EFFECT OF FEEDING DIFFERENT CONCENTRATE: CORN SILAGE RATIOS WITH OR WITHOUT PROTECTED METHIONINE SUPPLEMENT ON PERFORMANCE OF DAIRY COWS

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SUMMARY

Twenty Friesian cows in the early lactating stage were randomly divided into four similar groups (5 animals each) to evaluate the effect of dietary factors. 1- (Concentrate: Corn silage) ratio (50%: 50%) or (25%: 75%) of their TDN allowances according to (NRC 1989) 2- Supplementation (corn silage with or without protected methionine).

Animals in all groups were fed based on energy requirement as follows:
T1-50% concentrate feed mixture (CFM) + 50%corn silage (CS)
T2-50%(CFM) +50%CS +15gm protected methionine/ head/day
T3- 25% (CFM) + 75%CS
T4-25%(CFM)+ 75%CS + 15gm protected methionine\head\day

The main result showed that increasing level of silage improved ($P<0.05$) feed intake on basis of (total digestible nutrient) TDN / head (kg). While, methionine supplementation improved ($P<0.05$) feed intake on basis of (digestible crud protein) DCP/ head (kg) or DCP/ $kg^{0.75}$ (gm). 75% corn silage ration showed significant higher ($P<0.05$) (organic matter) OM and (crud fiber) CF digestion coefficient and feeding values in terms of TDN%. Adding methionine insignificantly higher ($P>0.05$) all nutrient digestions values, except CP (crud protein) digestibility, which was significantly ($P<0.05$) increased. Feeding values in terms of TDN% and DCP% were significantly ($P<0.05$) increased with methionine supplementation. No significant differences ($P>0.05$) were detected in ruminal parameters (pH, NH_3-N and TVFA's) concentrations. Increasing level of silage in rations insignificant higher ($P>0.05$) daily milk yield; 4%FCM; fat% and total solids%. While, milk protein; lactose and (solids not fat) SNF% were nearly similar. Adding methionine insignificant higher ($P>0.05$) milk yield; 4%FCM; fat% and SNF%. Milk protein was increased ($P<0.05$) with methionine supplementation. Milk lactose and (total solids) TS were not affected by methionine supplementation. Increasing level of silage in the daily ration improved insignificantly feed efficiency on basis of Kg4%FCM/1kg dry matter intake (DMI) or Kg4%FCM/1kg DCP. While methionine supplementation improved insignificantly, feed efficiency on basis of Kg4%FCM/1kg DM intake.

***Keywords:** silage, forage ratio, Methionine, cows, milk*

INTRODUCTION

One of the important limiting factors for animal production in Egypt is the availability of feedstuffs during the dry season, so animals facing shortage and poor quality feeds which lead to lack in milk yield and high producing costs.

Utilization of corn silage has increased rapidly during the last two decade as forage for dairy cattle in Egypt. This increase can be related to the relatively high-energy yield of maize crop and ease of mechanization for ensiling (Mohamed et al., 1999). The high energy content along with cheap price of maize silage may promote to use it in dairy cattle feeding. Several researchers (Mahmoud et al., 1992 and EL-Sayes et al., 1997) reported that feeding corn silage for dairy cattle improved their performance, reduced cost of feeding and minimized the amount of expensive concentrate in daily ration.

On the other hand, corn silage is a highly palatable source of energy but low in crude protein (Shirley et al., 1972). Addition of amino acids lead to improve milk production and particularly milk protein content. Methionine has been identified as the most limiting amino acid for synthesis of milk protein (Rulquin et al., 1995). Some researchers have observed an increase in milk production with protected methionine supplementation (Xu et al., 1998 and Younge et al., 2001).

In this study, attempts were made to study the effect of different corn silage: concentrate ratio and protected methionine supplementation to rations of dairy cows on nutrient digestibility; milk yield; milk composition; rumen activity and feed efficiency.

MATERIALS AND METHODS

1-Cows and feeding

The present study was conducted at Sakha Experimental Station, Animal Production Research Institute, Agriculture Research Center, Ministry of Agriculture. Twenty lactating Friesian cows (in their second or third lactation season) were randomly distributed according to lactation season and milk yield into four similar groups (5 animals each) to evaluate the effect of feeding corn silage plus concentrate feed mixture in different ratios with or without protected methionine supplementation on animal performance. Animals in all groups were fed based on energy requirement according to NRC (1989) as follows:

T1- 50% concentrate feed mixture (CFM) +50%corn silage (CS) + 2 kg rice straw

T2- 50%(CFM)+50%CS +15gm protected methionine \head\day +2 kg rice straw

T3- 25% (CFM) + 75%CS+2 kg rice straw

T4- 25% (CFM)+ 75%CS+ 15gm protected Methionine\head\day +2 kg rice straw

Cows were fed individually twice daily at 8.00a.m.and 4.00p.m. All daily feed residuals were recorded and so daily feed consumption were determined. Subsequent corn silage and concentrate mixture allowances were adjusted biweekly based on average milk production. Protected methionine was individually supplemented mixed with concentrate feed mixture. Mineral blocks and water were available at all times for all animals' free choice. Animals were kept under the routine veterinary supervision.

2- Sampling and their analysis

Cows were milked twice daily at 7.00 a.m. and 5.00 p.m. Daily milk yields were individually recorded during the experimental period. Actual milk yield was corrected to 4% FCM according to the formula of Gaines, (1928). Samples of milk were collected weekly at the morning and the evening milking. Composite milk samples (relative to the quantity of milk production) were taken and frozen for chemical analysis. Milk analysis was determined by milko scan. Milk energy was calculated by using the formula of Overman and Sanmann, (1926).

At the end of the feeding experiment that lasted 90 days, three cows were randomly chosen from each group to evaluate the feeding values of experimental rations. Grab sample method and silica as internal marker were applied for the digestibility determination according to Van Kaulen and Young, (1977). Feces samples were collected twice daily at 12.00 hrs. Intervals for three successive days from each cow. Solution of 10% H_2SO_4 was added to the representative samples before drying in oven at 60°C for 24.00 hrs. Dried samples were ground and kept for chemical analysis according to A.O.A.C., (1995).

At the end of each digestibility trial, rumen liquor samples were collected from three cows of each group by stomach tube. Samples were collected during two consecutive days before morning feeding and at 3.00 hrs. And 6.00hrs. Post morning feeding. Samples were directly strained through four folds of gauze and divided into two portions, one for the immediately estimation of pH and Ammonia nitrogen (NH_3-N) while the other was stored in the deep freezer after added toluene and paraffin oil for total volatile fatty acids concentration (TVFA's) determination. Samples were tested for pH value using digital pH meter. (NH_3-N) concentration was determined according to Conway (1957). (TVFA's) was determined according to Abou- Akkada and El-Shazly (1964).

3-Statistical analysis

Data collected were statistically analyzed according to the following models:

$Y_{ijk}= \mu +T_i+P_j+ (T*P)_{ij}+E_{ijk}$

$Y_{ijk}= \mu +T_i+time+anim.(time)_{ij}+ (T*time)_{ij}+E_{ijk}$

Where:

Y_{ijk}=Observation, μ=Overall mean, T= the fixed effect of ratio, P= the fixed effect of supplementation, (T*P) =-the fixed effect of the interaction between the ratio and methionine supplementation.

Significant differences among treatment means were detected using (Duncan's 1955) procedure. The General Linear

Models Procedure of SAS (1998), was employed

RESULTS AND DISCUSSION

1-Chemical composition

The chemical composition of feed ingredients and the tested rations are presented in Table (1). Data indicated that corn silage had the higher CF and NFE contents, however it had the lower CP and ash contents compared with concentrate feed mixture. These data are close to those recorded by (Mahmoud et al., 1992). The variations in the chemical composition of the tested rations reflected the composition of their ingredients.

2-Feed intake

The daily feed intake expressed as DM; TDN and DCP per head per day or DM; TDN and DCP per $kg^{.75}$, for the different experimental rations are presented in Table (2). All cows were fed restricted amount of different ingredients to cover their requirements although animals fed rations contained 75% corn silage consumed insignificantly higher (p>0.05) DM and DCP than those fed 50% corn silage rations However cows fed 75% corn silage ration consumed higher (p<0.05) TDN/head/day than those fed 50%corn silage ration. This may due to better nutrient digestibility of the high corn silage treatments.

Supplementing protected methionine to rations insignificantly increased (p>0.05) feed intake as DM or TDN, while it significantly increased (p<0.05) feed intake of DCP than rations without methionine. Pisulewski et al. (1999) and Armentano et al. (1997) reported no effect of rumen protected methionine on dry matter intake.

Generally, the animals fed T4 (75%corn silage with protected methionine) had the highest feed intake as DM, TDN and DCP, animals fed T1 (50%corn silage) had the lowest DM intake. There were insignificantly (p>0.05) differences among all groups in DMI.

3-Digestion coefficients and feeding values

The results of digestibility trials and feeding values conducted on animal groups fed the experimental rations are summarized in Table (3). Rations contained 75% corn silage showed higher(p<0.05) OM and CF digestibilities than those fed on 50% corn silage rations, while digestibilities of DM; CP; EE and NFE were insignificantly (P>0.05)higher in 75% corn silage rations than those fed on 50% corn silage rations. This may be due to the mutual associative effect of corn silage with concentrate or may be attributed to the effect of corn silage, which provided stimulatory factors to rumen cellulolytic and other bacteria. (El-Ashmawy et al 2003).

Regarding the effect of protected methionine supplementation, data in Table (3) indicated that DM; OM; CF and NFE digestibilities were insignificantly (P> 0.05) increased and CP digestibility was significantly (P<0.05) increased with protected methionine supplementation. The improvement in digestibility coefficients of protected methionine rations could be

Table (1): Chemical composition of feed ingredients and calculated experimental rations fed to lactating cows (% on dry matter basis).

Ingredient	DM%	Chemical composition				
		CP%	EE%	CF%	NFE	ASH%
CFM	91.89	13.00	2.59	17.00	53.71	13.70
CS	28.40	10.75	2.60	24.30	55.55	6.80
RS	90.76	2.50	1.50	35.00	45.00	16.00
Experimental rations						
T_1	64.47	10.88	2.47	22.12	53.54	10.99
T_2	63.84	10.96	2.49	22.01	53.65	10.89
T_3	49.24	10.44	2.49	23.69	54.07	9.31
T_4	49.24	10.44	2.49	23.69	54.07	9.31

CFM=Concentrate feed mixture, CS= Corn silage, RS=Rice straw, T1=50%CS+50%FCM, T3=75%CS+25%FCM, T2=50%CS+50%FCM +15(gm protected methionine), T4=75%CS+25%FCM+15(gm protected methionine)

Table (2): Effect of corn Silage: concentrate ratio and protected methionine supplementation on feed intake (on DM basis).

Item	Treatment				±SE	Silage ratio		Methionine supplementation		±SE
	T1	T2	T3	T4		50	75	without	with	
DMI (kg/head/day)	16.4	17.44	17.72	18.16	.85	16.92	17.94	17.06	17.80	.60
DMI / kg^{75},gm	149.74	156.12	153.12	157.32	5.58	152.93	155.22	151.46	156.72	3.95
TDN (kg/head/day)	9.50^{b}	10.53^{ab}	10.89^{ab}	11.58^{a}	.52	10.02^{b}	11.24^{a}	10.20	11.05	.37
TDN / kg^{75},gm	86.70^{b}	94.26^{ab}	94.12^{ab}	100.33^{a}	3.42	90.48	97.23	90.41	97.30	2.42
DCP(kg/head/day)	1.12^{b}	1.28^{a}	1.22^{ab}	1.29^{a}	.060	1.20	1.26	1.17^{b}	1.29^{a}	.042
DCP/ $kg.^{75}$,gm	10.21^{c}	11.49^{a}	10.52^{bc}	11.22^{ab}	.412	10.85	10.87	10.37^{b}	11.36^{a}	.29

Number of observations=20,' SE=stander error, T1=50%CS+50%FCM, T3=75%CS+25%FCM, T2=50%CS+50%FCM +15(gm protected methionine), T4=75%CS+25%FCM+15(gm protected methionine)
a ,b, and c means with different superscripts in the same row are significantly ($P< 0.05$) different

Table (3): Effect of corn silage: concentrate ratio and protected methionine supplementation on nutrient digestibility and feeding values of experimental rations (on DM basis).

Ingredient	Treatment				±SE	Silage Ratio		methionine Supplementation		±SE
	T1	T2	T3	T4		50	75	without	with	
Digitations coefficients										
DM	60.5[b]	61.2[ab]	61.27[ab]	63.13[a]	.69	60.85	62.2	60.88	62.17	.49
OM	62.43	64.06	65.34	65.94	1.02	63.25[b]	65.64[a]	63.88	65	.72
CP	62.7[b]	67.16[a]	65.79[ab]	68.33[a]	1.03	64.93	67.06	64.24[b]	67.75[a]	.73
EE	77.7	77.86	78.36	79.14	.75	77.78	78.75	78.03	78.5	.53
CF	52.63[b]	53.7[b]	56.28[ab]	58.9[a]	1.17	53.17[b]	57.59[a]	54.45	56.30	.82
NFE	65. 6[b]	68.66[ab]	68.21[ab]	70.74[a]	1.35	67.13	69.48	66.91	69.7	.95
Nutritive values										
TDN	57.90[c]	60.38[bc]	61.47[ab]	63.77[a]	.78	59.14[b]	62.62[a]	59.69[b]	62.08[a]	.55
DCP	6.82[b]	7.36[a]	6.87[b]	7.13[ab]	.22	7.09	7.00	6.85[b]	7.25[a]	.15

Number of observations=12, SE=stander error, T1=50%CS+50%FCM, T3=75%CS+25%FCM, T2=50%CS+50%FCM +15(gm protected methionine), T4=75%CS+25%FCM+15(gm protected methionine)
a ,b and c means with different superscripts in the same row are significantly ($P < 0.05$) different

explained on the basis that these protected amino acid can play indirect role to stimulate anaerobic fermentation of organic matter that improve efficiency of utilization of nutrients, and direct role to improve digestion in abomasum. Berthiaume et al. (2000) reported that bacterial nitrogen flow and bacterial efficiency were higher for none lactating Holstein heifers fed protected methionine. Bacar (1995) reported that digestibility of CP was significantly improved with amino acid supplementation. However, Klemesrud et al. (2000) reported that organic matter and crude protein digestibilities were not affected by amino acid supplements.

Generally, T4 (75%corn silage with protected methionine) had the highest digestion coefficients of nutrients. While, T1 had the lowest one. There were insignificant ($p>0.05$) differences among different ration in the OM and EE digestibilities. Ration T1 (50% corn silage) showed lower ($p<0.05$) DM, CF and NFE digestibility values than T4, also T2 (50% corn silage with protected methionine) had lower ($p<0.05$) CF digestibility than T4.

Increasing level of corn silage in rations significantly ($P<0.05$) increased feeding value as TDN%, while insignificantly ($P>0.05$) decreased feeding value as DCP%. Similar trend was reported by Mahmoud et al., (1992), EL-Sayes et al., (1997)and Mohamed et al., (1999).

On the other hand, adding protected methionine significantly ($P<0.05$) increased feeding values as TDN% and DCP%.

Generally, Ration T4 had significantly ($P<0.05$) higher feeding value as TDN% than that of T1 and T2, while T3 showed lower ($P<0.05$) feeding value as DCP than that of T2 and T4.

4- Ruminal parameters:

Results of pH values; ammonia nitrogen concentrations (NH_3-N) and total volatile fatty acids concentrations (TVFA's) are presented in Table (4). Animals fed 75% corn silage rations showed lower ($P>0.05$) pH values and higher ($P>0.05$) NH3-N and TVFA's concentrations than those fed 50% corn silage rations. Increasing TVFA's with increasing corn silage level in rations may be related to the fermentation of the soluble carbohydrate within 3.00 hrs. post feeding.

Protected methionine supplementation insignificantly ($P>0.05$) decreased ammonia-N while, insignificantly ($P>0.05$) increased TVFA's concentrations, while pH value was not affected by protected methionine supplementation. Aly et al (2004) found that ammonia-N was insignificantly ($P>0.05$) decreased with methionine than control ration. Increasing TVFA's with methionine supplementation may be related to the increases of OM digestibility. Demeterova et al (2002) reported that the anaerobic fermentation of protected amino acids treatment were more efficient and faster yielding more TVFA's than that of control. However, Kholif and Kholif(2003) and Robinsion et al (2000) found that TVFA's were not affected by protected amino acids.

The highest pH value was at zero time, while the lowest value was at 3.00hrs. Post feeding. On the other hand, the highest values of ammonia-N concentrations and TVFA's

Table (4): Effect of corn silage: concentrate ratio and protected methionine, supplementation on rumen liquor parameters at different sampling times.

Item	Treatment					±SE	Silage ratio		supplementation		±SE
	Sampling time	T1	T2	T3	T4		50%	75%	without	with	
pH	0	6.63	6.56	6.52	6.46	.06	6.60	6.49	6.58	6.51	.04
	3	5.34	5.44	5.31	5.40	.07	5.39	5.36	5.33	5.42	.05
	6	5.88	5.80	5.69	5.72	.05	5.84	5.71	5.79	5.76	.04
Mean		5.95	5.93	5.84	5.86		5.94	5.85	5.90	5.90	
NH3-N (mg/100ml)	0	14.12	13.96	13.64	13.81	1.0	14.04	13.73	13.88	13.89	.72
	3	18.12	17.86	18.27	18.19	.20	17.99	18.23	18.20	18.03	.14
	6	14.89	14.76	15.93	14.63	.49	14.83	15.28	15.41	14.70	.34
Mean		15.71	15.53	15.95	15.54		15.62	15.75	15.83	15.54	
TVFA'S (meq/100ml)	0	7.65	7.61	7.70	7.86	.75	7.63	7.78	7.68	7.74	.53
	3	11.06	11.27	11.82	11.93	.57	11.17	11.88	11.44	11.60	.40
	6	8.15	8.19	8.23	8.34	.11	8.17	8.29	8.19	8.27	.07
Mean		8.95	9.02	9.25	9.38	.75	8.99	9.32	9.10	9.20	.53

Number of observations=12, SE=stander error, T1=50%CS+50%FCM, T3=75%CS+25%FCM,
T2=50%CS+50%FCM +15(gm protected methionine), T4=75%CS+25%FCM+15(gm protected methionine)

Table (5): Effect of corn silage: concentrate ratio and protected methionine supplementation on milk yield (kg) and milk composition %.

Item	Treatment				±SE	Silage ratio		Methionine supplementation		±SE
	T1	T2	T3	T4		50	75	without	with	
Daily milk yield(kg)	13.83	14.75	14.93	15.81	1.02	14.29	15.37	14.38	15.28	.72
FCM(kg)	12.38	13.84	13.94	15.19	1.09	13.11	14.57	13.16	14.52	.77
fat%	3.30^{b}	3.59^{ab}	3.56^{ab}	3.74^{a}	.134	3.45	3.65	3.43	3.67	.095
protein %	2.18^{b}	2.42^{a}	2.13^{b}	2.40^{a}	.064	2.30	2.27	2.16^{b}	2.41^{a}	.045
lactose %	4.59	4.57	4.59	4.54	.041	4.58	4.57	4.59	4.56	.029
total solids	11.04^{ab}	10.83^{b}	10.99^{b}	11.37^{a}	.156	10.94	11.18	11.02	11.10	.110
Solids-Not- Fat	7.74^{a}	7.24^{c}	7.43^{bc}	7.63^{ab}	.111	7.49	7.53	7.59	7.44	.079

Number of observations=12, SE=stander error, T1=50%CS+50%FCM, T3=75%CS+25%FCM,
T2=50%CS+50%FCM +15(gm protected methionine), T4=75%CS+25%FCM+15(gm protected methionine)
a and b means with different superscripts in the same row are significantly ($P<0.05$) different

concentrations were at 3.00 hrs. Post feeding while the lowest values were at zero time

Generally, it could be noticed that no significant (P>0.05) differences were observed for rumen parameters (pH; NH_3-N and TVFA's) among groups at zero time;3.00 hrs. and 6.00hrs. Post feeding.

5-Actual and 4% fat corrected Milk yields:

Results of actual and 4% fat corrected milk yield of lactating cows received the experimental rations are presented in Table, (5). Animals fed rations contained 75% corn silage showed insignificantly(P>0.05) higher daily and 4% fat corrected milk yields than those fed 50% corn silage. EL-Saadany et al (2001) and Mahmoud et al, (1992) reported an improvement in actual corrected milk yield of cows fed diet contained maize silage.

On the other hand, animals fed rations with methionine supplement showed insignificantly (P>0.05) higher daily and 4% fat corrected milk yields than those fed unsupplemented rations. Methionine and Lysine appear to be most limiting amino acids for milk synthesis. They are both heavily utilized by the mammary gland and are present in relatively low concentrations in plasma Xu et al (1998); Younge et al (2001) and Noftsger and St-Pierre (2003) observed that milk production increased with rumen protected methionine. However, Noftsger et al (2005) mentioned that no effect on milk production with rumen protected methionine.

Generally, animals fed T4 had the highest actual milk and 4%fat milk yields, while animals fed T1 had the lowest values. There were insignificant (P>0.05) differences among different groups in both actual milk yield and 4% fat milk yield.

6-milk composition% and milk nutrients yield:

Data of milk *nutrients* (content and yield) of lactating cows fed experimental rations are shown in Tables (5&6). Increasing corn silage level in rations insignificantly (P>0.05) increased fat, total solids and solids not fat contents in milk. Milk protein and lactose contents were not affected. On the other hand, milk nutrients yields were increased (P>0.05) with increasing corn silage level.

Protected methionine supplementation insignificantly (P>0.05) increased milk fat and total solids and significantly (P<0.05) increased milk total proteins.

However milk solids not fat insignificantly (P>0.05) decreased while milk lactose was not affected by methionine supplementation. Daily milk nutrients yields were higher (p>0.05) in milk of animals received protected methionine than others. The increases in milk fat content with methionine supplementation might due to methionine can facilitate the transfer of blood lipids to milk by furnishing methyl groups for synthesis of choline and phosphatidylcholine, which represent an important link between methionine and lipid metabolisim in ruminants(Seymour et al,1990). While, the increase in milk total proteins may be due to higher CP and OM digestibilities.

Table (6): Effect of corn silage: concentrate ratio and protected methionine supplementation on milk nutrients yield (kg).

Item	Treatment				±SE	Silage ratio		Methionine Supplementation		±SE
	T1	T2	T3	T4		50	75	without	with	
Fat	0.456	0.530	0.532	0.591	.047	0.493	0.562	0.494	0.561	.033
Protein	0 .301	0.357	0.318	0.379	.022	0.329	0.349	0.310	0.368	.015
Lactose	0.635	0.674	0.685	0.710	.044	0.655	0.698	0.660	0.692	.031
Total solids	1:527	1.597	1.641	1.798	.119	1.562	1.720	1.584	1.698	.084
Solids not fat	1.070	1.068	1.109	1.206	.079	1.069	1.160	1.09	1.137	.056
Milk energy kcal yield *	669.9^{b}	703.3^{ab}	699.9^{ab}	720.6^{a}	15.54	686.6	710.3	699.9	712..0	10.99

Number of observations=12, SE=stander error, T1=50%CS+50%FCM, T3=75%CS+25%FCM, T2=50%CS+50%FCM +15(gm protected methionine), T4=75%CS+25%FCM+15(gm protected methionine)
a and b means with different superscripts in the same row are significantly ($P<0.05$) different

These results are in harmony with those reported by Sancanari et al (2001) and Fahey et al (2002) that milk fat% increased with supplemented methionine. Kholif and Kholif(2003) and Noftsger et al (2005) mentioned that milk protein content increased with rumen protected methionine. Pisulewski et al (2002) observed that milk lactose% was not affected by rumen protected methionine.

Generally, T4 (75% corn silage with methionine) had the highest fat, total solids, while T2 (50% corn silage with methionine) had the highest milk protein content. Milk lactose was higher in T3 (75% corn silage). Milk fat content was lower ($p<0.05$) in animals fed T1(50% corn silage) than those fed T4. Animals fed T4 had the highest milk composition yields, while the group fed ration T1 had the lowest all milk composition yields, except, solids not fat content and yield which were lowest in milk of animals fed ration T2.

7-Gross feed efficiency

Feed efficiency was calculated as Kg 4% FCM produced/K g intake of DM; TDN and DCP as shown in Table (7). Results revealed that, cows fed ration contained 75% corn silage were more efficient than those fed 50%corn silage ration as Kg 4% FCM/ Kg DMI and Kg 4% FCM/Kg DCPI, while feed efficiency as Kg 4% FCM/Kg TDNI was nearly similar between the two groups. Dhiman and Satter (1997) reported that the efficiency of feed utilization increased as the proportion of corn silage was increased in diet based on corn silage and alfalfa. EL-Saadany et al (2001) reported that animals fed corn silage were more efficient than those fed clover hay. El-Aidy (2003) reported that cows fed ration contained 34.7%corn silage were more efficient as Kg 4% FCM/Kg DCPI than those fed ration contained 14.10% corn silage.

Animals fed rations supplemented with protected methionine were more efficient than those fed unsupplemented rations.

Generally, cows fed T4 were more efficient than those fed other rations as Kg 4% FCM/ Kg DMI and Kg 4% FCM/Kg DCPI, while group of cows fed T 1 was the least efficient one as 4% FCM/ Kg DMI. In addition, cows fed T2 were less ($p<0.05$) efficient as Kg 4% FCM/Kg DCP than those fed T4.

8-Economic efficiency

Economic efficiency of different rations is presented in Table (7). Results revealed that, cows fed ration contained 75% corn silage were more efficient than those fed 50%corn silage ration and the same results were observed for animals fed rations supplemented with protected methionine, which were more efficient than those fed unsupplemented rations.

Generally, cows fed T4 (75% corn silage with methionine) were more efficient than those fed other rations.

Finally, it could be concluded that increasing corn silage level from 50% to 75% for feeding moderate yielding cows increased milk yield; improved milk composition and decrease feed cost. Supplementing lactating cows rations with15g/head/day protected methionine can improve the digestibility of nutrients, milk yield and composition and feed efficiency.

Table (7): Effect of corn silage: concentrate ratio and protected methionine supplementation on feed efficiency and economic evaluation.

Item	Treatment				±SE	Silage Ratio		Methionine supplementation		±SE
	T1	T2	T3	T4		50	75	without	with	
Feed intake (kg/h/day)										
CFM	7.5	8	4.08	4.19		7.75	4.14	5.79	6.10	
C.S	7.08	7.6	11.82	12.13		7.34	11.98	9.45	9.87	
R.S	1.82	1.82	1.82	1.82		1.82	1.82	1.82	1.82	
Methionine (gm)	----	0.015	-----	0.015				----	0.02	
A-4%FCM yield (kg /day)	12.38	13.84	13.94	15.19	1.1	13.11	14.57	13.16	14.5	.77
b-Feed Efficiency										
Kg4%FCM/1kg DM intake	0.755	0.794	0.787	0.836	.03	0.775	0.812	0.771	0.82	.02
Kg4%FCM/1kgTDN intake	1.30	1.31	1.28	1.31	.05	1.31	1.30	1.29	1.31	.03
Kg4%FCM/1kg DCP	11.1[ab]	10.81[b]	11.43[a]	11.78[a]	.42	10.93	11.61	11.24	11.3	.29
c-Economic efficiency										
Daily feed cost (P.T)	1409	1522	1244	1341.5		1454	1281.5	1326.5	1432	
feed cost/head kg4%FCM (P.T)	113.5	109.8	88.73	88.14		110.7	87.65	100.34	98.5	

Number of observations=12, SE=stander error, T1=50%CS+50%FCM, T3=75%CS+25%FCM, T2=50%CS+50%FCM +15(gm protected methionine), T4=75%CS+25%FCM+15(gm protected methionine)

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تأثير التغذيه علي نسب مختلفة من العلف المركز: سيلاج الذرة مع إضافة المثيونين المحمي علي الأداء الإنتاجي للأبقار الحلابة .

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الهدف من هذه الدراسة هو دراسة تأثير اختلاف نسبة العلف المركز: سيلاج الذرة مع إضافة المثيونين المحمي في علائق الأبقار الحلابة علي المأكول و معاملات الهضم و إنتاج اللبن

تم إجراء هذه التجربة بمحطة سخا بكفر الشيخ باستخدام عشرون بقره فرزيان حلابة تم تقسيمهم إلى أربع مجموعات خمسة أبقار في كل مجموعه لتقييم المعاملات الغذائية الآتيه :

١) ٥٠%علف مركز +٥٠%سيلاج ذره+٢كجم قش أرز
٢) ٥٠%علف مركز +٥٠%سيلاج ذره+٢كجم قش أرز+١٥جم مثيونين محمي/للرأس/يومياً
٣) ٢٥%علف مركز +٧٥%سيلاج ذره+٢كجم قش أرز
٤) ٢٥%علف مركز +٧٥%سيلاج ذره+٢كجم قش أرز+١٥جم مثيونين محمي/للرأس/يومياً

وكانت أهم النتائج كما يلي:-

١- أدت زيادة نسبة سيلاج الذرة إلي زيادة معنوية في معاملات هضم المادة العضوية والألياف الخام وكذلك المركبات الكلية المهضومة، بينما إضافة المثيونين المحمي أدت إلي زيادة معنويه في معامل هضم البروتين والقيم الغذائية.

٢- أظهر الغذاء المأكول إرتفاعاً معنوياً بزيادة نسبة سيلاج الذرة في العليقه وبإضافة المثيونين المحمي .

٣- وقد تلاحظ عدم وجود فروق معنوية بين مقاييس الكرش في المعاملات المختلفة.

٤- كما أظهر ت النتائج انه بزيادة نسبة السيلاج وبإضافة المثيونين المحمي زاد معدل إنتاج اللبن وكذلك اللبن معدل نسبة الدهن إلي ٤% زيادة غير معنوية.

٥- إضافة المثيونين المحمي أدي إلي زيادة معنوية في نسبة بروتين اللبن.

٦- تحسنت كفاءة استخدام وتحويل الغذاء للأبقار الحلابة المغذة علي ٧٥%سيلاج ذره+١٥جم مثيونين محمي .

٧- كما أظهرت المجموعتين الثالثة والرابعة مردود اقتصادي لكل كيلو لبن منتج من الأبقار الحلابة .

مما سبق يتضح أنه بزيادة محتوي العليقه من المادة الخشنة وبإضافة المثيونين المحمي قد تحسنت معاملات الهضم والقيم الغذائية وكذلك إنتاج اللبن ودهن وبروتين اللبن كما تحسنت أيضا الكفاءة الإقتصادية والعائد من محصول اللبن للأبقار الحلابة .