Feeds offered, refusals and feces were analyzed for proximate analysis according to the A.O.A.C. (1990) procedures of and fiber fractions were analysed according to Van soest *et al* (1991). Urine was analyzed for total N by using the kjeldahl technique (A.O.A.C, 1990).

Samples of Longissimus dorsi (LD) muscle at 9^{th}, 10^{th} and 11^{th} ribs were taken for the chemical analysis according to A.O.A.C (1990). The eye muscle area was measured by a planimeter.

Data of the feeding and digestibility trials were analyzed as a randomized complete design using the GLM procedures of SAS (1990). Differences in mean values between treatments were compared by Duncan's multiple range tests (1955).

RESULTS AND DISCUSSION

Data in Table (1) summarize the average values of the proximate composition and fiber fractions of the three rations given to animals of the three treatments and treated wheat straw. Chemical composition of the tested rations indicated that rations were similar in CF and EE. However, rations of R2 and R3 were higher in CP and ash contents, while NFE was lower in these rations than those of the commercial concentrate feed mixture (R1). On the other hand, concentrations of fiber constituents (NDF, ADF and ADL) were higher in the rations contained date seed and olive pulp (R2 and R3) than those of CFM (R1) These findings are in close agreement with those obtained by Youssef and Fayed (2001), Abdou (2003) and Allam *et al* (2006). No significant difference was found between the chemical composition of block form (R2) and mash form (R3).

Data in table (2) showed that highest daily concentrate intake (g/head) was recorded for animals fed R1 followed by those fed formulated by-products (R2 and R3) however the differences were not significant since it was fixed at 3 % of body weight which was similar for all groups. However, wheat straw intake was significantly ($P>0.05$) higher in the groups fed with by-products (R2 and R3). The block form of the diet had a higher bulk density than the mash form and this may caused the higher voluntary intake of concentrate

as was found. These results are in agreement with those of Nyarko *et al.* (1993), Sansoucy (1995), Verma *et al* (1996), Singh *et al* (2001) Youssef (2002) and Samanta *et al.* (2003) who found that dry matter intake tended to increase as ration ingredients were mixed and blocked.

Table (1): Chemical composition of the experimental rations (% of DM).

Item	DM	OM	CP	CF	EE	Ash	NFE	NDF	ADF	ADL
R1 (CFM)	90.4	91.12	16.79	12.96	2.14	8.88	59.23	37.61	18.43	5.84
R2 (Block)	89.1	88.08	19.38	13.52	2.66	11.92	52.52	50.75	21.90	10.51
R3 (Mash)	88.8	88.02	19.17	13.94	2.70	11.98	52.21	48.06	19.94	8.22
Treated wheat straw*	74.2	87.97	9.87	30.62	1.28	12.03	46.20	67.18	42.11	10.85

* Wheat straw treated with 4% urea and covered under anaerobic conditions for five weeks.

Total DM intake (g/kg BW) of the animals fed the ration R2 was similar than those fed the control ration (34.03 vs 33.38 g/kg BW), but it was slightly higher than the intake of the animals were fed with R3 (34.03 vs 30.81 g/kg BW). This finding indicated that feed block has similar palatability as CFM. This finding was in agreement with the results of El-Shaer *et al.*, (1996), Youssef *et al* (2001) and El- Shaer *et al* (2002) who noted good palatability of olive cake and date stone for small ruminants. Moreover, agro-industrial by-products as feed block might improve their rumen fermentation and nutritive value (Hamadeh *et al.*, 2001, Ben Salem and Nefzaoui, 2003), and consequently improve palatability.

Table (2) showed that water intake for different treatments did not differ significantly. However there was a tendency of higher water intake in the groups fed with by-products groups (R2 & R3), which might be attributed to their high salt content. The present results are supported by the findings of Ben Salem *et al.*, (2001) who used blocks which contained olive cake, wheat bran, limestone , salt and urea, and concluded that lambs fed block consumed more water than those fed CFM.

Table (2): Feed and water intake of goats fed different experimental rations.

Item	R1	R2	R3	± SE
Live weight (kg)	27.46	27.62	27.57	0.73
Dry matter intake, g/head/day				
Concentrate	786.0	765.0	663.3	46.1
Treated wheat straw	137.0^{b}	164.0^{a}	182.3^{a}	7.41
Total DMI	923.0	929.0	845.6	44.79
Dry matter intake, g/kg BW				
Concentrate	28.38	28.06	24.16	1.7
Treated wheat straw	5.00^{b}	5.98^{ab}	6.65^{a}	0.29
Total DMI	33.38	34.03	30.81	1.69
Drinking water intake				
ml/day/head	1613.3	1893.3	1823.3	100.23
ml/day/kg BW	58.21	69.52	66.28	3.85
ml/g DMI	1.72^{b}	2.04^{a}	2.16^{a}	0.08

a, b, c, values with different letters on the same row differ significantly at $P<0.05$

Results of apparent coefficients of digestibility (Table 3) indicated that the digestion of most nutrients varied significantly among the three treatments. It appeared that male goats tended to utilize DM, OM and NFE better when fed on concentrate feed mixture, while CP and EE digestibilities were improved in animals fed R3 than other groups.

It was clear that CF digestibility tended to increase using R2 (block form). This means that the digestion and utilization of CF was improved by blocking the rations. Similar results were obtained by Ben Salem *et al* (2001), Ben Salem and Nefzaoui (2003) and Salman (2004) who found that feed blocks are considered alternative supplements which stimulate microbial activity in the rumen, thus improve digestion of low quality roughage by stall-fed or free grazing ruminants. Moreover, several authors (e.g. Chenost and Kayouli, 1997) recommend to give feed blocks during dry seasons to ruminants on poor quality fibrous feed (e.g. straws, low quality hays, stubble, etc.)

Table (3) also showed that the maximum values ($P<0.05$) of total digestible nutrients (TDN) were recorded for ration R1 (62.5%). Therefore, higher intake of TDN was recorded in animals fed with R1 diet as compared to those fed with R2 and R3.

There was no significant difference in digested crude protein (DCP) intake. Ration of R2 had the highest value of DCP intake (105.5 g/head/day and 3.9 g/kg BW) which may be due to high CP intake.

Table (3): Apparent digestibility coefficients and nutritive values of different experimental rations.

Item	R1	R2	R3	± SE
Digestibility coefficient %				
DM	63.7	63.2	61.9	0.38
OM	67.4^{a}	64.0^{b}	64.8^{ab}	0.66
CP	66.1^{ab}	64.1^{b}	67.0^{a}	0.52
CF	55.6^{ab}	58.0^{a}	54.0^{b}	0.72
EE	57.2	57.8	60.2	0.63
NFE	71.4^{a}	66.3^{b}	68.0^{b}	0.88
Nutritive values				
TDN intake g/head/day	578.5	540.1	497.3	29.7
TDN intake g/kg BW	20.91	19.7	18.1	1.03
TDN%	62.5^{a}	58.2^{b}	58.9^{b}	0.78
DCP intake g/head/day	96.5	105.5	97.2	5.1
DCP intake g/ kg BW	3.5	3.9	3.5	0.19
DCP %	10.4^{b}	11.4^{a}	11.5^{a}	0.18

a, b, c, values with different letters on the same row differ significantly at $P<0.05$

Feeding values of rations expressed as DCP% was significantly increased for formulated industrial by-products (R2 and R3) as compared to CFM (R1). Plane of nutrition was similar among treatment groups. The intake of TDN was sufficient to cover the nutritional requirements of 100 g gain/day, whereas DCP intake was 40-46% higher than the maintenance requirement (Kearl, 1982). These findings are in close agreement with those obtained by Samanta *et al* (2003).

Data in Table (4) revealed that nitrogen intake did not vary significantly among the experimental groups, but it was moderately higher for R2 due to higher feed intake and higher nitrogen content of block. Although, fecal and urinary nitrogen and consequently

total nitrogen excretion were higher in the group fed with R2 diet, the animals tended to retain higher amount of nitrogen than the other groups. Feeding of the block significantly decreased the rumen ammonia N concentration as compared to the mash form as was also found by Samanta *et al* (2003). Salman (2004) also noticed that it is well established that feed block manufactured from urea and agro-industrial by-products can be use as protein supplement for small ruminants fed with low quality forages and that statement was confirmed by the results of present study, as well.

Table (4): Nitrogen utilization of goats fed the different experimental rations.

Items	R1	R2	R3	± SE
N. intake g/head/day	23.27	26.31	23.23	1.26
N intake g/kg BW	0.847	0.963	0.843	0.05
Fecal N g/head/day	7.84	9.44	7.68	0.47
Fecal N g/kg BW	0.286	0.350	0.280	0.02
Fecal % of intake	33.85^{b}	35.87^{a}	33.00^{b}	0.52
Urinary N g/head/day	9.17	10.43	9.95	0.42
Urinary N g/Kg BW	0.334	0.383	0.360	0.02
Urinary N % of intake	41.58	39.67	43.03	2.49
Total N. excretion g/head/day	17.01	19.87	17.63	0.73
Total N excretion g/kg BW	0.620	0.733	0.640	0.04
Total N excretion as % of intake	75.43	75.53	76.03	2.58
N balance g/head/day	6.26	6.44	5.60	0.83
N balance g/kg BW	0.228	0.230	0.203	0.03
N. balance % of intake	24.57	24.47	23.97	2.58

a, b, c, values with different letters on the same row differ significantly at $P<0.05$

Generally, all the animals were in positive N balance which did not differ significantly among treatments. The retention of N as percentage of N intake was similar among treatments. This indicated that dietary inclusion of agro-industrial by-products had no adverse effect on N utilization as was also observed by Fayed *et al.* (2001) and Youssef and Fayed (2001). Moreover, clay, such as bentonite which was used in few studies as binder (Sudana and Leng, 1986; Anonym, 2001) could also be a way to decrease the rate of breakdown of urea into ammonia in the rumen. This effect improves nitrogen utilization and reduces the risk of ammonia toxicity.

Data of Table (5) show that animals fed R1 and R2 diets had higher body weight gain (14.32 and 13.24 kg) than that of R3 group (10.77 kg). Moreover, the average daily weight gain (ADG) for R1 and R2 diets (119.34 or 110.36 g), were significantly higher ($P<0.05$) than R3 (89.72 g). These results are in accordance with the results of Ben Salem *et al* (2000), and Galina *et al* (2000) who found that replacement of concentrate feed mixture with blocks resulted in similar growth rates as compared to those given the full amount of concentrate.

Body weight changes recorded for animals fed block form (R2) was higher by 18.7% than those fed mash form (R3). Salman (1997) also reported that using feed blocks improved weight gain of lambs (14%) as compared to a control group.

Data of feed efficiency (kg DM, TDN/kg weight gain) indicated that CFM (R1) and block (R2) diets were more efficient in covering DM and TDN to gain more than mash (R3) diet.

Table (5) : Economic analysis and feed conversion of the fattening diets during the growth trial.

Item	R1	R2	R3	± SE
Number of animals	12	12	12	
Live body weight				
Initial body weight, kg	15.59	14.93	15.78	0.118
Final body weight, kg	29.91[a]	28.17[ab]	26.55[b]	0.852
Body weight changes, kg	14.32[a]	13.24[ab]	10.77[b]	0.537
Average daily weight gain, g	119.34[a]	110.36[a]	89.72[b]	4.53
Feed intake				
Concentrate, kg/head/d	0.689	0.623	0.538	
Treated wheat straw, kg/head/d	0.123	0.138	0.156	
Total DMI, kg/head/d	0.813	0.761	0.694	
TDN intake g/head/d	509.75	442.14	408.07	
TDN intake g/kg BW	22.36	20.47	19.25	
Feed conversion ratio				
kg dry matter feed/kg weight gain	6.81	6.90	7.73	
kg TDN intake/kg weight gain	4.27	4.01	4.55	
Economical evaluation				
Return from body gain, LE	257.76	238.32	193.86	
Total feed cost, LE *	109.90	64.35	57.78	
Final margin, LE/head	147.86	173.97	136.08	
Feed cost, LE /kg weight gain	7.67	4.86	5.36	
Economic feed efficiency**	2.35	3.70	3.36	

a, b, c, values with different letters on the same row differ significantly at P<0.05

* Based on market prices at the beginning of the experiment (2007).

The price of one ton on DM basis was as follows: CFM; 1240, formulated agro industrial by-products: 750, treated wheat straw: 500 LE and kg live body weight: 18.0 L.E.

** Economic feed efficiency expressed as the ratio between the return from body gain, LE and total feed cost, LE (money input / money output)

Feed block supplement (R2) was resulted a decreasing feed cost/kg weight gain by 57.8 and 10.3% and increased the final margin LE/head by 15.0 and 21.8% as compared to the control (R1) and mash (R3) diets, respectively. On the other hand, economic evaluation of the use of feed block (R2) as supplement showed that an additional profit of 26.1 and 37.9 LE/head was achieved when compared with R1 and R3, respectively. The results agree with the results of Houmani and Tisserand (1999), El-Hag *et al.* (2002) and Salman (2004) who found that it was economically viable to use feed block, containing olive cake and date by-products, and urea to animals since the cost per kg gain was reduced by 23-38% as compared to the control diet.

In conclusion the use of feed block improves the economical efficiency of weight gain of fattening goat kids. The effects was highest for R2 (3.70) followed by R3 (3.36) as compared to the control(2.35).

Average of slaughter weight and dressing percentage based on either fasting or empty body weights for the experimental animals are presented in Table (6). Higher (P<0.05) hot carcass weight either with or without edible offals were found in goats fed with R1 and R2 diets as compared to R3. Such trait is influenced by body weight changes (Table 5). The results showed that dressing percentage on the basis of fasting weight either with or without

offals were significantly (P<0.05) higher in animals which received feed block (R2) than those of R1 and R3 diets. However, differences among the three groups in dressing percentage on the basis of empty weight were not significant, which might be due to decreasing the volume of the digestive tract content at slaughter in the animals of group R2. It has been noticed that dressing percentage on the basis of empty weight was parallel with the fasting body weight. The present results are in agreement with the findings of Maharem (1990), Zeid (1998) and Allam *et al* (2007).

Table (6): Dressing percentage (DP) of goats fed different experimental rations.

Item	R1	R2	R3	± SE
Slaughter weight / kg	30.33^{a}	28.37^{b}	26.77^{c}	0.54
Hot carcass / kg	14.89^{a}	14.53^{a}	13.05^{b}	0.32
Hot carcass / kg (with edible offals)	15.84^{a}	15.48^{a}	14.03^{b}	0.32
DP on basis of fasting weight (without offals)	48.77^{b}	51.22^{a}	49.12^{b}	0.43
DP on basis of fasting weight (with offals)	52.24^{b}	54.56^{a}	52.44^{b}	0.40
DP on basis of empty weight (without offals)	56.15	55.63	54.56	0.2
DP on basis of empty weight (with offals)	59.73	59.26	58.65	0.23

a, b, c, values with different letters on the same row differ significantly at P<0.05

Lean, bone and fat percentages of carcass are illustrated in Table (7). It can be noticed that lean percentage of the carcass was higher (P<0.05) in animals fed R1 and R2 diets as compared to R3. This could be associated with the obtained chemical composition of longismus dorsi (L.D.) muscle, since similar trend was observed for CP % of L.D., being higher in R1 and R2 group as compared to R3 (Table 8). The fat percentage of the carcass was connected with fat % of L.D., since the highest value was recorded with R3, followed by R2, and the lowest in R1. Bone percentage of goats from R1 and R2 groups was similar, but both groups were considerably lower (P<0.05) than R3 (Table 7). The eye muscle area is a good criterion for boneless meat of the carcass. The area of eye muscle was not significantly affected by the treatments and ranged between 10.11 to 11.06 cm^2. This result agreed with the findings of Gaili *et al* (1982), Zeid (1998) and Allam *et al* (2007). They found that the eye muscle area varied from 4.12 to 16.20 cm^2. It could be noticed that the eye muscle area of the block and CFM supplement groups were practically similar.

Table (7): Lean, bone and fat percentage in carcass side and eye muscle area (cm^2) of goats fed different experimental rations.

Item	R1	R2	R3	± SE
Lean %	67.3^{a}	67.1^{a}	65.2^{b}	0.43
Bone %	24.3^{b}	24.1^{b}	25.7^{a}	0.30
Fat %	8.4	8.8	9.1	0.18
Eye muscle area (cm^2)	11.06	10.84	10.11	0.46

a, b, c, values with different letters on the same row differ significantly at P<0.05

Chemical composition of L.D. (Table 8) showed that most of the chemical parameters were not significantly affected by the diet. Ether extract content in L.D was the highest (P<0.05) in the animals from R3 group, while lower values were found in R1 and R2 groups. This trend was associated with EE % content of the rations being fed (Table 1).

This result agreed with the findings of Maharem (1990), Zeid (1998) and Youssef *et al.*, (1999).

Table (8): Proximate analysis of eye muscle (% on dry matter basis) of goats fed different experimental rations.

Item	R1	R2	R3	± SE
Moisture	65.6	65.3	66.7	0.31
Dry matter	34.4	34.7	33.3	0.31
Protein	58.7	58.9	58.1	0.22
Ether extract	37.9^{b}	38.4^{b}	39.6^{a}	0.29
Ash	2.8	3.2	2.9	0.15

a, b, c, values with different letters on the same row differ significantly at $P<0.05$

It can be concluded that:

- Feed block based on agro-industrial by-products with urea can be fed successfully and economically as a concentrate for goat kids without any adverse effects on animal performance which are beneficially reflected on feeding cost and economical efficiency.
- Using feed block as supplementary feed could replace the costly concentrate feed mixture (CFM).

Referring to results shown above, it could be recommended using feed block as feed supplement for growing kids.

ACKNOWLEDGEMENT

This research was supported by Grant No., M 18- 001, Middle East Regional Cooperation (MERC) program, Bureau for Economic Growth, Agriculture and Trade, U.S. Agency for International Development. Great thanks are due to professor El- Shaer, H. M., the principle investigator, for the continuous encouragement, supplying all facilities and reading manuscript. This support is greatly appreciated.

REFERENCES

Abdou, A.R. (2003). Performance of goats fed halophytic shrubs with organic wastes supplements in Sinai. Ph.D. Thesis, Fac. of Agric., Cairo Univ., Egypt.

Allam Sabbah M.; H.M El-Banna and Randa R. El-Elamie (2007): Performance of Zaraibi kids fed diets supplemented with medicinal herbs. Egypt. J. Nutr. Feeds, 10 (2) Special Issue: 349-363

Allam, Sabbah M.; K.M. Youssef; M.A. Ali and S.Y. Abo Bakr. (2006). Using some fodder shrubs and industrial by-products in different forms for feeding goats in Sinai. J. Agric. Sci. Mansoura Univ., 31 (3): 1371 -1385.

Anonyme, M. (2001). Annual report for 1999/2000 season of the Mashreq and Maghreb project (The development of integrated crop/livestock production in the low rainfall areas of West Asia and North Africa). ICARDA. 413 pp.

A.O.A.C. (1990). Association of Official Analytical Chemists. Official Methods of Analysis, 15th ed. Washington, D.C., USA.

Ben Salem, H; A. Nefzaoui and L. Ben Salem (2000). Supplementing range goats in Central Tunisia with feed blocks or a mixture of *Opuntia ficus indica var. inermis* and *Alriplex nummularia*. Effects on behavioural activities and growth. In: Proceedings of the Seventh International Conference on Goats, France, May 15-21, 2000, pp. 988-989.

Ben Salem, H; A. Nefzaoui and L. Messaoudi (2001). Les blocs alimentaires a base de grignons d'olive. Une alternative économique pour la complémentation des fourrages pauvres. Annales de l'INRAT 74. 187-203.

Ben Salem, H. and A. Nefzaoui, (2003). Feed blocks as alternative supplements for f sheep and goats. Small Rum. Res., 49: 275-288.

Ben Salem, H, A. Nefzaoui, and M.S. Ben Said, (2003). Effect of PEG and olive cake feed blocks supply on feed intake, digestion, and health of goats given ketmes oak (*Quercus coccifera* L.) foliage. Anim. Feed Sci. Technol., 110: 45-59.

Chenost, M. and C. Kayouli (1997). Utilisation des fourrages grossiers en régions chaudes. In: Etude FAG Production et Sante Animales, vol. 135. FAO, Rome. 1997. 226 pp.

Duncan, D.B. (1955). Multiple range and multiple F-test, Biometrics 11:1

El Hag, M.G.; M.A. Al-Merza and B. Al-Salti (2002). Growth in the Sultanate of Oman of small ruminants given date by-products-urea multinutrient blocks. Asian-Australas. J. Anim. Sci. 15 (5), 671-674.

El-Shaer, H. M.; H. M. El-Sayed; A. R. Askar; E. E. El-Hassanein and H. S. Soliman (2002). Effect of feeding a combination of ensiled salty natural and cultivated shrubs on the digestion and productive performance of growing sheep in southern Sinai. Int. Symp. on Optimum Resources Utilization in Salt-Affected Ecosystems in Arid and Semi-Arid Regions, Egypt, pp. 461 - 471.

El-Shaer, H. M., H. M. Kandil, H. S. Khamis, and H. M. Abo El-Nasr, (1996). Alternative feed supplement resources for sheep and goats in Egypt. In: Proceeding of Seminar of Recent Advances in Small Ruminant, Rabat. Morocco.

Fayed A. M.; K. M. Youssef and H.M. Abou El-Naser. (2001): Nutritional performance of goats fed non-conventional diets based on olive pulp in Sinai. Egypt. J. Nutr. Feeds, 4 (2) : 81 - 89 .

Gaili, E.S.E.; Y.S. Ghanem and A.M. Mukhtar (1982). A comparative study of some carcass characteristices of Sudan desert sheep and goats. Anim. Prod., 14: 351-357.

Galina, M.A.; M. Guerrero; G. Serrano; R. Morales and G.F.W. Haenlein (2000). Effect of complex catalytic supplementation with non-protein nitrogen on the ruminal ecosystem of growing goats pasturing on shrub land in Mexico. Small Rum. Res., 36, 33-42.

Hadjipanayiotou, M. (1997). The role of crop residues and agro-industrial by-products in filling the deficit of animal feedstuffs in the middle East. In: Haddad, N., Tulwiler. R., Thomson, E. (Eds.), Improvement of Crop-livestock Integration Systems in West Asia and North Africa. Proceedings of the Regional Symposium on Integrated Crop-livestock Systems in the Dry Areas of West Asia and North Africa. Amman, Jordan. ICARDA. Aleppo, Syria. November 6-8, 1995. pp. xi + 572+40, 372-385.

Hamadeh, S. K.; G. N. Bistanji; M. R. Darwish; M. Abi Said and D. Abi Chanem (2001). Economic sustainability of small ruminants production in semi-arid areas of Lebanon. Small Rum. Res. 40: 41-49.

Houmani. M. and J.L. Tisserand (1999). Complémentation d'une paille de blé avec des blocs multinutritionnels: effets sur la digestibilité de la paille et intérêt pour des hrebis taries et des agneaux en croissance. Ann. Zootech., 48. 199 209.

Kearl, I. C. (1982). Nutrient Requirements of Ruminants in Developing Countries.International Feedstuffs Utilization. Utah Agric. Exp. Station, Utah State University, Logen, Utah, USA.

Leng. R.A. (1990). Factors affecting the utilisation of poor-quality forages by ruminants particularly under tropical conditions, Nutr. Res. Rev., 3: 277-303.

Maharem, G.M. (1990) Meat production and carcass characteristics of Barki and Damascus Goats and their crosses under two feeding systems. M.Sc. Thesis, Alexandria Univ. Fac. Agriculture.

Nyarko-Badohu, O.K.; C. Kayouli; A.A. BA and A. Gasmi (1993). Valorization of cereal straw in the feeding in the North of Tunisia. In: Proceeding of the International Conference in Increasing Livestock Production through Utilization of Local Resources, . Beijing. China 18-22 October, 1993. pp. 127-184

Salman, A. D. (1996). The role of multinutrient blocks for sheep production in integrated cereal-livestock farming system in Iraq. 2nd FAO Electronic Conference on Tropical Feeds, Livestock Feed Resources within Integrated Farming Systems.

Salman. A.D. (1997). The potential of by- product feed blocks in Tunisia Consultancy Report. ICARDA. Mashreq/ Maghreb Project (The Development of Integrated Crop-Livestock Production Systems in West Asia and North Africa).

Salman, A.D. (2004). New approach in development of feed block technology in the WANA region in the sub-Regional Expert consultation meeting on technology transfer. Proceedings of the Regional Technology transfer workshop. El-Tamzini, M and Hegazi, N and Rusan, L. (Editors). Muscat, Oman 14- 15 April, 2004.

Samanta, A.K.; K.K. Singh; M.M. Das; S.B. Maity and S.S. Kundu (2003). Effect of complete feed block on nutrient utilization and rumen fermentation in Barbari goats. J. Small Rum. Res., 48: 95-102.

Sancoucy, R. (1995). New development in the manufacture and utilization of multinutrient blocks. World Anim. Rev. 82. 78- 83.

SAS (1990). Users Guide Statistics, SAS Inst. Inc., Carg. NC.

Singh, K.K.; M.M. Das; A.K. Samanta; S.S. Kundu and S.D. Sharma (2001). Effect of grass based complete diets on feed intake and nutrient utilization in crossbred calves. In: Proceedings of the Xth Animal Nutrition Conference. NDRI, Karnal. India 9-11 November 2001. pp. 9- 10.

Sudana, I.B. and R.A. Leng. (1986). Effects of supplementing a wheat straw diet with urea or urea-molasses blocks and/or cottonseed meal on intake and live weight change of lambs. Anim. Feed Sci. Technol., 16. 25-35.

Van Soest. P.J.; J.B. Robertson and B.A. Lewis (1991). Methods for dietary fiber, neutral detergent fiber and non- starch polysaccharide in relation to animal nutrition. J. Dairy Sci., 74: 3583- 3597.

Verma, A.K.; U.R. Mehra; R.S. Dass and A. Singh (1996): Nutrient utilization by Murrah buffaloes (*Bubalus bubalis)* from compressed complete feed blocks. Anim. Feed . Sci. Technol., 59: 255- 263.

Youssef, K.M. (1999). Improving the palatability and nutritive value of some range plants for goat feeding in Sinia. Ph.D. Thesis. Fac. Agric. Ain Shams Univ., Egypt.

Youssef, K.M. and A.M. Fayed (2001). Utilization of some organic wastes as feed supplement for growing goats under desert condition. Egypt. J. Nutr. Feeds, 4(2): 91-99.

Youssef, K. M.; A. M. Fayed and H. S. Khamis (2001). Productive and / reproductive performance of ewes and does fed non-conventional diets based on olive pulp in Sinai. Egypt.J. Nutr. Feeds (Special Issue), 4: 591-604.

Youssef, K. M. (2002). Nutritional evaluation of treated rice straw for sheep. J. Agric. Sci. Mansoura Univ., 27(8): 5201 - 5209.

Zeid, A.M. (1998). Effect of medicinal herbs in performance of goat. Ph.D. thesis Faculty of Agric. Cairo Univ.

أداء وصفات الذبيحة للماعز المغذاة على أعلاف تكميلية من مخلفات التصنيع الزراعي فى صورة مكعبات علفية

كمال محمود يوسف

قسم تغذية الحيوان والدواجن – مركز بحوث الصحراء – المطرية – القاهرة – مصر

أجريت هذه الدراسة بمنطقة العريش – محافظة شمال سيناء لدراسة تأثير تغذية مخلفات التصنيع الزراعي في صورة مكعبات علفية على أداء الماعز وصفات الذبيحة. استخدم فى هذه الدراسة ٣٦ذكر ماعز بلدي نامى عند عمر ٣- ٤ شهور وبمتوسط وزن ١٥,٤ كيلو جرام تم تقسيمها إلى ثلاث مجاميع (١٢ حيوان فى كل مجموعة) وفقا لوزن الجسم. وزعت المجموعات عشوائياً على الثلاث معاملات التجريبية .

غذيت المجموعة الأولى (R1) على علف مركز تجارى بينما غذيت المجموعة الثانية والثالثة (R3,R2) على مخلوط علف مركب يتكون من ٢٥٪ نخاله قمح و٢٥ ٪ نوى بلح و٢٠٪ كسب زيتون و١٤٪ كسب فول صويا و١٠٪مولاس و ٢٪حجر جيري و٢٪طفله و٢٪ يوريا . قدمت العليقة الثانية(R2) فى صورة قوالب علفية بينما قدمت العليقة الثالثة (R3) كما هي بدون تصنيع تم تقديم المركزات بنسبة ٣٪ من وزن الجسم لكل المجاميع بينما قدم تبن القمح المعامل باليوريا حرا. استمرت التجربة لمده ١٢٠ يوم اتبعت بثلاث تجارب هضم (٣ حيوانات من كل مجموعة) لتقييم العلائق المستخدمة ثم تم ذبح ٣ حيوانات من كل مجموعة لدراسة صفات الذبيحة.

وكانت أهم النتائج المتحصل عليها كما يلى:-

- كمية المادة الجافة الماكولة تساوت بين R2, R1 ولكنها كانت اعلى قليلاً من R3.
- المادة المشروب (مل / جرام/ مادة جافة ماكولة) كان اقل معنويا مع R1 مقارنة مع R3, R2.
- عند التغذية على العلف المركز (CFM) زاد معامل هضم المادة الجافة والمادة العضوية والمستخلص الخالى من النيتروجين بينما عند التغذية على R2 زاد معامل هضم البروتين الخام، والمستخلص الاثيرى، وكان من الواضح ان التغذية على R2 (القوالب) ادت إلى زيادة معنوية فى معامل هضم الالياف الخام.
- اعلى مركبات غذائية مهضومة (٦٢,٥٪) لوحظت مع R1 بينما اعلى بروتين مهضوم (١٠٥,٥ جرام/ للراس / يوم أو ٣,٩ جرام/ كيلوجرام وزن حى) لوحظت مع R2.
- كل الحيوانات اظهرت ميزان نيتروجين موجب مع عدم وجود اختلافات معنوية بين المجاميع.
- سجلت مجموعة R2, R1 اعلى زيادة وزنية يومية (١١٩,٣٤ ، ١١٠,٣٦ جرام/ يوم) من مجموعة R3 (٨٩,٧٢ جرام/ يوم) .
- التغذية على القوالب العلفية (R2) ادت إلى انخفاض تكلفة التغذية/ ١ كيلو جرام زيادة فى الوزن الحى بحوالى (٥٧,٨٪ ، ١٠,٣٪) وادت إلى زيادة الربحية النهائية بالجنية لكل راس بحوالى (١٥,٠٪ ، ٢١,٨٪) مقارنة بمجموعة المقارنة (R1) و R3 ، على التوالى.
- كانت نسبة التصافى على اساس الوزن الصائم اعلى معنويا فى حيوانات مجموعة القوالب العلفية (R2) من (R3, R1)
- النسبة المئوية للحم فى الذبيحة كانت اعلى معنويا فى حيوانات R2, R1 بينما كانت R3 الاقل. وسجلت النسبة المئوية للعظم عكس هذا الاتجاه.
- مساحة العضلة العينية لم تتاثر معنويا بالمعاملات وتراوحت بين ١٠,١١سم٢ إلى ١١,٠٦سم٢.

وتوصى الدراسة بانه يمكن استخدام القوالب العلفية المصنعة من مخلفات التصنيع الزراعى واليوريا كبديل للعلف المركز التجارى الذى ينعكس على تكلفة التغذية وبالتالى الكفاءة الإقتصادية وبدون تاثيرات سلبية على اداء الماعز.