PRODUCTIVE AND REPRODUCTIVE PERFORMANCE OF DAIRY COWS FED CORN SILAGE WITHOUT OR WITH SOME MICROBIAL ADDITIVES.

G.E. Aboul-Fotouh[1]; S.M. Allam[1]; A.M. El-Gaafarawy[2] O.A. El-Zelaky[2]; and A.M. Abdel-Hafeez[2]

[1]*Faculty of Agriculture, Fayoum University, Fayoum, Egypt.*

[2]*Animal Production Research Institute, Agriculture Research Center, Dokki, Giza, Egypt.*

(Received 22/10/2010, Accepted 7/1/2011)

SUMMARY

The main objective of this study was to investigate the effect of using corn silage (CS) in cow's rations without or with dry live bacteria (DLB) or dry live yeast (DLY) on productive and reproductive performance of cows. Thirty pregnant Friesian cows were used in this study. They were divided into 6 similar groups, in parity (3rd season and 450 kg live body weight. The experimental period lasted from 8 weeks before the predicted date of calving and continued for 120 days post calving. The animals were fed according to NRC (1988) recommendations. The six groups were assigned to the following rations: R1: 60% CFM+ 20% CS + 20% (RS) and was considered as the control ration, R2: 60% CFM+ 20% CS + 20% RS + 2g (DLB), R3: 60% CFM+ 20% CS + 20% RS + 10g (DLY), R4: 40% CFM+ 40% CS + 20% RS + 2g DLB, R5: 40% CFM+ 40% CS + 20% RS + 4g DLB, R6: 40% CFM+ 40% CS + 20% RS + 10g DLY. Results showed that nutrients digestibility were significantly ($P<0.05$) improved by adding CS to the rations with bacterial or yeast additives especially with R6 followed by R5, R4, R3, R2 compared with R1. Similar trend was occurred with TDN, while DCP values were significantly ($P<0.05$) increased for R2 and R3, but it decreased with high CS rations. Within the same level of CS both additives decreased ($P<0.05$) ruminal pH among the different sampling times. Ruminal ammonia-N concentrations were significantly decreased ($P<0.05$) with increasing the level of CS (R4, R5 and R6), while the addition of DBL or DLY significantly ($P<0.05$) increased NH_3-N concentrations. Increasing level of corn silage improved milk yield at constant level of the DBL or DLY. The addition of DBL or DLY to corn silage rations increased milk yield especially for R6. The highest average milk yield was recorded with R6 followed by R5, while R1 recorded the lowest yield. Fat and protein percentages were the highest for groups R5 and R6. Percentage of milk total solids increased by both additives. No significant differences were observed regarding the fatty acids of milk fat due to feeding CS ration without additives (R1) or with DLB or DLY supplementation. All groups showed nearly similar feed conversion as the amount of TDN required to produce one Kg 4% FCM. Reproductive performance in terms of the first ovarian cycle length, return involution period (UIP), first ovulation (PPOI), first estrus (PPEI), first service (PPSI), service period (SP), number of service per conception (NSPC) of cows fed R5 and R6 were improved compared to those fed the other rations. From the economical point of view use of R6 (40% CS plus 10 g yeast/cow/day) in lactating cows rations could be recommended to improve milk production, feed conversion and reproductive performance.

Keywords: *cows; probiotics; yeast; digestibility; productive and reproductive performance.*

INTRODUCTION

During the summer season there is a clear drop in productive performance of Friesian cows. Feeding quality is considered as one of the most factors affecting this trait. In Egypt, the total cultivated area of corn crop is about 2 million feddans and its convertible to amount of whole corn silage may help to save an excellent quality of dairy rations ingredients (Mahmoud *et al.*, 1992). Using corn silage for dairy cattle improved their performance, minimized the amount of expensive concentrates and turns reduced cost of ration (El-Sayes *et al.*, 1997 and Khinizy *et al.*, 1997). Probiotics have many beneficial effects for animal host regarding intestinal micro-flora. Where, they can maintain and regenerate the state of residence and improve their performance (Dawson, 1995). The nutritional effect of probiotics is characterized by an improvement of the utilization of nutrients by the animal host. This effect can be monitored by digestibility measurements (Roberton and Chavalier, 1997). Probiotics could regulate and improve the balance of the microbial environment of the intestine, decrease digestive disturbances, inhibit of pathogenic intestinal microorganisms especially *Escherichia coli* (Salem *et al*., 2002) and improve feed conversion and health status (Windschitl, 1992). Probiotics are also considered as rich sources of vitamins, enzymes and other factors which improve appetite and rumen environment (Besong *et al*., 1996 and Putnam *et al*., 1997). Production responses to yeast are usually related to stimulation of cellulolytic and lactate-utilization bacteria in the rumen, increases fiber digestion and flow rate of microbial protein from the rumen (Newbold *et al*., 1996).

The objectives of this study were to investigate the effect of feeding two levels of corn silage without or with additives of dry live bacteria or dry live yeast on productive and reproductive performance of dairy cows. To achieve these objectives, nutrients digestibility, rumen activity, milk yield and its composition, some blood parameters, reproductive performance and feed conversion were studies.

MATERIALS AND METHODS

This study was conducted at El-Serw Experimental Station belonging to the Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Egypt. The experimental rations were evaluated before studying the optioned feeding trial on dairy cows.

Six digestibility trials were conducted on 3 mature Ossimi wethers averaged 50.0 kg live body weight for each trial to evaluate the feeding values of the following experimental rations:

R1: 60% CFM+ 20% CS + 20% RS was considered as the control ration.

R2: 60% CFM+ 20% CS + 20% RS + 2g DLB.

R3: 60% CFM+ 20% CS + 20% RS + 10g DLY.

R4: 40% CFM+ 40 % CS + 20% RS + 2g DLB.

R5: 40% CFM+ 40 % CS + 20% RS + 4g DLB.

R6: 40% CFM+ 40 % CS + 20% RS + 10g DLY.

Each digestibility trial lasted for 21 days as the preliminary period followed by 7 days collection one. Rumen liquor samples were taken from the three wethers of each trial at the last two consecutive days of collection period. The samples were taken by using rubber stomach tube before feeding and after 2, 4, and 6 hrs post feeding. The ruminal pH values were measured immediately by pH meter (*ORION RESEARCH*, model 201/digital pH meter). Ammonia nitrogen concentrations (NH_3-N) were measured according to Conway (1957). Total volatile acids (TVA's) were determined by the steam distillation methods described by Warner (1964). Twenty ml of strained rumen fluid was prepared for (TVA's) fractionation by high-pressure liquid chromatography (HPLC) according to Bush *et al.* (1970) and total number of protozoa was counted according to Abou-Akkada and El-Shazly (1964).

The whole corn plant was cultivated in El-Serw Experimental Station and harvested at the dough stage of maturity (after 70 days from cultivation).The plants were wilted for 24 hours before ensiling to diminish the moisture content to about 65-70%, then chopped (0.5-1 cm length) and ensiled using cement pits. The silos after completely filled and pressed were tightly covered by plastic sheets then by a soil layer of 20 cm in depth to guarantee anaerobic condition for the silos. The ensiling lasted for 50 days then samples were taken to test physical and fermentative characteristics.

Dry live bacteria:

Dry live bacteria was imported from USA by Dakahlia company, 18 El-Obura building Salah Salim St. Cairo, Egypt. It contained *Lactobacillus acidophilus, L. casei, Entrococcus faecium, Bifidobacterium thermophilus* (minimum $1.0X10^8$ cfu/g), fermentation products dehydrated, calcium carbonate, rice mill by-product and vegetable oil.

Dry live yeast:

Dry live yeast contained yeast culture (live *saccharomyces* 109 cfu/g) grown on a media of corn and supported by vitamin B1 (0.017 mg/100 g), Vitamin B2 (0.004 mg/100g) and Nichotenic acid (0.055 mg/100 g).

Milk production trial:

Thirty pregnant Friesian cows were used in this study. They were divided into 6 groups (five in each), whose assigned on the same dietary treatments of the digestibility trials that mentioned previously. Cows were similar in parity (3^{rd} season age and live body weight; 450 kg). The experimental period lasted 8 weeks before the predicted date of calving and continued for 120 days post calving. The animals were given their requirements according to NRC (1988) recommendations .The rations were offered twice daily at 9 a.m and 4 p.m. Feed additives ((DLY & DBL) were added at the morning individually for each cow. Cows were machine milked twice daily (8.0 a.m and 3.0 p.m). Milk yield was individually recorded three times weekly for 120 days postpartum and milk samples (0.5%) were obtained at the same time.

Blood samples:

Blood samples were collected at 3-4 days intervals starting two weeks post-calving and continued during the first 120 days post-partum for 4 hrs post-morning feeding. Blood samples were obtained to determine the blood concentration of progesterone (P4) for morning ovarian activity and determine serum total protein, albumin, total lipids, glucose, cholesterol, glutamic oxaloacetic transaminase (GOT), and glutamic pyruvic transaminase). Samples (5 ml) were collected from the jugular vein of each cow and centrifuged at 4000 rpm for 20 min and the blood serum was stored in clean glass vials at- 20° c until analysis. Serum total protein was determined as described by Armstrong and Carr. (1964), albumin (Doumas *et al.*, 1971), glucose (Siest *et al.*, 1981), cholesterol (Kostner *et al.*, 1979) and total lipids (Postma and Stroes, 1968).

Samples of feeds and feces were analyzed according to A.O.A.C.(1995). Milk was analyzed individually for milk fat, protein, total solids and ash every week by using Milkoscan apparatus.

Economic evaluation:

Economic evaluation was calculated considering the price of one Kg(DM basis) of silage, Clover hay, Rice straw, Concentrate feed mixture, Dry live bacteria and Dry live yeast were LE 0.25, 0.38, 0.055, 0.75, 78.68, 2.35, respectively. The price of one -Kg milk was 1.10 LE.

Statistical analysis:

Data were subjected to statistical analysis using the General linear Model (GLM) of SAS (1996). The data of digestion coefficients, blood metabolites and milk yield and its composition were subjected to one-way analysis of variance for examining the effects of treatments (i^{th} diets 1 to 6) according to the following model:

$$Y_{ij} = U + P_i + e_{ij}$$

Where: Y_{ij} = observed traits, U= overall mean, P_i = experimental diets 1-6, e_{ij} = Random error. The data of rumen parameters were subjected to analysis of variance for examining the effects of i^{th} treatments (diets 1-6) and time of sampling (0, 2, 4 and 6 hours) and their interaction according to the following model:

$$Y_{ijk} = U + P_i + D_j + PD_{ij} + e_{ijk}$$

Where Y_{ijk} = observed traits, U =overall mean, P_i =experimental diet 1-6, D_j = time of sampling, D_{ij} =interaction of treatment x sampling, e_{ijk}=Random error. Means were compared according to Duncan's Multiple Range Test at 0.05 level (1955).

RESULTS AND DISCUSSION

Chemical composition of feed ingredients and experimental rations:

Chemical composition of feedstuffs and experimental rations are presented in Table (1). It could be seen that CS contained 36.36 DM%, 9.65% CP, 24.22%CF, 50.45% NFE, 2.64% EE and 13.04 % ash. These values are more close to those recorded by El-Saadany *et al.* (2001), Moawad *et al.* (2001) and El-Ashry (2003b).The DLB contained 10.40% CP, 22.35% CF, 1.93% EE, 37.66% NFE and 27.66% ash. While, DLY contained 46.59% CP, 3.80% CF, 1.06% EE, 39.54% NFE and 9.01% ash. These results are within the normal ranges recorded by Abdel- Khalek *et al.* (2000). except that of CP in (DLB) and ash in (DLY), which were lower in the present study. Chemical composition of the experimental rations were different, since DM and CP % were lower in CS rations (R4 to R6), while CF% was higher, compared with the control ration. These results might be due to the chemical composition of CS and increasing its level in the rations. These results are in agreement with those of Bal *et al.* (2000a).

Table (1): Chemical composition of feedstuffs and experimental rations (% on DM% basis)

Item	DM	OM	CP	EE	CF	NFE	Ash	GE Meal/kg DM
CFM	91.15	90.73	16.13	3.10	12.75	58.75	9.27	4.19
CS	36.35	86.96	9.65	2.64	24.22	50.45	13.04	4.00
RS	89.22	83.75	3.86	1.77	33.48	44.64	16.25	3.79
DLB	95.32	72.34	10.40	1.93	22.35	37.66	27.66	3.36
DLY	89.15	90.99	46.59	1.06	3.80	39.54	9.10	4.54
Treatments								
R1	79.80	88.58	12.38	2.74	19.19	54.27	11.42	4.07
R2	79.80	88.58	12.38	2.74	19.19	54.26	11.42	4.07
R3	79.80	88.58	12.41	2.74	19.18	54.25	11.42	4.07
R4	68.84	87.83	11.09	2.65	21.49	52.60	12.18	4.03
R5	68.85	87.82	11.08	2.65	21.49	52.54	12.18	4.03
R6	68.84	87.83	11.10	2.65	21.48	52.60	12.17	4.03

Nutritional evaluation of the experimental rations:

Data presented in Table (2) illustrated that, no significant (P<0.05) difference were detected in most nutrients digestibility between R2 and R4 or R3 and R6 rations due to increasing levels of CS except in NFE digestibility, which was higher (P<0.05) in R4 and R5 than R1 and R2. This may be related to the high NFE% in CS. These results are in agreement with those reported by Mohsen *et al.* (2001) and Zaki *et al.* (2004) who found that digestion coefficients values were significantly (P<0.05) increased with bacteria or yeast addition to the tested rations.

Table (2): Digestion coefficients and nutritive values% of the experimental rations.

Item	R1	R2	R3	R4	R5	R6
DM	63.36 ± 0.75^{c}	65.54 ± 0.20^{b}	67.20 ± 0.13^{A}	64.94 ± 0.16^{b}	66.17 ± 0.40^{ab}	66.51 ± 0.45^{ab}
OM	68.98 ± 0.48^{c}	71.47 ± 0.13^{b}	72.58 ± 0.20^{Ab}	72.69 ± 0.39^{ab}	$73.77\pm0..25^{a}$	73.88 ± 0.59^{a}
CP	74.27 ± 0.32^{b}	76.24 ± 0.97^{ab}	78.29 ± 0.40^{A}	76.30 ± 0.58^{ab}	77.52 ± 0.83^{a}	78.42 ± 0.64^{a}
EE	72.43 ± 2.17^{a}	73.29 ± 0.69^{a}	74.62 ± 0.16^{A}	$73.04\pm0.1.17^{a}$	$74.58\pm0.1.59^{a}$	a76.45 ± 0.15^{a}
CF	59.51 ± 0.80^{b}	62.55 ± 1.43^{a}	63.88 ± 0.61^{A}	63.01 ± 0.62^{a}	64.65 ± 0.39^{a}	65.18 ± 0.93^{a}
NFE	70.95 ± 0.39^{d}	73.49 ± 0.54^{c}	74.18 ± 0.61^{Bc}	75.89 ± 0.45^{ab}	76.67 ± 0.26^{a}	75.38 ± 0.53^{abc}
TDN	63.57 ± 0.49^{b}	65.84 ± 0.14^{a}	66.80 ± 0.18^{A}	66.29 ± 0.32^{a}	67.22 ± 0.53^{a}	66.29 ± 0.53^{a}
DCP	9.19 ± 004^{bc}	9.44 ± 0.12^{b}	9.72 ± 0.05^{A}	8.64 ± 0.06^{e}	8.59 ± 0.09^{e}	8.70 ± 0.07^{d}
GE MealM	2.77 ± 0.02^{c}	2.87 ± 0.01^{b}	2.91 ± 0.01^{A}	2.87 ± 0.01^{ab}	2.91 ± 0.01^{ab}	2.90 ± 0.02^{b}

Means in the same row with different superscripts differ significantly at (P <0.05)

Generally, it could be seen that, the two high levels of additives showed the highest digestibility of the most nutrients with the high CS rations. However, the control ration showed the lowest values of all nutrients digestion coefficients, except EE digestibility where the differences were insignificant (P>0.05). The differences between R2 and R4 (both 2 g DLB) in DM, OM, CP, EE and CP digestibility were not significant, while there was significant (P<0.05) difference in NFE digestibility. Also, there were no significant differences between R4 and both R5 and R6 in all nutrient digestibility. These results may be related to the mutual associative effect of high CS rations with DLB or DLY addition. These improvements in digestibility values may be attributed to that. probiotics bacteria species possesses a wide range of digestive enzymes (amylase. protease. and lipase) which may enrich the concentration of intestinal digestive enzymes (Lee and Lee. 1990). Also. Newbold *et al.* (1996) reported that. production responses attributed to yeast are usually related to stimulation of cellulolytic and lactate-utilizing bacteria in the rumen. increase fiber digestion and increased flow of microbial protein from the rumen. The present results are in agreement with those reported by Wohlt *et al.* (1991) and Wohlt *et al.* (1998) who found significant improvement in digestibility of CP and acid detergent fiber (ADF) when lactating cows were fed diet contained corn silage supplemented with 10g yeast/h/d. Also, Allam *et al.* (2001) recorded that all nutrient digestibility were significantly increased by yeast supplementation with dairy cows.

Regarding, data in Table (2) showed that nutritive values expressed as TDN, CS rations were significantly ($P<0.05$) improved compared to the control ration, but DCP values were significantly ($P< 0.05$) decreased with increasing the level of CS in R4, R5 and R6 rations in comparison with the low one. Nutritive values obtained herein for rations contained CS were close to those recorded by Mohsen *et al.* (2001). The addition of different levels of DLB or DLY to all CS rations led to significant ($P<0.05$) improvement in the nutritive values as TDN and GE of these rations. While, DCP values were significantly ($P<0.05$) increased with the low CS rations, but it significantly ($P<0.05$) decreased in case of high CS rations with either DLB or DLY addition. Similar trends were reported by Allam *et al.* (2001).

Fermentation in the rumen:

Data in Table (3) cleared that ruminal pH values of CS rations (R1, R2, R3 and R6) were significantly ($P<0.05$) decreased at 6 hrs post feeding, compared with (R4 and R5). However, with increasing the level of CS in the rations (40% CS) there was a tendency for raising pH values with increasing the level in the tested diets. It was within the same level R4 and R5 rations were increased ($P< 0.05$) higher ruminal pH along the different sampling times. It is well known that probiotics provide growth factors, such as malate to bacteria that utilize lactate which in turn may moderate changes in ruminal pH (Nisbet and Martin, 1991).

Table (3): Effect of feeding experimental rations on, some rumen liquer measurements.

Item	Hrs	R1	R2	R3	R4	R5	R6
PH value	0	6.60 ± 0.069^{ab}	6.56 ± 0.032^{b}	6.55 ± 0.032^{b}	6.86 ± 0.029^{a}	6.78 ± 0.018^{a}	6.74 ± 0.054^{a}
	2	6.51 ± 0.062^{c}	6.48 ± 0.021^{cd}	6.54 ± 0.014^{b}	6.77 ± 0.029^{a}	6.69 ± 0.02^{a}	6.52 ± 0.047^{c}
	4	6.30 ± 0.049^{d}	6.30 ± 0.046^{d}	6.27 ± 0.014^{d}	6.56 ± 0.022^{b}	6.48 ± 0.034^{cd}	6.40 ± 0.032^{d}
	6	6.51 ± 0.026^{c}	6.41 ± 0.029^{d}	6.35 ± 0.023^{d}	6.67 ± 0.035^{a}	6.60 ± 0.014^{ab}	6.52 ± 0.02^{c}
Ammonia-N (mg/100ml)	0	19.06 ± 0.26^{c}	19.11 ± 0.47^{c}	19.85 ± 0.13^{de}	17.27 ± 0.32^{c}	17.71 ± 0.26^{c}	18.96 ± 0.5^{c}
	2	26.66 ± 0.89^{ab}	27.53 ± 0.87^{a}	29.27 ± 0.46^{a}	25.07 ± 0.42^{b}	25.32 ± 0.44^{b}	26.87 ± 0.84^{ab}
	4	24.08 ± 0.76^{b}	25.18 ± 0.39^{b}	26.35 ± 0.47^{ab}	23.68 ± 0.52^{b}	24.08 ± 0.34^{b}	24.51 ± 0.62^{b}
	6	22.26 ± 0.36^{c}	23.53 ± 0.32^{b}	23.96 ± 0.28^{b}	20.12 ± 0.24^{d}	22.00 ± 0.26^{c}	21.16 ± 0.68^{c}
Protozoa number $\times 10^{3}$ /ml L	Average	591 ± 25.37^{a}	498 ± 10.38^{c}	535 ± 17.01^{b}	607 ± 25.01^{a}	593 ± 25.01^{a}	596 ± 25.95^{a}

Means in the same row with different superscripts differ significantly at ($P <0.05$)

There was a trend for higher ammonia-N concentration corresponding to the higher level of CFM in rations R1, R2 and R3 than those of lower ones (R4, R5 and R6) at all sampling times (Table, 3). These results are in harmony with those obtained by Mehany (1999) who found that ruminal NH_3-N concentration increased with increasing the level of concentrate mixture in the rations. The differences amongst high CS rations in respect of NH_3-N concentration were not significant regarding 0, 2 and 4 hrs sampling times, but at 6 hrs this concentration was significantly ($P< 0.05$) lower with R4, compared to those of R5 and R6.The high CS rations (R4, R5 and R6) did not affect NH_3-N concentration when compared to the control ration (without additives). The rising in NH_3-N concentration of DLB and DLY in the present study may probably be attributed to the stimulatory effect of probiotics as promoters on proteolysis, amino acid deamination and ruminal urease activity (Newbold *et al.* 1996). The highest values of NH_3-N concentration was reached at 2 hrs post-feeding then decreased to the lowest values at 4 and 6 hrs post-feeding for all rations.

The TVA's concentrations were significantly (P< 0.05) higher with the higher level of CFM and lower level of CS in rations (R1, R2 and R3), compared with those of lower level of CFM and higher level of CS (R4, R5 and R6). Ruminal TVA's concentrations reached the maximum values at 4 hrs post-feeding mainly due to the fermentation of non-structural carbohydrate of the ration, but the minimum values recorded just on feeding time. The supplementation of DLB and DLY to the rations containing lower level of CS recorded higher TVA's concentrations (R2 and R3) than those of the control ration at 0, and 2 hrs post-feeding. Similar trend have been reported by Abdel-Khalek *et al.* (2000) and Miller-Webster *et al.* (2002) who found that addition of yeast culture to the rations of lactating cows containing corn silage increased ruminal TVA's concentrations. Moreover, Ibrahim *et al.* (2004) reported that higher ruminal TVA's concentrations when *Succharomyces cerevisiae, Bacillus subtilis, Lactobacillus acidphilus* or *Enterococcus faecium* were added to corn silage fed to lactating goats than control.

Data of proportion of individual VFA's % are presented in Table (4). Acetic acid concentration was significantly increased in high CS rations compared with the low CS rations. The highest ruminal acetic acid values were recorded with R5 and R6 whereas the lowest value was reported with the control. The rising of ruminal acetic acid values with increasing the level of corn silage might have been due to the higher crude fiber in the rations. These results are in agreement with those recorded by Bal *et al.* (2000b) who found that ruminal percentage of acetate linearly increased significantly with increasing level of corn silage in the ration of lactating cows. The addition of DLB or DLY to the corn silage rations increased (P<0.05) acetic acid production. Results obtained by Brydt et *al.* (1995) with cows and Radew (1999) with steers are in harmony with the presented results.

Table (4): Effect of feeding experimental rations on ruminal TVFA's and fraction VFA%.

Item	Hrs	R1	R2	R3	R4	R5	R6
Total VFA's (m Eq/100ml	0	9.42 ± 0.3^{e}	10.10 ± 0.27^{d}	10.48 ± 0.26^{cd}	8.71 ± 0.25^{e}	9.17 ± 0.12^{e}	9.79 ± 0.36^{e}
	2	10.26 ± 0.18^{cd}	11.19 ± 0.04^{bc}	11.71 ± 0.09^{b}	9.62 ± 0.16^{de}	10.13 ± 0.09^{de}	10.43 ± 0.30^{bcd}
	4	12.72 ± 0.21^{a}	$13..59 \pm 0.14^{a}$	13.85 ± 0.27^{a}	$11..37 \pm 0.48^{b}$	12.01 ± 0.21^{ab}	12.25 ± 0.27^{ab}
	6	$11..38 \pm 0.3^{ab}$	11.81 ± 0.32^{ab}	10.99 ± 0.47^{bc}	10.87 ± 0.43^{bc}	10.89 ± 0.26^{bc}	11.38 ± 0.34^{ab}
Ruminal VFA's (%):							
Acetic	4	46.24 ± 0.063^{d}	47.44 ± 0.09^{c}	47.64 ± 0.18^{c}	48.46 ± 0.05^{b}	49.82 ± 0.08^{a}	49.58 ± 0.18^{a}
Propionic		25.47 ± 0.088^{c}	25.97 ± 0.08^{abc}	25.62 ± 0.22^{bc}	26.18 ± 0.11^{ab}	25.53 ± 0.26^{c}	25.52 ± 0.25^{c}
Butyric		19.27 ± 0.32^{a}	16.48 ± 0.08^{d}	16.65 ± 0.25^{d}	17.39 ± 0.10^{c}	16.44 ± 0.03^{d}	16.71 ± 0.34^{d}
Valeric		3.25 ± 0.36^{bc}	3.45 ± 0.25^{ab}	2.82 ± 0.42^{bc}	2.41 ± 0.38^{cd}	1.45 ± 0.11^{e}	1.70 ± 0.17^{de}
Isobutyric		3.04 ± 0.043^{b}	3.18 ± 0.083^{b}	3.17 ± 0.039^{b}	3.21 ± 0.05^{b}	3.60 ± 0.05^{a}	3.52 ± 0.11^{a}
Isovaleric		2.73 ± 0.049^{de}	3.48 ± 0.17^{b}	4.10 ± 0.19^{a}	2.35 ± 0.04^{f}	3.16 ± 0.04^{bc}	2.97 ± 0.15^{cd}

Means in the same row with different superscripts differ significantly at (P <0.05)

Slightly differences in respect of propionic acid concentrations among dietary treatments due to BLD or DLY additions were found. These findings are in accordance with those of Bal *et al.* (2000b).

The percentage of butyric acid decreased (P<0.05) when all corn silage rations were supplemented with DLB or DLY in all the experimental rations compared with the un-supplemented one. These results are in agreement with those recorded by Miller-Webster *et al.* (2002) who found that yeast culture addition to corn silage decreased butyric acid in dairy cows.

The valeric acid percentage decreased (P<0.05) with animals fed high CS rations compared to the low CS rations, except R2 where the differences were significant (P<0.05).

The percentage of isobutyric acid were significantly (P>0.05) increased in R5 and R6 rations, compared with the other treatments, but was similar in corn silage rations especially (R2, R3, and R4) and control ration. These results are in agreement with those reported by Mohesn *et al.* (2001) who reported that no significant differences (P>0.05) in proportion of isobutyric acid with increasing level of corn silage by Friesian male calves.

As for isovaleric acid, the addition of DLB and DLY to corn silage rations especially in (R2, R3, R5 and R6) led to increasing (P<0.05) the percentage of isovaleric acid, but R4 recorded the lowest one.

Results of ruminal protozoa count are illustrated in Table (3). The addition of DBL in R2 or DLY in R3 to CS lowered (P<0.05) ruminal protozoa number in the rumen of animals received these rations compared to the other treatments. However, the protozoa number significant (P<0.05) increased with high CS rations (40%) supplemented with bacteria or yeast compared to R2 an R3 rations. On the other hand, Doreau and Jouany (1998) reported that the addition of yeast culture (10g/h) to cow's rations, which contained 60% CS, had no effect on ruminal protozoa count. Supplementing the diet with bacteria tended to decrease (P<0.05) protozoal numbers, which is considered undesirable in terms of preventing acidosis because ruminal protozoa play a critical role in utilization of lactic acid in the rumen (Newbold *et al*., 1987). In addition, protozoa contribute to recycling of nitrogen in the rumen and decreasing protozoal numbers is expected to decrease efficiency of protein utilization (Jouany, 1996 and Koenig *et al.* 2000). The obtained data are in line with the findings of Beauchemin *et al.* (2003) who found that supplementing the diet contained barely silage with *Enterococcus faecinm* decreased ruminal protozoa number of canulated steers. The high level of CS rations, supplementation with bacteria or yeast caused an increases (P<0.05) in the number of protozoa in comparison with those of R2 and R3. The increase in ruminal protozoa number may be associated with the relatively higher level of crude fiber, which led to increasing of ruminal pH values in these rations as shown in Tables 1 & 3, (Church 1988)

Blood serum parameters:

Data of some serum parameters are presented in Table (5). Within the same level of DLB or DLY, higher TP values were recorded for 40% CS rations than those of 20%CS rations. Higher TP values were recorded for both DLB and DLY rations than those of the CS without Probiotics. These results are in agreement with those obtained by El-Ashry *et al*., (2004). The present results could be related to the beneficial effect of DLB or DLY supplement on increasing protein digestibility through the enzymatic effect of protease and alteration of amino acid profile of digesta due to increasing microbial protein synthesis. Concerning albumin concentration, it was positively influenced due to both additives with 20 and 40% CS rations, in relation to R1 that have nil additives. Addition of DLY to either 20% or 40% CS rations significantly (P<0.05) increased globulin concentration compared to the control; while DLB affected positively only on 40% CS rations (R4 and R5). It was clear that there were significant differences (P<0.05) between DLB and DLY rations within the 20% CS rations, while the differences within the 40% CS were not significant for globulin concentration. Data of albumin /globulin ratio (A/G) indicated that differences between all experimental rations were not significant.

Table (5): Effect of feeding experimental rations for lactating cows on some blood serum parameters

Item	R1	R2	R3	R4	R5	R6
Total protein g/dl	7.34± 0.04^{d}	7.76±0.06^{c}	8.25±0.04^{b}	8.32±0.03^{b}	8.62±0.01^{ab}	8.79±0.04^{a}
Albumin g/dl	3.98±0.25^{d}	4.38±0.12^{c}	4.38±0.04^{c}	4.50±0.06^{b}	4.60±0.07^{ab}	4.81±0.04^{a}
Globulin g/dl	3.36 ±0.02^{c}	3.38±0.07^{c}	3.87±0.04^{ab}	3.82±0.04^{ab}	4.01±0.04^{a}	3.98±0.07^{a}
A/G ratio	1.20±0.02	1.30±0.04	1.13±0.02	1.18±0.05	1.15±003	1.21±0.05
Glucose mg/dl	57.94±1.43^{d}	58.70±0.88^{c}	60.99±0.81^{b}	60.63±0.41^{b}	62.41±0.47^{ab}	63.45±0.57^{a}
Total lipids mg/dl	343.3±2.87^{d}	381.54±12.96^{c}	439.06±2.26^{b}	442.48±1.53^{ab}	441.79±1.26^{b}	450.92±3.28^{a}
Cholesterol mg/dl	148.23±3.47^{ab}	142.39±4.62^{b}	144.68±3.54^{b}	139.76±4.28^{c}	134.56±4.29^{c}	126.07±5.59^{d}
GOT Iu/l	40.73±0.44^{ab}	37.87±1.29^{b}	36.38±0.9^{b}	36.04±0.83^{b}	34.52±0.67^{c}	32.38±0.37^{d}
GPT Iu/l	24.71±0.04^{ab}	22.86±0.08^{b}	21.38±0.06^{b}	20.15±0.08^{c}	18.19±0.30^{d}	16.86±0.46^{e}

Means in the same row with different superscripts differ significantly at (P <0.05)

Lactating cows fed CS rations (R3 to R6 rations) supplemented with DLB or DLY had significantly (P<0.05) higher serum glucose than those fed unsupplemented one. The higher serum glucose level may have been related to rapid rate of hydrolysis and absorption of dietary carbohydrates in the alimentary tract. Also, the higher level of glucose as affected by DLB or DLY supplements may have been related to the effect of these additives through enhancing the activity of amylase enzyme that lead to increasing carbohydrates hydrolysis in the small intestine of lactating cows into glucose as end-product (Williams, 1989).

Concentration of total lipids indicated that the highest value was obtained with cows fed 40% CS ration with 10g DLY and most of the other supplemented CS rations had significantly higher total lipids concentration than the control (R1). The obtained values were close to those given by El-Gaafarawy *et al.*(2000) with Friesian cows and El-Aidy *et al.* (2003) with dairy buffalos. Bacterial and yeast additives may lead to some alteration in bacterial lipids content by stimulation of bacterial lipids synthesis (Williams, 1989).

Cholesterol concentration significantly ($P<0.05$) decreased when cows were fed CS rations supplemented with DLB or DLY. The reduction was significant only with supplemented 40% CS rations. Abdel-Ghany *et al.* (1995) and El-Ashry *et al.* (2004) reported similar trend with lactating buffaloes fed diet supplemented with yeast culture or *lacto-sacc*.

Results of GOT and GPT concentrations indicated that bacteria and yeast supplemented rations showed lower GOT values than unsupplemented CS ration in which the differences were only significant between R5 and R6 compared with the control ration. The lowest value of GOT was recorded for R6 (32.38), while the highest value was recorded for R1 (40.73). It is of interest to observe that data of GPT followed similar trend as that of GOT (Table, 5). These results are in accordance with those reported by Mahmoud *et al.* (2003) who indicated that, blood plasma GOT and GPT concentration in Friesian calves were decreased with increasing the levels of CS and decreasing the concentrate mixture in the ration. In addition, El-Ashry *et al.* (2001a) found that the addition of both Yea-sacc and lacto-sacc in lactating buffalo's led to decreased serum GOT.

The present values of serum GOT and GPT in the different experimental rations are within the normal range for ruminants and suggesting that the experimental growth promoters were safe and had no negative effects on the liver function.

Milk production and its composition:

Average daily milk and 4% FCM yields are presented in Table (6). The inclusion of DBL or DLY in tested ration (R5 and R6) significantly ($P<0.05$) improved milk yield and 4%FCM by (11.73 and 10.08 %), and (14.28 and 11.66%), respectively as compared with control ration (R1). Rations included CS might have positive effects in improving milk productivity, which might refer to the moderating effect of CS as succulent feed besides their high quality as a juicy, palatable feed of high energy, and vitamin contents, especially vitamin A.

Table (6): Effect of feeding the experimental rations for the Friesian cows on daily milk yield (Kg) and its composition (%)

Item	R1	R2	R3	R4	R5	R6
Actual milk	14.57 ± 0.37^{c}	14.91 ± 0.23^{c}	15.20 ± 0.28^{bc}	15.61 ± 0.32^{abc}	16.04 ± 0.30^{ab}	16.28 ± 0.29^{a}
4% FCM	13.37 ± 0.32^{c}	13.72 ± 0.24^{c}	14.06 ± 0.26^{bc}	14.44 ± 0.34^{abc}	14.93 ± 0.07^{ab}	15.28 ± 0.28^{a}
Fat	3.45 ± 0.06^{b}	3.47 ± 0.03^{b}	3.50 ± 0.03^{ab}	3.50 ± 0.03^{ab}	3.54 ± 0.04^{ab}	3.59 ± 0.01^{a}
Protein	3.43 ± 0.02^{ab}	3.38 ± 0.01^{b}	3.46 ± 0.02^{ab}	3.44 ± 0.04^{ab}	3.43 ± 003^{ab}	3.50 ± 0.02^{a}
Lactose	4.49 ± 0.08^{a}	4.42 ± 0.03^{b}	4.52 ± 0.02^{a}	4.50 ± 0.02^{a}	4.49 ± 0.02^{a}	4.49 ± 0.01^{a}
Total solids	12.13 ± 0.03^{a}	11.97 ± 0.05^{b}	12.20 ± 0.06^{a}	12.17 ± 0.06^{a}	12.23 ± 07^{a}	12.28 ± 0.05^{a}
Solids not fat	8.58 ± 0.05^{b}	8.50 ± 0.039^{b}	8.70 ± 0.07^{a}	8.67 ± 0.03^{a}	8.69 ± 0.03^{a}	8.69 ± 0.04^{a}
Ash	0.76 ± 0.03^{a}	0.70 ± 0.01^{b}	0.72 ± 0.01^{ab}	0.73 ± 0.008^{ab}	0.77 ± 0.02^{a}	0.70 ± 0.02^{b}

Means in the same row with different superscripts differ significantly at ($P <0.05$)

Within the same dose of DLB and DLY, data clearly showed that increasing the ratio of CS (40% CS) improved average milk yield compared to R2 and R3 20% CS. These results are in line with those reported by Zaki *et al.* (2004) who indicated that the daily milk yield as FCM was significantly higher for cows fed rations including high level of CS (65% of DM) compared with 50% of CS.

Results showed that, addition of bacteria or yeast to the CS rations of lactating cows increased the daily actual milk yield by 2.33, 4.32, 7.14, 10.10 and 11.74 and by 1.93, 4.46, 7.28, 10.92 and 13.52% for FCM of rations R2, R3, R4, R5, and R6, respectively compared with CS ration without additives (R1). It means that supplementing the high CS rations is considered more favorable than the un-supplementing CS rations. These results are in accordance with those found by Jaqette *et al.* (1988) who indicated that, milk yield of lactating cows fed a diet containing maize silage supplemented with *Lactobacillus acidophilus* was increased ($P<0.05$) compared with un-supplemented one. Moreover, Ibrahim *et al.* (2004) stated that the increasing milk yield could occur with microbial supplements as a result of an increase in feed intake since the additional DM intake provided an extra energy. Inspection the data of TDN (Table, 2) and serum glucose (Table, 5) may emphasize this explanation.

When comparing bacteria with yeast supplemented rations contained CS it, was found that, R6 showed that the highest values for actual milk and 4% FCM yields. So this ration that included 40% CS + 10g yeast/cow (R6) could be used for good practical feeding system for dairy cows recommendation. Putnam *et al.* (1997) and Wohlt *et al.* (1998) added 10g yeast/cow/ day to the CS ration and found milk and 4% FCM yields were higher with yeast supplemented ration than the control one that have nil yeast supplement.

Results regarding milk composition are presented in Table (6). It could be observed that all 40% CS rations were significantly ($P<0.05$) higher in milk fat content than that of control ration. The increases in fat content of milk produced by the cows fed 40% CS rations may be largely related to the inclusion of CS in these rations in which generally contained high acetic acid content (El-Ashry *et al.* 2003b). Results indicated that there was insignificant ($P<0.05$) increase in milk fat content by added the two types of additives to the two levels of CS rations, except in R6 which was highly significant with their items than R1. These results are in line with those reported by Bilik *et al.* (2000) who indicated that, milk fat content of cows fed diet contained maize silage was insignificantly ($P>0.05$) increased with *Bifidobacterium* addition. Putnam *et al.* (1997) and Dann *et al.* (2000), reported that, the addition of yeast culture to CS diet of dairy cows had insignificant effect on fat content. However, Gombos *et al.* (1995) and Strzetelski (1996) found that, cows fed CS supplemented with 10/g/cow/day of yeast culture showed an increase ($P<0.05$) in milk fat content.

In respect of milk protein contents, within the same does of DLB and DLY, increasing the level of CS in rations had no effect on milk protein content. Similar results were obtained by Zaki *et al.* (2004). Data in Table (6) showed that the effect of using DLB or DLY with different rations on milk protein content was insignificant when compared with R1. These results are supported by the findings of Kung *et al.* (1997) and Dann *et al.* (2000) who showed that, yeast culture addition to the CS ration had no effect on milk protein content. There were no significant ($P<0.05$) differences in milk lactose content among the experimental rations; only R2 significantly ($P<0.05$) decreased milk lactose content in comparison with other rations. These results are in accordance with those reported by Dann *et al.* (2000) and Ibrahim *et al.* (2004) who found that yeast addition to the CS rations of dairy cows had no significant effect on lactose content.

Concerning the milk total solids (TS), it was clear that, the DLB or DLY addition didn't affect milk TS contents with all experimental rations, except R1 and R2 rations in which its content of milk TS was significantly decline than the other. These results are supported by El-Ashry *et al.* (2003b) with lactating buffaloes. The DLB or DLY addition in R3, R4, R5 and R6 increased ($P<0.05$) milk TS content, but it significantly ($P<0.05$) decreased in R2. These results are in harmony with those reported by Kung *et al.* (1997) and Ibrahim *et al.* (2004). Regarding milk solids not fat content (SNF), the addition of both DLB and DLY in low and high CS rations significantly ($P<0.05$) increased milk SNF contents except for R1 and R2 rations. However, Ibrahim *et al.* (2004) reported that yeast and bacteria addition to the ration containing CS had no remarkable effect on SNF% by lactating goats. As for milk ash content, using DLB or DLY with different rations decreased ($P<0.05$) milk ash content with rations (R2, and R6), and decreased with (R3 and R4), but it increased ($P<0.05$) in R5 and control ration.

Data of fatty acids of milk fat (Table 7) cleared that no significant differences were observed among all dietary treatments in respect of all estimated fatty acids of milk fat. Also, the addition of DLB or DLY to all CS rations did not affect the fatty acids percentage of milk fat (C8:0 to C18:0). These results are in agreement with those obtained by Abo El-Nor and Kholif (1998). However, El-Ashry *et al.* (2001a) reported that cows fed diet supplement with yeast culture had higher ($P<0.05$) contents of C_{14} and C_{16} than those of control.

Regarding feed conversion parameters (Table 8), it was clear that DM intake (Kg) /Kg 4% FCM were closely similar amongst all experimental rations without any considerable effect due to both additives. Similar trend was found with Kg TDN /Kg 4%FCM among all experimental dietary treatments. The same trend was obtained by Ibrahim *et al.* (2004) who concluded that feed conversion (Kg DM intake /kg milk) by lactating goats fed CS supplemented with bacteria or yeast was insignificant compared with control one. The results obtained are in agreement with those of Mahmoud *et al.* (1992), and El-Ashry *et al.* (2003b).

Table (7): Fatty acids proportions in milk fat for cows fed the experimental rations

Item	Treatments						
	R1	R2	R3	R4	R5	R6	R7
C8:0	1.41±0.62	5.77±1.54	3.80±0.95	1.61±0.55	3.71±1.51	4.47±0.92	4.07±0.68
C10:0	1.39±0.58	2.57±0.74	2.78±1.26	2.67±0.39	5.95±2.14	5.58±3.08	1.24±0.25
C12:0	4.85±1.29	4.50±1.77	1.75±4.56	1.63±1.49	4.54±2.21	5.89±0.95	0.65±0.10
C14:0	4.11±1.43	2.74±1.76	4.07±1.97	3.72±0.61	5.62±2.07	2.52±1.12	3.50±0.58
C16:0	7.19±0.94	7.71±1.24	8.67±1.77	9.69±3.08	7.63±1.82	6.64±0.86	3.53±1.65
C18:0	20.83±0.63	23.34±2.78	19.52±4.04	23.04±5.58	15.72±1.34	19.51±2.73	29.42±0.70
C20:0	4.77±1.22	3.46±0.73	5.36±1.86	4.35±1.77	28.82±1.34	4.32±0.27	3.54±1.13
C18:1	29.51±1.21	28.06±2.15	29.80±3.72	30.68±1.49	28.38±1.74	24.27±2.17	32.27±2.72
C18:2	22.69±0.41	21.05±3.45	21.51±1.88	20.01±3.26	19.73±3.24	21.35±2.14	20.55±3.08
C18:3	3.25±1.18	0.80±0.46	2.74±1.79	2.60±1.52	5.90±2.15	5.45±2.13	1.23±0.29

The different among rations in all traits was not significant

Table (8): Feed conversion of the experimental rations for milk production.

Item	R1	R2	R3	R4	R5	R6
4% CFM kg/d	13.37	13.72	14.06	14.44	14.93	15.28
DM intake kg/d	11.04	11.20	11.54	11.73	12.26	12.24
TDN	7.02	7.37	7.71	7.78	8.24	8.19
DCP	1.015	1.057	1.122	0.992	1.053	1.065
DM/FCM kg/kg	0.83±0.01	0.82±0.01	0.82±0.04	0.81±0.03	0.82±0.03	0.80±0.03
TDN/FCM kg/kg	0.53±0.01	0.54±0.01	0.55±0.03	0.55±0.02	0.54±0.02	0.54±0.02

Means in the same row with different superscripts differ significantly at (P <0.05)

Reproductive performance:

The effect of feeding the CS rations without or with DLB or DLY supplementation on reproductive traits are shown in Tables (9&10). Reproductive results revealed that days of maximum P_4 level were insignificantly (P>0.05) shorted in cows fed R5 and R6 than other rations. Similar trend was also observed concerning Day to reach > 1.0 ng/ml and the first ovarian cycle length where cows fed R5 and R6 were significantly (P<0.05) shorter than those fed the other rations.

Table (9): Average of serum progesterone (P4) concentration and some ovarian activity parameters during the 1st post-partum estrous in the Friesian cows fed the experimental rations.

Item	R1	R2	R3	R4	R5	R6
Days of maximum P4 level	12.9±0.10	12.8±0.08	13.1±0.08	13.2±0.11	12.8±0.09	12.2±0.06
Value of maximum P4 level ng/ml	6.8±0.1^{c}	7.0±0.1^{b}	7.1±0.2^{b}	7.1±.02^{b}	7.3±0.3^{a}	7.4±0.2^{a}
Days to reach >1.0 (ng/ml)	4.4±0.1^{a}	4.3±0.4^{a}	4.3±0.4^{a}	4.2±0.5^{a}	3.9±0.6^{b}	3.8±0.22^{b}
The first ovarian cycle length (day)	23.5±2.1^{a}	24.1±3.1^{a}	23.2±1.9^{b}	23.1±2.2^{b}	21.1±2.50^{c}	20.2±3.0^{c}

Means of different superscripts on the same row are significantly (P< 0.05).

Value of maximum P_4 level was significantly (P<0.05) higher in cows fed R5 and R6 than those fed the other rations. The overall means of UIP in all experimental rations was shorter than the average previously reported on Friesian cows in Egypt (28.8 – 37.8 days) by Kadoom (1991) and Swiefy (1997). It was shorter (P<0.05) in R5 and R6 (contained 40% CS with 4 g of DLB and 10 g of DLY), respectively as compared with cows fed other rations (Table 10). Similar trend was also observed concerning PPEI where cows fed R5 and R6 resumed their ovarian activity post-partum earlier than cows fed other rations. The interesting point to be noted is that all cows displayed their first ovulation within one-month post-partum. Moreover, the days reach the PPEI and PPSI of cows fed R5 and R6 were significantly (P<0.05) shorter than those fed other rations. It is worth also to note that cows of R5 and R6 resulted in shorter (P<0.05) SP and to get pregnant (Table 10) relative to the other groups.

Table (10): Post-partum reproductive characteristics of Friesian cows fed the experimental rations.

Item	R1	R2	R3	R4	R5	R6
Uterine involution period, day (UIP)	25.3±4.2^{a}	24.4±2.6^{b}	25.2±3.1^{a}	24.2±2.6^{b}	23.8±2.5^{c}	23.1±2.4^{c}
First ovulation, day (PPEI)	28.2±3.6^{a}	29. 3±3.6^{a}	28.1±4.2^{a}	28.8±2.4^{a}	27.68±2.8^{b}	26.1±2.9^{b}
First estrus, day (PPSI)	41.5±3.1^{a}	39.6±4.1^{a}	40.6±2.6^{a}	39.2±2.9^{b}	37.5±3.2^{c}	35.2±4.2^{c}
First service, day (UIP)	64.1±4.1^{a}	64.2±3.8^{a}	63.2±3.6^{b}	62.1±2.9^{b}	60.8±3.8^{c}	51.2±2.8^{c}
Number of service per conception, day (NS/C)	3.1±0.6^{a}	3.0±0.5^{a}	2.9±0.4^{a}	2.8±0.3^{a}	2.3±0.5^{b}	2.2±0.6^{b}
Service period, day (SP)	63.5±5.3^{a}	63.2±8.3^{a}	60.4±6.8^{b}	58.8±7.1^{b}	48.3±5.8^{c}	46.6±6.4^{c}
Days open, day (DO)	127.6±10.3^{a}	127.4±8.9^{a}	123.6±9.4^{a}	120.9±9.8^{a}	109.1±0.8^{b}	97.8±9.6^{b}
Birth weight of born, kg	36±0.70	35±0.80	35±0.89	36±0.51	37±1.12	38±0.60

Means of different superscripts on the same row are significantly (P< 0.05)

Birth weight of calves born tended to be heavier in the cows fed the rations (R5 and R6) than those on the other rations; however, the differences between groups were not significant. Such findings indicated the superiority of (R5 and R6) in the reproductive status which may be related the mutual effect of CS as indicated by Dhiman and Satter (1997) and McCormick *et al.* (1999) and the role of both bacteria and yeast cultures, which acts as probiotics as reported by Abdel- Khalek (2003) and El-Ashry *et al.* (2004).

Finally, the present results indicated that feeding R5 and R6, which contained 40% CS with 4g of DLB (R5) or 10g of DLY (R6) by Friesian cows improved most of the experimental traits compared to the other five rations.

Economical evaluation of CS rations without or with bacteria or yeast supplementation are presented in Table (11). Improvement in profitability due to the inclusion of experimental additives was observed especially with the high level of CS rations (R4, R5 and R6) in comparison with un-supplemented one (R1). In supporting with the presents results, Ibrahim *et al.* (2004) found that addition of commercial microbial supplements such as different strains of bacteria or yeast culture to the corn silage ration of lactating goats tended to increase economic efficiency than unsupplemented ration.

In conclusion, it was clear that R6 (40%CS + 10g yeast/h/d) could be recommended from economical point of view to improve milk production, feed conversion and reproductive performance.

Table (11): Economic evaluation of the experimental rations for milk production from cow

Item	R1	R2	R3	R4	R5	R6
DM intake ,kg/d	11.04	11.20	11.54	11.73	12.26	12.24
Price of kg DM,LE	0.511	0.511	0.511	0.411	0.411	0.411
Price of feed additive, LE	0	0.16	0.024	0.16	0.32	0.024
Diet cost/cow/day, LE	5.64	5.88	5.92	4.98	5.36	5.05
Daily milk yield ,kg	14.57	14.91	15.20	15.61	16.04	16.28
Price of milk yield/cow/day, LE	16.03	16.40	16.72	17.17	17.64	17.91
Profit above feeding cost LE	10.39	10.52	10.80	12.19	12.28	12.86

Milk yield/cow/day × Price of one kg milk (1.10 L E).

REFERENCES

Abd El-Ghany, A.A; M. A.A. El-Barody and O.A.O. Saad (1995). Milk yield and composition, blood metabolites and rumen activity as affected by different levels of *Saccharamyces cerevisiae* plus growth medium supplementation in Egyptian buffloes. In Proc. 5th Sci. Conf. Anim. Nutrition, Ismailia, 1: 115.

Abdel-Khalek, A. E. (2003). Productive and reproductive performance of primiparous and multiparous Friasian cows fed rations supplemented with yeast culture (Yea-sacc ^{1026}). Egypatin J. Nutr and Feeds. Special Issue, 161: 1105.

Abdel-Khalek, A. E., A. F. Mehrez and E. A. Omar (2000). Effect of yeast culture (Lacto-sacc) on rumen activity, blood constituents and growth of suckling Friesian calves. Proc. Conf. Anim. Prod. In the 21th Century, Sukha, 18:20 April: 201.

Abou-Akkada, A. R and K. El-Shazly (1964). Effect of absenece of ciliate protozoa from the rumen on microbial activaty anf growth of lambs.

Abo El-Nor, S.A. H. and A.M. Kholif (1998). Effect of supplementation of live yeast culture in the diet on the productive performance of lactating buffaloes. Milchweissenschaft, 53 (12): 663 - 666.

Allam, A.M; K. El-Shazly; B.E.A. Borhami and M.A. Mohamed (20001). Effect of bakers yeast (*Saccharamyces cerevisiae*) supplementation on digestion in sheep on milk response in dairy cows. Egyptian J. Nutr. Feeds 4 (special Issue): 315.

A.O.A.C. (1995). Official Methods of Analysis (16th) Ed. Association of Official Analytical Chemists, Washington, D.C., USA.

Armstrong, W.D. and C.W. Carr (1964). Physiological chemistry: Laboratory Direction, 3rd ed pp.75, Bourges Publishing Co. Minneapolis, Minnesota, USA.

Bal, M. A., R.D. Shaver; A.G. Jirovee, K.J. Shinners and J. G. Coors (2000a). Crop processing and chop length of corn silage; effect on intake, digestion and milk production by dairy cows. J. Dairy Sci., 83: 1264

Bal, M. A., R.D. Shaver, H.A.I. Jobeile, J.G. Coors and J.G. Lauer (2000b). Corn silage hybrid effects on intake, digestion and milk production by dairy cows. . J. Dairy Sci., 83:2849

Beauchemin, K. A., W.Z. Yang, D. P. Morgavi, G.R. Ghorbani, Wikautz and J.A. Z. Leedle (2003). Effect of bacterial direct-fed microbials and yeast on site and extent of digestion, blood chemistry and sub clinical ruminal acidosis in fed lot cattle. J. Anim. Sci., 81: 1682.

Besong, S., A. Jackson, C.L. Hicks and R.W. Hemken (1996). Effect of supplemental liquid yeast product on feed intake, ruminal profiles and yield composition and organoleptic characteristics of milk from lactating Holstein cows. J. Dairy Sci., 79:1654.

Bilik, K., J. Strzetelski., S. Osieglowski and J. Milewski (2000). Effect of various Probiotics on cows performance and milk composition. Rocznik. Naukowe. Zootech. 27: 169-177.

Bush, K. J., R.W. Russell and T.W.Young (1970). Quantitative separation of volatile fatty acids by high pressure Chromatography

Brydt, E., A. Bota, P. Lasztiy, K. Vajdovich and G. Nagi (1995). Effect viable Saccharomyces cerevisiae on the ruminal fermentation, acid base metabolism and milk production of dairy cows. Magyar Allatorvosok Lapjia. 50: 543.

Church, D.C. (1988). Digestive physiology and nutrition. 2nd Ed., Reston Book, New Jersey.

Conway, E.F. (1957). Microdifussion analysis and Volumetric Error. Rev. Ed. Lock Wood, London.

Dann, H. M., J. K. Drackley; G. C. McCoy; F. Hutjens and J. E. Garrett (2000). Effect of yeast culture (*Saccharamyces cerevisiae*) on prepartum intake and postpartum intake and milk production of Jersy cows. J. Dairy Sci., 83.

Dawson, K. A. (1995). Current and future role of yeast culture in animal production: A review of research over the seven years. Dep. Anim Sci., Book Univ. Of Kentucky, USA, pp. 269.

Dhiman, T. R. and L. D. Satter (1997). Yield response of dairy cows fed different proportion of alfalfa silage and corn silage. J. Dairy Sci., 80: 2069.

Doumas, B., W. Wabosn and H. Biggs (1971). Albumin standards and measurement of serum with bromocresol green. Clin. Chem. Acta., 31: 87.

Doreau, M. and J. P. Jouany (1998). Effect of a Saccharamyces cerevisiae culture on nutrient digestion in lactating dairy cows J. Dairy Sci., 81: 3214.

Duncan, D. B. (1955). Multiple range and F-test. Biometrics, 11:1 .

El-Aidy, A.A., M.A. El- Ashry, I.A. Adou-Selim and H.M. El- Sayed (2003). Effect of maize silage with berseem on the production and reproductive performance of dairy buffaloes. M. Sc. Thesis, Fac. of Agric., Ain Shams Univ., Egypt.

El-Ashry, M.A., I.A. Abou-Selim; H.M. El- Sayed and A.A. El-Aidy (2003b). Effect of maize silage with berseem on productive performance of dairy buffaloes. Egyptian J. Nutr. Feeds. 6 (1): 25.

El-Ashry, M.A., H.M. El- Sayed, Hana M. El-Koussy. M.M. Khorshed, H.M. Saleh and A. K. Ammar (2004). Effect of Lacto-sacc on feed efficiency, some blood constituents and reproductive performance of growth Egyptian bufflo Heifers. Egyptain J. Nutr and Feeds. 7 (1): 97.

El-Ashry, M A., A.M. Kholif, H. A. El-Alamy, H.M. El- Sayed and T. A. El-Hamamsy (2001a). Effect of different yeast culture supplementation to diet on the productive performance of lactating buffaloes. Egyptian J. Nutr. Feeds. 4 (1): 21.

El-Gaafarawy, A. M.; I. L. Ibrahim, S. A. Swiefy and E. A. Omar (2000). Effect of adding yeast culture or sodium bicarbonate to lactating Friesian cows diet containing fodder beet root silage on rumen activity and blood constituents. Proc. 3[rd] All Africa Conf. Anim. Agric. & 11[th] Conf. Egyptian Soc. Anim. Prod., Alexandria. Egypt: 269.

El-Saadany, S. A., A. M. Abdel- Khabir, Bahira K. Mohamed and Zeid (2001). Comparative study on the effect of feeding maize stalks silage or whole maize plants silage versus traditional rations on crossbred Friesian lactating cows. Egyptian J Nutr and Feeds 4 (special Issue): 377.

El-Sayes, F.M; M.R. M. Mostafa and M.K. Hathout (1997). Nutritional and economical efficiency for using the maize silage in fattening buffalo calves locally. 5[th] World Buffalo Conf., Oct. 13-16 Caserta, Italy.

Gombos, S., J. Tossenberger and C. Szabo (1995). Effects of probiotics and yeast culture on the performance of pigs and daitry cows. Krmiva, 37: 13.

Ibrahim; Fathia A.M.E. Ahmed and Ahlam A. El-Shew (2004). Effect of commercial supplements on performance of lactating Zaraibi goats Arab Univ. J. Agric. Sci., 12 (2): 545.

Jaqette, R. D., R. J. Dennis, J. A. Coalson, D.R. Ware, E.T. Manfed and P.L. Read (1988). Effect of feeding viable *Lactobacillus acidophilus* (BT, 386) on performance of lactating dairy cows. J. Dairy. Sci., 71 (suppl. 1): 219.

Jouany, J.P. (1996). Effect of ruminal protozoa on nitrogen utilization by ruminants. J. Nutr. 126: 1335 S.

Kadoom, A.K.A. (1991). Hematological and biochemical studies in Friesian cows during calving conception level. M. Sc. Thesis, Fac. Of Agric., Alexandria Univ., Egypt.

Khinizy, A.E., R.T. Foud, M.M. Mohy El-Deen, B.B. Matter and A.A. Fahmy (1997). Effect of feeding whole green maize with urea-molasses minerals mixture on performance of Buffalo calves. Egyptain J. Apple. Sci.., 12:408.

Koenig, K.M., C.J. Newbold, F.M. McIntosh and L.M. Rode (2000). Effect of protozoa on bacterial nitrogen recycling in the rumen. J. Anim. Sci. 78:2431.

Kostner, G.M., P. Avogaro, G. Bittolo Bon, G. Cazzo-lato and G.B. Quinci (1979). Determination of high-density lipoproteins: Screening methods compared. Clin. Chem. 2516:939.

Kung, L., E.M. Kreek, R.S. Tung, A.O. Hession. A.C. Sheperd. M.A. Chohen. H.E. Swain and J.A.Z. Leedle (1997). Effect of a live yeast culture and enzymes on in vitro ruminal fermentation and milk production of dairy cows. J. Dairy. Sci., 80: 2045.

Lee, S.Y and B. H. Lee (1990). Esterolytic and lipolytic activities of Lactobacillus casi-subsp-casei LLG. J. of Food Sci., 55: 119.

Mahmoud, A. M., M. M. Bendary, M. A. Harfoush and G. A. Ramadan (1992). Effect of feeding lactating cows corn silage on milk production compared with tradional summer and winter rations. J. Agric. Sci. Mansoura Univ. 17 (19): 2904.

Mahmoud, S.A., M.K. Mohsen, M.M. Bendary, E.M. Abdel-Raouf and H.M.A. Gaafar (2003). Performance of growing Friesian calves fed rations containing corn silage, blood constituents and carcass traits. Egyptian J. Nutr and Feeds, 6 (special Issue): 727.

McCormick, M. E., D.D. French, T.F. Brown, G.J. Cuomo, A.M. Chapa, J.M. Fernandez, J.F. Beatty and D.C. Blouin (1999). Crude protein and rumen un degradable performance of Holstein cows. J. Dairy. Sci., 82: 2697.

Mehany, S. B. (1999). Evaluation of some feeding systems for meat production. Ph. D. Thesis, Fac. of Agric., Cairo Univ. Egypt.

Miller-Webster, T., W.H. Hoover and M. Holt (2002). Influence of yeast culture on ruminal microbial metabolism in continuous culture. J. Dairy. Sci., 85: 2009.

Moawad, R. I., A.A. Zak, M. Marghany and A. A. H. El-Tahan (2001). The effect of replacing cotton plant silage with maize silage on milk production of dairy cows. Egyptain J. Nutr. Feeds, 4 (special Issue): 117.

Mohsen, M.K., S.A. Mahmoud, E.M. Abdel- Raouf, M.M. Bendary and H. M. A. Gaafar (2001). Performance of growing Friesian calves fed rations containing corn silage: Nutrient digestibility, rumen activity, live body weight and economic evaluation. Egyptian J. Nutr and Feeds, 4 (special Issue): 485.

Newbold, C.J., R.J. Wallace and F.M. McIntosh (1996). Mode of action of the yeast (*Saccharamyces cerevisiae*) as feed additive for ruminants. Brit. J. Nutr. 76: 249.

Newbold, C.J., A.G. Williams and D.G. Chamber (1987). The *in vitro* metabolism of D, L-lactic acid by ruminal microorganisms. J. Sci. Food Agric. 38: 9.

Nisbet, D.I. and S.A. Martin (1991). Effect of Saccharamyces *cerevisiae* culture on lactate utilization by the ruminal bacterium selenomonas ruminantium. J. Anim. Sci., 69:4628.

N.R.C. (1988). Nutrient Requirements of Dairy Cattle. National Academy of science. National Research Council, 6^{th} Revised ed. Washington, D.C., USA.

Postma, T. and J.A. Stores (1968). Lipids screening in clinical chemistry. Clinical Chimica Acta,22: 569.

Putnam, D.M., C.G. Sochho, N.L. Whitehouse, N.A. Kierstead and B.D. Garthwaite (1997). Effect of yeast culture in the diets of early lactation dairy cows on ruminal fermentation and passage of nitrogen fractions and amino acids to small intestine. J. Dairy Sci., 80: 347.

Radew, V. (1999). Influence of the yeast culture in sheep. Bulgarian. J. Agric. Sci., 5: 663.

Roberton, J.L. and S. Chavalier (1997). Probiotics in pigs and poultry nutrition. ESVIM conf., France.

Salem, F.A., M.R. El-Mahdy, G.H. Zaza and F. M.A Abo Donia (2002). Effect of non-hormonal growth promoters on digestibility, rumen fermentation, some blood constituents and growth rate in sheep. Annals of Agric. Sci., Moshtohor, 40: 1449.

S.A.S. (1996). SAS. User's Guide: Statistical Analysis System Institute, INC., Cary, N.C. USA.

Siest, G., J. Henny and F. Schiele (1981). Interpretation des examens de laborotoire karger ed.206.

Strzetelski, J. (1996). Modern principles and methods of fattened cattle nutrition. Instytut zoo techniki biuletvn in formacyiny. 34: 45.

Swiefy, A.S. (1997). Post-partum reproductive performance of Friesian cows in relation to season of calving and level of milk production. Ph.D. Thesis. Fac. Of Agric., Cairo Univ. Egypt.

Warner, A.C.I. (1964). Production of volatile fatty acids in the rumen: Methods of measurements. Nut. Abst. Rev., 34:339

Williams, P.E.V. (1989). The mode of action of yeast culture in ruminal diets. A review of the effect on rumen fermentation patterns. PP. 65 in biotechnology in the feed industry. Alltech Tech. Publ. Nicholasville.

Windschitl, P.M. (1992). Effect of probiotics supplementation of hulls barely and corn based diets on bacterial fermentation in continues culture of ruminal contents. Can J. Anim. Sci., 72:265.

Wohlt, J. E., A.D. Finkelstein and C.H. Chung (1991). Yeast culture to improve intake, nutrient digestibility and performance by dairy cattle during early lactation. J. Dairy. Sci., 81: 1345.

Wohlt, J. E., T.T. Corciane and P. K. Zajac (1998). Effect of yeast on feed intake and performance of cows fed diets on corn silage during early lactation. J. Dairy. Sci., 81: 1352.

Zaki, A.A., M. Marghany, A.A El-Tahan and R.I. Moawad (2004). Effect of increasing fiber content from corn silage on milk yield and digestibility in dairy cows. Egyptian J. Nutr and Feeds. 4: 325.

الأداء الإنتاجى والتناسلى للأبقار الحلابة التى تغذت على سيلاج الذرة بدون أو مع بعض الإضافات الميكروبية.

جمال الدين أبو الفتوح[1] و صبحى علام[1] و أحمد الجعفراوى[2] و أسامة عزمى الزلاقى[2] و أحمد محمد عبد الحفيظ[2]

[1]كلية الزراعة - جامعة الفيوم- الفيوم – مصر.

[2]معهد بحوث الإنتاج الحيواني - مركز البحوث الزراعية – الدقى – الجيزة - مصر.

الهدف من هذه الدراسة هو بحث تأثير استخدام سيلاج الأذرة بدون أو مع إضافة البكتريا الجافة النشطة أو الخميرة الجافة النشطة علي إنتاج اللبن والأداء التناسلي والقيمة الغذائية وقياسات الدم ونشاط الكرش. تم استخدام ٣٥ بقرة فريزيان عشار حامل قسمت إلي ستة مجاميع بكل منها خمس حيوانات في الموسم الثالث و متوسط وزن ٤٥٠ كجم (قبل الولادة بشهرين وحتى ١٢٠ يوم بعد الولادة) وقد غذيت الحيوانات تبعا لمقررات NRC ١٩٨٨ كالتالي:

الطيقة الأولي : (كنترول) ٦٠ % علف مركز + ٢٠% قش ارز + ٢٠% سيلاج الأذرة.

الطيقة الثانية: ٦٠ % علف مركز + ٢٠% قش أرز + ٢٠% سيلاج الأذرة + ٢ جم بكتريا جافة نشطة.

الطيقة الثالثة : ٦٠ % علف مركز + ٢٠% دريس برسيم + ٢٠% سيلاج الأذرة + ١٠ جم خميرة جافة نشطة.

الطيقة الرابعة : ٤٠ % علف مركز + ٢٠% قش أرز + ٤٠% سيلاج الأذرة +٢ جم بكتريا جافة نشطة.

الطيقة الخامسة : ٤٠ % علف مركز + ٢٠% قش أرز + ٤٠% سيلاج الأذرة + ٤ جم بكتريا جافة نشطة.

الطيقة السادسة: ٤٠ % علف مركز + ٢٠% قش أرز + ٤٠% سيلاج الأذرة + ١٠ جم خميرة جافة نشطة.

وقد أظهرت النتائج تحسنا معنويا في معاملات الهضم باستخدام السيلاج سواء مع البكتريا أو الخميرة الجافة النشطة خاصة المجموعة السادسة تلتها المجموعة الخامسة والرابعة والثالثة والثانية والأولي. أدت إضافة البكتريا والخميرة الجافة النشطة إلي زيادة القيم الغذائية زيادة معنوية بينما البروتين المهضوم زاد معنويا مع المجموعة الأولي والثانية والثالثة لكن انخفض بزيادة سيلاج الأذرة في العلائق (٤٠%) سواء مع إضافة البكتريا والخميرة الجافة النشطة. ارتفعت قيم pH بزيادة مستوي سيلاج الأذرة في العلائق (الرابعة والخامسة والسادسة). أدت إضافة البكتريا والخميرة الجافة النشطة إلي انخفاض معنوي لقيم pH في مختلف أوقات أخذ العينة، انخفض تركيز NH_3-N مع زيادة سيلاج الأذرة في العلائق (الرابعة - الخامسة - السادسة) في مختلف أوقات أخذ العينة مقارنة بباقي العلائق. بينما أدت إضافة البكتريا والخميرة الجافة النشطة إلي زيادة معنوية في تركيز NH_3-N ، زاد محصول اللبن اليومي معنويا بزيادة نسبة سيلاج الأذرة في العلائق عند ثبات الجرعة المضافة من البكتريا والخميرة الجافة النشطة. حققت المجموعة السادسة أعلي محصول لبن يومي تلتها المجموعة الخامسة.

لوحظ تماثل معامل تحويل كل العلائق كمركبات كلية مهضومة وكطاقة مهضومة واللازمة لإنتاج ١ كجم لبن معدل الدهن (٤%) حيث كانت الاختلافات غير معنوية بين المجاميع، تحسن الأداء التناسلي معنويا من حيث عودة الرحم لوضعه الطبيعي، وأول تبويض، أول دورة شبق، أول تلقيحه، عدد التلقيحات اللازمة للإخصاب، فترة الإخصاب للأبقار التي غذيت علي المجموعة الخامسة والسادسة مقارنة بباقي العلائق.

نستخلص من هذه الدراسة ومن وجهة النظر الاقتصادية أنه يمكن التوصية باستخدام عليقه المجموعة السادسة والتي احتوت علي سيلاج أذرة بالكيزان مع إضافة ١٠ جم خميرة جافة نشطة كأحسن العلائق التي أدت إلي تحسن الأداء الإنتاجي والتناسلي وأيضا الأفضل كعائد اقتصادى .