

EFFECT OF PARTIALLY OR TOTALLY REPLACING SOYBEAN MEAL BY GUAR KORMA MEAL ON SHEEP AND COWS PERFORMANCE MILK PRODUCTION.

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ABSTRACT

This study was carried out to determine the effects of using different levels of Guar korma meal (*GK) on milk yield and milk composition, rumen function of experimental rations fed to sheep and dairy cows. Animals were fed one of from experimental rations, control ration with 0% GK or rations with 5%, 10% and 15% GK. Animals fed rations containing guar korma showed linear decrease ($P < 0.05$) of total dry matter intake (DMI) with increasing ration guar korma meal level inclusion in rations. Twelve Barki male sheep were assigned randomly into 4 similar groups of 3 animals each to determine the digestibility coefficients, nitrogen balance and nutritive values of experimental rations. Results of digestibility trials showed that there were no significant differences ($P < 0.05$) in digestibility of DM, OM and CP for ration containing 10% GK compared to the control ration. While, there was significant ($P < 0.05$) decrease rations containing 5%, 15% guar korma. Similar trend recorded for the nutritive values. However, nitrogen utilization showed positive nitrogen balance with all animals fed the experimental rations. Three cannulated female Barki sheep were used to determined rumen fermentation parameters. The main results showed no significant differences among experimental groups in the values of ruminal pH and $\text{NH}_3\text{-N}$ concentrations, while the highest ($P < 0.05$) of TVFA'S concentrates were observed with the ration containing 10%GK and the control ration than rations containing 5%,15% guar korma. Dry matter and CP degradability showed significant ($P < 0.05$) increased for rations containing GK than the control ration. Eight lactating crossbred Friesian cows were used to determine milk yield and milk composition. Cows fed ration containing 5% GK showed slight improvement in milk yield in comparison with the control ration. However Milk fat (%) increased ($P < 0.05$) for rations containing guar meals compared with the control ration.

*GK= guar korma meal

INTRODUCTION

Guar seed (*Cyamopsis tetragonoloba*) is a multi-purpose annual herbaceous legume which is drought tolerant and cultivated mainly in the autumn season in arid environments as in Brazil, Australia and South Africa or in the Southern part of the USA, as Texas or Arizona. The current average productivity of guar seed is 0.7-2.5t/ha of seeds. Average (1.6ton/ ha) has been reported by Wong *et al.*, (1997), Ecocrop, (2010). Purushottam Sharma (2009) reported that the Current production of guar seed is 4.3million tons from 2.82 million hectares under cultivation. India produces about 80% of world production, and about 2 million tones of guar meal are produced and

utilized in the manufacture of guar gum from the endosperm. The germ and the husks are removed by grinding and dry heating to obtain the guar gum. Lee *et al.* (2004), found that the guar seed comprise of (three parts: the seed coat (14-17%), the endosperm (35-42%), and the germ (43-47%).The resulting by-product made of germs and husks (guar korma meal). Guar korma Meal is rich in protein and carbohydrates, and is a 100 % natural agricultural product without the addition of any chemicals or preservatives. Processed guar meal can be used in conjunction with other feed stuffs, in feed rations. Feeding characteristics and other properties of guar meal have been well evaluated in poultry nutrition by several authors including Couch *et al.*, (1967), Verma and McNab (1982), lee *et al* (2009) and Hassan *et al.*, (2010). However, few experiments have been done to evaluate the nutritive value of different guar meals for ruminant nutrition. The aim of study, the present study is to examine the utilization of guar korma meal as a protein source in ruminants rations, and investigate the effect of replacing guar korma meal with soybean meal on feed intake, nutritive value, rumen function, protein degradability in sheep and Milk yield and its composition in dairy cows.

MATERIALS AND METHODS

This work was conducted at Noubaria Experimental Station, Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture

Experimental Rations:

Four experimental rations were formulated to contain 5%, 10% and 15% guar korma of total concentrate mixed ration, and replacing dietary soybean meal (SBM).

As follows:-

- | | | |
|-----------------|---------------------|------------------|
| 1. R1 (Control) | %0 guar korma meal | 15% soybean meal |
| 2. R2 | %5 guar korma meal | 10% soybean meal |
| 3. R3 | %10 guar korma meal | 5% soybean meal |
| 4. R4 | %15 guar korma meal | 0% soybean meal |

The chemical analysis of Guar Korma,concentrate feed mixed (CFM) and rice straw is presented in table (1). The chemical analysis of experimental rations is presented in table (2).

Table (1): Chemical analysis of guar korma meal, the concentrate feed mixture and rice straw used in the experimental rations.

Item	Gura korma meal	Rice Straw	CFM1	CFM2	CFM3	CFM4
Yellow corn			36.0	36.0	36.0	36.0
Wheat bran			26.0	26.0	26.0	26.0
Soybean meal			15.0	10.0	5.0	0.00
Gura korma meal			0.0	5.0	10.0	15.0
Sugar beet pulp			9.0	9.0	9.0	9.0
Olive cake			6.0	6.0	6.0	6.0
Molasses			5.0	5.0	5.0	5.0
Salt			1.0	1.0	1.0	1.0
Limestone			1.5	1.5	1.5	1.5
Premix*			0.5	0.5	0.5	0.5
Total			100	100	100	100
Chemical analysis (% on DM):						
DM	92.00	89.50	89.14	89.42	88.95	88.86
OM	94.60	86.48	93.24	93.05	92.16	93.07
CP	55.80	3.20	15.24	15.55	15.96	16.31
CF	7.50	36.75	6.86	7.25	7.54	7.84
EE	4.70	0.95	2.65	2.78	2.98	3.20
NFE	26.60	44.58	68.49	67.47	66.68	65.72
Ash	5.40	14.52	6.76	6.95	6.84	6.95
NDF	25.50	69.42	30.65	30.91	31.32	31.47
ADF	12.90	52.10	16.87	17.44	17.97	18.39
ADL	5.34	12.54	4.76	5.04	5.22	5.39
Hemi cellulose	12.60	17.32	13.78	13.47	13.35	13.08
Cellulose	7.56	39.56	12.11	12.40	12.75	13.00

* One kilogram of premix contain: Vit. A 12000 000 IU, Vit. D3 2200 00 IU, Vit. E 1000 mg, Vit. B1 1000 mg, Vit. B2 4000 mg, Vit b6 100 mg, Vit b12 10 mg, Pantothenic acid 3.33 g, Biotin 33 mg, folic acid 0.83 g, Zn 11.79g, Mn 5 g, Fe 12.5 g, Cu 0,5 g, Se 16.6 mg and Mg 66.7g.

CFM1=15%SBM, 0%GK. CFM2=10%SBM, 5%GK. CFM3= 5%SBM, 10GK. CFM4= 0%SBM, 15%GK.

Digestibility trails:

Twelve Barki male sheep were assigned randomly into 4 similar groups of 3 each (48kg, live body weight) were used in digestibility trials. Each digestibility trial lasted two weeks as preliminary period followed by one week as a collection period. The animals were housed in metabolic cages fitted, a stainless steel screen having 4 mm mesh to retain feces but allow free passage to urine, which was collected through a funnel to be easily separated. The animals were fed twice a day at 8.00 am and 16.00 pm according to the NRC (1994) recommendations. They were fed 850-g / head / day from the concentrate feed mixture plus 300g rice straw to cover the maintenance requirement. Water was available in front of the animals all time. Feed samples were collected and prepared for proximate analysis.

Feces and urine were collected quantitatively once a day before the morning meal at 8.00, and stored at -10 °C. The seven days combined collection was sampled then it was kept for routine analyses. Fecal samples were dried at 60 °C for 72 hours (partial drying) and ground through a one

mm screen using a Wiley mill grinder. They were composite sample of 20 gm each per treatment per animal for analyses. Digestibilities were determined and expressed on dry matter basis. Chemical analyses were carried out according to AOAC (1995), crude protein (CP) by Kjeldahl, while nitrogen free extract (NFE) was calculated by difference. Fiber fraction NDF (neutral detergent fiber), ADF (acid detergent fiber) and ADL (acid detergent lignin) were determined as described by Van Soest (1963).

Rumen fermentation parameters:

Three female sheep fitted with permanent rumen fistula (with an average of 45 kg live body weight), were used in rumen fermentation studies. Rumen samples were collected from each animal from the fistula of one; three and six hours after the morning feeding. Ruminal pH was determined directly by a Beckman pH meter. Fifty ml of rumen liquor were deproteinized using sulphuric acid (50 ml 0.1 N) and volume was completed with water to 500 ml in a volumetric flask and filtered the supernatant was used for determination of ammonia nitrogen using (MgO) distillation method Al-Rabbat, *et al* (1971). VFA'S were estimated using steam distillation as described by Warner (1964). Volatile fatty acid fractions were determined according to Erwin *et al.* (1961) using gas liquid Chromatography

In Situ Trials:

Polyester bags (100 % Dacron polyester) with a mean pore size of 45 µm and 7 X 15 cm had a surface area of about 210 cm² were used at each incubation time. Approximately 3 g of ingredient CFM were placed in each bag. Bags were incubated in the rumen of each sheep and removed after 3, 6, 12, 24, 48 and 72 hours. After the removal of the bags, they were washed under a gently flowing steam of tap water until the fluid was clear. Bags were drained, dried at 60 °C for 72 hours, cooled in desiccators and weighed. Dry matter and nitrogen content were estimated according to the method of (A.O.A.C. 1995). Two bags were washed in running water for 15 min. to determine the initial soluble fraction (a). The kinetics of DM and CP disappearances was studied by fitting the individual values to the following equation:

$$P = a + be^{-c(T-Lt)}$$

Proposed by Orskov and McDonald (1979) where P represents the disappearance after time T, Lt is lag time until the start of the degradation. The, a, b and c are estimates of soluble fraction, the degradable fraction and the rate of degradation, respectively. The effective rumen degradability (ED) was estimated according to Orskov and McDonald (1979). Rumen out flow rate (k) was assumed to be 0.05 per hour for concentrate (McDonald 1981).

$$ED = a + bc/c+k.$$

Lactation Trials:

Eight lactating crossbred Friesian cows used in duplicated 4 X 4 Latin squares design according to the mathematical models of Steel and Torrie (1980). Statistical analysis were carried out using the GLM adapted by SAS (2000). Cows were chosen according to body weight (500 kg in average). Each two cows were offered one of the experimental rations for 30 days. The first 10 days was considered as preliminary period followed by 20 days collection period. The daily rations fed to cows covered both the maintenance

and production requirements. Maintenance requirement calculated according to (NRC, 1990) and requirement for the production was calculated from the preliminary period and also the previous milk yield according to Barney Harris (1992). Cows were fed at 8.00 a.m. and 16.00 p.m. and then were milked twice a day and milk samples were taken (1% of milk yield/ period) during the last 20 days of each period at 8.00 and 16.00. Actual milk yields were recorded daily and milk samples were taken and kept at 4 °C for latter analysis. Fat correct milk (4 %) was calculated according to Gaines (1923) using the following equation: $FCM = M (0.4 + 0.15 F \%)$

Where M = milk yield,
F = fat percentage

Milk fat percentage was determined according to Gerber's method as described by Ling (1963). Total solids percent (TS), total protein and ash were determined according to the standard methods of A.O.A.C. (1995). Lactose was determined according to a rapid method for the determination of lactose in milk and cheese described by John *et al.* (1957). Solid not fat (SNF) was calculated by differences.

Table (2): chemical analysis content of Experimental Ratios:

Item	Experimental rations			
	R1	R2	R3	R4
DM	89.89	90.10	89.73	89.72
OM	91.40	91.15	91.24	91.14
CP	12.10	12.28	12.52	12.72
CF	14.71	15.10	15.43	15.76
EE	2.23	2.29	2.40	2.58
NFE	62.36	61.48	60.79	59.97
Ash	8.60	8.85	8.86	8.97
NDF	40.79	41.1	41.58	41.83
ADF	26.10	26.60	27.16	27.59
ADL	6.79	7.02	7.20	7.34
Hemi cellulose	14.69	14.50	14.42	14.24
Cellulose	19.31	19.58	19.96	20.25

RESULTS AND DISCUSSION

Feed intake, digestibility coefficients, nutritive values and nitrogen utilization data is presented in table (2). Feed intake showed that, total dry matter intake (DMI) of rations containing 10, 15% guar korma meal was less than the ration containing 5% and the control rations these differences were statistically significant at ($P < 0.05$). No significant differences were recorded between ration containing 5% guar korma and the control. Similar trend was recorded for the sheep fed CFM. These results were in-agreement with those obtained by Hossein *et al* (2010) who reported linear decrease ($P < 0.001$) of total (DMI) for animals given more than 10% of guar korma. This decrease was most likely due to the some of the beans odor and gum residual from guar korma meal Morteza and Qazvinian (2003) found that increasing DMI was associated with decreasing guar meal percentage in diets. On the other

hand Rahman *et al* (1968), reported that palatability problems have been encountered when more than 5% guar meal was included in the diet.

Data presented in table (2) indicated that animals fed R1 and R3 showed highest ($P < 0.05$) digestibility values of DM, OM, and CP compared with other rations. Prasad *et al.*, (1998) Found that the rate of CP digestion decreases with increasing the proportion of guar meal in broiler rabbits diets. Also, Huston and Shelton (1971) showed that the CP digestibility of guar meal was 64% and 62% in rations contained 10, 15% guar meal respectively. Islam Shah *et al* (1964) reported that OM digestibilities ranged from 71% and 76% when guar meal constitutes up to 10% of cattle rations. Digestibility of CF is mainly dependent upon the concentration and availability of holocellulose (cellulose and hemicellulose) portion which is affected by the degree of lignification Smith *et al* (1971). The present study showed that the ADF and cellulose increasing linearly with increasing level of guar korma meal in rations, this led to decreasing CF digestibility for rations containing guar korma than the control ration ($P < 0.05$). These results were in agreement with those reported by Bhagwan *et al* (1974). On the other hand, the present results (table 2) indicated that the nutritive value as TDN and DCP increased significantly ($P < 0.05$) for animals fed Ration1 and Ration3. While, animals fed Rations 2, 4 recorded the lowest values ($P < 0.05$). Nitrogen utilization values are present in table (2). All animals showed positive nitrogen balance which ranged between 3.47 and 4.25 gm N/day. Highest values were obtained with sheep fed R1 and R3 however, the lowest were observed with R4 with significant differences ($P < 0.05$).

Table (3): Digestibility coefficients, nutritive values and nitrogen utilization of sheep given the experimental rations.

Item	Experimental rations			
	R1	R2	R3	R4
CFM* (g/d/head)	850.00±72.76 ^a	835.00±67.64 ^a	813.5±71.85 ^b	798.5±68.89 ^c
RS** (g/d/head)	300.00	300.00	300.00	300.00
TDMI (g/d/head)	1150.00±92.42 ^a	1135.00±87.15 ^a	1113.50±89.56 ^b	1098.50±86.85 ^c
Digestibility coefficients (%):				
DM	62.79±0.62 ^a	60.14±0.61 ^b	63.11±0.63 ^a	58.05±0.52 ^c
OM	66.51±0.55 ^b	65.04±0.53 ^c	67.39±0.60 ^a	62.23±0.57 ^d
CP	60.59±0.71 ^a	57.81±0.65 ^b	59.09±0.59 ^a	57.28±1.75 ^b
CF	62.35±0.68 ^a	61.96±0.84 ^b	59.03±0.75 ^b	57.84±0.81 ^c
EE	71.32±0.91 ^a	71.51±0.96 ^a	70.26±0.92 ^c	71.03±0.87 ^b
NFE	68.71±0.71 ^a	67.60±0.75 ^b	69.09±0.72 ^a	65.72±0.69 ^c
Nutritive value (%)				
TDN	62.93±0.76 ^a	61.70±0.71 ^b	62.30±0.78 ^a	59.93.08±0.67 ^c
DCP	7.33±0.14 ^a	7.10±0.12 ^c	7.39±0.11 ^a	7.29±0.15 ^b
Nitrogen utilization:				
N-Intake (NI)	22.26±0.25 ^b	22.30±0.22 ^a	22.31±0.18 ^a	22.36±0.16 ^a
N-Digested (ND)	13.50±0.34 ^a	12.77±0.27 ^c	13.19±0.28 ^b	13.03±0.29 ^b
N- Urine (NU)	9.44±0.51 ^a	8.99±0.58 ^b	9.04±0.52 ^b	9.46±0.65 ^a
N-Balance (NB)	4.06±0.14 ^a	3.78±0.11 ^b	4.15±0.07 ^a	3.57±0.19 ^b
NB/NI	18.24±0.13 ^a	17.00 ±0.16 ^b	18.60±0.11 ^a	15.97±0.15 ^c
NB/ND	30.07±0.24 ^b	29.61±0.28 ^b	31.46±0.27 ^a	27.39±0.26 ^c

^{a, b, c and d} Means in the same row with different superscript are significantly ($P < 0.05$).

*CFM= concentrate feed mixture, ** RS= rice straw

Rumen fermentation parameters and VFA production.

The results of ruminal parameters which is presented in table (3) showed insignificant differences ($P < 0.05$) among experimental animals in the values of ruminal pH and $\text{NH}_3\text{-N}$ concentration. However the animals fed rations containing guar korma recorded slightly higher $\text{NH}_3\text{-N}$ concentration compared with the control animals results there were in agreement with those obtained by Santra and Karim(2009) who found that total nitrogen and ammonia nitrogen production increased with increasing guar korma in the rations. On the other hand the control ration and R3 recorded ($P < 0.05$) higher total VFA concentration compared with R2 and R4. This improvement in TVFA:S may be due to the increasing of digestibility of organic matter kholif *et al* (2005), El-Ashry *et al.*, (2003). Generally, the level of ammonia and TVFA:S concentrations were adequate enough to allow maximum microbial protein synthesis according to McCarthy *et al.*, (1989). There was a linear increase ($P < 0.05$) in acetic acid percentage and acetic/ propionic acid ratio as the level of guar korma meal increased in the rations, these results were in agreement with those of Bhagwan *et al.*, (1974) who reported that supplementation with guar meal in ruminates rations led to significant increase ($P < 0.05$) in acetic: propionic acid ratio.

Table (4): Overall means with their SE of rumen parameters of sheep fed the experimental Rations (means \pm SE).

Items	Experimental rations			
	R ₁	R ₂	R ₃	R ₄
Ph	6.54 \pm 0.11	6.52 \pm 0.10	6.50 \pm 0.05	6.55 \pm 0.07
$\text{NH}_3\text{-N}$ concentration (mg/100mlR.L)	13.47 \pm 0.12	13.51 \pm 0.10	13.55 \pm 0.15	13.58 \pm 0.09
VFA concentration (meq/100 mlR.L)	13.11 \pm 0.21 ^a	12.67 \pm 0.12 ^b	13.45 \pm 0.11 ^a	11.32 \pm 0.14 ^c
Acetic acid, %	51.66 \pm 0.31 ^b	53.43 \pm 0.25 ^a	54.37 \pm 0.16 ^a	54.70 \pm 0.22 ^a
propionic acid, %	24.33 \pm 0.19 ^a	24.12 \pm 0.11 ^a	23.07 \pm 0.08 ^{ab}	22.30 \pm 0.23 ^b
Butyric acid, %	12.80 \pm 0.13	11.30 \pm 0.23	11.70 \pm 0.17	11.90 \pm 0.40
Acetic /propionic ratio	2.12 \pm 0.02 ^b	2.22 \pm 0.04 ^b	2.36 \pm 0.05 ^a	2.45 \pm 0.03 ^a

^{abc} means in the same row with different superscripts are significantly differ ($P < 0.05$).

Degradation of dry matter and crude protein.

Data in table (4) showed the in-situ DM and CP disappearance along with the effective degradability (ED) of DM and CP calculated for $k = 5\% \text{ h}^{-1}$ (ARC, 1984). Higher ($P < 0.05$) ED was recorded with ration containing 15% guar korma, followed by rations contained 10% and 5% guar korma. However, the control ration had a significantly lower ($P < 0.05$) ED of DM. These results disagreed with of Hossein *et al* (2010), who reported that applying heat treatment during processing of guar korma meal led to decrease the effective degradability of DM when compared with cotton meal. Supplementation with guar korma meal may have provided more readily available nutrients to the rumen microbes, potentially meeting their nutritional requirements of rumen microflora from rapidly degradable fraction (a) than

control ration Mohsen *et al.*, (2010). Also, similar trend was recorded for ED of CP degradability for rations containing guar korma meal which ranged from 63.21% to 66.04% those of being higher ($P < 0.05$) than control ration Lund *et al.*, (2008) reported that N degradability for guar meal ranged between 60-68%. Our results were in-agreement with Mondal *et al* (2008) who found that Guar meal had higher rate of CP degradability than soybean meal and sunflower meal, also rapidly degradable fraction (a) was greatest in guar meal, with intermediate values in SBM.

Table(5):Degradation kinetics of DM and CP for sheep fed the experimental rations (mean \pm SE).

Item	Experimental rations			
	R1	R2	R3	R4
DM				
a, %	28.85 \pm 0.22 ^b	30.37 \pm 0.54 ^a	30.94 \pm 0.53 ^a	31.23 \pm 0.34 ^a
b, %	57.21 \pm 0.23 ^c	57.41 \pm 0.12 ^b	59.34 \pm 0.16 ^a	62.56 \pm 0.21 ^a
c, %	0.053 \pm 0.003 ^c	0.054 \pm 0.001 ^b	0.054 \pm 0.002 ^a	0.056 \pm 0.001 ^{ab}
EDDM, %	58.29 \pm 0.29 ^c	60.44 \pm 0.53 ^b	61.75 \pm 0.33 ^b	64.28 \pm 0.23 ^a
CP				
a, %	22.56 \pm 0.32 ^c	24.59 \pm 0.22 ^b	24.05 \pm 0.24 ^b	25.38 \pm 0.15 ^a
b, %	57.77 \pm 0.21 ^c	62.18 \pm 0.25 ^b	62.88 \pm 0.27 ^b	64.29 \pm 0.11 ^a
c, %	0.075 \pm 0.001 ^c	0.082 \pm 0.001 ^b	0.080 \pm 0.002 ^b	0.086 \pm 0.001 ^a
EDCP, %	57.20 \pm 0.37 ^c	63.21 \pm 0.21 ^b	63.28 \pm 0.13 ^b	66.04 \pm 0.11 ^a

^{abc} Means within column with different superscript are significantly differ ($P < 0.05$).

a = soluble fraction (%). b = potentially degradable fraction (%).

c = rate of degradability (% h⁻¹). ED = effective degradability (%).

Milk yield and composition

The daily milk, FCM (4%) and Milk composition are presented in table (5). In general, cows fed on ration containing 5% guar korma meal and control ration had highest ($P < 0.05$) daily milk yield and FCM (4%) compared with other rations. The results of this study were in-agreement with previous studies of Morteza and Qazvinian (2010), Rahman, and Leighton, (1968) who found that in dairy cows, palatability problems have been reported when more than 5 % guar meal was included in the diet and also had negative effect on milk yield. However, dairy cows and heifers fed rations containing 10-15% guar meal got acquainted to its odor and taste after a few days and intake remained lower than the control ration as well as in dairy performances Rahman *et al.*, (1968). On the other hand milk fat (%)increased for rations containing guar korma meals compared with control ration ($P < 0.05$). These results are in-agreement with those of Safimahmed and Gulamraul (2013), who found that the milk fat % of buffaloes fed ration containing guar meal was higher ($P < 0.01$) than those fed of control. This was associated with the increase in the proportion of acetic acid production Storry and Rook (1965). Milk protein was influenced by guar korma meal supplement ($P < 0.05$). Milk protein concentration was lowest ($P < 0.05$). for control ration than rations contain guar korma meal.

Table (6): Milk yields and milk composition for lactating cross berd Friesian cows fed the experimental rations (mean ± SE).

Item	Experimental rations			
	R1	R2	R3	R4
Milk yields, kg/d	12.82 ± 0.29 ^a	12.51 ± 0.15 ^a	12.09±0.25 ^b	11.57 ± 0.11 ^c
4 % FCM	11.92 ± 0.40 ^a	12.06 ± 0.24 ^a	11.36±0.78 ^b	11.05 ± 0.12 ^c
Fat, kg/d	0.45 ± 0.01 ^{ab}	0.47 ± 0.01 ^a	0.44±0.03 ^{ab}	0.43 ± 0.02 ^b
Milk composition (%):				
Total solids	12.23 ± 0.15 ^b	12.55 ± 0.11 ^a	12.49 ± 0.14 ^a	12.06± 0.18 ^b
Solids not fat	8.70 ± 0.12 ^{ab}	8.79 ± 0.25 ^{ab}	8.89 ± 0.12 ^a	8.36 ± 0.24 ^b
Fat	3.53 ± 0.15 ^b	3.76 ± 0.22 ^a	3.60 ± 0.12 ^b	3.70 ± 0.18 ^a
Protein	3.35 ± 0.16 ^b	3.39 ± 0.13 ^a	3.42 ± 0.12 ^a	3.41 ± 0.19 ^a
Lactose	4.38 ± 0.26 ^a	4.42 ± 0.29 ^a	4.52 ± 0.26 ^a	3.99 ± 0.39 ^b
Ash	0.97 ± 0.05	0.98 ± 0.04	0.95± 0.03	0.96 ± 0.06

abc Means within rows with different superscript are significantly differ (P<0.05).

Economic efficiency:

The economic evaluations of feeding the experimental rations are presented in Table(6).

Milk price and feeding cost were calculated based on the market prices in the year 2013. It was clear that R4 was the cheapest ration to produce one kg milk yield, followed by the ration containing 10% guar korma. While, the control ration was the most expensive one.

The economic return (L.E. / h/ d) was higher for the ration which contained 5% guar korma and achieved an increased 3% in the economic returns than the control ration. The lowest return was recorded for ration containing 15% guar korma. These results proved that ration contained 5% guar korma improved the economic return (L.E. / h/ d).

Table (7): Economic efficiency for lactating cows fed the experimental rations (mean± SE).

Item	R1	R2	R3	R4
CFM intake/h/day	8.580±0.41 ^a	8.510±0.44 ^a	8.0150±0.42 ^b	7.850±0.38 ^c
Rice straw intake/h/day	3.980±0.35 ^b	4.020±0.38 ^{ab}	4.120±0.34 ^a	4.215±0.33 ^a
Total intake/h/day	12.55±0.73 ^a	12.538±0.81 ^a	12.135±0.79 ^b	11.965±0.76 ^c
cost of total feed/LE/h/day	20.62	20.18	18.86	18.26
Price of milk yield(LE)	59.60	60.30	56.80	55.25
Net revenue	38.98	40.12	37.94	36.99
Economic Efficiency%	189	199	201	203

abc Means within rows with different superscript are significantly differ (P<0.05).

Free market prices (LE/ton) for the feed ingredients used in formulating the experimental rations in the year (2013).

Soybean meal = 3925, guar korma meal = 3225, Yellow corn = 2650, Wheat bran = 1750, sugar beet pulp=900, olive cake= 800

Molasses = 1050, Salt = 150, Limestone = 50, Premix = 2000. Rice straw = 390, Price / kg milk yield 4% fat (LE) = 5.00

The price of one ton of CFM containing guar korma meal with rate of 0, 5, 10 and 15% was 2222, 2187, 2152 and 2117 L.E respectively

CONCLUSION

In conclusion, the present results demonstrated that substitution 10% of soybean meal with guar korma meal showed the best effect on nutritive values and 5% guar korma meal had the best effect on animal performance. However, as little information about nutritive values, kinetic of guar meal nutrient disappearances in ruminants are available therefore further work is needed to examine the possibility of using guar korma meal in possibly at higher levels in ruminant feeding.

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تأثير الإستبدال الجزئي أو الكلي من كسب فول اصويا مع كسب الجوار كورما علي الأغنام وكفاءة إنتاج اللبن بالأبقار

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**إدارة بحوث الثروة الحيوانية، معهد بحوث الصحراء، مدينة الأبحاث العلمية والتطبيقات التكنولوجية، برج العرب الجديدة، ، الأسكندرية، مصر.

أجريت هذه الدراسة لبيان تأثير إستخدام ثلاث نسب مختلفة من كسب الجوار كورما على القيمة الغذائية ، تخمرات سائل الكرش ،معدل تحلل المادة الجافة والبروتين الخام ومعدل إنتاج الحليب ومكوناته. تكونت أربعة علائق (CFM) العليقة الأولى (المقارنة) والعليقة الثانية والثالثة والرابعة تحتوي علي صفر، ٥ ، ١٠ و ١٥٪ من كسب الجوار كورما علي التوالي وتم الاستبدال مع كسب فول الصويا. بالإضافة إلي قش الارز كعليقة مائه. وتم عمل تجارب الهضم باستخدام إثني عشر من ذكور أغنام البرقي بمعدل ٣أغنام/عليقة وقد أظهرت نتائج معاملات الهضم والقيم الغذائية إنخفاض معنوي تدريجيا عند ($p < 0.05$) في قيمة المأكول الكلي علي أساس المادة الجافة (DMI) مع الحيوانات التي تغذت على العلائق المحتوية علي كسب الجوار كورما عند مقارنتها بالعليقة المقارنة ، في حين سجلت معاملات هضم DM، OM, CP والقيمة الغذائية معيرا عنها بمجموع المواد الغذائية المهضومة و المهضوم من البروتين زيادة معنوية ($p < 0.05$) للعليقة المقارنة والعليقة التي تحتوي على ١٠ ٪ من كسب الجوار كورما مقارنة بالعلائق الأخرى. كما أظهرت النتائج أتران أزوتي موجب مع الحيوانات علي العلائق الأربعة. وبالنسبة لتجربة تخمرات سائل الكرش فقد تم استخدام ثلاثة من الإناث الأغنام البرقي لكل عليقة وأظهرت النتائج الرئيسية أن الفروق ضئيلة بين الحصص التجريبية في قيم الأسم الهيدروجيني ومعدل إنتاج الكرش من الأمونيا NH_3-N ، في حين لوحظت زيادة معنوية ($p < 0.05$) في معدل إنتاج الأحماض الدهنية الطيارة TVFA'S مع العليقة المقارنة و العليقة التي تحتوي على ١٠٪ من كسب الجوار كورما. من جهة أخرى أظهرت نتائج معدل تحلل المادة الجافة والبروتين الخام في الكرش زيادة معنوية ($p < 0.05$) مع علائق الحيوانات التي تغذت علي العلائق المحتوية علي كسب الجوار كورما مقارنة بالعليقة المقارنة. وبالنسبة الي تجربة معدل إنتاج الحليب قد تم إستخدام ٨ من أبقار الفريزيان الخليط عند وزن ٥٠٠ كجم تقريبا وقد أظهرت النتائج أن الحيوانات التي تغذت علي العليقة المحتوية علي ٥% جوار كورما كانت أعلى نسبة عند مقارنتها مع العلائق الأخرى بينما أظهرت نتائج نسبة الدهن والبروتين في الحليب زيادة معنوية ($p < 0.05$) للحيوانات التي تغذت علي العلائق المحتوية علي كسب الجوار كورما عند مقارنتها بالعليقة المقارنة.

قام بتحكيم البحث

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