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EFFECT OF DIFFERENT LEVELS SUPPLEMENTATION OF DRY BREAD YEAST IN AWASSI EWES RATIONS ON MILK PRODUCTION AND ITS COMPONENTS

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Abstract

This study was conducted by using 32 Awassi ewes were randomly divided into four groups, with average body weight 61.66 kg to study the effect of using dry bread yeast on milk production and its composition in Awassi ewes. All groups were fed rations consist of mainly of barley, wheat bran and soybean meal. The groups have different levels of dry bread yeast (0, 0.3, 0.6, 0.9)% from rations to treatments 1,2,3 and 4 respectively. Each ewe in groups received 1.5 kg/ dry matter. Results showed a significant increase in milk production ($P<0.05$) in T2, T3 and T4 compared with T1 (470, 541, 573, 599 gm/day).Rumen liquor pH, ammonia and microorganism concentration before feeding were not affected, while after 2 hours of feeding, pH value of rumen liquor increased significantly ($P<0.05$) in T2, T3 and T4. The results of this study showed an improvement in milk production by adding dry bread yeast.

***Keywords*:** Milk production, dry bread yeast, sheep.

Introduction

Dry yeast (*Saccharomyces cerevisiae*) was used in ruminant diets for the first time to stimulating growth by Eckles and William (1925).Then it became widely used in diets during the 1940s and 1950s. In recent years, there has been a noticeable trend for nutrition researchers to use many types of additives to rations in order to improve the efficiency of food utilization to meet production requirements and reduce its costs. Several studies conducted on this topic that dealt with the use of *Saccharomyces cerevisiae* in feed ingredients indicated an improvement in production (milk or meat). Improvement varies according to the type feeding (concentrated or roughages). These studies have shown that improvement in production by adding yeast is the result of an improvement in rumen conditions through changes in rumen fermentation and its products (Stanislaw and Sobiech, 2009 and Sylwia *et al.,* 2009). Several studies have indicated that adding dry bread yeast (*Saccharomyces cerevisiae*) to ruminant diets has improved rumen conditions (Roa *et al.,* 1997) by maintaining a low pH level of rumen as well as improving anaerobic conditions by consuming oxygen and a suitable subtracting a second gas. Carbon oxide and thus a positive reflection on milk production and fat (Stanislaw and Sobiech, 2009). Yeasts are also considered a vital enhancement used in diets of agricultural animals as they activate beneficial bacteria and inhibit harmful bacteria (Sylwia *et al.*, 2009) Also working to withdraw ammonia. This experiment was designed to study the effects of adding dry bread yeast in rumen conditions and its reflection on milk production and its components in Awassi ewes.

Materials and Methods

Thirty-two Awassi ewes were used in the third season for milk production, after 12 weeks of lambing, the animals were divided into four groups with an average weight of 61.66 kg. was taken into consideration that the rate of milk production in the four groups is approximately equal to 420 g for each ewe daily. Performing statistical analysis of primary animal weights and milk production rate to ensure that there are no significant differences between the treatments. The ewes were placed inside a large semi-exposed hall, and divided into four pens 4 x 4 m in size, equipped with a trough and a pot for drinking water. Groups animals were fed on four diets consisting mainly of barley, wheat bran, soybean meal, and wheat straw, and they contained 0, 0.3, 0.6, and 0.9% dry bread yeast (Saccharomyces cerevisiae) of diets for 1st, 2nd, 3rd and 4th treatment respectively, shown in Table 1, and the percentage of dry, organic matter, crude protein and ether extract was calculated in laboratory determined as stated in AOAC (2002). The quantities of feed intake were determined as 1.5 kg dry mater/animal/day and included in the nutritional decisions according to NRC (1985) at 8 am and at hour 3 pm with clean water for the duration of the trial.

Table 1 : The formulation and chemical composition of whole ration.

Components%	T1	T2	T3	T4
Barley	63	63	63	63
Wheat bran	25.25	25.23	25.19	25.13
Soybean meal	5	5	5	5
wheat straw	5	5	5	5
yeast	0	0,3	0,6	0,9
Urea	0.75	0.75	0.75	0.75
Salt+limestone	1	1	1	1
Chemical composition of the diet%				
Dry matter*	91.85			
Organic matter*	92.74			
Crude fiber*	8.45			
Ether extract*	2.78			
Crude protein*	14.88			
Metabolizabl Energy Mcal/kg of DM**	2.584			

*Estimated composition according to (Atlas *et al*., 1995). ** Calculated on a dry matter basis according NRC, 1985).

The study lasted for 50 days after the adaptation period of 10 days, during which samples of milk (20%of milk production) were taken every 10 days after the lactation of ewes (twice daily) for chemical analysis by device (JulieZ7, Milk Analyzer) European origin. Blood samples were drawn at 30th day of experiment after three hours of feeding by used medical syringe 10 cm^3 capacity from the jugular vein according to Jain et al (1987) where blood pH was measured using a pH meter (Doumas and Biggs, 1972), samples placed in test tube with a capacity of 12 cm^3, then serum blood separated by using a centrifuge at 4000 rpm for 10 minutes, after which the filtrate was separated and kept in 10 cm^3 plastic tubes and kept in the freezer at -20°C until the blood tests are performed, total protein concentration, glucose, cholesterol, triglycerides and urea in the blood serum were estimated using several ready-made analysis manufactured by the French company (Merieux) by spectrophotometer (Auto-analyzer, RA-1000, UK) according Burtis and Ashwood (1999). Rumen liquid samples was collected before feeding in the morning and two hours feeding using the Suction Pump device through the mouth and then into the esophagus and then to the rumen to withdraw the rumen liquid in a volume of 200ml (Baily and Scott, 1998) to measure the pH of the rumen liquid directly using the pH meter, afterwards rumen liquid samples was filtered by using a medical gauze and preserved until the analysis was carried out as mentioned by Shamoon (1983). Rumen liquid ammonia was estimated by Legleiter *et al*. (2005) according to Broderick and Kang (1980). The numbers of bacteria and protozoa were estimated using the Breed method according Atlas *et al*. (1995), and the numbers indicated the logarithm of their real numbers. Statistical analysis of experiment data was performed using a complete randomized design (CRD) to analyze the variance of data rates between coefficients for a one-way experiment as stated in Daoud and others (1990) according to the following mathematical model:

$$Yij = \mu + Ti + E\,ij$$

Yij = watch value j in diary i.

μ = the overall average.

Ti = effect of the treatment (diet) i.

Eij = Test error for test modules.

The averages were compared using the computer using the SAS program (2000). Duncan's multiple-range test was also performed to test the significance of the differences between the averages (Duncan 1955)

Results and Discussion

The results in Table (2) did not indicate significant differences between treatments in rate of ewes weights at the end of the experiment ranged between 60.91-62.99 kg, while a significant improvement was observed ($p < 0.05$) between the treatments in daily milk yield in favor of the second, third and fourth treatment compared to the control were 470, 541, 573 and 599g/day/ewe respectively. Results showed no significant effect between the four treatments under the percentages of milk fat were 6,24, 6,12, 6,33 and 6,31%, milk lactose 5.37, 5.48, 5.61 and 5.55%, milk protein 3.42, 3.87, 3.45 and 3.97% and total solids 10.49, 10.32, 10.19 and 10.31% respectively. Perhaps the improvement in milk yield in treatments was due to dry bread yeast which may have led to an improvement in the digestibility factor of food compounds as well as an increase in the efficiency of protein exploitation and energy provided in diets, moreover the yeast is a source of vitamin B which is positively associated with milk production as noted in previous studies increasing the amount of bypass microbial protein to the intestine by adding yeast (Stanislaw and Sobiech, 2009 and Sylwia *et al.*, 2009). Fuentes *et al.* 2009, Russell and Bernard *et al.* 2008, Haddad and Goussous (2005) also reported that a drop in pH to under 5.7 leads to a decrease in production, and this decrease will lead to an increase in the activity of microorganisms that produce propionic acid and the latter has a major role in the decrease in milk production and the percentage of fat in it, while one of the most important activities of dry yeast is to exploit the acids produced inside the rumen and thus maintain the pH of the rumen liquid from the decrease, and this is what was observed in the values of the acidity of the rumen for the first treatment as shown in Table (3).

Table 2 : Effect of using dry bread yeast on milk secretion and composition in Awassi ewes.

Item	T1	T2	T3	T4
Initial BW, kg	62.75±5.9	60.72±7.6	61.48±5.3	61.71±8.2
Final BW, kg	62.99±7.1	60.91±6.9	61.33±5.8	61.92±7.5
Milk yield, g/d	470± 15.2 B	541±21.3 A	573±23.1A	599±13.4 A
Lactose%	5.37±0.43	5.48±0.64	5.61±0.23	5.55±0.42
Fat%	6.24± 0.29	6.12± 0.41	6.33±0.35	6.31±0.23
Protein%	3.42±0.31	3.87±0.17	3.45±0.28	3.97±0.27
Solids-not-fat%	10.49±0.21	10.32±0.32	10.19±0.29	10.31±0.27

Horizontally different character Indicates to significant differences ($P<0.05$).

Results revealed that no significant differences in rumen liquid pH before feeding between treatments (Table 3) were 6.62, 6.79, 6.78 and 6.82, after 2hr of feeding was 5.69 and 6.47 And 6.57 and 6.79 and significantly differences ($p < 0.05$) in favor of dry bread yeast addition factors compared to the control treatment. Table (3) indicates that no significant differences in ammonia concentrations of rumen liquid before feeding were 8.21, 8.42, 8.48, and 8.62 mg/100 ml, and after 2hr of feeding was 13.56, 14.87, 14.51 and 14.92 mg/100 ml. Results showed no significant effect between the four treatments in the numbers of bacteria before feeding, as it reached logarithm of numbers 9.132, 9.254, 9.312 and 9.297 / ml rumen liquid, while the significant differences ($p<0.05$) in the numbers of bacteria appeared after 2hr of feeding as logarithm numbers reached 11.321, 11.841, 11.849 and 11853 / ml rumen liquid excel addition treatments respectively.

Table 3 : Effect of using dry bread yeast in some of rumen characteristics before feeding and two hours after feeding.

	Before feeding				After feeding			
	T_1	T_2	T_3	T4	T_1	T_2	T_3	T4
pH	6.62±0.21	6.79±0.28	6.78±0.27	6.82±0.31	5.69±0.14 B	6.47±0.17A	6.57±0.13 A	6.79±0.19A
Ammonia mg/100 ml	8.21±3.1	8.42±2.7	8.48±1.2	14.92±4.6	13.56±4.8	14.87±3.7	14.51±3.3	14.92±4.6
Log number of bacteria/ml	9.132±0.1	9.254±0.1	9.312±0.1	9.297±0.1	11.321±0.1 B	11.841±0.1 A	11.849±0.1A	11.853±0.1 A
Log number of protozoa/ml	6.245±0.11	6.321±0.12	6,411±0.13	6.491±0.12	6.531±0.12B	6.946±0.14 A	6.967±0.13 A	6.962±0.13 A

Horizontally different character Indicates to significant differences (P<0.05).

These differences came in line with concentration of ammonia in rumen which may confirm improvement in rumen conditions with appropriate rumen pH for the activity of microorganisms (Attar 1981) and thus a positive reflection in numbers (Marden *et al.,* 2008 and Fuentes *et al.,* 2009). The results did not indicate differences significant in numbers of protozoa before feeding that logarithm numbers reached 6,245, 6.321, 6.411 and 6.491/ml rumen liquid, while the first treatment decreased significantly (p<0.05) from the treatments in the logarithm of the protozoa numbers after 2hr of feeding were 6.531, 6.946, 6.967 and 6.962/rumen liquid, respectively.

Table 4 : Effect of using dry bread yeast in some blood measurements.

Item	T1	T2	T3	T4
Blood pH	7.16± 0.17	7.18±0.19	7.19±0,22	7.23±0.17
Glucose mg/100 ml	85.95±2.98	85.64±2.47	87.47±7,35	88.89±8.47
Triglycerides mg/100 ml	80.22±6.69	82.25±6.72	84.58±9.64	85.17±8.37
Cholesterol mg/100ml	125.47±9.34	126.88±8.93	128.57±8.29	132.82±7.37
Total protein g/100ml	7.13 ± 2.01	7.27 ± 2.12	7.57 ± 2.94	7.37 ± 1.32
Albumin g/100 ml	4.34±0.47	4.65±0.45	4.87±0.34	4.48±0.95
Globulin g/100 ml	2.84±0.17	2.89±0.18	2.81±0.11	2.91±0.19
Urea mg/100 ml	33.54±5.25	34.85±7.42	36.99± 5.97	38.89±7.21
ALT IU/L	18.14±2.98	16.62±4.82	17.31±3.72	16.94±3.84
AST IU/L	17.24±3.82	16.97±1.97	16.22±3.87	14.67±2.82

Horizontally different character Indicates to significant differences (P<0.05).

(Galin, 2006). Table (4) shown addition of dry bread yeast has not significant effect in blood measurements pH were 7.16, 7.18, 7.19 and 7.23 and it was within the normal range of the pH of blood maintain it from change by balancing acid and base ions (Mohiuddin and Yusef, 1987). Concentration of blood glucose was not affected were 85.95, 85.64, 87.47 and 88.89mg/100ml blood, triglycerides 80.22, 82.25, 84.58 and 85.17 mg/100ml blood, cholesterol 125.47, 126.88, 128.57 and 132.82 mg / 100 ml blood, total protein 7.13, 7.27, 7.57 and 7.37g/100ml blood, albumin 4.34, 4.65, 4.87 and 4.48g/100ml blood, globulin 2.84, 2.89, 2.81, and 2.91g/100 ml blood, urea 33.54, 34.85, 36.99, 38.89 mg/100ml blood, ALT enzyme concentration was 18.14, 16.62, 17.31, 16.94, and AST 16.22, 16.97, 17.24 and 14.67 IU/L, respectively. Although the differences were not significant, we note that there are computational differences in favor of the coefficients in which the dry bread yeast was added, including the total protein concentration of blood, and perhaps this increase was due to an improvement The conditions of rumen using yeast, which reflected positively on the growth of microorganisms inside the rumen, which in turn will pass into the small intestine to be enzymatically digested (Yassin, 2014 and Shiriyan *et al.*, 2011), same applies to concentration of triglycerides and cholesterol in blood, as it was observed that there were mathematical differences in favor of second and third treatments. From results of this study, it is clear use dry bread yeast in Awassi ewe diets has a clear effect on improving milk production.

References

Association of official analytic chemists (A.O.A.C.) (2002). Official methods of analysis 13th. Ed., Washington, DC.

Al-Attar, A.A.K. (1981). Physiological digestion and ruminant nutrition. Part one, College of Agriculture, University of Basra.

Atlas, R.M.; Parks, L.C. and Brown, A.E. (1995). Laboratory Manual of Experimental Microbiology. Mosby-Year Book, Tnc., Missouri.

Baily, W.R. and Scott, E.G. (1998). Diagnostics Microbiology.9th Ed. Mosby, Saint Louis.

Bernard, L.; Leroux, C. and Chiliard, Y. (2008). Expression and nutritional regulation of lipogenic in the ruminant lactating mammary gland. Adv. Exp., Med. Biol., 606: 67-108.

Broderick, G.A. and Kang, J.H. (1980). Automated simultaneous determination of ammonia and amino acids in ruminal fluid and in vitro media. J. Diary Sci., 33: 64-75.

Burits, C.A. and Ashwood, E.R. (1999). "A Textbook of clinical chemistry", 3rd edition. W. B. Saunders: 826-835.

Dawood, K.M. and Elias, Z.A. (1990). Statistical methods for agricultural research, Dar Al-Kutub for printing and publishing, University of Mosul, Ministry of Higher Education and Scientific Research, Republic of Iraq.

Duncan, C.B. (1955). Multiple rang and Multiple "F" test. Biometric, 11: 1-12.

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

Eckles, C.H. and Williams, V.M. (1925). Yeast as a supplementary feed for lactating caw. Journal of Dairy. Science, 8: 89.

Fuentes, M.C.; Calsamiglia, S.; Cardozo, P.W. and Vlaeminck, B. (2009). Effect of pH and level of concentration in the diet on the production of biohydrogenation intermediates in a dual-flow continuous culture. J. Dairy Sci., 92: 4456-4466.

Galin, N. (2006). Effects of dietary *Saccharomyces cerevisiae* live yeast culture supplementation on ruminal digestion and protozoa count in rams fed with low or high ratio forage/concentrate. Review Med.Vet., 157(12): 609- 613.

Haddad, S.G. and Goussous, S.N. (2005). Effect of yeast culture supplementation on nutrient intake, digestibility and growth performance of Awassi lambs. Animal feed science and technology 118: 343-348.

Jain, S.C.; Louhuja, N.K. and Kapoor, A. (1987). (*Trigonella foenum graecum* Linn) hypoglycemic agent. Indian J. Pharm. Sci., 49: 113-114.

Khawaja, A.K.; Al-Bayati, I.A. and Matthew, S.A.A. (1978). Chemical Composition and Nutritional Value of Feed Materials Iraqi Ministry of Agriculture and Agrarian Reform, the General Directorate of Livestock.

Legleiter, L.R.; Mueller, A.M. and Kerley, M.S. (2005). Level of supplemental protein dose not influence the ruminally undegradable protein value. J. Anim. Sci., 83: 863-870.

Marden, J.P.; Julien, C.; Monteils, V.; Auclair, E.; Moncoulon, R. and Bayourthe, C. (2008). How does live yeast differ from sodium bicarbonate to stabilize ruminal pH in high-yielding dairy cows. J. Dairy Sci. 91: 3528-3535.

Mohiuddin, K. and Yusef, W.H. (1987). Veterinary Physiology, Ministry of Higher Education and Scientific Research, University of Mosul.

National Research Council (N.R.C.) (1985). Nutrient sheep 6th ed. National Academy Press. Washington, D.C.

Russell, J.B. and Jo May Chow (1993). Another theory for the action of ruminal buffer salts: Decreased starch fermentation and propionate production. J. Dairy Sci., 76: 826-830.

SAS (2000). Users Guide: Statistics. Version 8 Edition. SAS Institute Inc., Cary, NC.

Shamoon, S.A. (1983). Amino Acid Supplements for Ruminant Farm Livestock with Special Reference to Methionine. PH. D. Thesis. Glasgow University, U.K.

Shiriyan, S.; Zamani, F.; Vatankhah, M. and Rahimi, E. (2011). Effect of urea Treated wheat straw in a pelleted total mixed ration on performance and carcass characteristics of Lori-Bakhtiari Ram lambs. Global veterinarian, 7(5): 456-459.

Roa, V.M.L.; Barcena-Gama, J.R.; Gonzalez, S.M.; Mendoza, G.M.; Ortega, M.E.C. and Garcia, C.B. (1997). Effect of fiber source and a yeast culture (*Saccharomyces cerevisiae*) on digestion and the environment in the rumen of cattle. Animal Feed Science Technology, 64: 372-336.

Sylwia, G.; Nnowak, W. and Mikula, R. (2009). Effect of *Saccharomyces cerevisiae* live cells and *Saccharomyces cerevisiae* culture on the performance and blood biochemical indices in dairy cows. Bull Vet. Inst Pulary, 53: 747-751.

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

Yassin, M.S. (2014). Addition of yeast and bentonite to improve utilization of urea in fattening diets In Karadi lambs. Master Thesis-College of Agriculture and Forestry-University of Mosul.