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Research Article

Effect of Adding *Saccharomyces cerevisiae* and/or Probiotic as Dietary Supplementation in some Biochemical Traits of Local Awassi Male Lambs

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Abstract | This study was conducted to investigate the effect of *Saccharomyces cerevisiae* (SC) and / or probiotic supplementation as feed additives on some blood biochemical traits (Hemoglobin concentration(Hb), Total protein(TP), Total cholesterol(TCH), Triglycerides(TG) in local Awassi male lambs. This experiment was performed in Vet. Medicine College / Kufa University. Twenty four lambs at age of 2-3 months were randomly divided into four groups (6 each) as follows: Group(G) one (Control) was fedon concentrate diet at the rate of 2% BW with wheat straw, G2 was given 5g/head of SC mixed with diet, G3 was given 1g/head /weekly of probiotic (Biolact®), G4 was given SC and probiotic (Biolact®)mixed with diet as mentioned in G2 and G3 respectively. Blood samples were taken monthly to study the traits above. Results revealed that the G2,G3 and G4 showed significantly (P<0.05) higher than the control group in Hb values.G4 showed significantly (P<0.05) higher in TP values than other groups at last experiment. While inTCH, G4 illustrated the lowest values than other groups at all periods and alternated G2 the significantly decreasing was detected in TG values than other groups at the last two months. In conclusion: the SC and probiotic combination improved the blood biochemical traits in Awassi male lambs.

Keywords | Lambs, Probiotic, Biochemical, Supplementation, Traits.

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INTRODUCTION

The ruminants feeding were insufficient for a long period because it was founded on the quantity without the quality basis, this case leading to a very big gap between the animals requirements and feed availability. Therefore, any attempt that target to improve the production should be done through feeding system improvements. Today, the feed characterization according to their chemical composition, and the constitution of their different fragments, is the important one of the objectives of nutritionists when consist balancing rations that get nutrients for the microorganisms in the rumen to growth and development and then of the animal (Muniz et al., 2008).

Yeast item supplementation has a many advantages in ruminant nutrition which have been exhibited an increase in nutrient digestibility, change of the volatile fatty acids concentration created in the rumen, lessening in ruminal ammonia, and increment of ruminal microorganism populace (Chaucheyras-Durand et al., 2008). Besides, yeast culture supplementation in growing lambs can possibly enhance feed intake and growth and can substitute antibiotic agents as growth enhancing feed additive substance (Tripathi and Karim, 2011).

Numerous investigations announced that SC addition animated change in blood parameters positively, for example, yeast supplementation resulted in better iron salt absorption from the small intestine, affecting positively hemoglobin (Hb) forming processes (Dobicki et al., 2005). Neither live yeast cultures nor dried yeast significantly affected the

Table 1: Effect of dietary *Saccharomyces cerevisiae* and/or Probiotic supplementation in **Hb** of local Awassi male lambs M±SE.

Periods (monthly) Groups	Zero	1	2	3	4	5	6
G1	B7.02 ± 0.54b	A8.57 ± 0.59b	AB7.66 ± 0.61b	AB7.34 ± 0.49b	AB7.32 ± 0.37b	AB7.80 ± 0.61b	A8.04 ± 0.54b
G2	B8.85 ± 0.37b	A10.94 ± 0.21a	A10.42 ± 0.22a	B9.00 ± 0.27a	B9.28 ± 0.22a	B8.75 ± 0.49ab	A9.35 ± 0.19a
G3	A11.50 ± 0.37a	AB10.57 ± 0.33a	BC10.02 ± 0.37a	C9.06 ± 0.22a	C9.10 ± 0.33a	BC9.91 ± 0.35a	C9.84 ± 0.46a
G4	AB10.82 ± 0.23a	A11.31 ± 0.25a	ABC10.42 ± 0.19a	BC9.80 ± 0.18a	C9.37 ± 0.64a	BC9.97 ± 0.38a	BC9.87 ± 0.21a
LSD	1.2074						

Means with a different small letter in the same column significantly different (P<0.05)
Means with a different capital letter in the same row significantly different (P<0.05)

blood total protein (BTP) values in calves (Dobicki et al., 2005; Kuprechtova and Illek, 2006), or neonatal dairy calves (Lesmeister et al., 2004) or early lactating dairy goats (Stella et al., 2007). Abu El-Ella and Kommonna (2013) reported that supplementation of yeast culture decreased cholesterol concentration. Also Mousa et al. (2012) worked on sheep and reported that feeding diets treated with probiotic resulted in a decrease of cholesterol concentration. Then again, the useful impacts of dietary yeast addition on the levels of the various protozoa kinds in rumen encourage favorable outcomes on metabolic activities described by increments of BTP, BUN and calcium focuses and diminishing of BTG levels in rams (Galip, 2006).

MATERIALS AND METHODS

Animals and Experiment Design

This experiment was performed in the animal farm of Veterinary Medicine College of Kufa University from 25 March up to 20 September 2017. Twenty four Awassi male lambs at age of 2-3 months were used with a mean body weight was 14.25 kg. The animals were randomly divided into four groups (6 each) equally (body weight was considered) and treated as following:

Group one (Control) was fed on concentrate diet at the rate of 2% body weight with wheat straw daily, Group two (SC) was fed on the same diet and was given 5g/head of S. cerevisiae daily, mixed withconcentrated diet, Group three (Pro.) was fed on the same diet and was given one sachet (1g)/head /weekly of probiotic **(Biolact®)** mixed with concentrated diet, Group four (SC+Pro.) was fed on the same diet and the concentrated diet was mixed S. cerevisiae as mentioned in group two and probiotic **(Biolact®)** as mentioned in groupthree. Water was freely offered for all groups of animals.

Biochemical and Blood Analysis

The following traits estimated by the photometric method: Hemoglobin concentration (Hb) was measured according to Coles, (1986), blood Total Protein (TP) evaluated according to Henry et al. (1974), Total Cholesterol (TCH) determination according to Tietz (1999), Triglycerides (TG) estimated according to Fossati and Prencipe, (1982).

Statistical Analysis

Data was performed using the Statistical Analysis System - version 9.1. One-way, Two ANOVA and Least significant differences post hoc test were performedto assess significant differences among means. P < 0.05 was considered statistically significant (SAS, 2010).

RESULTS AND DISCUSSION

Hemoglobin (Hb) g/dl

Results revealed that all treatment groups (G2, G3 and G4) showed significantly (P<0.05) higher the control group in **Hb** values in all experiment months (Table 1).

The significantly (P<0.05) higher in Hb values in treatment groups (G2, G3 and G4) than control group during experiment periods and mathematical increasing in Hb values in G4 compared with G2 and G3, it could be attributed to the effect of yeast and bacterial probiotic that resulted in better iron salt absorption from the small intestine that iron salt considered the main source of hemoglobin synthesis, also probiotics were found to produce vitamins B, affecting positively blood - cell forming processes that confirmed by (Kander, 2004) and in agreement with Sarwar et al. (2011) who found that Hb, PCV and RBC's count were higher (P<0.05) in growing Kajli lambs fed diets containing probiotics than those without it.

Total Protein (TP) g/dl

The differences among groups within each month in TP, G4 recorded significantly (P<0.05) higher in the 4th and 6th months (6.50±0.24 and 6.92±0.15) respectively than other groups Table (2).

Table 2: Effect of dietary *Saccharomyces cerevisiae* and/or Probiotic supplementation in **TP** of local Awassi male lambs M±SE.

Periods (monthly) Groups	Zero	1	2	3	4	5	6
G1	AB6.18±0.19a	B5.70±0.12a	AB6.28±0.16a	AB5.84±0.13a	B5.74±0.15b	A5.86±0.11a	A6.37±0.12ab
G2	AB5.90±0.26a	B5.49±0.26a	AB5.90±0.25a	AB5.89±0.16a	B5.50±0.15b	A6.25±0.33a	A6.21±0.01b
G3	AB5.92±0.22a	AB5.79±0.38a	A6.17±0.37a	AB5.77±0.07a	B5.45±0.09b	AB5.80±0.10a	A6.53±0.14ab
G4	C5.75±0.15a	B6.01±0.32a	A6.35±0.19a	A6.35±0.12a	A6.50±0.24a	AB6.27±0.18a	A6.92±0.15a
LSD	0.5967						

Means with a different small letter in the same column significantly different (P<0.05)
Means with a different capital letter in the same row significantly different (P<0.05)

Table 3: Effect of dietary Saccharomyces cerevisiae and/or Probiotic supplementation in blood total **Cholesterol** of local Awassi male lambs M±SE.

Periods (monthly) Groups	Zero	1	2	3	4	5	6
G1	A46.22± 1.27a	A45.12± 0.51ab	A46.53± 1.47a	AB44.72± 0.91a	B41.65± 0.61a	C36.16± 0.78a	C34.55± 0.68a
G2	A43.83± 2.03a	A41.57± 1.00c	A43.52± 1.21ab	A43.44± 0.99ab	B35.11± 1.29b	B34.05± 0.99a	B32.25± 0.91ab
G3	AB44.81± 1.40a	A47.27± 1.47a	AB44.03± 0.71ab	B43.39± 1.14ab	D36.09± 0.59b	D34.48± 0.71a	D33.00± 0.81ab
G4	A44.75± 1.53a	AB42.15± 1.86bc	AB42.35± 0.41b	B41.47± 0.39b	C35.14± 1.62b	CD33.24± 0.84a	D30.81± 0.32b
LSD	3.2509						

Means with a different small letter in the same column significantly different (P<0.05)
Means with a different capital letter in the same row significantly different (P<0.05)

The significant (P<0.05) increasing of TP values in group that be supplemented by yeast and bacterial probiotic (G4) than other groups during the experiment periodsit may be related to the synergism effect of probiotics (yeast + bacteria) supplementation on protein digestibility through the enzymatic effect of protease and alteration amino acid profile of digestion due to increasing microbial protein synthesis leading to increase in protein formation in the cells of liver and consequently increasing in the blood TP (Abdel-Khalek et al., 2000).

Total Cholesterol (mg/dl)

The results showed significant (P<0.05) differences among groups at different periods Table 3. The G1 recorded significantly (P<0.05) increasing in Cholesterol values compared with other groups for all experiment months which showed (G2,G3 and G4) significantly decreasing in cholesterol values during all experiment months than control group.

The significant (P<0.05) reduction in the total cholesterol level in G2,G3 and G4 as a result of SC and/or probiotic supplementation compared with control group of each experiment period, which it may be considered as an indication of the improvement in the health status of animal because of yeast and probiotic addition leading to more using of cholesterol molecule for body growth and development which confirmed by Abu El-Ella & Kommonna, (2013) who reported that supplementation of probiotic decreased cholesterol concentration and in agreement with El-Ashry et al. (2004) and Talha et al. (2009) worked on buffalo claves and Abdel Rahman et al. (2012) and Mousa et al., (2012) worked on sheep and reported that feeding diets treated with probiotic resulted in a decrease of cholesterol concentration and improve animal health. Or it may be attributed to, the enzymatic de-conjugation of bile acids (bile acids consist of cholesterol) by probiotics hydrolase (Begley et al., 2006) and once de-conjugated, bile acids became less soluble and less absorbed by the intestines, leading to their elimination in the feces.

Triglycerides (TG) mg/dl

Results demonstrated that G2 alternated G4 the significant decreasing than other groups in blood **TG** values which be evident during 5th and 6th months (22.89 ± 1.28 and 32.69 ± 1.40) respectively of experiment Table (4).

The significant (P<0.05) reduction in the TG values in G2 and G4 than other groups at 5th and 6th months respectively of experiment, it could be due to, the effect of yeast and

Table 4: Effect of dietary *Saccharomyces cerevisiae* and/or Probiotic supplementation in blood **TG** of local Awassi male lambs M±SE.

Periods (monthly) Groups	Zero	1	2	3	4	5	6
G1	C18.98 ± 1.45a	C19.95 ± 0.51a	BC22.36 ± 1.03a	B24.58 ± 1.63a	B26.03 ± 1.31a	B24.75 ± 0.65ab	A36.14 ± 1.18ab
G2	B20.94 ± 1.05a	B20.16 ± 0.43a	B22.57 ± 1.70a	B23.40 ± 1.75a	B22.88 ± 0.57a	B22.89 ± 1.28b	A37.45 ± 1.12a
G3	D20.54 ± 0.40a	D20.85 ± 0.37a	CD22.86 ± 1.62a	B26.50 ± 1.42a	BC25.24 ± 2.07a	BC25.22 ± 0.85ab	A35.89 ± 1.49ab
G4	CD20.70 ± 0.52a	D19.92 ± 0.31a	CD23.92 ± 1.76a	BC25.17 ± 1.61a	BC25.37 ± 1.49a	B26.81 ± 1.93a	A32.69 ± 1.40b
LSD	3.6126						

Means with a different small letter in the same column significantly different (P<0.05)
Means with a different capital letter in the same row significantly different (P<0.05)

probiotic supplementation leading to decrease the TG values in blood serum of supplemented animals as a result of positive changes in rumen fermentation and increase in bacterial and protozoal numbers and some changes in short-chain fatty acids concentration in the rumen that all this changes leading to reduction in TG formation in the cells of liver and consequently decreasing in the blood TG that consistent with Masek et al. (2008) and in agreement with Chiofalo et al. (2004) who reported a significant reduced in the concentration of non-esterified fatty acids (NEFA), triglycerides and increase of high density lipoproteins (HDL) in growing kids supplemented with probiotics.

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CONFLICT OF INTEREST

Authors declare that there was no conflict of interest.

AUTHORS CONTRIBUTION

Dr Hayder and Dr Drgham did the experimental design. Dr Hayder did the experimental work and lab work. Dr Hayder and Dr Drgham wrote the manuscript.

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