EFFECT OF FEEDING DIFFERENT CONCENTRATE: CORN SILAGE RATIOS WITH OR WITHOUT PROTECTED METHIONINE SUPPLEMENT ON PRODUCTIVE AND REPRODUCTAIVE PERFORMANCES OF LACTATING COWS

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ABSTRACT

The present study was conducted at Sakha Experimental Station, Animal Production Research Institute, Kafr El-Shikh, Egypt. Twenty Friesian lactating cows after month of parturition were divided into four similar groups 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 (PMet.) on milk production and its composition, some blood parameters and some reproductive performance. Data were statistically analyzed by SAS (1998) according to the two ways with interaction model.

Milk production was improved with feeding 75% corn silage (CS) and with supplement PMet. than the other rations. 75% CS ration detected higher milk fat%. Also; supplement PMet. detected higher milk fat% and protein%. Feeding 50% CS ration increased plasma total proteins while prolactin concentrations were decreased. Plasma total proteins, total lipids and, prolactin were increased with adding PMet. Conception rate was higher and numbers of services/conception were lower with 75% CS ration and with adding PMet. Feeding 75% CS ration or adding PMet showed higher level of blood plasma progesterone.

The results data might suggest that addition PMet. and increasing level of CS were improved performance of lactating cows.

Keywords: corn silage ratio, protected Methionine, reproductive, cows.

INTRODUCTION

Forages that are high in digestibility and that can be consumed in large amounts are an essential diet component for many high producing dairy cattle. Corn silage is considered a highly quality forage and it is used to support dairy production through the summer in Egypt. (Groff and Wu 2005) 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). For this reason, supplementing silage-based diets with rumen undegradable protein (RUP) was shown to lower plasma urea nitrogen (PUN) concentrations and improves reproduction of dairy cows (Ferguson et al., 1988). In addition, Amino acids absorbed in the cow's small intestine are derived from microbial protein and from dietary proteins that are undegraded in the rumen. So it has become common practice to include supplemental bypass protein to rations for lactating cows especially methionine that has been identified as the most limiting amino acid for synthesis of milk protein (Rulquin et al., 1993).

MATERIAL AND METHODS

Experimental design:

The present study was conducted at Sakha Experimental Station, Animal Production Research Institute, KaferEl-Shikh, Egypt. Twenty multiparous lactating Friesian cows were randomly distributed according to lactation season and milk yield into four similar groups (5

animals each). The experiment begun after month of parturition and continued for about four months

Animals in all groups were fed based on energy requirement according to NRC (1989) as follows:

R1-50% concentrate feed mixture (CFM) + 50% corn silage (CS),
R2-25% CFM + 75% CS,
R3-50% CFM + 50% CS +15 gm PMet.,
R4-25% CFM + 75% CS+ 15 gm PMet.

Cows were fed individually twice daily at 8.00 a.m. and 6.00 p.m.. Protected methionine was individually 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. Chemical composition of feed ingredients rations were shown in Table (1).

Table (1): Chemical composition of feed ingredients fed to lactating cows (% on DM basis)

Ingredients	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**

CFM=Concentrate feed mixture CS= corn silage RS=rice straw

Chemical composition of feed ingredients was determined according to A.O.A.C. (1995).

Milk sample and chemical 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. Samples of milk were collected weekly at the morning and the evening milking for chemical analysis by milk scan.

Blood plasma sample and their analysis:

The blood samples were taken at different periods: 1- twice weekly at 8.00 a.m (to determine progesterone Harmon). 2- Monthly to determine some blood plasma metabolism and plasma prolactin concentration. Blood samples were collected from the jugular vein into clean dried glasses culture tubes containing anticoagulant (heparin) and then centrifuged at 3000 rpm 15 minute. The samples of blood plasma were collected into clean and serial labeled dried glass vial and then stored at -18 C° till chemical analysis. Blood plasma total lipids was determined according to (Zollner and Kirsch. 1962), total proteins were determined by the methods of (Henry et al. 1974), and; glutamic- oxaloacitc transaminse (GOT) and glutamic- pyruvic transaminase (GPT) were determined by the methods of Reitman and Frankel. (1957). Plasma prolactin was measured by methods according to (Zacur.(1983). Plasma progesterone (P4) was determined according to the methods of Nulsen and Peluso. (1992).

Reproductive performance:-

standing behavior was considered at the main sign of heat and cows which showed that behavior were artificially inseminated for investigating some reproductive performances as affected by tested rations, the interval from parturition to each of the first services (PFS), number of services/conception (NS/C), fertile inseminations (days open) and conception rate. Pregnancy diagnose was detected by rectal palpation after 60 days from the last insemination.

Statistical analysis:-

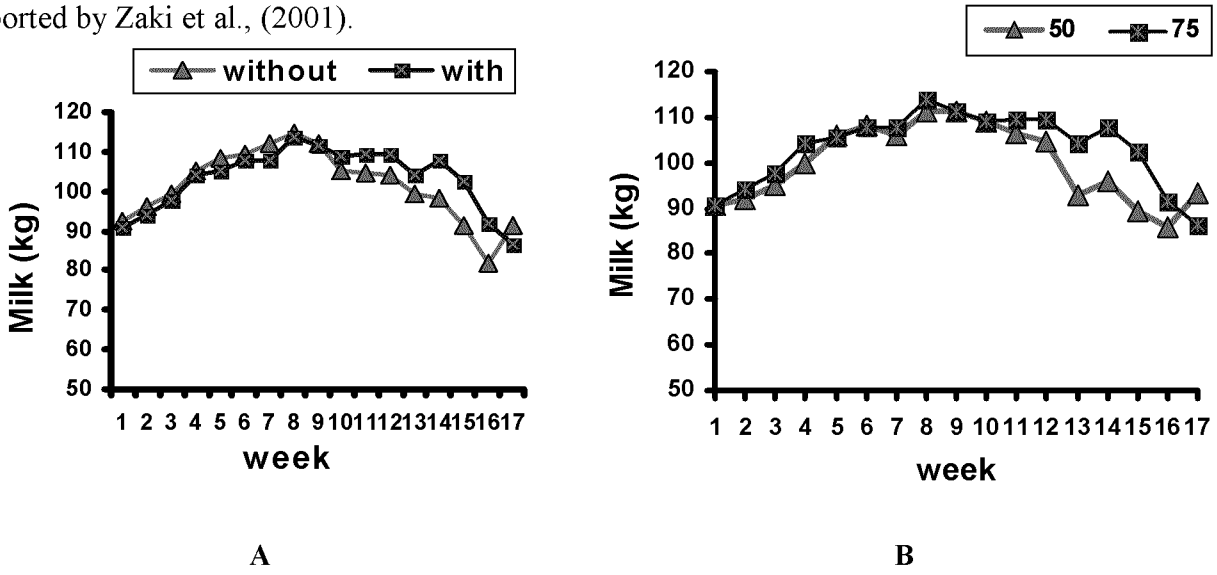
Data collected were statistically analyzed according to the General Linear Models Procedure of SAS (1998). According to the following model

$Y_{ijk}= U+Ti+Pj+(T*P)_{ij}+E_{ijk}$ where Y=Observation, μ=Overall mean, T= the fixed effect of ratio, P= the fixed effect of supplementation, and (T*P) the fixed effect of the interaction between the ratio and methionine supplementation.

RESULTS AND DISCUSSION

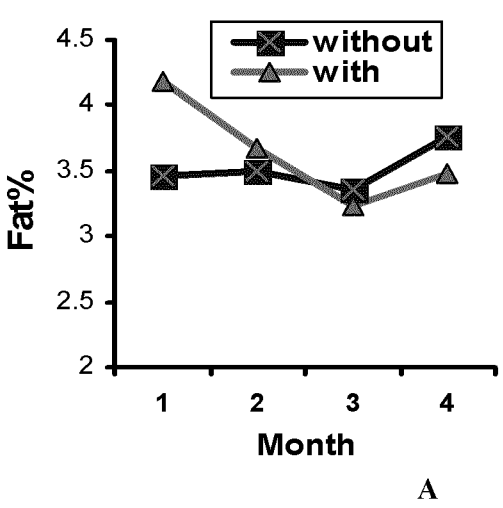
1-Milk production and composition:

Weekly means for milk yield and its monthly composition are shown in Figures 1, 2 and 3. Feeding ration containing 75% CS produced 7.5% more milk than 50% CS ration. This agrees with the results observed by EL-Saadany et al., (2001). Also milk fat% was higher by 5.79% for cows fed the high CS than low CS ration (Fig., 2B). Increasing milk production and milk fat% may be due to the energy intake increased from carbohydrate sources and to the higher ready content of acetic acid in corn silage, and higher, nutrients digestibility and TVFA's content in rumen of animals fed on 75 % CS rations (El-Ganiny et al., 2007). While milk protein (Fig., 3B) was not different among diets for the low silage and high silage the same rustles were reported by Zaki et al., (2001).

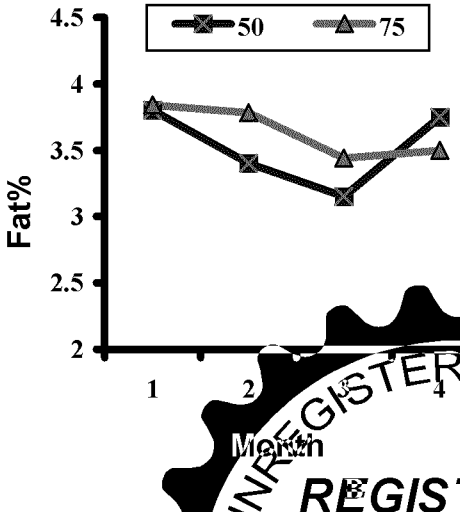


A B

Fig. (1): Effect of experimental rations on milk production



A

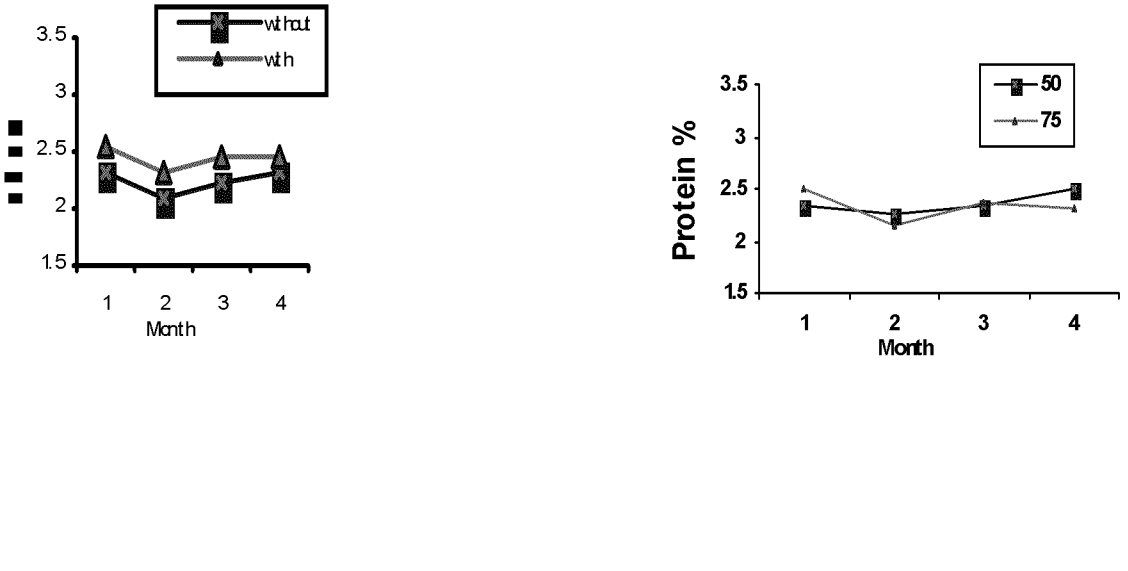


B

Fig(2): Effect of experimental rations on milk fat%

Animals fed rations supplemented with (Met) showed (P>0.05) higher milk yield by 6.3 more than those fed non supplemented rations (Fig., 1A). This may be due to methionine and lysine appears to be most limiting amino acids for milk synthesis Noftsger and Pierre (2003). Met Supplementation (P>0.05) increased milk fat and increased milk protein by 6.99% and 11.5% respectively; more than ration without methionine (fig., 2A and fig., 3A). The increases in milk fat% with methionine supplementation might due to that 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 metabolism in ruminants (Seymour et al., 1990). The increase in milk protein may be due that methionine must contribute 5.3 to 5.6% of the total essential amino acids in duodenal digest and 2.5-2.7% of the total amino acids respectively for maximum content and yield of milk protein (Rulquin et al, 1995) .



A B

Fig. (3): Effect of experimental rations on milk protein %

Blood plasma parameters:

Results of some blood parameters are presented in Table (2) showed that, animals fed 75% CS rations showed lower (P>0.05) plasma total proteins and GPT. While GOT were higher (P>0.05) than those fed 50% corn silage rations. This is agreeing with Mahmoud et al., (2003).

Protected methionine supplementation showed (P>0.05) increase plasma total lipids and total proteins while (P>0.05) decreased plasma, GPT and GOT. Increasing of plasma total proteins with protected amino acids may be due to higher organic matter and CP digestibility that reported by El-Ganiny et al ., (2007) and to increase of methionine level in the blood, Piepenbrink et al., (1996). The higher plasma total lipids with supplement methionine may be due to that methionine facilitated the hepatic secretion lipoproteins rich in triacylglcerol (McCarthy et al., 1968). Level of blood plasma prolactin hormone were higher (P>0.05) with increasing the level of corn silage. As soon as, protected methionine supplementation.

Table (2): Effect of fed experimental rations on blood parameters of lactating cows.

parameter	Ratio		Supplementation		SE ±
	50%	75%	without	with	
Total lipid (g/100 ml)	0.22	0.23	0.20	.25	0.023
Total protein (g/100 ml)	7.93	7.47	7.58	[illegible]	[illegible]
GOT (u/L)	27.55	28.55	29.03	26.07	1.720
GPT (u/L)	2.16	2.01	2.17	2.02	0.368
Prolactin(ng/ml)	6.95	7.95	6.29	[illegible]	[illegible]

4-Reproductive Performance:-

Results of some reproductive performance parameters are presented in Table (4) and Figure 4 (A, B). Data indicated that cows fed the diet containing high corn silage had higher (P>0.05) level of p4 (ng/ml) 1.138 more than 50% CS ration. Cows fed 75% corn silage had first

of service days an average of 20.67 d longer than cows receiving low corn silage diet. While cows fed the diets containing low forage ration remained nonpregnant an average of 35.34 d longer than cows receiving high corn silage diet.

Cows fed the diet containing protected methionine had (P>0.05) higher progesterone level and conception rat % while it had insignificantly (P>0.05) lower first of service days, and numbers of service per conception These findings are in concert with those of Carroll et al., (1994),

Table (3): Effect of fed experimental rations on reproductive performance.

item	Ratio		Supplementation	
	50%	75%	without	With
Number of service	3.33	3.16	3.5	3
First of service (days)	92.83	113.5	127.66	78.66
Days nonpregnant	222.5	187.16	272a	137.66b
Conception rat %	83	100	83	100

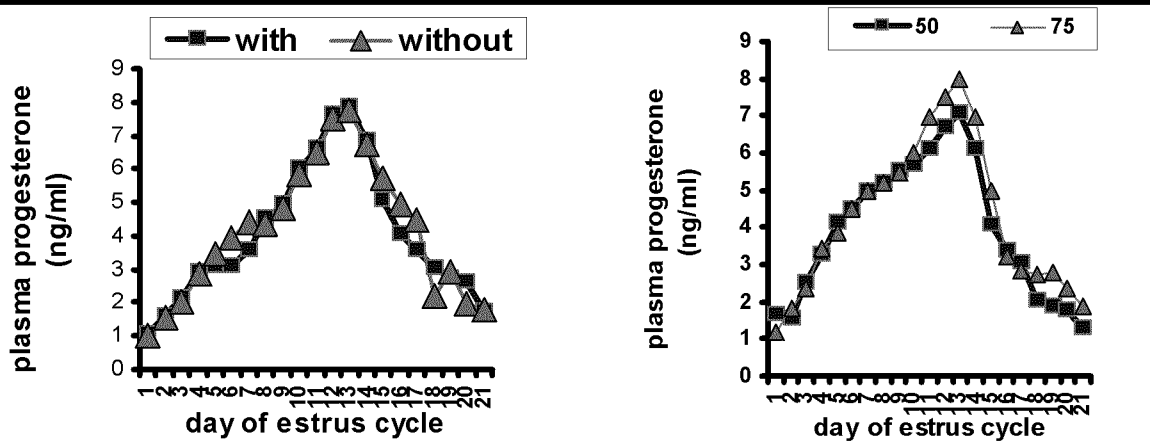


Fig. (5): Effect of experimental rations on progesterone profile.

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