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 fed a 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 in TCH, 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.

**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).

<table>
<thead>
<tr>
<th>Periods (monthly) Groups</th>
<th>1</th>
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</thead>
<tbody>
<tr>
<td>G1</td>
<td>B7.02 ± 0.54b</td>
<td>A8.57 ± 0.59b</td>
<td>AB7.66 ± 0.61b</td>
<td>AB7.34 ± 0.49b</td>
<td>AB7.32 ± 0.37b</td>
<td>AB7.80 ± 0.61b</td>
</tr>
<tr>
<td>G2</td>
<td>B8.85 ± 0.37b</td>
<td>A10.94 ± 0.21a</td>
<td>A10.42 ± 0.22a</td>
<td>B9.00 ± 0.27a</td>
<td>B9.28 ± 0.22a</td>
<td>B8.75 ± 0.49ab</td>
</tr>
<tr>
<td>G3</td>
<td>A11.50 ± 0.37a</td>
<td>AB10.57 ± 0.33a</td>
<td>BC10.02 ± 0.37a</td>
<td>C9.06 ± 0.22a</td>
<td>C9.10 ± 0.33a</td>
<td>BC9.91 ± 0.35a</td>
</tr>
<tr>
<td>G4</td>
<td>AB10.82 ± 0.23a</td>
<td>A11.31 ± 0.25a</td>
<td>ABC10.42 ± 0.19a</td>
<td>BC9.80 ± 0.18a</td>
<td>C9.37 ± 0.64a</td>
<td>BC9.97 ± 0.38a</td>
</tr>
<tr>
<td>LSD</td>
<td>1.2074</td>
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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)

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.

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

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

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)

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 periods 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).

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

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

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) 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
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 these 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 reduction in the concentration of non-esterified fatty acids (NEFA), triglycerides and increase of high density lipoproteins (HDL) in growing kids supplemented with probiotics.

**ACKNOWLEDGEMENTS**

Authors would like to thank the staff of the farm of faculty of Veterinary Medicine and the Public Health lab for their contribution.

**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.

**REFERENCES**


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

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