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# USING SOME FODDER SHRUBS AND INDUSTRIAL BY-PRODUCTS IN DIFFERENT FORMS FOR FEEDING GOATS IN SINAI

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## ABSTRACT

Berseem hay (BH) and mixture of fodder shrubs (FS), which consisted of 30% *Acacia saligna* (AS) and *Atriplex nummularia* (AN) were chopped and ground to be used as roughage in desert goats rations. Eighteen mature male goats with an average live body weight of 32.91 ± 0.414 kg were used in metabolism trials to assess the effect of FS and form of the ration on the digestibility, nitrogen balance and water balance and some rumen fermentation parameters. Animals were randomly assigned into sex feeding groups, R1(BH+CFM) as mash, R2 {(BH) as mash + (CFM) as block}, R3 (BH + CFM) as block, R4 (FS+CFM) as mash, R5 {(FS) as mash + (CFM) as block} and R6 (FS + CFM) as block. The experimental rations contained 60 % CFM + 40 % roughage, the concentrate feed mixture (CFM) consisted of (23.5% date seed, 15% olive pulp, 25% wheat bran, 25% radicell, 10% molasses and 1.5% urea ).

The results showed a significant (P<0.05) difference in dry matter intake of CFM only between R1 and R6 , the highest value of total dry matter intake was in R1 and the lowest value was in R5.Ration 1(R1) showed the highest digestion coefficients for all nutrients. The same trend was observed for the nutritive value as TDN and DCP.

There was a significant (P<0.05) difference in nitrogen balance among groups, the highest value was in R1, while the lowest value was in R5.

Twenty four male goat kids (4 months old and 15.67 ± 1.11 kg average live body weight) were used in a growth trial for 6 months. Animals were divided randomly into three feeding groups, R1 (BH + CFM) as mash, R3 (BH + CFM) as block and R6 (FS + CFM) as block. The same CFM and roughage: concentrate ratio, which were used in the digestion trails were used in the growth trail. Average daily gains of animal R1 and R3 were significantly (P<0.05) higher than those in R6. On the other hand, animal in R6 had the highest economic efficiency than R1 and R3.

From the previous data, it could be concluded that using feed blocks consisting of 60% CFM and 40% FS seems to be a good, practical and economical for feeding system for goats in the desert area.

**Keywords:** feed blocks, digestion coefficient, fodder shrubs, rumen and blood parameters.

## INTRODUCTION

In desert areas, sheep and goats mostly thrive on grazing of natural grass as well as browsing on shrubs and tree leaves. These feed resources are characterized by low palatability and poor nutritive value and imbalance of nutrient resource (Eid, 2003and Samanta *et al.*, 2003). Many attempts have been done to increase the utilization of these roughage resources by various methods such as, supplying of the deficient nutrients mainly energy and nitrogen (Leng, 1990) and using feed blocks in sheep and goats feeding (Nagpal and Aror, 2002). The use of complete feed blocks in animal feeding have several advantages as, simple and efficient technique giving a product having easer of transportation and minimum feeding selectivity which reflects on the feeding costs, as well as could be carrier of anathematic medicines (Ben Salem and Nefzaoui, 2003 and Samanta *et al.*, 2003). Agro-industrial by-products are available in Egypt in large quantities and characterized by having nutritive value. So, it can be used as supplementary ingredient in animal rations (Mohamed and El-Saidy, 2003).

Therefore, the objective of this study was to investigate the effect of feeding fodder shrubs in different forms on the performance of growing goats in Sinai.

## MARERIALS AND METHODS

The present study was carried out in Ras Suder Research Station, Desert Research Center, Ministry of Agriculture, in South Sinai Governorate. This study was divided into three parts, the first part included preparation of the ingredients of ration in different forms, the second part involved metabolism trials and the third part included a growth trial.

In the first part, both *Atriplex nummularia* (AN) and *Acacia saligna* (AS) as fodder shrubs (FS) were colleted and chopped into 3-5 cm and sun dried for 15 days then were ground to pass throeyd about 0.5- 1cm sieve.A mixture of FS contained 30% AS plus 70% AN was used as roughage in tested rations. Also berseem hay (BH) was chopped, ground and used as good quality roughage. Roughages were mixed with a concentrate feed mixture (CFM) ratio of 40%: 60 %, respectively. The CFM consisted of 23.5% date seed, 15% olive pulp, 25% wheat bran 25%, radicell 10%, molasses and 1.5 % urea. Urea and molasses were dissolved in a least amount of water and sprayed to the feed mixture. 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 2weeks in winter. Blocks were turned up side down from time to time to accelerate the drying process.

In the second part, metabolism trials were carried out for 28 days (21 days as preliminary period and 7 days as collection period) using eighteen mature male goats with 32.91±0.41 kg average live body weight. Animal were divided randomly into six feeding groups (3 animals each) as follows: R1: (BH + CFM) as mash, R2: (BH as mash and CFM as feed block), R3: (BH + CFM) as feed block, R4: (FS + CFM) as mash, R5: (FS as mash + CFM as feed block), R6: (FS+ CFM) as feed block. Rations in all groups were fed at 2.5% from live body weight of animals. Dry matter intake and water consumption were determined, meanwhile, water balance was calculated. At the end of digestibility trails, rumen samples were taken by stomach tube at zero time (just before feeding) and then at 6 hours post feeding to determine pH and NH3-N, and VFA's concentration. Blood samples were withdrawn before feeding to determine total protein, albumin, urea, ceratinine and globulin concentration.

In the third part, In spite of the results obtained in the second part of this work, three-tested rations (differed in roughage and physical form) were chosen in a growth trail taking into consideration the ease in application and more profitability for the farmer. Growth trail was carried out for 180 days using 24 male kids (4 months age) with average body weight 15.67 ± 1.11 kg and treated against external parasites to ensure that the animals are in good health and are free from parasites. Animals were divided randomly, according to their live body weight into three feeding groups (8 each).First group, R1was fed (40% BH + 60% CFM) as mash, second group, R3 was fed (40% BH + 60% CFM) as feed block while the last group, R6 was fed (40% FS + 60% CFM) as feed block. During the growth trail, each group of animals was housed in separate pen. All groups were fed 5% of live body weight twice daily (8.00 am and 3.00 pm), refusals (if any) were collected just before offering the next ration, both feed intake and orts were recorded daily for all animals. Water was available all the time.

Animals were weighed at the beginning and then biweekly. Body weight changes were recorded for each animal. The production costs of rations, feed conversion were calculated based on the market prices in year 2002, when the ingredients and experimental rations were bought and prepared.

**Chemical analysis**

Samples of feed, urine and feces were analyzed according to A.O.A.C (1990). Fiber fraction constituents were determined according to Goering and Van Soet (1970). Ruminal liquor pH was immediately measured by using pH meter. Ammonia nitrogen ($NH_3$-N) and total volatile fatty acid (VFA, s) were determined according to A.O.A.C (1990) and Warner (1964), respectively. Blood analysis was determined by using commercial Kits.

**Statistical analysis**

Data were statistically analyzed by one way of variance using SAS, (1998), and the model was :-

$$Y_{ij} = M + T_i + e_{ij}$$

Where :- $Y_{ij}$ = experimental observation
$M$ = general mean
$T_i$ = effect of treatment
$e_{ij}$ = experimental error

Differences among means were compared by Duncan's multiple range test of SAS (1998).

## RESULTS AND DISCUSSIONS

**Chemical composition of ingredients and experimental rations:**

Chemical composition of ingredient and experimental rations were presented in table (1).

Table (1): Chemical composition of feed ingredients and the experimental rations (% as DM basis)

| Items | DM | OM | CP | CF | EE | NFE | Ash | NDF | ADF | ADL | Cell. | Hemi. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (AN) | 89.52 | 76.99 | 14.53 | 16.72 | 2.73 | 43.01 | 23.01 | 60.55 | 30.63 | 16.85 | 13.78 | 29.92 |
| (AS) | 89.41 | 89.48 | 13.62 | 18.09 | 2.97 | 54.80 | 10.52 | 58.72 | 35.31 | 18.4 | 16.91 | 23.41 |
| (BH) | 89.00 | 88.35 | 15.90 | 28.22 | 2.38 | 41.85 | 11.65 | 59.31 | 31.93 | 10.04 | 21.89 | 27.38 |
| Dale seed | 90.1 | 98.27 | 8.89 | 12.3 | 6.04 | 71.04 | 1.73 | 58.13 | 40.68 | 14.77 | 25.91 | 17.45 |
| Olive pulp | 91.56 | 93.92 | 8.33 | 34.25 | 7.02 | 44.32 | 6.08 | 68.88 | 46.79 | 23.50 | 23.29 | 22.09 |
| Radicell | 92.46 | 95.71 | 24.85 | 11.68 | 2.46 | 56.72 | 4.29 | 62.16 | 18.1 | 4.35 | 13.75 | 44.06 |
| Wheat bran | 88.67 | 94.34 | 14.8 | 11.06 | 3.88 | 64.6 | 5.66 | 47.22 | 13.75 | 2.88 | 10.87 | 33.47 |
| **Rations** | | | | | | | | | | | | |
| R1 | 90.00 | 92.67 | 17.90 | 19.90 | 3.29 | 51.58 | 7.33 | 54.40 | 26.95 | 9.75 | 17.20 | 27.45 |
| R2 | 89.50 | 92.47 | 17.70 | 19.39 | 3.18 | 52.20 | 7.53 | 54.92 | 27.75 | 9.80 | 17.95 | 27.17 |
| R3 | 88.50 | 92.25 | 18.25 | 20.00 | 3.00 | 51.00 | 7.75 | 54.68 | 27.72 | 9.99 | 17.73 | 26.96 |
| R4 | 88.00 | 88.70 | 17.02 | 15.87 | 3.58 | 52.23 | 11.30 | 54.75 | 27.81 | 12.12 | 15.69 | 26.94 |
| R5 | 88.20 | 89.00 | 16.94 | 15.10 | 3.35 | 53.61 | 11.00 | 54.92 | 27.74 | 12.98 | 14.76 | 27.18 |
| R6 | 89.00 | 89.00 | 17.35 | 15.37 | 3.31 | 52.97 | 11.00 | 54.59 | 28.00 | 12.80 | 15.20 | 26.59 |

(AN):*Atriplex nummularia* , (AS): *Acaci salegana* , (BH): brseem hay. R1:(BH +CFM) as mach,
R2: BH as mach +(CFM as feed block), R3: (BH + CFM) as feed block, R4:(FS(70% AN+30% AS )+CFM) as mach,R5:FS as mach+(CFM as feed block), R6(FS +CFM )as feed block.

The data in this table showed that BH had the highest crude fiber compared with AS and AN .On the other hand, AN contained the highest ash (23.01%) compared with BH and AS. These results are in agreement with those obtained by Famhy (1998) and Eid (2003). On the other hand, olive pulp had the highest amount of CF, NDF, ash and ADF compared with the other ingredients. The highest value of NFE was in date seed followed by wheat bran. Radicell showed the highest value of CP. These results are similar to those found by Youssef and Fayed, (2001) and Abdou (2003).

Chemical composition of tested rations indicated that rations were similar in all nutrients except CF, ash, and ADL. However, rations consisted of FS, (R4, R5 and R6) were higher in ash content and ADL., while, CF was lower in these rations than others while contained BH. These differences may be due to the variation of chemical composition of FS mixture compared to berseem hay.

**Voluntary feed intake and feeding value**

Voluntary feed intake, digestibility, nutritive value and nitrogen balance data in table (2) indicated that a significant difference ($p < 0.05$) in dry matter intake (g/kg BW) of CFM only was observed between R1 and R6 being 13.50 and 12.62 g/kg BW respectively. While, there were no significant differences in roughage and total dry matter intake among groups. The highest intake of CFM and roughage was in R1and the lowest CFM intake was in R6, while, the lowest roughage intake was in R5. It could be observed that the highest total DM intake was recoded byR1and R3. These results may be due to mechanical treatment (chopping and grinding) of R1 and mixing roughage with concentrate and blocking of R3, also to higher content of protein and the quality of roughage source (BH compared to FS) in these rations (Nagpal and Arora, 2002). These results are in agreement with those obtained by Jaster and Murohy, (1983) who reported that reduction in particle size of feeds by chopping or grinding could result in an increase in forage intake and may prevent selection .Also , Nyarko-Badohu *et al.*, (1994) found an increase of straw intake by sheep when supplemented with molasses containing blocks.

In the same table, the digestion coefficients were varied significantly ($P<0.05$) among treatments. Whereas, R1 was the highest in digestion coefficients of all nutrients except hemicellulose followed by R3, while the lowest digestion coefficient was in R2. The improvement of digestibility in R1may be due to the effect of mechanical treatment (chopping and grinding), which lead to increase the breakdown of the linkages between cellulose and lignin. These results are in agreement with those of El Ashry *et al.*, (1997). Generally, improving nutrients digestibility in particular R1 and R3 indicated that available carbohydrate supplied by molasses might have resulted in better utilization of the ration (Leng, 1984 and Schier et *al.*, 1989).

In the case of rations contained FS (R4, R5 and R6), the highest values of digestion coefficients were recorded by R5. These data may be due to the lower intake of roughage in this group. Similar results were obtained by Etman and Soliman (1999) who reported that the digestibility coefficients of all nutrients were affected by concentrate roughage ratio. Also, this result agreed with that obtained by Aly et *al.*, (1982).

Table (2): Voluntary feed intake,digestion coefficients, nutritive value and nitrogen balance of experimental rations.

| Items | R1 | R2 | R3 | R4 | R5 | R6 |
|---|---|---|---|---|---|---|
| | | | Feed intake g/kg BW | | | |
| CFM | $13.50^{a}\pm0.02$ | $12.97^{ab}\pm0.1$ | $13.24^{ab}\pm0.02$ | $13.20^{ab}\pm0.002$ | $12.97^{ab}\pm0.005$ | $12.62^{b}\pm0.49$ |
| Roughage | 8.99±0.001 | 7.73±0.52 | 8.83±0.01 | 8.80±0.001 | 7.13±1.39 | 8.41±0.033 |
| Total intake | 22.49±0.004 | 20.70±0.52 | 22.07±0.005 | 22.00±0.004 | 20.10±1.39 | 21.03±0.82 |
| | | | Digestibility coefficients % | | | |
| DM | $65.91^{a}\pm0.55$ | $58.7^{c}\pm1.03$ | $64.60^{ab}\pm0.61$ | $58.64^{c}\pm0.60$ | $62.74^{b}\pm0.11$ | $55.01^{d}\pm0.28$ |
| OM | $67.07^{a}\pm0.67$ | $59.81^{d}\pm1.00$ | $65.16^{b}\pm0.58$ | $59.41^{d}\pm0.15$ | $61.83^{c}\pm0.24$ | $54.82^{e}\pm0.37$ |
| CP | $70.17^{a}\pm0.47$ | $63.76^{b}\pm0.65$ | $68.31^{a}\pm0.88$ | $69.79^{a}\pm0.65$ | $69.98^{a}\pm0.34$ | $63.39^{b}\pm0.55$ |
| CF | $63.60^{a}\pm0.64$ | $48.38^{c}\pm1.31$ | $62.28^{a}\pm0.64$ | $52.3^{b}\pm0.16$ | $52.38^{b}\pm.058$ | $50.48^{cb}\pm0.04$ |
| EE | $75.42^{a}\pm0.60$ | $67.71^{b}\pm1.90$ | $73.09^{ab}\pm0.40$ | $71.78^{b}\pm1.52$ | $73.02^{ab}\pm0.43$ | $66.8^{c}\pm0.25$ |
| NFE | $66.82^{a}\pm0.47$ | $61.86^{b}\pm1.11$ | $64.7^{a}\pm0.55$ | $57.31^{c}\pm0.16$ | $61.16^{b}\pm0.39$ | $52.48^{d}\pm0.83$ |
| | | | Nutritive value % | | | |
| TDN | $65.46^{a}\pm0.69$ | $58.32^{c}\pm1.03$ | $62.85^{b}\pm0.55$ | $55.90^{d}\pm0.18$ | $58.90^{c}\pm1.02$ | $51.52^{e}\pm0.35$ |
| DCP | $12.57^{a}\pm0.08$ | $11.35^{c}\pm0.13$ | $12.46^{a}\pm.016$ | $11.89^{b}\pm0.11$ | $11.91^{b}\pm0.19$ | $10.98^{c}\pm0.09$ |
| | | | Nitrogen balance:- | | | |
| NI g/h/d | 21.69±2.15 | 19.62±1.49 | 20.95±1.39 | 20.16±1.14 | 18.12±1.32 | 18.19±1.78 |
| FN g/h/d | 6.47±0.70 | 7.11±0.60 | 6.64±0.59 | 6.09±0.42 | 5.44±0.46 | 6.66±0.55 |
| UNg/h/d | $7.92^{bc}\pm1.12$ | $6.33^{c}\pm0.90$ | $8.12^{bc}\pm0.86$ | $10.77^{ab}\pm1.07$ | $12.40^{a}\pm0.99$ | $9.11^{abc}\pm1.62$ |
| NBg/h/d | $7.30^{a}\pm0.48$ | $6.18^{ab}\pm1.45$ | $6.19^{ab}\pm0.78$ | $3.30^{bc}\pm0.70$ | $0.28^{c}\pm0.13$ | $2.42^{c}\pm1.36$ |

a,b,c and d means in the same row with *different* superscripts differ significantly ($P<0.05$).

*NI: Nitrogen intake* ,FN: Fecal nitrogen ,UN ,Urainy nitrogen ,NB, Nitrogen balance.

Generally, rations contained BH had the highest nutrients digestion compared with those contained FS. This result may be due to the higher content of ADL in rations contained FS. This result agree with those obtained by Jung and Allen, (1995) and Youssef and Fayed (2001), who reported a negative relationship between lignin concentration and forage digestibility.

The nutritive value as TDN and DCP (Table 2) indicated that BH rations showed the highest value of TDN% in R1 (65.46 %) and the lowest value was in R6 (51.52%). The higher TDN% may be due to the higher intake of CFM and higher digestibility of nutrients in R1. The DCP values showed the same trend of TDN values. These results are in agreement with those reported by Etman and Soliman (1999). On the other hand, in the FS rations, R5 was the highest in TDN % and the lowest value was in R6. This may be due to lower digestibility coefficients of R6.

Generally, rations contained BH had higher% TDN values than those contained FH. This may be due to higher content of CF of rations contained FS as showed by Aguilera (1987) and Youssef and Fayed (2001) who found that reduction in TDN and DCP values may be due to the high lignin content .Also, These results agreed with those obtained by Fahmy, (1998) and Eid, (2003) who reported that animals fed rations consisted of agro- industrial by products and halophytic shrubs had lower TDN values than those consisted of BH and agro- industrial by products.

**Nitrogen and water balance**

Nitrogen balance results in table (2) showed that in the case of BH rations, the highest value of N balance was in R1 and the lowest value was in R2 .this may be due to different of DMI and crude protein digestibility. While among FS rations, R4 had the highest N balance followed by R6, while R5 had the lowest N balance. This may be due to the higher excretion of urinary nitrogen which lead to negative effect on N balance.

Data of water consumption in table (3) showed that there was no significant difference among groups of free drinking water. Animals of R1 showed the highest free drinking water, while the lowest was in R2. These results may be due to the variation in DMI.

The highest total water intake was in R1 while the lowest was in R2. The increase in total water intake may be due to the higher intake of DM and CP. The same results were obtained by Youssef (1999) and Eid (2003).

Urinary water was higher in R6 followed by R5 (1410.55 and 1288.88 ml/h/d) respectively, than other groups. These results are in agreement with the findings of Eid (2003) who showed that the high content of ash in natural and cultivated halophytic (shrubs) plants mixtures lead to push animals to increase excretion of urine as natural chanel to excrete minerals. Increasing total water execration in R6 and R5 lead to decreasing water balance in R6 and R5.

**Rumen parameters**

Data in table (4) showed that ruminal ammonia nitrogen ($NH_3$-N) concentration was lower before feeding and increased post feeding with all rations. The mean value ranged from 22.81 in R3 to 28.7mg/100 ml RL in R1.

Table (3): Water consumption and balance of goats as affected by experimental rations.

| Items | R1 | R2 | R3 | R4 | R5 | R6 |
|---|---|---|---|---|---|---|
| | | | **Water intake:-** | | | |
| Free drinking | 2816.66 | 2203.33 | 2651.66 | 2718.33 | 2504.44 | 2422.22 |
| water ml/h/d | ±262.95 | ±198.01 | ±197.82 | ±171.70 | ±214.96 | ±200.13 |
| Combined | 84.13 | 99.29 | 99.29 | 100.96 | 94.59 | 80.97 |
| water ml/h/d | ±8.43 | ±7.49 | ±8.66 | ±5.74 | ±7.01 | ±7.93 |
| Metabolic | 297.04$^{a}$ | 241.12$^{ab}$ | 270.58$^{ab}$ | 248.29$^{ab}$ | 235.23$^{ab}$ | 202.36$^{b}$ |
| water ml/h/d | ±28.15 | ±18.15 | ±25.40 | ±13.69 | ±16.60 | ±19.23 |
| Total water | 3197.83 | 2543.74 | 3021.53 | 3067.58 | 2834.56 | 2705.55 |
| *intake ml/h/d* | ±236.07 | ±222.76 | ±195.22 | ±155.80 | ±238.00 | ±226.49 |
| | | | **Water excretion:-** | | | |
| Feacal water | 235.47$^{a}$ | 198.8$^{ab}$ | 202.47$^{ab}$ | 183.56$^{ab}$ | 130.86$^{b}$ | 157.32$^{b}$ |
| ml/h/d | ±15.18 | ±26.29 | ±33.16 | ±24.28 | ±6.19 | ±12.68 |
| Urinary water | 1052.66$^{ab}$ | 572.66$^{b}$ | 1163.33$^{a}$ | 1136.66$^{a}$ | 1288.88$^{a}$ | 1410.55$^{a}$ |
| ml/h/d | ±144.36 | ±76.01 | ±168.73 | ±46.93 | ±29.00 | ±318.56 |
| Total water | 1288.13$^{a}$ | 771.46$^{b}$ | 1365.8$^{a}$ | 1320.22$^{a}$ | 1419.74$^{a}$ | 1567.87$^{a}$ |
| excre. ml/h/d | ±14.53 | ±67.34 | ±170.58 | ±37.08 | ±33.98 | ±108.26 |
| ***WaterBalance** | 1909.7 | 1772.28 | 1655.73 | 1747.36 | 1414.82 | 1137.68 |
| **ml/h/d** | ±363.95 | ±215.99 | ±301.26 | ±186.57 | ±209.05 | ±307.21 |

a and b means in the same row with different superscripts differ significant ($P<0.05$).

*Metabolic water was calculated from TDN intake a yield of 0.6 g.water per g.(Farid et al.,1985).* *Including insensible water loss.

Higher $NH_3$-N concentration may be due to that higher dry matter and DCP intake as well as the increase of digestibility which lead to the improvement of microbial protein synthesis and rumen microflora growth . This agreed with that of Nagpal and Arora (2002) and Nagalakshimi and Reddy (2001).

Increasing ammonia nitrogen in the rumen was a result of increasing protein intake as mentioned by Abd El Gawad *et al.,* (1994) and El Sayed (1994). Also, ammonia was higher for goats fed mash than those fed block. This result indicated that feeding of complete diet in the from of blocks slowed down the production of ammonia in the rumen and thus save the body system from the burden of recycling of excess ammonia ( Samanta *et al* .2003).

Concentration of VFA,s ranged from (6.72 m-equiv/100 ml) in R1 to (8.55 m-equiv/100ml) in R6 before feeding and increased after feeding to a range from (10.05m-equiv/100ml) in R5 to (12.47 m-equiv/100ml) in R4. Generally, the mean of VFA,s concentrations ranged from (8.45 in R1 to 10.38 in R4) and were within the normal level (3.07 to 19.90 ml.eq./100 ml) of rumen liquor reported by several researchers El-Sayed (1994), Youssef (1999), Abdou (2003) and Eid (2003).

Ruminal pH ranged from 6.46 in R 6 to 7.13 in R1 and R2 before feeding while, after feeding it ranged from 6.06 in R4 to 6.66 in R3. The mean pH values of rumen liquor in the present study are within the ranges reported by El Ashry *et al.,* (1997) and Rakha (1988). The pH values were always above 6.00 which ensure maximal cellulolytic activity and microbial protein synthesis (Hungate, 1966).

**Blood parameters**

Data in table (5) show that the concentration of total blood serum protein before feeding varied significantly ($p<0.05$) and ranged from 8.42 mg/100ml in R5 to 9.61mg/100ml in R6. The increase in total protein concentration may be due to the supplementation of urea and molasses and increasing the digestibility of CP. These results agree with those found by Abdel Aziz *et al.,* (1993) and Yousef and Zaki (2001).

Generally, the ranges obtained in this study were similar to those obtained by Talha *et al.,* (2005).

Blood serum albumin concentrations ranged from 4.23 to 4.56 mg/100 ml in R5 and R1, respectively. The highest values of serum albumin may be due to the higher digestibility of CP than other ration as showed by Rowlands (1980) and Yousef and Zaki (2001).

Generally, values of albumin were within the normal range (3.5-5.0) obtained by Kaneko(1989).

Blood serum globulin had highest value in R6(5.33 gm), while the lowest was in R3 (4.17 mg). These values of globulin concentration were within the normal value indicating good immunity status of animals (Talha *et al.,* 2005).

Ceratinine level ranged from 1.17 mg/100ml to 1.43 mg/100ml. These results agreed with those obtained by El Ashry *et al.,* (1997) who found that plasma cereatinine level ranged between 0.09 to 1.4 mg/100ml blood.

Table(4): Effect of tested rations on some rumen parameters .

| Items | Timo of sampling | R1 | R2 | R3 | R4 | R5 | R6 |
|---|---|---|---|---|---|---|---|
| | | | | Experimental rations | | | |
| | | | | $NH_3$-N,mg/100ml RL | | | |
| 0 hours | | $26.41^{a}$±0.005 | $18.97^{e}$±0.003 | $20.42^{d}$±0.55 | $25.43^{b}$±0.25 | $25.11^{b}$±0.11 | $25.71^{c}$±0.13 |
| 6 hours | | $30.99^{a}$±0.03 | $30.08^{ab}$±0.27 | $25.2^{c}$±0.028 | $29.55^{b}$±0.65 | $29.23^{b}$±0.09 | $21.12^{d}$±0.13 |
| Mean | | $28.7^{a}$±0.09 | $24.53^{c}$±0.13 | $22.81^{d}$±0.36 | $27.49^{b}$±0.24 | $27.17^{b}$±0.55 | $23.42^{d}$±0.06 |
| | | | | VFA,s (mequiy /100 mg RL) | | | |
| 0 hours | | $6.72^{b}$±0.10 | $8.37^{a}$±0.02 | $8.39^{a}$±0.02 | $8.28^{a}$±0.08 | $8.28^{a}$±0.02 | $8.55^{a}$±0.20 |
| 6 hours | | $10.17^{c}$±0.09 | $10.88^{b}$±0.17 | $10.67^{bc}$±0.31 | $12.47^{a}$±0.19 | $10.05^{c}$±0.03 | $10.41^{cb}$±0.23 |
| Mean | | 8.45± | 9.63± | 9.53± | 10.38± | 9.17± | 9.48± |
| | | | | pH. | | | |
| 0 hours | | $7.13^{a}$±0.04 | $7.13^{a}$±0.08 | $7.06^{a}$±0.07 | $6.70^{b}$±0.05 | $6.63^{b}$±0.03 | $6.46^{c}$±0.03 |
| 6 hours | | $6.66^{a}$±0.05 | $6.50^{a}$±0.17 | $6.46^{ab}$±0.05 | $6.06^{b}$±0.12 | $6.30^{ab}$±0.05 | $6.26^{ab}$±0.21 |
| Mean | | $6.9^{a}$±0.04 | $6.82^{a}$±0.08 | $6.76^{a}$±0.06 | $6.38^{b}$±0.06 | $6.47^{b}$±0.03 | $6.36^{b}$±0.18 |

a,b and c means in the same row with different superscripts differ significantly (P<0.05).

Table (5): Effect of tested rations on some blood parameters before feeding .

| Items | Experimental rations | | | | | |
|---|---|---|---|---|---|---|
| | R1 | R2 | R3 | R4 | R5 | R6 |
| **Total protein (gm)** | $9.43^{a}$±0.21 | $8.62^{b}$±0.04 | $8.47^{cb}$±0.15 | $8.59^{bc}$±0.07 | $8.42^{c}$±0.07 | $9.61^{a}$±0.01 |
| **Albumin (gm)** | $4.56^{a}$±0.07 | $4.26^{b}$±0.01 | $4.30^{ab}$±0.10 | $4.40^{ab}$±0.11 | $4.23^{b}$±0.10 | $4.28^{b}$±0.03 |
| **Globulin (gm)** | $4.87^{c}$±0.05 | $4.36^{bc}$±0.06 | $4.17^{c}$±0.06 | $4.19^{b}$±0.08 | $4.19^{d}$±0.17 | $5.33^{a}$±0.03 |
| **A/G ratio** | $0.94^{ab}$±0.009 | $0.98^{b}$±0.03 | $1.03^{b}$±0.09 | $1.05^{b}$±0.10 | $1.00^{a}$±0.03 | $0.80^{c}$±0.10 |
| **Creatinine (mg/100ml)** | $1.43^{a}$±0.06 | $1.28^{b}$±0.02 | $1.31^{d}$±0.05 | $1.17^{c}$±0.001 | $1.42^{a}$±0.05 | $1.42^{a}$±0.001 |
| **Urea-N (mg/100ml)** | $34.69^{a}$±3.59 | $11.89^{c}$±0.42 | $11.30^{c}$±0.57 | $28.06^{b}$±0.68 | $15.97^{c}$±2.75 | $11.40^{c}$±0.42 |

a,b,c and d means in the same row with different superscripts differ significantly (P<0.05).

Urea nitrogen concentration was higher in R1 (34.69 mg/100ml) followed by R4 (28.06 mg/100ml). This may be due to higher nitrogen intake in these groups. Samanta *et al.*,(2003) showed that plasma urea-N reflects the dietary CP intake.

**Growth performance**

Data in table (6) indicate that the highest daily weight gain (111.11 g/day) was recorded by animals fed R1 (berseem hay plus CFM) as mash followed by R3 group fed (berseem hay + CFM) as feed blocks (103.27 g/day) then the lowest daily weight gain was in group fed fodder shrubs + CFM as feed blocks R6 (83.83 g/day). These results may be due to the higher intake of TDN in R1 and R2 (587.83 and 556.22 g/h/d) respectinly, compared to 420.92 g/h/d in R3 and also, the higher CP digestibility in the same order. These results are in agreement with those obtained for growing goats under similar feeding by Youssef (1999) and Youssef and Fayed (2001).

**Table (6): Effect of the experimental rations on live body weight gain, feed intake and feed conversion of growing goats.**

| Items | Experimental rations | | |
|---|---|---|---|
| | R1 | R3 | R6 |
| **Live body weight :-** | | | |
| Initial body weight ,kg | 15.35±0.40 | 15.67±0.48 | 15.98±0.27 |
| Final body weight ,kg | 35.35[a]±0.50 | 34.26[a]±0.70 | 31.07[b]±0.03 |
| Total body weight gain,kg | 20.00[a]±0.38 | 18.59[a]±0.57 | 15.09[b]±0.29 |
| Daily body weight gain,g | 111.11[a]±0.45 | 103.27[a]±0.8 | 83.83[b]±0.71 |
| **Feed intake :-** | | | |
| Concentrate ,kg/h/d | 0.539 | 0.531 | 0.519 |
| Roughage ,kg /h/d | 0.359 | 0.354 | 0.298 |
| Total DMI,kg/h/d | 0.898 | 0.885 | 0.817 |
| TDN intake ,g/h/d | 587.83 | 556.22 | 420.92 |
| TDN intake,kg/kg $w^{0.75}$ | 0.052 | 0.049 | 0.039 |
| ***Feed conversion g feed/g gain*** | | | |
| **DMI** | 8.08 | 8.57 | 9.75 |
| **TDN** | 5.29 | 5.39 | 5.02 |

a and b means in the same row with differ significantly(P<0.050).
R1:(BH +CFM) as mash ,R3:(BH+CFM) as feed block, ,R6:(FS+CFM)as feed block .

The highest total DMI was recorded for kids fed R1 (0.898 kg/h/d) followed by R2 (0.885 kg/h/d), this may be due to high palatably of berseem hay compared to R3 contained fodder shrubs.

Feed conversion (DM feed / gain ) was the lowest in R1 followed by R2 then R3 being (8.08,8.57 and 9.75), respectively.

**Economical evaluation:**

According to 2002 market prices, data in table (7) showed that the feeding cost to produce one Kg body gain was higher for goats fed berseem hay than those fed shrubs, which gave the best economical value. This may be due to that the price of berseem hay was expensive and fodder shrubs was cheaper in R3, besides of the lower cost of transportation of fodder shrubs than berseem hay.

**Table (7): Economical evaluation of the experimental ration**

| Items | Experimental rations | | |
|---|---|---|---|
| | R1 | R3 | R6 |
| **Price of feed intake,h/d/L.E *** | | | |
| **Concentrate** | 0.268 | 0.264 | 0.258 |
| **Roughage** | 0.242 | 0.238 | 0.033 |
| **Feed cost /daily gain,L.E** | 0.510 | 0.502 | 0.291 |
| **Feed cost /kg gain,L.E** | 4.59 | 4.86 | 3.47 |
| **Economic feed efficincy**** | 2.17 | 2.05 | 2.88 |

*Based on market prices at the beginning of the experiment .The price of ton on DM basis was as follows :
CFM,400 ,BH,600 and FS,100 L.E.
The price of 1kg live body weight at selling time was 10 L.E
**Economic feed efficiency expressed as the ratio between the price of total live body weight gain and the price of feed consumed to that gain.

## CONCLUSION

From the previous data, it could be concluded that using feed blocks from 60% concentrate feed mixture and 40% fodder shrubs was a good economical solution for feeding goats in the desert area.

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# استخدام بعض الشجيرات الرعوية ومخلفات التصنيع الزراعى فى اشكال مختلفة لتغذية الماعز فى سيناء

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اجريت هذه الدراسة بمحطة بحوث راس سدر التابعة لمركز بحوث الصحراء بمحافظة جنوب سيناء حيث تم تجميع كميات من الشجيرات الرعوية (٧٠ % قطف و ٣٠ % اكاسيا ) وتجهيزها عن طريق التجفيف الهوائى والتقطيع وتقديمها مع مخلفات التصنيع الزراعى ( نوى بلح ، تفلة الزيتون ، تفلة بيرة ، ردة ، مولاس ) ثم تقديمها فى اشكال مختلفة.

تم استخدام عدد ١٨ ذكر ماعز بالغ بمتوسط وزن ٣٢,٩١ كجم بهدف دراسة تأثير التغذية على٤٠ % أخشان (مخلوط الشجيرات الرعوية أو دريس البرسيم) وخلطهما مع ٦٠ % مركزات( مخلفات التصنيع الزراعى) ثم تقديمها للحيوان فى اشكال مختلفة لدراسة تأثيرها على المادة الجافة المأكولة ومعاملات الهضم وميزان النتروجين وبعض مقاييس التخمر فى الكرش ودلالات التمثيل الغذائى فى الدم .

**وكانت العلائق المختبرة كالاتى :**

المجموعة الاولى : ( دريس البرسيم + مخلوط العلف المركز ) مخلوطين بدون كبس .
المجموعة الثانية : دريس البرسيم بدون كبس + مخلوط العلف المركزمكبوس فى صورة قوالب.
المجموعة الثالثة : ( دريس البرسيم + مخلوط العلف المركز ) مكبوسين فى صورة قوالب .
المجموعة الرابعة :( مخلوط الشجيرات الرعوية + مخلوط العلف المركز) مخلوطين بدون كبس
المجموعة الخامسة: مخلوط الشجيرات الرعوية بدون كبس + مخلوط العلف المركزمكبوس فى صورة قوالب.
المجموعة السادسة:( مخلوط الشجيرات الرعوية + مخلوط العلف المركز) مكبوسين فى صورة قوالب.

**وكانت اهم النتائج كما يلى:-**

١- سجلت المجموعة الاولى اعلى معدلات فى كل من كمية المادة الجافة المأكولة ومعاملات الهضم والمواد الغذائية الكلية المهضومة وميزان النتروجين .
٢- سجلت المجموعة الخامسة أقل قيمة للمادة الجافة الماكولة وكذلك أقل قيمة لميزان النتروجين .
٣- كانت قياسات الدم والكرش فى المدى الطبيعى .

تبعت تجربة التقييم بتجربة نمو استمرت لمدة ٦ شهور عن طريق استخدام عدد ٢٤ ذكر ماعز (عمر ٦ شهور بمتوسط وزن ١٥,٦٧ كجم) لتغذى على ثلاث علائق مختبرة هى الاولى والثالثة والسادسة نظرا للاهمية التطبيقية والاقتصادية .

**وكانت اهم النتائج كما يلى:-**

١- فى تجربة النمو أظهرت المجموعة الاولى أعلى معدل زيادة يومية فى حين سجلت المجموعة السادسة أقل معدل زيادة يومية .
٢- سجلت المجموعة السادسة أعلى معدل كفائة اقتصادية.

توصى الدراسة بامكانية استخدام مخلوط الشجيرات الرعوية بنسبة ٤٠ % مع ٦٠ % مخلفات التصنيع الزراعى كحل اقتصادى جيد لتغذية الماعز فى المناطق الصحراوية.