EFFECT OF DRY YEAST AND/OR BENTONITE AS FEED ADDITIVES ON THE PRODUCTIVE PERFORMANCE OF LACTATING EWES AND ITS OFFSPRINGS

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SUMMARY

Effect of dried yeast and/or bentonite in the diets of lactating Rahmani ewes on the milk yield and its composition, some rumen parameters, some blood parameters, feed conversion, nitrogen balance and nutrient digestibility in addition to performance of offsprings of lactating ewes were studied for 10 weeks. Twenty lactating Rahmani ewes, being 3 years old and weighing on the average 45 kg were divided randomly into four similar groups. The control group was fed on a basal diet, while the second, third and fourth groups were fed on the basal diets supplemented with dry yeast, bentonite and yeast +bentonite, respectively. Results revealed that supplementations enhanced significantly (P<0.05) the total dry matter intake and utilization of roughages. Highest values of milk yield, fat corrected milk, fat, protein, lactose and total solids yield in milk were recorded with animals fed on the diets supplemented with yeast and/or bentonite compared with the control group. Supplementation of the ewe's diets significantly (P<0.05) increased the nutrients digestibilies and feeding values in comparison with control. The daily gain of offspring's of ewes supplemented groups increased significantly (P<0.05) compared to those of the control group. It could be concluded that, the supplementation of yeast and/or bentonite to the diets of lactating ewes increased total dry matter intake, milk yield, and its quality as well as, rumen activity, N-balance, nutrients digestibilies, feeding values, some blood parameters and weight gain of offsprings.

Keywords: yeast, bentonite, nutrients digestibilities, blood parameters, performance, lactating ewes

INTRODUCTION

Yeast products have been shown to modify rumen fermentation (Harrison *et al.*, 1988, Wiedmeier *et al.* 1987), to stimulate the number and growth of rumen bacteria (Dawson *et al.* 1990 and Erasmus *et al.* 1992), and to increase the initial rate of forage digestion in the rumen.

Inclusion of yeast cultures (YC; *Saccharomyes cerevisiae*) in the diets of ruminants has been shown to alter molar proportions of ruminal Volatile fatty acid "VFA" (Newbold *et al.*, 1990 and Dawson .1993), increase nutrient digestibilities (Dawson, 1993, Hanafy, 1997, El–Ashry *et al.*,., 2001, 2003 and Osman and Swidan, 2003) reduce ruminal NH_3 concentration, shift bacterial populations and increase the number of ruminal bacteria, increase protozoa and alter the flow of N fractions to the duodenum (Williams *et al.* 1991 and Dawson1993) .Dietary YC for cows and buffaloes has increased DMI and milk yield (Adams,1994, Dann *et al.* 2000 and El-Ashry *et al.* 2001)

Yeast cultures used as a dietary supplement for dairy cattle for many years, is thought 1 – to improve rumen function and hence, milk production and feed efficiency by stimulating growth of rumen bacteria, particularly cellulolytic species and 2 – to improve fiber digestibility (Harrison *et al.* 1988). Moreover, studies by Kumar *et al.* (1994) on buffalo calves showed that addition of yeast culture as a growth promoter, to the diets resulted in increasing rumen pH, total bacteria, of protozoa culture count, Total volatile fatty acids "TVFA's", total N and microbial protein with decreasing ammonia–N concentration and improving digestion of cellulose and DM disappearance

Much attention recently has been focused on use of supplemented Yeast and bentonite to increase ruminant's performance. Piva *et al.* (1993), Erasmus *et al.* (1992), El-Ashry *et al.* (2001) and Allam *et al.* (2001) reported that the addition of YC in the diet of dairy cows and buffaloes was beneficial in improving production of milk, 4 % FCM, and milk fat and milk composition. Moreover, bentonite is one of the common natural clays used in animal diets to improve digestibility of nutrients and daily gain and feed intake (Saleh *et al.* 1999 and Salem *et al.* 2001)

Bentonite can absorb toxic products of digestion and decrease the accumulation of toxic substances in tissues, thus decreasing the incidence of internal disorders (Mckenzie, 1991). Furthermore, the addition of bentonite to the diet can partly equalize the supply of nitrogen to the rumen microorganisms; so, bentonite could be considered as a useful component in the ration. (Kalivoda, 1987).

Increasing of milk yield for lactating ewes is an important factor for the production of robust lambs at weaning, therefore, the present study was carried out to investigate the effect of dried yeast and / or bentonite on the milk yield, milk composition, some rumen parameters, some blood parameters, feed conversion, nitrogen balance and nutrient digestibility in addition to performance of offsprings of lactating ewes.

MATERIALS AND METHODS

This study was carried out at the experimental station, Faculty of Agriculture, Al-Azhar University, Assiut Branch. Two feed additives were used in this study, 1) Dry yeast and 2) Bentonite.

Animals and feeding:

Twenty lactating Rahmani ewes, being 3 years old and weighed on the average 45 kg were divided into 4 groups (5 ewes/group) to study the effect of adding dry yeast and / or bentonite in ration, compared to a control group. The feeding trial lasted 10 weeks. The first group (T_1) was kept as a control and fed a basal diet formulated from berseem (3rd cut), wheat straw and concentrate feed mixture (CFM), while the second group (T_2) was fed the basal diet supplemented with 0.5 % dry yeast as part of CFM. The third group (T_3) received the basal diet plus 4 % bentonite of CFM. The fourth group (T_4) received the basal diet supplemented with 0.5 % dry yeast + 4 % bentonite of CFM. The CFM was offered at a rate of 2 % of average live body weight of each group. The CFM was formulated to supply the requirements using Linear Programming method of (Abou'l-Ella, 2000) from available feedstuffs in the station. The CFM was offered to animals once daily at 8.00 am, and after animals had consumed it, berseem was offered at equal rate for each group, then wheat straw was fed ad libitum. The residue of offered roughage was collected and weighed daily and recorded for each group. Feed consumption was calculated. The intakes of CFM were adjusted biweekly for each group according to the changes in body weight to meet the required allowance. Each group was kept in separate shaded pen and adapted for the diet for 7 days. Fresh water was available throughout the experimental period. Ewes and their offspring were weighed at the beginning of the experiment and biweekly till the end of the experiment. During lactation, all ewes were hand milked biweekly milked after removing them away from their offspring the day before to determine the total milk yield per day and milk composition for each group.

Tables (1&2) show the composition of the concentrate feed mixture and the chemical composition of feedstuffs used in the experiment.

Digestibility and N –balance trials:

Four digestibility trials were carried out using three adult Rahmani rams weighing about 45 kg to determine nutrients digestibility and N- balance. Animals were left in metabolic cages for 21 days, 14 days for adaptation and 7 days for collection periods. Samples of rumen fluid were collected, using stomach tube. Samples were withdrawn just before morning diet and at 3 and 6 hours post feeding. Samples were strained through two layers of cheese cloth and were immediately used for determination of ruimnal pH and ammonia nitrogen (NH_3–N) concentration. pH value was measured using a digital pH meter. Strained rumen liquor samples were stored in glass bottles with 3 drops of toluene and a thin layer of paraffin oil just to cover the surface to stop microbial activity and to prevent volatilization and then samples were frozen for VFA'S determination.

Samples:

1. Feedstuffs:

Samples of feedstuffs used were subjected in duplicate to determine the proximate analysis (DM, CP, CF, EE and ash) according to AOAC (1990) and NFE values were calculated by difference.

2. Milk samples:

Ewes were hand milked in all experimental groups and milk yield was recorded. The 40g /kg fat corrected milk yield was calculated using the formula of Gaines and Overman (1938). Individual milk sample of each animal was taken, analyzed for total protein, fat, and total solids as described by AOAC (1995), while lactose content was measured according IDF (1974)

3. Blood plasma sampling and analysis:

Blood samples were collected from the jugular vein using (10ml) glass tubes containing sodium EDTA, from all experimental animals at monthly intervals. Samples were centrifuged at 4000 rpm for 15-min. to obtain serum, which was stored at -20°C until analyzed. Blood serum was tested for total protein, albumin according to Doumas and Biggs (1972). Serum globulin was calculated by difference between the total protein and albumin concentration .Albumin /Globulin ratio was calculated .Urea nitrogen was estimated using kits supplied by Biocon Egypt.

4. Ruminal liquor samples:

Ruminal liquor was collected from each animal in clean and sterile flask by using clean and sterile stomach tube. Thirty ml of the ruminal fluid were drawn aseptically into clean and sterile vials to be used for bacteriological examination immediately after collection. The colony forming units/ml of the ruminal liquor was carried out by standard plate techniques (Baily & Scott, 1994).

Chemical analysis:

Dry matter (DM), crude fiber (CF), crude protein (CP), ether extract (EE) and ash of feed and feces, while urinary N were determined according to A.O.A.C. (1990) procedures.

TVFA's were determined by steam distillation method according to Warner (1964). Ammonia nitrogen was determined in the filtered rumen liquor (as mg %) according to Abou-Akkada and Osman (1967).

Statistical analysis:

Data were subjected to the statistical analysis (SAS, 1990). Duncan's multiple range tests (1955) was used for testing the significant differences between groups.

RESULTS AND DISCUSSION

Nutrient digestibility and feeding value:

The results of nutrients digestibility and feeding values of experimental rations are shown in Table (3). Results showed a significant ($P<0.05$) effect on dry matter and nutrients digestibilities and feeding value in groups fed the diets supplemented with dried yeast and /or bentonite. The tested supplements increased significantly digestion coefficients of all nutrients and nutritive value for T2, T3 and T4 as compared to control group. The differences between supplemented rations were insignificant. These results are in accordance with those found by Abdel-Mawla *et al.*, (1998), Saleh *et al.*,(1999), Abdel–Baki *et al.*,,(2001), Salem *et al.*,(2001), Gabr *et al.*, (2003) and El-Tahan *et al.*,(2005)

Table (1): Chemical composition of concentrate feed mixtures used.

Item	%
Yellow corn	67.5
Undecorticated cottonseed meal (U.C.S.M)	15
Wheat bran	15
Limestone	1.5
Common salt	0.5
Mineral premix	0.5
Total	100

Table (2) Chemical composition (%) of feedstuffs and concentrate feed mixture used (DM basis).

Item	DM	OM	CP	CF	EE	NFE	Ash
Yellow corn	88.20	97.70	9.30	0.80	4.30	82.80	2.30
UCSM	92.10	95.20	28.30	24.61	4.83	37.46	4.80
Wheat bran	86.55	93.65	16.10	10.40	3.56	63.59	6.35
Berseem	12.15	87.35	16.40	27.15	2.95	40.85	12.65
Wheat straw	88.55	83.80	2.65	35.40	1.56	44.19	16.20
CFM composition	86.33	94.28	13.0	6.06	4.50	70.72	5.72

Table (3): Nutrients digestibilities and feeding values of the experimental rations.

Item	Treatments			
	T1	T2	T3	T4
Apparent digestibility,%:				
DM	64.93± 2.44 ^{b}	71.35± 1.65 ^{a}	69.85±1.15 ^{a}	72.15± 1.03 ^{a}
OM	63.06± 1.54 ^{b}	74.85± 1.28 ^{a}	72.25±1.11 ^{a}	75.35± 1.55 ^{a}
CP	62.84± 2.35 ^{b}	72.70± 1.57 ^{a}	71.65± 1.1 ^{a}	75.75±1.07 ^{a}
CF	55.85± ±1.45 ^{b}	66.64± 1.2 ^{a}	66.35± 1.4 ^{a}	68.95±1.35 ^{a}
EE	69.36± 1.09 ^{b}	74.82± 1.55 ^{a}	72.75± 1.01 ^{a}	76.25± 1.00 ^{a}
NFE	71.65± 1.75 ^{b}	77.84±2.08 ^{a}	76.45± 1.60 ^{a}	79.55± 1.40 ^{a}
Feeding values ,%:				
TDN	61.42± 1.15 ^{b}	71.17± 1.33 ^{a}	68.88± 1.05 ^{a}	72.40± 1.12 ^{a}
DCP	7.14±1.06 ^{b}	7.69± 1.00 ^{a}	7.30± 0.7 ^{a}	7.50± 0.8 ^{a}

- Each value represents a mean of 3 samples.
T1 = Control, T2 = Dry yeast, T3 = Bentonite and T4 = Dry yeast + Bentonite
a,b,c Means at the same column with different superscripts are significantly different at ($P<0.05$).

who reported that supplementing bentonite to diets significantly ($P<0.05$) improved nutrients digestibility and nutritive value. The increase in digestibility may be due to the increase in the retention time and a decrease in ruminal turnover rate (Ellis *et al.*,1983).On the other hand, El–Ashry *et al.*,(2001), Allam *et al.* ,(2001) and Ragheb and Abd- Khalek (2003) reported that supplemented yeast to rations improving all nutrient digestibilities. The improvement of protein digestibility may be due to the stimulation of rumen protelytic bacteria (Williams 1991), moreover, improving CF digestibility may be attributed to increasing the number of rumen cellulolytic bacteria due to yeast supplementation (Gomez-Alarcon *et al.*,1987). When bentonite was added to diets, digestabilitilites of CP,CF and EE increase and ruminal turnover rate decrease (Kirilov and Burikhonov,1993).

Results of Table (3) show that feeding value (TDN and DCP) of supplemented rations were increased significantly compared to control group. The highest value was recorded with T_4 followed by T_2 and T_3, while the lowest one was recorded with control group. These results were in accordance with those found by Saleh *et al.* (1999), Salem *et al.*,(2001) and El Tahan *et al.*,(2005), who reported that TDN and DCP were significantly ($P<0.05$) increased by adding bentonite when compared to the control group. Furthermore El-Ashry *et al.*, (2001) reported that supplemented diets with yeast increased ($P<0.05$) feeding value of the rations.

2. Feeding trial:

2.1. Dry matter intake: -

The DMI data are presented in Table (4). There were significant differences ($P<0.05$) in the total dry matter intake among the different experimental animals. Higher values were recorded with the groups fed the diets supplemented with dried yeast and / or bentonite (T_2, T3 and T_4) compared to the control group (T_1) .T_2, T3 and T_4 consumed more DM by 4.35 %, 5.58% and 5.58 % than control group respectively. The enhanced intake is most likely due to an improvement of the rate of breakdown of feedstuffs in the rumen

One potential benefit of the addition of yeast or / and bentonite to lactating ewe diets is enhancement of DMI. This benefit was demonstrated clearly in this study, the explanation for this is that, as yeast added to the rations, it provides stimulatory actors to rumen cellulolytic bacteria as reported by Williams *et al.*, (1991) and Erasmus *et al.*,(1992) and Piva, *et al.* (1993) .The differences among supplemented rations group was not significant. Such results agree well with the remarks made by Adams *et al.*,(1995), Allam *et al.*, (2001), Robinson and Garret (1999), Saleh *et al.*,(1999), El-Ashry *et. al.*, (2001 and 2003) and Salem *et al.*, (2001) and Putnam *et al.*, (1997), who reported that there was a significant improvement in DMI when yeast culture was given to lactating animals. However, Aramel and Kent (1990) found no effect of YC supplementation on DMI. Also, these results agreed with those obtained by Gabr *et al.*, (2003) and EL-Tahan *et al.*, (2005) with adding different level of bentonite to growing lambs.

Table (4): Effect of supplementing lactating ewe's rations with dried yeast and/or bentonite on the dry matter intake (DMI).

Item	Experimental group			
	(T1)	(T2)	(T3)	(T4)
Total DM intake (kg / head / day)	2.20^{b}	2.30^{a}	2.33^{a}	2.33^{a}
CFM (kg / head / day)	0.990	0.995	1.000	1.000
Berseem (kg / head / day)	0.625	0.643	0.645	0.645
Wheat straw (kg/ head / day	0.582	0.655	0.680	0.687

T1 = Control, T2 = Dry yeast, T3 = Bentonite and T4 = Dry yeast + Bentonite
*Figures in the same row having the same superscripts are not significantly different (P<0.05)

Table (5): Effect of supplementing lactating ewe's rations with dried yeast and/or bentonite on the milk yield and composition and feed efficiency .

Item	Experimental groups			
	T1	T2	T3	T4
Milk yield (g/h/d):	$650{\pm}20^{b}$	$720{\pm}14^{a}$	$700{\pm}10^{a}$	$750{\pm}7^{a}$
4% fat corrected milk	954.2^{b}	1109.88^{a}	1055.95^{a}	1126.88^{a}
Total solids (g/h/d)	$131.63{\pm}1.7^{c}$	$147.10{\pm}2.8^{b}$	$144.20{\pm}1.9^{b}$	$161.70{\pm}1.05^{a}$
Fat (g/h/d)	$46.28{\pm}0.9^{b}$	$52.56{\pm}1.02^{a}$	$50.26{\pm}1.01^{a}$	$55.13{\pm}0.8^{a}$
Solid non fat (g/h/d)	86.65	95.18	93.31	100.13
Total protein (g/h/d)	46.02±1.03	51.70±0.8	50.12±1.2	54.600±1.1
Lactose (g/h/d)	29.45±1.10	33.34±1.03	32.97±1.4	35.7±1.2
<u>Milk composition (%)</u>				
Total solid	20.25±0.19	20.43±12	20.60±0.20	21.56±0.10
Fat	7.12±0.17	7.30±15	7.18±0.11	7.35±0.05
Solid non fat	13.33	13.22	13.33	13.35
Total protein	7.08±0.18	7.18±0.15	7.16±0.21	7.28±0.08
Lactose	4.53±0.17	4.6 3±0.12	4.71±0.17	4..76±0.12
<u>Feed efficiency: -</u>				
Milk kg./DMI kg.	0.339	0.318	0.333	0.310
FCM , kg/DMI kg	0.434	0483	0.453	0.484

T1 = Control, T2 = Dry yeast, T3 = Bentonite and T4 = Dry yeast + Bentonite
*Figures in the same row having the same superscripts are not significantly different (P<0.05)

2.2. Milk yield and composition: -

Effect of supplementation of rations on milk yield and its composition is presented in Table (5). There were significant (P<0.05) differences in the amount of milk yield, milk fat and fat corrected milk (FCM) (Table 5) among different treatments and the higher values of milk yield were recorded with animals fed diets supplemented with dry yeast and /or bentonite in comparison with control group. The highest value was recorded with T4. In the other word, T4 recorded higher milk yield than those of T_1, T_2 and T_3 by 15.38, 4.17 and 7.14 %, respectively. The relative improvement in milk production of T2 and T4 could be attributed to the fact that supplementation with yeast may act as a source of B-vitamins, which may occasionally be beneficial. Moreover, the microbial protein flow from the rumen was increased with addition of yeast to the diet (Williams *et al*, 1990) These results agreed with those reported by Piva *et al*., (1993), Adams *et al*., (1995),Yousef, *et al*. (1996), Abo-El-Nor and Kholif (1998), Dann *et al*.,(2000), Robinson, and Garrett, (1999) and, Allam et .al.,(2001),who reported that production of milk, FCM and milk fat was increased significantly by dietary yeast culture supplement. El-Ashry *et al*.,(2001) and Abdel-Khalek (2003), showed that milk production, milk protein and milk fat yields were significantly (P<0.05) affected by YC supplementation .On the other hand ,these results are supported with findings of Saleh *et al*.,(1999) with buffaloes, Abdel-Baki, *et al*. (2001) with cows and Abdel-Mawla et .al. (1998) and Salem and El-Shewy,(2001) with goats who found that the ration supplemented with bentonite improved milk production and its composition. Baldi *et al*., (1996) concluded that bentonite significantly increased molar proportion of butyrate which can be used as a precursor for fat synthesis.

Yield of protein and lactose has been effected by supplementation of ration with yeast or/and bentonite but the differences among treatments were insignificant compared to control group, however supplementation of rations had significant effect (P<0.05) on total solids and fat yield compared with control group. The highest values were recorded with T_4 followed by T_2 and T_3, the lowest one was recorded with control group. These results came in line with those obtained by Abo-El-Nor and Kholif (1998), Saleh *et al*., (1999) and Abdel-Baki *et al*. (2001), who reported that differences in SNF and protein percent of cow's milk fed ration supplemented with yeast or bentonite were not significant. The increase in milk protein content by probiotics supplementation may be due to stimulation of rumen microbes that cause altering the microbial protein synthesis and increased protein yield in the milk (Dawson, 1993 and Abou'l Ella *et al*. 2003)

Ewes fed the experimental ration supplemented with bentonite and /or dried yeast tended to have the better-feed efficiency calculated as milk yield/DMI and 4% FCM/DMI. Feed efficiency was higher in supplemented groups compared to the control one. Such results agreed well with the remarks made by El-Ashry, *et al*. (2001) indicating that feed conversion was improved by adding different kinds of yeast to buffaloes rations and Abd El-

Baki *et al.*, (2001) who reported that feed conversion was improved by adding Tafla clay to cows rations.

3. Rumen parameters:

As shown in Table (6), the ruminal pH decreased insignificantly (P>0.05) by adding bentonite to the rations ,but it increased by adding yeast to the rations compared to control one at 3 and 6 hrs post feeding. The pH mean values were similar in the different treatments. These results are in accordance with those found by Abd EL–Baki *et al.* (2001) who reported that ruminal pH values significantly increased by adding clay Tafla at 3 and 6 hrs post feeding than control group. Khattab *et al.*, (2003) found that Yea-Sacc and Lacto – Sacc had lower pH at different times compared to control. This can be attributed to fermentation process by the rumen microorganisms, which took place on the soluble carbohydrate.

No significant differences were observed for NH_3-N concentration among treatments at 3 and 6 hrs post feeding. Table (6) values of T2 and T3 were lower than that of the control, but NH_3-N concentration of T4 was similar to T1 (control group). These results are in agreement with the findings of Newbold (1991), Erasmus *et al.* (1992), Saleh *et al.* (1999), Hanafy, (1997), Abd-El-Baki *et al.* (2001), Salem *et al.* (2001) and El-Saadany *et al.* (2003). Lower ammonia concentration with bentonite supplementation may be due to the ability of bentonite to absorb ammonia nitrogen from rumen fluid and to release it back when the concentration falls. Khattab *et al.* (2003) reported that values of NH_3–N concentration of yeast treatments were lower than control. The reduction in NH_3-N of yeast treatments may be attributed to the inhibitory effect of growth promoters on proteolysis, amino acid determination and ruminal urease activity. Furthermore, Williams *et al.* (1990) reported that the reduction of NH_3-N concentration in the rumen appear to be the result of increased incorporation of ammonia into microbial protein and may be the direct result of stimulated microbial activity.

Total volatile fatty acids (TVFA's) concentrations were found to be significantly higher in treated groups (T_2, T3 and T_4) than T1 (control group). Similar results were reported by Salem *et al.* (2001) and Abd El–Baki *et al.* (2001). Higher TVFA's concentration due to bentonite supplementation may be attributed to the ability of bentonite to improve the nutrients digestibility within rumen (Kirilov and Burikhonov, 1993). On the other hand, Khattab *et al.* (2003), found that the treatments of Lacto-Sacc showed higher ruminal TVF's concentration compared with the control group.

4. Nitrogen balance:

Nitrogen balance of ram lambs fed on the experimental rations are shown in Table (7)The differences between supplemental rations and control one were significantly (P<0.05).Higher value was obtained with supplemented rations compared to control group, this might be attributed to the improvement of CP digestibility. Such results were obtained by Allam *et al.* (2001) and El-Ashry *et al.*, (2003) (supplemented rations with yeast) and Abd El-Baki *et al.* (2001) (supplemented rations with bentonite).

Table (6). Effect of supplementing lactating ewe's rations with dried yeast and/or bentonite on rumen liquor parameters.

Groups	pH Time hour				VFA's (meq / 100 ml) Time hour				NH3-N (mg / 100ml Time hour			
	0	3	6	Av.	0	3	6	Av.	0	3	6	Av.
T1	6.59	6.15	6.35	6.36	8.15	9.82	8.45	8.81^{b}	18.62	31.66	22.15	24.14
T2	6.63	6.45	6.55	6.54	9.29	10.95	9.92	10.05^{a}	19.95	30.16	21.35	23.82
T3	6.65	5.05	6.25	6.34	8.95	10.86	9.55	9.77^{a}	19.33	30.25	20.05	23.21
T4	6.71	6.45	6.66	6.61	9.25	11.66	9.65	10.19^{a}	19.85	32.05	22.14	24.68

T1 = Control, T2 = Dry yeast, T3 = Bentonite and T4 = Dry yeast + Bentonite
a,b,c Means at the same column with different superscripts are significantly different at (P<0.05).

Table (7): Feed intake (g DM/h/day), Nitrogen utilization of ram lambs fed the experimental diet supplemented with dry yeast and/or bentonite.

Item	Experimental groups			
	T1	T2	T3	T4
Feed intake, g DM /head / day:				
CFM	580	600	580	600
Berseem	125	125	125	125
Wheat straw	175	275	320	360
Total feed intake	880	1000	1025	1085
N-intake ,gm / day	17.08±0.8	16.93±0.5	17.12±1.01	17.29±0.9
Fecal nitrogen (g/h/d)	4.52±1.03	4.14±0.8	4.55±0.6	4.22±.05
N-digested ,gm / day	12.56±1.2	12.79±0.9	12.57±1.2	13.07±1.1
N- Urinary ,gm / day	6.62±0.9	6.50±0.8	6.56±0.9	6.50±1.2
N- Balance ,gm / day	5.94±0.8^{b}	6.29±0.6^{a}	6.01±0.4^{a}	6.57±0.7^{a}
N- retention , %				
** Protein productive value	34.78±1.1	37.15±1.10	35.11±1.01	37.97±0.8
Absorbed	47.52±1.3^{a}	49.18±0.9^{a}	47.81±1.0^{a}	50.27±0.7^{a}

T1 = Control, T2 = Dry yeast, T3 = Bentonite and T4 = Dry yeast + Bentonite
a,b,c Means at the same column with different superscripts are significantly different at (P<0.05).

** Protein productive value (PPV) = $\frac{\text{N - retained}}{\text{N – intake}}$ × 100 (Krishna-Mohan *et al.*, 1987)

Table (8): Effect of supplementing lactating ewe's rations with dried yeast and/or bentonite on serum proteins and urea.

Item	Treatments			
	T1	T2	T3	T4
T.P.(g/100 ml)	6.10±0.3	6.61±0.7	6.32±0.4	6.640.8
AL. (g/100ml)	3.1 5±0.2 ^{b}	3.54±0.09 ^{a}	3.55±0.06 ^{a}	3.35±0.04 ^{a}
GL.(g /100 ml)	2.95±0.5	3.07±0.2	2.77±0.4	3.29±0.03
AL/GL ratio	1.08	1.15	1.28	1.02
Urea (mg/100 ml)	24.80±1.2	25.70±1.03	22.75±1.01	25.65±1.1

T1 = Control, T2 = Dry yeast, T3 = Bentonite and T4 = Dry yeast + Bentonite
a,b,c Means at the same column with different superscripts are significantly different at (P<0.05).

Table (9): Effect of supplementing lactating ewe's rations with dried yeast and/or bentonite on the performance of their offsprings.

Item	Experimental group			
	Control	Dry yeast	Bentonite	DY + Bentonite
No of offsprings	5	5	5	5
Initial weight (kg)	5.9 ± 0.42	5.8±0.56	6.5± 0.39	6.30 ± 0.16
Final weight (kg)	17.24± 0.52	18.54±045	18.96 ± 0.29	19.95± 0.35
Total gain (kg)	11.34± 1.3 ^{b}	12.74± 1.5 ^{a}	12.46± 0.9 ^{a}	13.65± 1.05 ^{a}
Average daily gain (g)	162± 7.5 ^{b}	182± 7.15 ^{a}	178± 6.83 ^{a}	195± 5.75 ^{a}

a,b,c Means at the same column with different superscripts are significantly different at (P<0.05).

Serum blood parameters:

Concentration of plasma total protein (TP) and globulin (GL) tended to be higher in the supplemented treated groups than the control. however level of albumin (AL) was significantly (P<0.05) higher in supplemented treated groups than control group .On the other hand TP and GL concentration in the bentonite group (T3) were not effected compared to control group versus the effect of dry yeast (T2 and T4) compared to T1 and T3.Blood serum parameters were within the normal range in supplemented treated groups and control. Serum urea nitrogen tended to be similar in all groups, however the lowest value was recorded with T3 (bentonite group). The present blood parameters of supplemented treated groups as compared to the control may indicate the beneficial effect of the supplements on ewes metabolism. Similar results are obtained by Abdel Mawla *et al.* (1998), Salem *et al.*, (2001), El-Ashry *et al.* (2001) and Ragheb and Abd El-Khalek (2003).

2.3. Offspring performance:

The results of lambs performance nursed the from treated ewes are shown in Table (9) There were significant (P<0.05) differences in the average daily gain between different lambs groups and the higher values of lambs daily gain were recorded with supplemented group (182,178 & 195 g/h/day for T2,T3 and T4, respectively) in comparison with control group (162 g/h/day). Final weight of lambs received yeast or bentonite was similar. On the other hand, offsprings of supplemented ewe groups were heavier ((19.95, 18.96 and 18.54 kg for T4,T3 and T2, respectively) relative to the control group (17.24) at the end of experimental period .Weight gain throughout the whole experimental period and average daily gain followed the same trend. The increase in the daily gain of offspring's resulting from supplemented groups compared to those in control may be due to the higher milk yield and its content from total solids, total protein and milk fat. The yeast and/or bentonite incorporated into the ewe's feed, have a direct effects on the ewe and indirect effects on the lambs. These results agree with those reported by Abou'l Ella *et al.*, (2003).Lactobacillus mixtures have also been effective in reducing scouring and mortality and stimulated live weight gains in lambs (Pond and Goode, 1985 and Umberger *et al.*, 1989).

CONCLUSION

A supplement of 0.5% dry yeast and / or 4 % bentonite of CFM could be recommended to be included in diets of lactating ewes and that may improve the nutrients digestibility, feed conversion and enhance milk yield and its quality and weight gain of offsprings.

REFERENCES

Abdel-Mawla, S. M; D. M. A. El-Kerdawy and F. A. F. Salem (1998). Productive performance and blood constituents of lactating goats fed diets supplemented with sodium bentonite. Egypt J. Nutritional and Feeds, 1:53.

Abd-El-Baki, S. M., A. Z. Bassuny, A. M. Aiad and E. M. Hassona (2001): Clayes in animal nutrition .9.In vitro adsorption of ammonia by some local clays and using tafla clay in pelleted complete feed containing urea for sheep. Egypt J. Nutritional and Feeds, 4 (special Issue):77-87.

Abd-El-Baki, S. M.; A.Z. Bassuny; H. M. Ghanem; R. I. Moawd and A. H. Ghoneim (2003): Clays in animal nutrition.2.Study on using tafla in buffalo bull calves feeding. . Egypt J. Nutr. and Feeds, 4 (special Issue): 702-708.

Abdel-Khalek, A.E. (2003): Productive and reproductive performance of primiparous and multipar5ouds Friesian cows fed rations supplemented with by yeast culture (Yea –Sacc[1026]). Egypt J. Nutr. and Feeds, 4 (special Issue): 1095-1105.

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

Abou'l-Ella, A. A. (2000): Mathematical-programming models applied to feed formulation for ruminants. Ph. D. Thesis in Animal Nutrition, Fac. of Agriculture, Ain-Shams Univ., Shoubra El-Kheima, Cairo, Egypt.

Abou'l-Ella, A. A.; A. N.Sayed; S.G. Abdo and M. M. Khorshed (2003). Effect commercial probiotics supplementation on the productive performance of lactating ewes. Egypt J. Nutritional and Feeds, 4 (special Issue):1023-1033.

Abou-Akkada, A. R. and H. E. Osman (1967). Studies on the utilization of non-proteinnitrogen in Egypt .J. Agric., Cairo Univ.

Adams,A. L.; B. Harries, Jr., H. H. Van Horn and C. J. Wilcox (1995). Effect of varying forage types on milk production responses to whole cotton seed, tallow, and yeast. J. Dairy Sci., 78: 573-581.

Allam, A. M., K. El-Shazly, B. E. A. Borhami and M.A. Mohamed (2001): Effect of baker's yeast (Saccharomyces Cerevisiae) supplementation on digestion in sheep and milk response in dairy cows. Egypt J. Nutritional and Feeds, 4 (special Issue): 315-323.

A.O.A.C. (1990). Association of Official Analytical Chemists. Official Methods of Analysis. 13rd Ed., Washington, D.C., USA.

Aramel, M. J. and B. A. Kent (1990). Effect of yeast culture on nutrient digestibility and milk yield response in early to mid-lactation dairy cows. J. Dairy Sci.78: 537-581.

Baily, W. R. and Scott, E. G. (1994). Diagnostic Microbiology. 9th Ed. Mosby, Saint Louis.

Baldi, A.; F. Cheli, and G. Savoini, (1996). Influence of bentonite added to the ration on rumen pH, volatile fatty acids and nitrogen ammonia in dairy cows. Nutr. Abst. &. Rev., B., 66(5): 2067..

Dann. H. M.; J. Grackley; G. C. McCpy; M. F. Hutjens and J. E. Garrent (2000). Effects of yeast culture (Saccharomyes cerevisiae) on prepartum intake and postportum intake and milk production of Jersy. J. Dairy Sci.,83:123.

Dawson, K.A. (1993). Biotechnology in the feed industry, Proceeding of Alltech's9th Annual Symposium, T.P. Lyons Ed. Alltech's Technical Publications, P.269.

Dawson, K. A.; K. E. Newman and J. A. Boling (1990): Effects of microbial supplements containing yeast and lactobacilli on roughage-fed ruminal microbial activities. Anim. Sci., 63:3392.

Doumas, B. T. and H. G. Biggs (1972b). The colorimetric determination of total protein in serum or plasma. Standard methods of clinical chemistry.Vol.7.Academic Press. New York., USA.

Duncan, D.B. (1955).Multiple Eange and Multiple F-test. Biometrics, 11: 1-42

El-Ashry, M. A.; Afaf M. Fayed, K. M. Youssef, F. A. Salem and Hend S. Aziz. (2003). Effect of feeding flafomycin or yeast as feed supplement on lamb performance in Sinai. Egypt J. Nutritional and Feeds, 4 (special Issue): 1009-1022.

El-Ashry, M. A.; Zeba A. Motagally and Y.A. Maareck (2001): Effect of live dried baker's yeast and yeast culture on performance of growing buffalo calves. Egypt J. Nutritional and Feeds, 4 (special Issue):607-617.

Ellis, W. C.; G. W. Horn; D. Delancy and K. R. Pond (1983). Effects of ionopHores on grazed forage utilization and their economic value for cattle on wheat pastures. In: G. W. Horn (Ed) Proc. National Wheat pastures Symp.pp.343.Oklahoma Agric.Exp.Sta.Mp115,Still water.

El-Saadany, S. A.; T. I. El-Monayer; A. M. M. Zeid and M. A. Boraei (2003). Effect of feeding different rations with or without bentonite on the performance o0f growing lambs. Egypt J. Nutritional and Feeds. 4 (special Issue):1181-1190.

El-Tahan A. A. H; R. I. Moawd; A. A. Zaki and M. Marghany (2005) Effect of adding tafla clay on performance of growing calves fed rations contating maize silage. . Egypt J. Nutr. and Feeds 8 (1). Special Issue: 167-178.

Erdman, R. A. and B. K. Sharma (1989). Effect of yeast culture and sodium bicarbonate on milk yield and composition in dairy cows. J. Dairy Sci.72: 1929-1932.

Erasmus, L.J.; P. M. Botha and A. Kistner (1992). Effect of yeast culture supplement on production rumen fermentation and duodenal nitrogen flow in dairy cows. J. Dairy Sci., 75:1022.

Gaber, A. A.; E. L. Shehata; M. E. Ahmed and M. H. Azzam (2003): Performance and carcass trials of rahmani lambs fed rations containing dried poultry manure with addition of bentonite clay. Egypt J. Nutritional and Feeds 6(2):173-188.

Gains, W. L. and O.R. Overman (1938): Interrelation of milk fat, milk protein and milk energy yield. J. Dairy Sci., 21:261-271.

Ghorbani, G. R.; D. P.Morgavi; K. A. Beauchemin and J.A. Leedle (2002): Effects of bacterial direct-fed microbials on ruminal fermentation, blood variables, and the microbial populations of feedlot cattle. J. Anim. Sci., 80 (7):1977-1985.

Gomez-Alacron, R., C. Dudas, and J. T. Huber. (1987). Effect of *Aspergillus oryzae* (Amaferm) and yeast on feed utilization by Holstein cows. J. Dairy Sci.70 (suppl.1) 218.(Abstr.).

Hanafy, M. A. (1997). Effect of yeast culture supplementation in ruminant diets on feed utilization, rumen fermentation and growth performance. J. Agric. Sci. Mansoura Univ., 22(4):1047-1055.

Harrison, G. A.; R. W. Hemken; K. A. Dawson; R. J. Harmon and K. B. Barker (1988). Influence of addition of yeast culture supplement to diets of lactating cows on ruminal fermentation and microbial populations. J. Dairy Sci., 71:2967.

International Dairy Federation (IDF) (1974). Determination of the lactose content of milk and milk production. In the book "Methods and analysis milk and milk production" Moscow, Keles.

Kalivoda, M.(1987). Additives as production promotants and preventive and curative agents in ruminant.disease. Krmiva, 29(11): 259-266(C.F. Nutrition Abstracts and Reviews-series-B(1989): 59.

Khattab. H. M., F. A. Salem; M. M. Sayeda and H. M. Nagh (2003). Effect of Yea-Sacc, Lacto-Sacc supplementation and energy levels on performance, rumen activity, some blood constituents and carcass traits in growing sheep. Egypt J. Nutritional and Feeds, 4 (special Issue):081-989.

Kirilov, M. P. and A. Burikhonov (1993). Bentonite in the feeding of replacement heifers. Zootekhniya, 8:20.

Krishna Mohan, D. K; K. K.. Krishna Reddy and A. S. Srirama Murthy (1987). Protein requirements of crossbred lambs. Ind. J. Anim. Sci., 50 (10): 1121-1127

Kumar, U.; V. K. Sareen and S. Singh (1994).Effect of *Saccharomyces cerevisiae* yeast culture supplement on ruminal metabolism in buffalo calves given a high concentrate diet. Animal Production 59: 209.

McKenzie, R.A. (1991). Bentonite as therapy for Lantana Camara poisoning of cattle.Aust.Vet.J.68: 146.

Miake, S.; K. Nomoto; T. Yokokura; Y. Yoshikai; M. Mutai and C.J. Newbold; P.E. Williams; N. McKain (1990). The effects of yeast culture on yeast numbers and fermentation in the rumen of sheep. Proc. Nutr. Soc., 49:47.

Newbold, C. J.; P. E. V. Williams; N. Mckain; A. Walker and R. J. Wallace (1990). The effect of yeast culture on yeast numbers and fermentation in the rumen of sheep.Proc.Nutr.Soc.,49:474.

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.Milchwisssenschaft.53:66 3-666.

NRC. (1985). Nutrient requirements of sheep. National Research Council, Academic Press, Washington, DC, USA.

Osman, A. A. and F. Z. Swdan (2003). Effect of yea-sacc. lacto-sacc supp;ementations and energy levels on performance, rumen activity, some blood constituents and carcass traits in growing sheep. Egypt J. Nutritional and Feeds, 6 (special Issue):981-989.

Piva, G; S. Belladanna; G. Fusconi and F. Sicbaldi (1993): Effects of yeast on dairy cow performance. ruminal fermentation, blood components and milk manufacturing properties. J. Dairy Sci., 76:2117.

Pond, K. R. and L. Goode (1985): The evaluation of probios for wean-stressed lambs. Pioneer Hi-Bred Int., Des Moines, Iowa, USA.

Putnam, D. E. and C. G. Schwab (1994). Mode of action of yeast culture. J. Anim. Sci., 72.Suppl., 2-5.

Putnam, D.E.; C.G. Schwab; M.T. Kierstead and B.D. Garthwaite (1997). Effect of yeast culture in the diets of early lactating dairy cows on ruminal fermentation and passage of nitrogen fractions and amino acids to the small intestine. J. Dairy Sci., 80:374.

Ragheb, E. E. (2003) Effect of lacto-sacc and acid pak additives on productive performance of Friesian calves under early weaning system. Egypt J. Nutritional and Feeds 6 (2).127-137.

Ragheb, E. E.; A. F. Mehrez and A. E. Abdel–Khalek (2003). Digestibility coefficients, blood parameters. feed efficiency and growth performance of weaned Friesian calves fed diet supplemented with lacto–Sacc. Egypt J. Nutritional and Feeds, 4 (special Issue): 693-702.

Robinson, P. H. and J. E. Garret (1999). Effects of yeast culture (Saccharomyes cerevisiae) on adaptation of cows to postpartum diets and on lactation performance .J. Anim. Sci.,77:988.

Saleh, M. S.; E. M. Abdel-Raouf; M. K. Mohesn and A. Y. Salem (1999). Bentonite supplementation to concentrate ration for lactating buffaloes. Egypt J. Nutritional and Feeds, 2; 67.

Salem, F. A. F., Hanaa H. El-Amary and S.H. Hassanin (2001). Effect of bentonite supplementation on nutrients digestibility, rumen fermentation, some blood physiological parameters and performance of growing lambs. Egypt J. Nutritional and Feeds, 4 (special Issue):179-191.

Salem, F. A. F. and A. A. El-Shewy (2001): Supplementation of bentonite and dolomite to lactating goat's ration. Egypt J. Nutritional and Feeds, 4 (1):11-20.

Sann, H. M.; J. K. Drackley, G. C. Mccoy, M. F. Hutjens and J. E. Garrett. (1999). Effect of culture yeast on prepartum intake and postpartum intake and milk production of jersey cows. J. Dairy Sci., 83:123-127.

SAS. (1990). SAS/STAT. "Guide for personal computers" SAS Inst., Inc., Cary, NC, USA..

Smirnov, V. V.; N. K. Kovalenko; V.S. Podgorskii and I.B. Sorokulova (2002). Probiotics based on live cultures of microorganisms. Microbiol. Z., 64(4): 62-80.

Tarakanov, B. V. (1993). Biopreparations for raising the efficiency of feed utilization. Zootekhniya, 8:16-18.

Umberger, S. H.; D.R. Notter; K.E. Webb and W.H. McClure (1989). Evaluation of a Lactobacillus inoculant on feedlot lamb performance. Anim. Sci. Res. Rep. Virginia Agric. Exp. Stat., Virginia Poly., 8:40-45.

Warner,A. C. I. (1964). Production of volatile fatty acid in the rumen, methoods significantly of measurements. Nutr. Abstr. and Rev., B, 34:339.

Wiedmeier, R. D.; M. J. Arambel and J. L. Walters (1987): Effect of yeast culture and *Aspergillus oryza* fermentation extract on ruminal characteristics and nutrient digestibility. J. Dairy Sci., 70:2063.

Williams, P. E. V.; A. Walker and J. C. Macrae (1990). Rumen probiosis: the effect of yeast culture (viable yeast) Saccharomyces servisiae + growth medium) on duodenal protein flow in wether sheep.Proc.Nutr.Soc.49: 128a (Abst.).

Williams, P. E. V.; C. A. G. Tait; G. M. L. Innes and C. J. Newbold (1991). Effect of the inclusion of yeast culture (*Saccharomyces servisiae* plus growth medium) in the diet of dairy cows on milk yield and forage degradation and fermentation patterns in the rumen of steers. J. Anim. Sci., 69: 3016.

Wohlt, J. E.; T.T. Corcione and P.K. Zajac (1998). Effect of yeast on feed intake and performance of cows fed diets based on corn silage during early lactation. J. Dairy Sci., 81(5):1345-1352.

Yousef, H. M.; K.A. El-Masry and A.I. Aboulnaga (1996). Effect of dried live yeast supplement on haemobiochemical levels and milk production responses of lactating buffaloes under hot summer conditions in Egypt. Egyptian J.Anim. Prod., 33:11-21.

تأثير اضافة الخميرة الجافة و / أو البنتونيت علي الأداء الإنتاجي للأغنام الحلابة و نتاجها

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في هذه التجربة تم دراسة مدي تأثير إضافة الخميرة الجافة (خميرة الخباز) و/أو البنتونيت لعلائق النعاج الحلابة علي إنتاج اللبن وتركيبه الكيمياني و بعض مقاييس سوائل الكرش و بلازما الدم و ميزان الازوت و معاملات الهضم بالإضافة إلي تأثيره علي أداء الحملان الرضيعة لمدة ١٠ أسابيع. تم تقسيم عدد ٢٠ نعجة رحماني حلوب أعمارها ٣ - ٤ سنة بمتوسط وزن ٤٥ كجم إلي اربعة مجموعات متشابهة علي النحو التالي : -

غذيت المجموعة الأولى علي العليقة الأساسية بدون أي إضافات اعتبرت كمجموعة مقارنة (مجموعة ١) بينما غذيت المجموعة الثانية علي العليقة الإساسية مضافا إليها الخميرة الجافة بنسبة ٠,٥ % من مخلوط العلف المركز (مجموعة ٢) و غذيت المجموعة الثالثة على العلية الاساسية مضافا اليها البنتونيت بمعدل ٤ % من مخلوط العلف المركز(مجموعة ٣)بينما غذيت المجموعة الرابعة على العليقة الاساسية مضافا اليها إليها الخميرة الجافة بنسبة ٠,٥ % و البنتونيت بمعدل ٤% من مخلوط العلف المركز(مجموعة ٤). اجريت ثلاث تجارب هضم بالطريقة المعتادة على عدد ١٢ كبش رحماني بمتوسط وزن ٤٥ كجم لتقييم العلائق و تم أخذ عينات من سائل الكرش على فترات مختلفة (قبل التغذية الصباحية و بعد ثلاثة و ست ساعات من التغذية) و تم أخذ عينات من الدم.

أوضحت التجربة النتائج التالية:-

١. إضافة الخميرة و البنتونيت إلي علائق النعاج الحلوب أدي إلي زيادة معنوية في استهلاك المادة الجافة والخشنة مع وجود زيادة معنوية مقارنة بالمجموعة المقارنة المغذاة علي عليقة بدون أي إضافات.
٢. بالاضافة الى زيادة معنوية فى معاملات الهضم و القيمة الغذائية و الكفاءة الغذائية و ميزان الازوت و ان كانت مجموعة الخميرة كانت افضل من مجموعة البنتونيت و افضلهم المجموعة الرابعة بالمقارنة بالمجموعة المقارنة
٣. أدت اضافة البنتونيت الى انخفاض تركيز نتروجين الامونيا و زيادة pH الكرش عند صفر و ٣ و ٦ ساعات بعد الاكل بينما ادت اضافة الخميرة الى انخفاض هذه القيم بالمقارنة بالمجموعة المقارنة.
٤. أدت اضافة البنتونيت. اضافة الخميرة و /أو البنتونيت أدى الى زيادة تركيز الاحماض الدهنية الطيارة زيادة معنوية بالمقارنة المجموعة المقارنة.
٥. مجموعات الحيوانات التي غذيت علي علائق مضافا إليها الخميرة و / أو البنتونيت أعطت أعلي معدلات في إنتاج اللبن مع زيادة مكوناته الكيميائية من البروتين والدهون وسكر اللبن مما كان لة تأثير على زيادة معدلات النمو لحملانها الرضيعة مقارنة بالمجموعة المقارنة مقارنة بالمجموعة المقارنة.
٦. أدت اضافة الخميرة الى ارتفاع تركيز البروتين الكلى و الجلوبيولين و الالبيومين فى بلازما الدم و ان كانت زيادة الالبيومين كانت معنوية مقارنة بالمحموعة المقارنة بينما اضافة البنتونيت لم تؤثر كثيرا على محتوى سيرم الدم من هذه المكونات.وكانت جميع هذه القيم فى جميع المجاميع فى المدى الطبيعى مما يوضح عدم تأثير هذه الاضافات على صحة الحيوان. تركيز اليوريا فى سيرم دم جميع المجاميع بما فيهم المجموعة المقارنة كانت متقاربة و ان كانت أقلهم تركيزا المجموعة المضاف اليها البنتونيت.

من هذه الدراسة نستنتج أن إضافة الخميرة بمعدل ٠,٥ % من العلف المركز و / أو البنتونيت بمعدل ٤ % من العلف المركز إلي علائق النعاج الحلوب أدى إلي زيادة استهلاكها من المادة الجافة والخشنة و تحسن معاملات الهضم للمادة الجافة و العضوية و الكفاءة الغذائية مع زيادة إنتاجها من اللبن و جودتة مما يؤثر بالايجاب علىزيادة معدل النمو اليومي لحملانها الرضيعة.