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Effect of Green Forage Type on Productive Performance and Milk Composition of Lactating Egyptian Buffalo

[1]A.E.M. Mahmoud and [2]H.M. Ebeid
[1]Department of Animal Production, Faculty of Agriculture, Cairo University, 12613, Giza, Egypt
[2]Dairy Animal Nutrition, Department of Dairy Science, National Research Center, Egypt

Corresponding Author: A.E.M. Mahmoud, Department of Animal Production, Faculty of Agriculture, Cairo University, 12613, Giza, Egypt

ABSTRACT
The objective of the present study was to investigate the effect of inclusion different types of forage in dairy buffaloes rations on the performance of milk production. Twelve multi parous Egyptian buffaloes, after 8 weeks of calving (averaged 550 kg live body weight) were assigned into three groups of 4 buffaloes in 3×3 Latin square design. Each group fed one of the three rations with different kind forage either berseem (R1), berseem plus corn silage (R2) or corn silage (R3). All groups were fed forage plus Concentrate Feed Mixture (CFM) by 50% concentrate: 50% roughage. The digestibility coefficients of DM, CP, CF and cellulose were significantly higher for R1 compare to other tested rations. However, no significant differences noticed among tested rations for OM, EE, NFE, NDF, ADF and hemicelluloses. All tested rations, had nearly similar values of TDN and DE. R1 contained (B) had the highest DCP value (11.81%) followed by R2 (10.25%) contained (B+CS) while R3 contained (CS) had the lowest value (8.63%). No significant differences among the tested groups in both actual and 7% FCM yields. In addition, there were insignificant differences between animals fed all tested rations in lactose, ash and SNF of milk produced. While feeding both kinds of forages (B+CS) and CFM (R2) were significantly increased fat, protein and TS contents compared with feeding R1 and R3. No significant differences were observed among tested groups for feed efficiency as the amount of DM required to produce one kg 7% FCM. While highly significant differences among treatments were detected concerning DCP efficiency. Normal ranges for the blood parameters were observed with no significant differences as the result of feeding all tested rations. Short chain fatty acids were significantly higher with ration contained berseem compared to with rations contained corn silage which had higher values in long chain fatty acids.

Key words: Berseem, corn silage, buffaloe, fatty acids

INTRODUCTION
Major components of raw milk include the water carrier, fat protein, lactose and minerals. Variations in the content or composition of these milk components are the results of genetic selections and dietary managements. Genetics determines the relative ability of mammary cells to synthesize and secrete components of milk, where dietary management influence availability and composition of the nutrients used for milk component synthesis. However, concentration and thus yield of milk fat and a much lesser extent of milk protein can be manipulated through diet management (Bachman, 1992).

Feeding management practices of the dairy farm can have a major impact on the levels of milk fat and protein concentration in milk. Nutritional strategies that optimize rumen function also maximize milk production and milk components. However, there are several strategies that producers can use to enhance rumen function and the resulting milk components. However, nutritional strategies that impact milk components include adequate rumen degradable protein and adequate pounds of forage NDF in the diet especially for early lactation cows (Varga and Ishler, 2007).

Concentration of fat in milk can vary over a range of about 3 percentage units through diet manipulation. In contrast, lactose and minerals and the other solids contents of milk is not responsive whereas the protein percentage can be varied 0.6 units (Bachman, 1992; Varga and Ishler, 2007).

The kind and type of forage fed to dairy cows influences greatly milk production and farm profitability. Species differ widely in chemical composition, nutrient digestibility and of digestion (Bachman, 1992). Chemical composition of grass and legume are distinctively different CP content is generally lower for grass than legumes; however the composition of the crude protein differs. Grass contains more non-protein nitrogen in soluble protein and legumes contain more amino acids or peptides in soluble crude protein (Varga and Ishler, 2007).

The FA profile of milk fat can be modified by feeding strategies and there may be longer-term options by animal breeding. There are possibilities for a chain-approach from farm to processor to consumer, some examples were presented and such an integrated approach is essential if scientific findings are to be put into practice. However, there remain questions about human health claims of various milk FA's. Research and standard protocols, for sampling, storage and FA analysis in forages are needed and there is current research underway in this area in many parts of the world.

This study was carried out to investigate the effect of inclusion different type of forage (Berseem or corn silage) in dairy buffaloes rations on the performance of milk production.

MATERIALS AND METHODS

This study carried out at the Experimental Station of Animal Production Department, Faculty of Agriculture, Cairo University, Giza, Egypt. The experiment lasted for 90 days Latin square design.

Ensiling procedures: Whole corn plants were chopped to make corn silage. Silage was kept underground inside the silo with dimensions of (4×3×1.5 m length, width and height). The walls of the silo were covered with polyethylene sheet and the top of the silo was covered by a thin layer of polyethylene sheet (1.0 mm), then a clay layer of approximately 20 cm thickness was spread over the polyethylene sheet for 10 weeks.

Experimental animals and rations: Twelve lactating multiparous Egyptian buffaloes (in 3^{rd} and 5^{th} lactation seasons) weighed 550 kg on average were used after 8 weeks of calving, they were assigned into three groups of 4 buffaloes. Each group of buffaloes feed one of the three rations with different content of forage either Berseem (B), Berseem plus Corn Silage (BCS) or Corn Silage (CS) in 3×3 Latin square design. Animals in the experimental groups were fed forage plus concentrate feed mixture in mash form (CFM) by 50% concentrate: 50% roughage.

Feeding procedures: Animals were individually fed on the experimental rations to cover energy and protein requirements according to Ghoneim (1964). The CFM was offered to all animals at milking time (7.0 am and 7.0 pm). Green forages were offered twice daily (9.0 am and at 3.0 pm).

The animals received sodium bicarbonate (as a buffer) at 1% of total dry matter intake when fed corn silage. Water was available at all times. The daily offered and orts were individually recorded for each animal.

Milk yield and composition: Buffaloes milk was obtained by hand milking twice daily (7.0 am and 7.0 pm) and the daily milk yield was individually recorded and was corrected to 7% FCM by the following equation according to Raafat and Saleh (1962):

$$7\%\ FCM = 0.265*\text{milk yield}+0.5*\text{fat yield}$$

Milk sampling and analysis: During the 7 days collection period two milk samples were individually collected from each buffaloes at 7.0 am and 7.0 pm and were composite. Chemical analysis of milk fat, protein, solids not fat, total solids and ash were determined according to Ling (1963). Lactose was calculated by difference. Saturated, unsaturated and total fatty acids were determinate in the fat of the milk after extraction by using methyl ester boron trifluoride method (AOAC, 2000). The fat is saponified with sodium hydroxide in methanol. The fatty acids are methylised with boron trifluoride in methanol, extracted with heptane and determined on a gas chromatography with FID detector (PE Auto System XL) with auto sampler and Ezchrom integration system. Carrier gas (He); ca 25 Psi-air 450 mL min^{-1}, Hydrogen 45 mL-split 100 mL min^{-1} oven temperature 200°C injector and detector 250°C.

Digestion trials: At the end of each collection period, nutrients digestibility were determined by the Acid Insoluble Ash (AIA) technique as described by Van Keulen and Young (1977), to determine the digestion coefficients and the nutritive values of the experimental rations. Feces samples were collected for six successive days from each animal. Total Digestible Nutrients (TDN) were calculated according to the classic equation of McDonald *et al.* (1995) as follows: TDN, Percentage = digestible CP, Percentage+digestible CF, Percentage+digestible NFE, Percentage+digestible EE, Percentage*2.25.

Blood parameters: Blood samples were collected from all the experimental buffaloes at the end of tested period of each ration. The blood samples were taken from the jugular vein in dry clean glasses tubes using heparin as anticoagulant and then centrifuged for 15 min at 4000 rpm to obtain plasma. Biochemical of blood plasma constituents was determined by using commercial kits, total protein and creatinine as described by Tietz (1986, 1990), albumin was determined according to Doumas *et al.* (1971), blood plasma urea was determined according to Patton and Grouch (1977). Alanin Amino Transferase (ALT) and activity of aspartate transfearse (AST) were determined by the methods of Young (1990). Glucose (g dL^{-1}) was executed by using kits of Stanbio Laboratory Inc, procedure No. 1070. (San Antonio, Texas, USA). Total lipids, triglycerides and total Cholesterol (mg dL^{-1}) were quantified by using a calorimetric method by using kits of the Bio diagnostic company.

Statistical analysis: Data were analyzed using the general linear model procedure of SAS (2000). One way ANOVA procedure used to analyze the intake, digestibility, feed intake, milk production, fatty acids and blood parameter data following the next model; $y_{ij} = \mu+T_{ij}+E_{ij}$, were, μ is the overall mean of y_{ij}, T_{ij} is the treatment effect; the E_{ij} is the experimental error. The differences among means were separated according to Duncan's New Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Chemical composition and fiber fractions of the experimental rations: The chemical analysis of tested feedstuffs (Table 1) indicated that both tested roughage (berseem and corn silage) considered as a high quality forage which contain reasonable amounts of nutrients. Corn silage contained more DM, OM, CF and NFE, while fresh Berseem contained more CP and ash contents. Concerning the composition of calculating experimental rations, results showed that all tested rations had practically nearly similar values for DM, EE, NFE, ash and hemicelluloses. R2 and R3 showed the highest DM, CF, NDF, ADF, ADL and cellulose. While R1 and R2 contained fresh berseem had the highest CP content being; 15.16 and 13.94%, respectively. Such results are mainly a reflection of the chemical composition of CFM and both kinds of tested forages.

Digestion coefficient and nutritive values: Digestibility coefficients and nutritive values of the experimental rations are shown in Table 2. The digestibility coefficients of DM, CP, CF and cellulose were significantly ($p<0.05$) higher for R1 compared to other tested rations (R2 and R3). However, no significant differences noticed among three tested rations for OM, EE, NFE, NDF, ADF and hemicelluloses.

In general the higher digestibility values obtained of most nutrients of all tested rations may be attributed to the effect feeding such high quality forage (Berseem or corn silage) which provided stimulatory factors to cellulotic bacteria and other rumen bacteria. These factors resulted in some changes in the digestive function which lead to increase the availability and utilization of nutrients in the rumen and could have a significant impact on digestion and nutritive values of experimental rations.

Data in Table 2 reported that all experimental rations had nearly similar values of TDN with insignificant differences between tested rations. On the other hand, R3 had significantly ($p<0.05$) lower DCP (8.63%) followed by the 2nd ration (10.25), while the 1st ration (R1) had significantly ($p<0.05$) higher value (11.81%). This may be due to the higher CP content of berseem than corn silage used during formulation R1 and R2 (Table 1). The chemical composition of grass and legumes are distinctively different. Crude protein content is generally lower for grass than legumes;

Table 1: Chemical composition and fiber fractions of the experimental foodstuffs and rations consumed by lactating buffaloes (% on a DM basis)

	Feedstuffs			Experimental rations		
Item	B	CS	CFM	R1	R2	R3
Chemical composition						
DM	17.00	33.00	92.12	55.03	58.93	63.41
OM	89.96	91.28	87.89	88.91	89.10	89.54
Ash	10.04	8.72	12.11	11.09	10.90	10.46
CP	14.15	8.48	16.15	15.16	13.94	12.42
EE	2.55	2.71	5.44	4.01	4.04	4.11
CF	22.83	28.05	10.19	16.43	18.00	18.86
NFE	50.43	52.04	56.11	53.31	53.12	54.14
Fiber fractions						
NDF	34.78	60.00	31.69	33.22	40.20	45.44
ADF	23.91	45.64	24.16	24.04	29.94	34.59
ADL	2.53	5.60	4.05	3.30	4.11	4.80
Cellulose	21.16	40.04	20.12	20.63	25.78	29.79
Hemi cellulose	10.87	14.36	7.52	9.17	10.26	10.84

B: Berseem, CS: Corn silage, CFM: Concentrate feed mixtures, R1: B+CFM, R2: BCS+CFM, R3: CS+CFM

Table 2: Digestibility and nutritive value of the experimental rations consumed by lactating buffaloes

	Experimental rations			
Item	R1	R2	R3	±SE
Digestibility (%)				
DM	73.20[a]	68.48[ab]	66.84[b]	1.43
OM	78.00	72.41	72.94	1.65
CP	77.93[a]	73.51[ab]	69.49[b]	2.00
EE	78.94	83.04	84.02	2.43
CF	69.60[a]	62.00[b]	67.64[ab]	1.67
NFE	62.59	59.05	64.76	3.83
NDF	63.04	57.63	62.06	2.13
ADF	63.45	58.33	63.56	1.83
Cellulose	73.08[a]	70.40[ab]	62.76[b]	2.50
Hemicelluloses	61.93	55.32	57.28	4.44
Nutritive values (%)				
TDN	62.27	63.33	64.55	2.46
DCP	11.81[a]	10.25[b]	8.63[c]	0.27

Means in the same row with different superscript are significantly different (p<0.05), R1: B+CFM, R2: BCS+CFM, R3: CS+CFM

Table 3: Effect of experimental rations on milk yield and its composition

	Experimental rations			
Item	R1	R2	R3	±SE
Milk yield (kg h^{-1} day^{-1})	9.47[a]	9.44[a]	10.29[a]	0.27
7% (FCM)	9.61[a]	10.21[a]	10.33[a]	0.29
Fat (%)	7.15[ab]	7.78[a]	7.04[b]	0.19
Protein (%)	3.56[ab]	3.65[a]	3.41[b]	0.05
SNF (%)	9.90[a]	10.06[a]	9.73[a]	0.16
TS (%)	17.04[b]	17.90[a]	16.77[b]	0.17
Lactose (%)	5.10[a]	5.22[a]	5.19[a]	0.10
Ash (%)	1.22[a]	1.15[a]	1.15[a]	0.06

Means in the same row with different superscript are significantly different (p<0.05). R1: B+CFM, R2: BCS+CFM, R3: CS+CFM

however, the composition of the crude protein differs. Grass contain more none protein nitrogen in soluble protein and legumes contain more amino acids or peptide in soluble protein (Glenn *et al.*, 1989). Generally, the present nutritive values are mainly associated with the chemical composition and proportion of the experimental feedstuffs, in particular of berseem and corn silage. These results are in agreement with those obtained by El-Ready (2000), El-Aidy (2003) and Khalafalla *et al.* (2007) who found a higher digestibility of all nutrients for cows or buffaloes fed rations contained corn silage, berseem or corn silage and berseem along CFM.

Milk production and composition: The effect of feeding tested rations on the average of actual and 7% FCM yield of the experimental lactating buffaloes are shown in Table 3. Results indicated that, no significant differences among tested groups in both actual and 7% FCM yields. However, feeding experimental buffaloes rations contained either fresh Berseem (R1) or corn silage (R3) or both tested forages (R2) did not affect such these parameters. These results revealed also that, the requirements of the expected production of the experimental buffaloes were covered by given formulated rations. Moreover, all experimental buffaloes fed these tested rations achieved and maintained higher milk production as the results of feeding such high quality forage along with CFM in proper amounts and proportions. Similar results were found by El-Aidy (2003) who noticed that milk yield of buffaloes did not significantly affected by the partial replacement of berseem by corn silage.

In addition, there were insignificant ($p<0.05$) differences among animals fed all tested rations in lactose, ash and SNF of milk. While feeding both kinds of forage and CFM (R2) was significantly increased the content of milk fat, protein and TS (7.78, 3.56 and 17.90%, respectively) compared to feeding corn silage and CFM (R3). Meantime, no significant ($p<0.05$) differences were observed in fat and protein content of milk among buffaloes fed R1 and R3. The concentration of lactose, minerals and the other solids constituent of milk, do not respond predictably to adjustment in diet (Varga and Ishler, 2007), which occurred in this study.

The high fat content of milk produced by the buffaloes fed R1 and R2 may be related to inclusion long fresh berseem in these two rations, while the lower content of milk produced by feeding corn silage in the 3rd ration may be attributed to the small particle length of corn silage and fine grinding of CFM used during formulation (R3). Feeding of forages that are ground finely results in rumen fermentation that produces a higher proportion of propionic acid and, in turn, reduced milk fat percentage. Length of forage is an indicator of its effectiveness in maintaining milk fat percentage. An average forage particle length of 0.25 inches or more is needed to keep ruminal molar percentage of propionate below 25 and milk fat 3.6% in cow's milk (Bachman, 1992).

Milk fat percentage of cows fed corn silage based diets with 24% NDF was less than that of cows fed 29 or 35% NDF (Cummins, 1992) but in another study (Bal *et al.*, 1997) production of milk fat and milk was not different among cows fed corn silage based diets with 25 or 29% NDF. Corn silage elicits similar or greater chewing activity by cows than does Alfa Alfa (Mertens, 1997) and mean NDF digestibility is similar for corn and Alfa Alfa silages (Kung *et al.*, 1992); therefore, the minimum amount of NDF needed to maintain ruminal function when diets are based on corn silage is probably similar to that for diets based on Alfa Alfa diets based on Alfa Alfa silage assuming the particle size is adequate. While, Roseler *et al.* (1997) showed that, in models for practicing DMI of lactating cows fed high energy diets ranging in NDF from 25 to 42% of DM less than 1% of variation in DMI was accounted for by dietary NDF. Although there are great variations were observed the optimum values of NDF contents needed to maintain and enhance milk composition of lactating cows as mentioned previously and by NRC (2001) for dairy cattle. Although, the NDF and ADF values were recorded in this study which ranged between 33.22 and 45.44% for NDF and 24.04 and 34.59% for ADF and hence that fed intake of these nutrients, the milk composition produced by the experimental buffaloes fed tested rations were within the normal range of high quality buffaloes milk, which had fat, protein, SNF, TS, lactose and ash %, not below than 7.04, 3.41, 9.73, 16.77, 5.19 and 1.15%. These results may be explained by the fact which, indicated that, the micrflora of buffaloes rumen were more efficient in degradation of plant tissue than that of cows as explained by the results obtained by Bendary *et al.* (2002) and Bahira *et al.* (2002), indicated that DM, CF fractions and nutrients disappearance percentage of some synthetic and natural cellulosic materials were more pronounced when samples were incubated in buffaloes rumen than in cow rumen.

The results of the protein percentage (Table 1) indicated that R2 had the highest value (3.65%) followed by R1 (3.56%) with insignificant differences, while the 3rd ration recorded the lowest value (3.41%) with significant ($p<0.05$) differences.

The high protein content of milk produced by feeding R1 and R2 compared to feeding R3 may be due to the higher TDN consumed by the buffaloes fed these rations compared to those fed R3 ration as shown in Table 6. Energy intake is the primary nutritional factor affects milk protein percentage and yield. As intake of energy from carbohydrate sources increases, milk yield and protein percentage increase and contribute, in about 85:15 proportion, to the observed increase in yield of milk protein. Energy intake as dependent upon DMI and energy density of the diet (Bachman, 1992). Varga and Ishler (2007) indicated that energy is needed for maintaining milk protein production. In early lactation, increased energy seems to stimulate both milk and milk protein production with little effect on the percentage of protein in milk. Later in lactation, energy does increase the concentration of protein in milk to a certain extent. Some of this response in milk protein may be due to the extra glucose and acetate available at the udder but added energy may importantly cause an increase in microbial protein synthesis that increase amino acid supply at the udder. Studies have shown that feeding more rumen available carbohydrate can increase milk protein production.

Generally, milk composition produced by the experimental buffaloes was within the normal range of buffalo's milk produced under similar conditions (El-Aidy, 2003).

Fatty acids profile: Fatty acid composition of milk fat is depicted in Table 4. Generally results indicated that short chain fatty acids (from C6:0 to C16: 1 ω) were significantly higher with ration contained Berseem plus CFM. On contrast, long chain fatty acids (C≥18)were significantly higher ($p<0.05$) with rations containing corn silage. Olic C18: 1ω9 had a higher value being; 25.26% with R3 compared to other rations. No significant differences observed in vaccinic acid percentage among tested rations. R2 appeared high significant effect on linolic and linolenic contents of milk fat comoared to rations contained Berseem or silage only.

Table 4: Effect of experimental raions on milk fatty acids profil

	Experimental rations			
Item	R1	R2	R3	±SE
C6:0 Caproic	1.34^{a}	0.765^{b}	0.805^{b}	0.085
C8:0 Caprylic	0.845^{a}	0.46^{b}	0.46^{b}	0.038
C10:0 Capric	1.60^{a}	1.045^{b}	0.92^{b}	0.092
C12:0 Lauric	2.12^{a}	1.38^{b}	1.325^{b}	0.059
C14:0 Myristic	11.195^{a}	8.655^{b}	8.425^{b}	0.318
C14: 1 ω5 Myristolic	0.69^{a}	0.27^{b}	0.285^{b}	0.063
C15: 0 Pentadecanoic	1.59^{a}	1.235^{b}	1.375^{b}	0.113
C16: 0 Palmitic	37.525^{a}	29.785^{b}	29.605^{b}	1.679
C16: 1 ω7Palmitioleic	2.395^{a}	1.435^{b}	1.385^{b}	0.22
C17:0 Heptadecanoic	1.095	1.225	1.125	0.069
C18: 0 Stearic	11.51^{b}	17.53^{a}	19.095^{a}	1.591
C18: 1 ω9 Oliec	19.04^{b}	23.975^{b}	25.26^{a}	0.886
C18: 1 ω7Vaccinic	4.695	4.79	4.32	0.222
C18: 2 ω6 Linoleic	3.09^{b}	5.345^{a}	4.15^{ab}	0.363
C18: 3 ω3Lionlenic	0.245^{b}	0.39^{a}	0.17^{c}	0.011
C18: 4 ω4 Octadecatetraenoic	0.65^{ab}	0.71^{a}	0.575^{b}	0.075
C20:0 Arachidic	0.115^{b}	0.16^{a}	0.165^{a}	0.007
Non identified	0.26	0.845	0.825	0.144

Means in the same row with different superscript are significantly different ($p<0.05$). R1: B+CFM, R2: BCS+CFM, R3: CS+CFM

Table 5: Blood constituents of lactating buffaloes fed the experimental rations

	Treatments			
Item	R1	R2	R3	±SE
Total proteins (g dL^{-1})	9.83	10.31	9.84	0.41
Albumin (g dL^{-1})	6.57	5.83	6.13	0.41
Globulin (g dL^{-1})	3.25	4.48	3.71	0.70
Total lipid (g dL^{-1})	581.27	544.23	614.10	28.18
Glucose (g dL^{-1})	82.69	140.38	112.82	24.26
Urea (g dL^{-1})	85.30	94.60	117.43	10.89
Creatinine (g dL^{-1})	1.08	1.83	1.28	0.28
AST (IU L^{-1})	98.63	96.88	83.02	10.61
ALT (IU L^{-1})	70.18	92.96	72.40	7.45

Means in the same row with different superscript are significantly different ($p<0.05$), R1: B+CFM, R2: BCS+CFM, R3: CS+CFM

Table 6: Feed intake, feed conversion of the experimental rations

	Experimental rations			
Item	R1	R2	R3	±SE
Feed intake h day^{-1} (DM basis)				
DM (kg)	12.74^a	13.00^a	12.24^b	0.12
TDN (kg)	7.93^b	8.23^a	7.90^b	0.08
DCP (kg)	1.50^a	1.33^b	1.06^c	0.01
Feed conversion 1 kg^{-1} 7% FCM				
DM (kg)	1.28	1.42	1.23	0.06
TDN (kg)	0.83	0.81	0.79	0.04
DCP (kg)	0.16^a	0.14^a	0.10^b	0.01

Means in the same row with different superscript are significantly different ($p<0.05$), R1: B+CFM, R2: BCS+CFM, R3: CS+CFM

These results investigated that fatty acids profile of buffaloes milk could be mainapulate by using two type of green forage together (grass and legumes).

Blood constituents: Blood plasma constituents of experimental lactating buffaloes as affected by partial or complete substitution of complete berseem with corn silage are summarized in Table 5. Results of all blood plasma conistuents cleared that no significant differences were observed among the tested groups. Generally, in the present study blood parameters values measured were within the normal range for healthy lactating buffaloes as recorded by many authors, El-Aidy (2003) and Eweedah *et al.* (2007), when lactating buffaloes fed rations containing different roughages. They found that, globulin values ranged from 4.00 to 4.61 g dL^{-1}, total lipids from 378.80 to 622.10 mg dL^{-1}, ceritainen from 1 to 2 mg dL^{-1}. Wide variation is noticed among reviewed values, which may be due to the plan of nutrition, kinds of feedstuffs used in feeding, age and status of animals (lactation, pregnancy, etc.) along with the differences in the technique adopted for estimating the plasma constituents.

Feed intake and feed conversion: Average daily feed intake by lactating buffaloes are presented in Table 6. Buffaloes fed R2 recorded the highst DM and TDN followed by R1, while those fed R3 showed the lowest intake ($p<0.05$). The higest feed intake of DCP was recorded for animals fed

R1 followed by feeding R2, while the animals fed R3 consumed the lowest amounts DCP head/day. This was attributed to the high content of DCP as results of incorption Berseem in these rations (Table 2).

Data on feed conversion expressed as DM, TDN and DCP required producing one kg 7% FCM are presented in Table 6. The production efficiency expressed as the amount of 7% FCM produced by one kg TDN consumed by R3 tended to be lower than other incorporation of CFM compared to feeding Berseem or corn silage with CFM (R1 and R2). From a statistical point of view, the differences among all tested groups were not significant. While highly significant difference among treatment were detected concerning DCP efficiency. The better efficiency of feed utilization obtained with the combination of corn silage and concentrate feed mixture (R3) observed in this study is in agreement with El-Aidy (2003) who found that lactating buffaloes fed corn silage along with CFM were more efficient concerning the amount of 7% FCM produced by one kg DM and TDN consumed if compared to feeding berseem and CFM.

CONCLUSION

The present results indicated that using such high quality forage for feeding lactating buffaloes formulated balanced rations with adequate protein and energy that reflect on health conditions and enhanced milk production and composition.

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