EFFECT OF ADDING YEAST CULTURE TO RATION ON THE PERFORMANCE AND SOME BLOOD PARAMETERS OF ARABI FATTENING LAMBS.

Suzan M.N. Muhamad

Department of Animal Resources, College of Agriculture, University of Salahaddin, Erbil, Iraq.

(Received 25/10/2011, Accepted 15/1/2012)

SUMMARY

Twenty four individual Arabi male lambs weighing 30.7±0.400 kg and 5 months of old were used to test the effect of additional three levels of Saccharomyces *cerevisiae* (SC): 0, 3 and 6 g SC / lamb/day to the ration on growth rate and some blood parameters. Lambs in R_1 group were fed diet with no SC and in R_2 and R_3 groups were fed on diets supplemented with 3 and 6g /lamb/day of SC, respectively. The concentrate diet was offered once daily in quantities calculated to support maintenance and 200 g daily gain while barley straw was offered *ad libitum*. The final body weights were 43.95, 45.30 and 47.46 kg for R_1, R_2 and R_3 respectively. Average daily gain was 193, 201 and 239 g/d for the same respective groups. Dietary addition of SC improved the growth rate by 13.8 and 30.2% at the levels of 3 and 6 g/lamb/d respectively over the control diet; differences however, failed to be significant. Lambs fed SC treated diets utilized their feed more efficiently than control treatment. Serum sugar (SG) concentration was significantly increased in R_2 and R_3 group ($P<0.01$). In contrast, serum urea-N (SUN) concentration was decreased ($P<0.01$) due to the addition of SC. Glutamate oxaloacetate transaminase (GOT) showed a significant differences among different experimental groups, were the control group recorded the lowest value ($P<0.05$). In conclusion, additional of SC improved live weight gain, feed conversion ratio and some blood parameters.

Keywords: *saccharomyces cerevisiae; Arabi lambs; performance.*

INTRODUCTION

Probiotic was a mixture of benefit microbes which mixed with fed of animals in order to make a benefit and healthy microbial balance in the intestine, this balance lead to improved animal productivity especially in stressed animal which face a heat stress, fed on toxic or improper diets (Yoruk *et al.*, 2006; Zinedine *et al.*, 2005). Inclusion the probiotic contain *Saccharomyces cerevisiae* in animal diets seemed to improve lambs performance (Hassan and Hassan, 2008) and increased live weight gain (Orr *et al.*, 1988.; Galyean *et al.*, 2000) and improve digestibility (El-Shaer, 2003) and enhanced feed conversion ratio. Recently Hassan and Hassan (2008, 2011) reported significantly improvement in live weight gain and feed conversion ratio was associated with lamb fed diet supplemented with local (Iraqi) probiotic containing SC as compared with control diet. This improvement was associated with highly reduction in blood urea nitrogen (BUN). In normal condition, the lactate is utilized by specific bacteria and thus the pH value is maintained at 6.0. At this pH value the cellulolytic bacteria well, derive their energy requirements and produce volatile fatty acids (VFA), which help the ruminant animal derive its energy (Bowen, 2009). Otherwise, when the lactate accumulates in the rumen, the pH value drops, suppressing the cellulolytic bacteria and this leads to accumulation of fiber in the rumen. At this points digestion of dry matter (DM) and its components would affected negatively. Incorporation of yeast into ruminant diets is thought to help decrease lactate concentration in the rumen by stimulating bacteria that ferment lactate (Rossi *et al.*, 2006). Moreover, addition of baker's yeast (SC) to ruminant diets has improved the digestibility of DM, crude protein (CP) and hemicellulose, increased rumenal bacteria numbers (Marghany *et al.*, 2005). However, little literatures are available about the effect of yeast culture on the growth performance of sheep and/or goats. Therefore, the objective of this work was to investigate the effects of feeding different SC levels on daily intake, growth rate and some blood parameters.

MATERIALS AND METHODS

This experiment was conducted to evaluate the effect of increasing levels of yeast (SC) supplementation on daily feed intake, growth rate and some blood parameters. Twenty four growing Arabi male lambs with an average body weight of 30.7± 0.4 kg live weight and 5-6 months old were used in this experiment. Animals were divided into 3 comparable groups (8 lambs each) and randomly allocated to the three rations (R_1, R_2 and R_3). The basal ration (control, R_1) contained a mixture of barley 35%; wheat bran 35%; soybean meal 12%; yellow corn 17% and 1% minerals and vitamins mixture. The chemical composition of the control ration and its ingredients are presented in Table 1. Treatments consisted of a SC-free basal ration (control, R_1); the basal ration supplemented with either 3g (R_2) or 6g (R_3) of SC/lamb/day. While barley straw was offered *ad libitum*. Yeast culture (Yea-Sacc, product of Alltech Biotechnology Center, Kentucky, USA) was included in the ration by simple mixing with concentrate diet just before the morning feeding. The concentrate diet was offered once daily at about 08.00 am in quantities calculated to support maintenance and 200 g daily gain (Al Jassim *et al.*, 1996). The diets were gradually introduced to the lambs over a period of 2 weeks before the start of experiment, during this time all animals treated for tape worms and other helminthes. Fresh water was available all the time. Live body weight (LBW) was recorded once weekly to the nearest 0.100 kg. The amount of ration offered was changed weekly according to the body weight changes and keeping SC level unchanged. The feeding trial lasted for 70 days during which live body weight was recorded every week, feed intake (concentrate and straw) was recorded daily by subtracting the refusals (if any) from the amount offered. Average daily gain (ADG) and feed efficiency conversion ratio (FCR) were calculated.

Table (1): Chemical composition of feedstuffs and concentrate diet (g/kg DM).

Chemical composition	Barley	Soybean meal	Yellow corn	Wheat brain	Barley* straw	Concentrate diet
Dry Matter g/kg (fresh)	951	945	937	914	940	925
Organic Matter (OM)	915	880	927	859	841.4	833
Total nitrogen (TN)	19	70	13	25	2.976	26
Ether extract (EE)	12	149	34	45	15	44
Crude Fiber (CF)	65	50	36	118	335	76
Nitrogen free extract (NFE)	718	244	433	610	472.8	568
Metabolizable energy ME, MJ)**	12.17	13.56	13.07	12.37	6.5	12.4

**Chemical composition according to Hassan and Hassan (2010).*

***ME (MJ/ kg DM) = 0.012 CP +0.031 EE+0.005 CF +0.014 NFE (MAFF, 1979).*

Blood samples:

Within 2 days before ending the fattening period, five ml of blood samples were collected from half of the experimental animals in each treatment (4 lambs/ treatment) by jugular vein puncture just three hours post morning feeding to determine serum sugar (SG), serum cholesterol (SCH), serum creatinine (SCR) and some of liver and kidney functions such as glutamate oxaloacetate transaminase (GOT), glutamate pyruvate transaminase (GPT) and urea-N (SUN). The blood samples were centrifuged at 4000 rpm. for 20 minutes and blood serum was separated and preserved in sterile test tube and stored at -20 C^{o} for biochemical assay. SG was determined as soon as possible after sampling serum were analyzed for SG, SCH, SCR, SUN, GOT and GPT. Means concentrations were calculated for each animal within each treatment group, SG was measured by spectrophotometrically (Spectronic Instruments, USA) utilizing standard kits (Bio-Merieux, France). The concentration of SCH was determined by using commercial kits according to Schmidt-Nielsen (1964). Creatinine was assayed according to Bartels *et al.* (1971). SUN was

measured photometrically using urea-kit S180 (France) and according to method of Coulombe and Faveran (1963). Serum GOT and GPT activities were determined by using commercial kits according to Armstrong and Carr (1964).

Chemical analysis:

Chemical analysis were conducted on the ingredients and concentrate diet for DM, ash, total nitrogen, crude fiber and ether extract analysis following A.O.A.C.(1990) procedures.

Statistical analysis:

Data of growth performance were analyzed by ANOVA for completely randomized design according to Gill (1978) using the model: $Y_{ij} = \mu + T_i + e_{ij}$; where Y_{ij} is the dependent variable, μ is the overall mean, T_i is the effect of the YSC supplementation and e_{ij} is the residual error assumed to be independently and randomly distributed. Duncan's test (1955) was used to compare the treatment means.

RESULTS AND DISCUTION

All lambs finished the experiment without any health problems. The effect of dietary addition of SC on lamb productive performance is presented in Table 2. Lambs had an average initial body weight of 30 kg ± 1.56. The final body weights were 43.95, 45.30 and 47.46 kg for R_1, R_2 and R_3 groups respectively. Average daily gain was 193, 201 and 239 g/d for the same respective groups. Dietary addition of SC improved the growth rate by 13.8% and 30.2% at the levels of 3 and 6 g/lamb/d, respectively over the control diet; differences however, failed to be significant. Since the amount of concentrate diets offered according to the live body weight requirement, In general all the lambs consumed similar amount of concentrate diet across treatments (1005, 1000 and 1016 g/lamb/d for R_1, R_2 and R_3 respectively). However, lambs fed the treated groups consumed more feed as DM, ME and CP. Manley due to the group feeding system used in the present study (R_2 and R_3) consumed more barley straw (399 and 408 g/d/h respectively) as compared with control treatment (346 g/d/h).

Table (2): Performance of Arabi lambs as affected by dietary addition of SC.

	Experimental ratios[@]		
Item	R_1 (control)	R_2	R_3
Levels of SC g/d	0	3	6
Avg. initial weight (kg)	30.43	31.21	30.68
Avg. final weight (kg)	43.95[b]	45.30[b]	47.46[a]
Growth period (day)	70	70	70
Avg. total gain (kg)	13.52[b]	14.09[b]	16.78[a]
Avg. daily gain (g)	193[b]	201[b]	239[a]
Improvement, %	-	4.15	23.83
Feed intake/lamb/day			
DM (g)	1351	1399	1424
OM (g)	1128	1168	1189
TN (g)	169.3	170.0	162.5
ME (MJ)	14.71	14.99	15.25
Efficiency of feed utilization			
g DM/g gain	6.99[b]	6.96[b]	5.96[a]
MJ ME/g gain	0.076[b]	0.075[b]	0.063[a]
g TP /g gain	0.878[b]	0.846[b]	0.721[a]

[@] R1 = Control basal diet; R1 + 3g SC/h/d= R2; R1+ 6g SC/h/d =T3

Data of feed intake and feed efficiency were not statistically analyzed. Lambs fed the SC treated diets utilized their feed more efficiently than control treatment. Such improvement in LWG, straw intake and FCR may be attributed to first, improvement in the digestibility of most nutrients (Robinson, 1997; Dawson, 1993; Harris *et al.*, 1992; Wiedmeier *et al.*, 1987; Williams *et al.*, 1991 and Wohlt *et al.*, 1991). Robinson (1997) reported that supplementation of yeast culture in the diet increased net digestion in the fore stomach, particularly of fiber leading to increase energy output. Earlier work (Chademana and Offer,

1990) found that yeast increased the initial rate of forage digestion in the rumen. Moreover, Ahmed and Salah (2002) reported that addition of yeast culture (SC) improve the digestibility of DM, CP and CF leading to an increase in the nutritive value (TDN, DCP and ME) and nitrogen balance. Secondly, the increase in digestibility, especially for CF, may have been due to an increase in the population (Newbold *et al.*, 1996 and Wiedmeier, *et al.*, 1987) and/or activity (Dawson, 1993, Erasmus *et al.*, 1992) of rumen cellulolytic bacteria. Proteolytic bacteria counts were also stimulated by yeast culture (Yoon and Stern, 1996).This will lead to higher concentration of total VFA this may have been due to the increase in the bacterial counts and activity (Newbold *et al.*, 1996; Dawson, 1993; Wiedmeier, 1987; Erasmus *et al.*, 1992 and Yoon and Stern, 1996) and the stability of the rumenal environment (Lyons, 1994). Similar trend was reported by (Taie *et al.*, 1998). Finally, the ability of different yeast preparations to stimulate the viable count of bacteria in the sheep rumen appears to correspond with their ability to remove O2 from rumen fluid (Newbold *et al.*, 1996). The amount of O_2 entering the rumen of sheep daily was calculated to be in the range of 11.5–38 liters through saliva, food and diffusion of the blood of the host animal (Newbold *et al.*,1996 and Czerkawski,1969). Oxygen is known to be toxic to anaerobic bacteria and it inhibits the growth of rumen bacteria in pure culture studies (Loesche, 1969; Marounek and Wallace, 1984) and the adhesion of cellulolytic rumen bacteria to cellulose (Roger *et al.*, 1990). The presence of respiring yeast, therefore, would be predicted to be beneficial to the rumen microorganisms. Statistical analysis revealed that neither BTG nor BCH were significantly affected by addition of SC, Similar finding was obtained by Milewski and Sobiech (2009). It was noted that the reserve fat in high producing ruminant was mobilized to compensate the negative energy balance which was often observed leading to a temporary rise in BTG (El-Sherif and Assad, 2001). Since, BTG concentration was not affected in a current study due to addition of SC; there was probably a supported influence for yeast on energy metabolism (Milewski and Sobiech, 2009). Suskovic *et al.*, (2001) indicated that inclusion probiotics in ruminant diets reduced blood concentration of BCH; however, the mechanisms are still unknown.

To clarify the mode of action of SC in the present study, serum biochemical parameters was evaluated as concentrations of SG, SUN, SC, SCR, GPT and GOT (Table 3). Table (3) clarified that SG concentration was significantly ($P<0.01$) increased due to addition of *SC*. R_3 group recorded the highest ($P<0.01$) SG concentration in comparison with the other treatments. While, the control group (R1) recorded the lowest ($P<0.01$) SG concentration in comparison with the other treatments.

Table (3): Blood parameters of Arabia lambs as affected by dietary addition of SC

Item	Experimental ratios		
	R_1 Control	R_2	R_3
Levels of SC g/d	0	3	6
Serum glucose (mg /dl)	80.9 [b]	93.5 [a]	101.8[a]
Serum urea -N (mg /dl)	27.1 [a]	22. 8 [b]	21.9 [b]
Serum cholesterol (mg /dl)	58.4 [b]	76.4 [a]	82.4 [a]
Serum creatin (mg /dl)	0.62 [b]	0.71 [b]	0.90 [a]
GOT (IU/dl)	29.5 [b]	71.4 [a]	78.0 [a]
GPT (IU/dl)	12.0 [b]	13.0 [a]	10.5 [a]

[a and b] *Means within rows with different superscripts are significantly different (P<0.05)*

Similar result was observed by Milewski and Sobiech (2009). These increases can be simply explained by the propionogenesis process that proved to be improved by yeast inclusion (Erasmus *et al.*, 1992; Lesmeister *et al.*, 2004 and Kawas *et al.*, 2007). Propionic acid is the main substrate for glucose synthesis in ruminants (El-Ashry *et al.*, 1988). However, Jouany *et al.* (2000) reported that yeast metabolize the glucose and small oligosaccharides produced by amylolytic bacteria that adhere to starch grains and, as a consequence, less glucose is available for fermentative bacteria the growth of which is then decreased. Saccharomyces cerevisiae cells can consume as much as 4g glucose per hr. per g DM. In contrast, SUN concentration was decreased ($P<0.01$) due to addition of SC. However, differences between R2 and R3 group were not statistically significant. The urea-N level ranged from 21 to 27 mg/dl. Rakha (1985) reported that the normal urea-N level in sheep and goats was ranged from 8 to 40 mg/dl. Changes in serum urea would reflect changes in criminal ammonia-N concentration (Fouda, 2008). This decrease might be consistent with the decrease in rumenal NH_3-N due to the same reason that confirmed by many other studies (El-Ghani, 2004; Khadem *et al.*, 2007 and Lascano and Heinrichs, 2009). Since, a

decrease in rumenal NH_3-N can be attributed to the increase of its utilization by rumen microbes (Chaucheyras-Durand and Fonty, 2001), then a decrease in SUN which is a real useful indicator for CP status and N metabolism, can be explained by the same explanation as in a decrease in rumenal NH_3-N, because the SUN concentration was closely related to the rumenal NH_3-N evolutions (Valkeners *et al.*, 2008). It is very likely that large amounts of NH_3 were lost from the rumen fluid by absorption through the rumen epithelium and transferred by portal blood to the liver to produce urea. Physiologically, Milewski and Sobiech (2009) suggested that yeast supplementation had a protective effect on renal function as evidence from a decrease in SUN and creatinine concentrations. Moreover, Dobicki *et al.*, (2005) observed a significant decrease in the activity of liver enzymes in cows fed supplemental dried yeast, which indicated an improvement in the physiological condition of the liver and an increase in hepatic metabolic reserve. Serum cholesterol, Serum creatin and GOT were significantly increased ($P<0.01$) due to addition of SC. R_3 group recorded the highest ($P<0.01$) SCH, SCR and GOT concentration in comparison with the other. While, the control group (R_1) recorded the Lowest ($P<0.01$) SCH, SCR and GOT concentration respectively in comparison with the other treatments. Cholesterol values obtained in the present study were within the normal ranges obtained by Hassan and Hassan (2009) and Hassan et al. (2010) using Awassi and Karadi lambs. It appears that GOT and GPT assessed in blood serum, as indicators of liver function. GOT showed a significant differences among different experimental groups on contrast, the control groups recorded the lowest ($P<0.05$) GOT value. In general, the values recorded for GOT and GPT are within the normal range reported by Mohamed and Abou-Zeina (2008) in goats' kids. Abd-El-Kareem (1990) and Fouda (2008) found values ranged from 24 to 65 and 14 to 37 IU/L for GOT and GPT, respectively, in goats and sheep.

REFERENCES

Abd El-Kareem, F. A. (1990). Improvement the Utilization of Roughage by Goats. Ph. D. Thesis, Fac. Agric. Cairo Univ. Egypt.

Ahmed, B.M. and M. S. Salah (2002). Effect of yeast culture as an additive to sheep feed on performance, digestibility, nitrogen balance and rumen fermentation. J. King Saud Univ., Vol. 14, Agric. Sci. (1): 1-13,

Al Jassim, R.A.M., S.A. Hassan and A.N. Al-Ani (1996). Metabolizable energy requirements for maintenance and growth of Awassi lambs. Small Ruminant Res. 20: 239-245.

A.O.A.C. (1990).Official Methods of Analysis. 15th edn. Association of Official Analytical Chemists, Arlington, Virginia.

Armstrong, W. D. and C.W. Carr (1964). Physiological chemistry: Laboratory Direction. 3rd edn. Burges Publishing Co. Minneapolis, Minnesota. USA.

Bartels, H. (1971). Colorimetric determination creatinine. Clin. Chem. Acta. 32: 81.

Bowen, R. (2009). Nutrient absorption and utilization in ruminants. In Rumen Physiology and Rumination. rbowen@colostate.edu.

Chademana, I. and N.W. Offer (1990). The effect of dietary inclusion of yeast culture on digestion in the sheep. Anim. Prod., 50: 483-489.

Chaucheyras-Durand, F., and G. Fonty (2001). Establishment of cellulolytic bacteria and development of fermentative activities in the rumen of gnotobiotically-reared lambs receiving the microbial additive Saccharomyces cerevisiae CNCM I-1077. Reprod. Nutr. Dev. 41: 57–68.

Coulombe, J. J. and L. Faveran (1963). A new semi-micro method for colorimetric determination of urea. Clin. Chem., 9: 102.

Czerkawski, J. W. (1969). Methane production in ruminants and its significance. World Rev.of Nut. and diet. 11: 240-282.

Dawson, K. A. (1993). Current and Future Role of Yeast Culture in Animal Production: a Review of Research over the last Seven Years. Biotech. in Feed Indust., T. P. Lyons, edn. Alltech Tech. Publ. Nicholasville, KY. 269-280.

Dobicki, A., J. Preś, W. Luzak and A. Szyrner (2005). Influence of dried brewery's yeast on body weight gains, physiological and biological indicators of blood and development of rumen microorganisms in calves. Medycyna Wet, 61, 946-949.

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

El-Ashry, M.A., H.A. El-Alamy, O.A. Salem and A.M. Kholif (1988). Rumen parameters of lactating goats as affected by different concentrate: roughage ratios. Annals Agric. Sci., Moshtohor, 26: 217 - 232.

El-Ghani, A.A. (2004). Influence of diet supplementation with yeast culture (Saccharomyces cerevisiae) on performance of Zaraibi goats. Small Ruminant Res., 52: 223-229.

El-Shaer, E.K.H. (2003). Nutritional Studies in Ruminants (Effect of Yeast Culture Supplementation and Concentrate: Roughage Ratio on Performance of Growing Lambs). Ph.D.Thesis Faculty of Agriculture, Mansoura University. Egypt.

El-Sherif, M.M.A. and F. Assad (2001). Changes in some blood constituents of Barki ewes during pregnancy and lactation under semiarid conditions. Small Ruminant Res. 40: 269-277.

Erasmus, L.J., Botha, P.M. and A Kistner (1992). Effect of Yeast Culture Supplement in Production, Rumen Fermentation and Duodenal Ritrogen Flow in Dairy Cows. J. of Dairy Sci., 75, 203-217.

Galyean, M.L., G.A. Nunnery., P.J. Defoor., G.B. Salyer and C.H. Parson (2000). Effect of live culture of Lactobacillus acidophilus (strain 145 and 51) and propionibacterium Frendenreichii PF-24 on performance and carcass characteristics of finishing beef steers. Burnett center progress report No (8):3056-3061.

Gill, J.L. (1978). Design and Analysis of Experiments in the Animal and Medical Sciences. Ames. Iowa, USA: The Iowa State Univ. Press. 1.2: 287-303.

Harris, B. Jr., D.E. Dorminey, W.A. Smith, H.H. Van Horn and C.J. Wilcox (1992). Effect of feather meal at two protein concentrations and yeast culture on production parameters in lactating dairy cows. J. of Dairy Sci., 75: 3525-3530.

Hassan, S.A. and K.M. Hassan (2009).The effect of supplementation of medicinal plants and probiotic on growth rate and some blood parameters of karadi lambs. Egyptian J. Nutrition and Feeds, 12 (1): 53-63.

Hassan, S.A. and K.M. Hassan (2010). The effect of supplementation of medicinal plants and probiotic agent on growth rate and some blood components of Karadi lambs. Egyptian J. Applied Sciences 25 (8A): 408-419.

Hassan, S.A., and K.M. Hassan (2008). The effect of supplementation of medicinal plants and probiotic on growth rate and some blood parameters of Karadi lambs. Egyp. J. Nutr. and Feeds (accepted).

Hassan, S.A., and K.M. Hassan (2011). Response of Karadi lambs to the rosemary officinal supplementation fed with either alkali treated or untreated barley straw basal diets. Egyp. J. Nutr. and Feeds (accepted).

Hassan, S.A., K.M. Hassan and A. Al-Rubeii (2010). Carcass characteristics of Karadi lambs as affect by different levels of dietary supplement of rumen degradable nitrogen fed with *Nigella sativa*. Afri. J. Biotech. 9 (27): 4295-4299.

Jouany, J.P. (2000). Twenty years of research into yeast culture, now a standard in ruminant diets around the world. Proceedings from Alltech's 15th Annual European, Middle Eastern and African Lecture Tour. p. 44-52.

Kawas, J.R., R. Garcia-Castillo, F. Garza-Cazares, H. Fimbres-Durazo, E. Olivares-Saenz, G. Hernandez-Vidal and C.D. Lu (2007). Effects of sodium bicarbonate and yeast on productive performance and carcass characteristics of light-weight lambs fed finishing diets. Small Rumin. Res. 67: 157-163.

Khadem, A.A., M. Pahlavan, A. Afzalzadeh and M. Rezaeian (2007). Effects of live yeast Saccharomyces cerevisiae on fermentation parameters and microbial populations of rumen, total tract digestibility of diet nutrients and on the in situ degradability of alfalfa hay in Iranian chall sheep. Pak. J. Biol. Sci., 10: 590-597.

Lascano, G.J., and A.J. Heinrichs (2009). Rumen fermentation pattern of dairy heifers fed restricted amounts of low, medium, and high concentrate diets without and with yeast culture. Livest. Sci. 124:48–57.

Lesmeister, K.E., A.J. Heinrichs and M.T. Gabler (2004). Effect of supplemental yeast (Saccharomyces cerevisiae) culture on rumen development, growth characteristics, and blood parameters in neonatal dairy calves. J. Dairy Sci., 87: 1832–1839.

Loesche, W.J. (1969). Oxygen Sensitivity of Various Anaerobic Bacteria. Appl. Micobiol., 18: 723-727.

Lyons, T.P. (1994). Biotechnology in the Feed Industry and Beyond: A Panorama of Techniques, Processes and Products to Address Animal Production Problems Today and Tomorrow. In: Biotech. In Feed Indust., Proc. of Alltech's Tenth Annual Symp. Nottingham, England: Nottingham University Press.

MAFF (1979). Energy allowance and feeding system for ruminants. Ministry of Agriculture, Fisheries and Food Department of Agriculture and Fisheries for Scotland. Technical Bulletin 33.

Marghany, M., M.A. Sarhan, A. Abd El-Hey and A.A.H. El-Tahan (2005). Performance of lactating buffaloes fed rations supplemented with different levels of baker's yeast (Saccharomyces cerevisiae) Egyptian J. Nutrition and Feeds. (Special Issue), 8: 21.

Marounek, M. and R.J. Wallace (1984). Influence of Culture on the growth and metabolism of the rumen bacteria *Selenomonas* ruminantium, *Bacteroides amylophilus*, *Bacteroides succinogenes* and *Streptococcus bovis* in Batch Culture. J. General Microbiol., 130: 223-229.

Milewski, S. and P. Sobiech (2009). Effect of dietary supplementation with Saccharomyces cerevisiae dried yeast on milk yield, blood biochemical and hematological in ewes. Bull Vet Inst Pulawy 53: 753-758.

Mohamed, M.I. and A.A. Abou-Zina Hala (2008). Effect of dietary supplementation with biologically treated sugar beet pulp on performance and organs function in goat kids.American-Eurasian. J. Agric. & Environ. Sci., 4 (4): 410-416.

Newbold, C.J., Wallace, R.J. and F.M. McIntosh (1996). Mode of Action of the Yeast *Saccharomyces cerevisiae* as Feed Additive for Ruminants. Br. J. Nut., 76, 249-261.

Orr, C., D.R. Ware., E.T. Manfredi and D.P. Hutheson (1988). The effectof continuous feeding of Lactobacillius acidophilus strain BT 1386 on gain and feed efficiency of feeder calves. J. Anim. Sci. 66 (supp. 1): 460-461. (Abst.).

Rakha, G. M. (1985). Effect of Concentrate Deprivation on Animal Health and Production. M.Sc. Thesis, Fac. of Vet. Medicine, Cairo Univ. Egypt.

Robinson, P.H. (1997). Effect of yeast culture (*Saccharomyces cerevisiae*) on adaptation of cows to diets postpartum. J. Dairy Sci., 80: 1119-1125.

Roger, V., Fonty, G., Komisarczuk-Bony, S. and P. Gouet (1990). Effects of physicochemical factors on the adhesion to cellulose avicel of the rumen bacteria *Ruminicoccus flavefaciens* and *Fibrobacter succinogenes subsp.* succinogenes. Appl. Environ. Microbiol., 56: 3081-3087.

Rossi, C.A., V. Sgoifo, A.L. Dell-Orto, E.C. Bassini and G. Savoini (2006). Effects of live yeast in beef cattle studied. Feedstuffs. 16: 11.

Schmidt-Nielsen (1964). The Camel. (Cited from Desert Animals: physiological problems of heat and water. Oxford. Clerendon press. Smith, L. W.; C. C. Calvert and H. R. Cross. 1979. Dehydrated poultry excreta vs. cottonseed meal as a nitrogen supplements for Holstein steers. J. Anim. Sci. 48:633.

Suskovic, J., K. Blazenka, G. Jadranka, and M. Srecko (2001). Role of lactic acid bacteria and *Bifidobacterium* in symbiotic effect. Food Technol. Bioteclunol., 39:227-235.

Taie, H.T., Abdel-Rahman, M.M., Ahmed, B.M. and H.A. Shereen (1998). Effect of dietary energy on digestibility, rumen fermentation, digestion kinetics, performance and carcass traits of sheep. Proc. of Internat. Conf. in Anim. Prod. and Health in Semi-Arid Areas. Al-Arish, Egypt, 1-3 Sept. (1998) 351-365.

Valkeners, D., A. Théwis, M. Van Laere and Y. Beckers (2008). Effect of rumen-degradable protein balance deficit on voluntary intake, microbial protein synthesis, and nitrogen metabolism in growing double-muscled Belgian Blue bulls fed corn silage-based diet J. Anim. Sci.86:680-690.

Wiedmeier, R.D., M.J. Arambel and J.L Walters (1987). Effect of yeast culture and *Aspergillus oryzae* fermentation extract on rumenal characteristics and digestibility. J. of Dairy Sci., 70 (1987), 2063-2072.

Williams, P.E., C.A.G. Tait, G.M. Innes and C.J. Newbold (1991). Effects of the inclusion of yeast culture (*Saccharomyces cerevisiae* 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, 3016-3022.

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., 74, 1395-1402.

Yoon, I.K. and M.D. Stern (1996). Effects of *Saccharomyces cerevisiae* and *Aspergillus oryzae* cultures on rumenal fermentation in dairy cows. J. Dairy Sci., 79, 411-417.

Yörük, M.A., T. Aksu, M. Gül and D. Bolat (2006). The Effect of soybean meal treated with formaldehyde on amount of protected protein in the rumen and absorption of amino acid from small intestines. Turk. J. Vet. Anim. Sci., 30: 457-463.

Zinedine, A., M. Faid and M. Benlemlith (2005). *In vitro* reduction of aflatoxin B1 by strains of lactic acid bacteria isolated from sourdough bread. International J. Agric. and Biol. 7: 67-70.

تأثير اضافة خميرة الخبز *SACCHAROMYCES CEREVISIAE* الى علائق حملان التسمين العرابية على كفاءة التحويل الغذائي وبعض متغيرات الدم.

سوزان محمد نور محمد

قسم الثروة الحيوانية - كلية الزراعة - جامعة صلاح الدين – اربيل - العراق.

تم استخدام 24 حملاً عرابياً ذكرا بمعدل وزن 30.7 ± 0.400 كغم وعمر 5 أشهر لمعرفة تأثير إضافة ثلاثة مستويات من خميرة الخبز *Saccharomyces cerevisiae* 0، 3، 6 غم \حمل \يوم الى علائق تسمين الحملان العرابية على النمو وبعض متغيرات الدم. قسمت الحملان إلى ثلاثة مجاميع R_1 (0 خميرة خبز) ، R_2 (3 و 6 غم \حمل\يوم خميرة خبز) ، R_3. قدمت العليقة المركزة مرة واحدة يومياً وفق كميات محسوبة لتوفير احتياجات الادامة و200 غم زيادة وزنية يومية مع تقديم تبن الشعير بشكل حر لكل حيوان. متوسط الأوزان النهائية للحملان كانت 43.95، 45.30 و 47.46 كغم للمجاميع R_1 و R_2 و R_3 على التوالي، بينما كان معدل الزيادة الوزنية اليومية 193، 201 و 239 غم\يوم للمجاميع السابقة على التوالي.

اتضح أن إضافة الخميرة أدى الى تحسن غير معنوي في نسبة النمو حيث بلغت 13.8 و 30.2% للمجاميع R_2 ، R_3 مقارنة مع مجموعة المقارنة.

ازداد تركيز جلوكوز الدم معنوياً ($P<0.01$) في المجموعة R_2 وR_3 رافقه انخفاض عالي المعنوية في تركيز يوريا الدم.

تركيز انزيم Glutamate oxaloacetate transaminase (GOT) أظهر انخفاض معنوي ($P<0.05$) في مجموعة المقارنة R_1 مقارنة مع المجاميع الاخرى.

تم الاستنتاج من نتائج البحث ان إضافة خميرة الخبز أدت الى تحسّن في الزيادة الوزمية ، كفاءة التحويل الغذائي و بعض متغيرات الدم.