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Effect of dietary supplementation with *Saccharomyces cerevisiae*on blood parameters, liver function, immunity and health status and quantity carcass characteristics of Awassi male lambs fed low and high concentrate.

تاثير اضافة خميرة الخبز *Saccharomyces cerevisiae*on على صفات الدم ووظائف الكبد والمناعة والحالة الصحية وبعض صفات ذبائح الحملان العواسي المغذاة على مستويين من العلف المركز

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Abstract

Twenty four Awassi male lambs with (27± 1.78 Kg) initial weight, and 4 – 5 months of age ,were divided into four groups (6 lambs each), to study the effect of two levels of feeding on liver function, immunity, health status and quantity carcass characteristics. Two levels of feeding (low level (40:60) and high level (60:40) that supplemented with two levels of bakery yeast, *Saccharomyces cerevisiae*.These diets were offered to lambs once daily. Significantly increased($P<0.01$) in total blood protein, albumin and ($P<0.05$) globulin with 40:60 level of feeding, while significantly increased($P<0.01$) albumin and decreased globulin with 60:40 level of feeding.Total cholesterol, S. Total triglyceride, High density Lipoprotein (HDL) and Very Low Density Lipoprotein (VLDL) were significantly decreased ($P<0.01$) after 3hrs of feeding and no significant with Low Density Lipoprotein (LDL) in level 40:60, whereas significantly increased ($P<0.01$) of serum cholesterol concentration, S. Total triglyceride, High density Lipoprotein (HDL) and Low Density Lipoprotein (LDL) and no significant in Very Low Density Lipoprotein (VLDL) in level 60:40 of feeding. The activities of some liver enzymes SC significantly increased ($P<0.01$) (AST) (GOT) but Lipase enzyme decreasedsignificantly(GPT) and totalbilirubin after 3hrs of feeding with 40:60.Whereas decreased ($P<0.01$)(GOT) ,(GPT) and total bilirubin in serum blood with 60:40 level of feeding .SC supplementation significantly increased($P<0.05$) on skin weight gain (kg)with 60:40 concentrate : roughage ratio. On the other hand, no significant increase on offal's weight and heart girth of Awassi male lambs. In concolusion the obtained results refer to the using of SC as growth promoting agent for lambs to increase the nutritional value of low diet in order to decrease the diet costs.

Key words: Awassi male lambs- blood parameters -liver function- carcass characteristics

الخلاصة

استخدمت في الدراسة اربعة وعشرون من ذكور الحملان العواسي وبمعدل وزنبلغ (27±1.78 كغم) ، واعمار تراوحت بين 4 الى 5 اشهر . قسمت الحيوانات الى اربعة مجاميع (6 لكل مجموعة) لغرض دراسة تاثير مستويين من من التغذية على وظائف الكبد، المناعة ، الحالة الصحية والخواص الكمية للذبيحة. استخدمت في لدراسة مستويين من العلائق ،الاول المستوى الواطئ (40:60)) والثاني المستوى العالي (60:40) حيث اعتمدمستويين من خميرة الخبز(*Saccharomyces cerevisiae*) واحد لكل عليقة. اعطيت العليقة لمرة واحدة باليوم. سجلت زيادة معنوية($P<0.01$)في مستوى بروتين الدم الكلي ،الالبومين و ($P<0.05$)للكلوبيولين في تاثيرالعليقة ذات المستوى الوطي . بينما العليقة ذات المستوى العالي سجلت زيادة معنوية ($P<0.01$) للالبومين وانخفاض في الكلوبيولين.الكوليستول الكلي، والدهون الثلاثية ، الدهن البروتيني العالي الكثافة (HDL)والدهن البروتيني الواطى الكثافة جدا(VLDL) جميعها اظهرت انخفاض معنوي($P<0.01$)بعد 3 ساعات من التغذية وكانت غير معنوية في الدهن البروتيني الواطى الكثافة (LDL) في العليقة ذات المستوى الواطئ بينما سجلت زيادة معنوية ($P<0.01$) في تركيز كولسترول الدم ، والدهون الثلاثية، الدهن البروتيني العالي الكثافة (HDL) و الدهن البروتيني الواطى الكثافة (LDL) وغير معنويةالدهن البروتيني الواطى الكثافة جدا (VLDL) في العليقة ذات المستوى العالي. بعض انزيمات

الكبد اظهرت زيادة المعنوية (P<0.01)كما في GOT و ال AST لكن انزيمات الدهون وال GPT والبليروبين الكلي اظهر انخفاض معنوي بعد 3 ساعات من التغذية على العليقة الواطئة المستوى بينما انخافض واضح (P<0.01) سجل لل GOT وال GPTوالبليروبين الكلي في مصل الدم في العليقة ذات المستوى العالي .اظهرت معوضات الخمائر زيادة معنوية (P<0.05)في وزن المكتسب للجلد في العليقة ذات المستوى العالي. من ناحية اخرى لوحظت زيادة غير مهمة لل offal's weight وال heart girth في ذكور العواسي.

استنتجت الدراسة ان خميرة الخبز ذات تاثير مهم جدا في تحفيز النموعن طريق رفع القيمة الغذائية للغذاء الواطئ القيمة الغذائية ومن ثم تقليل الكلفة

Introduction

One such natural stimulator, with probiotic and prebiotic properties (1) is *Saccharomycescerevisiae* yeast, which has a wide spectrum of activity (2). Yeast supplement had a stimulating effect on energy metabolism and a protective effect on renal function.Sheep are known for their excellent ability to utilize organic feed; however production effectiveness is generally lower in this species than in other farm animals. Therefore, attempts are made to supplement animal diets with feed additives stimulating sheep production and increasing milk yield. Using yeast culture (YC) in ruminant diets to improve performance has been reviewed by (3) and it was found to increase blood total protein (4) glucose concentration (5) and decrease cholesterol (6). Furthermore, metabolites produced by S. Service in culture might have antimicrobial activities against pathogens and modulatory effects on the immune system (7)Studies by (8)found that Rahman sheep fed ration supplemented with 5 and 7.5 g/h/ of live dried yeast had increased blood plasma total protein as compared with control. (9)Reported that Suffolk crossbred ewes fed 60:40 concentrated: roughage ration which supplemented daily with 2.5 or 5 gm. of yeast culture showed higher serum glucose and urea concentration ,but decreased cholesterol concentration than control ewes while albumin and urea did not significantly different in the gestation period. An increase in milk yield associated with the supplementation of the diet with yeast products has been also shown in sheep (10; 11).The present study has designed to use SC as growth promoting in lambs, and to find out its effect on blood parameters and liver function.

Materials & Methods

Twenty four healthy Awassi male lambs of 3.5 to 4 months age, weighing 22 ± 2.2Kg have been used in this study.They were divided into four treatments. They were fed on a crushed diet with the formula showen in table 1. Lambs in T1 and T3 treatments were fed experimental diets without SC either 40:60 or 60:40 (concentrate: roughage), while lambs in T2 and T4 treatments were fed either 40:60 or 60:40 (concentrate: roughage) + 5gm/head/day with SC. The SC was dry and Turkish production. All treatments had been given fixed levels of dietary energy. The clinical observations were recorded in all groups at the end of four months. All lambs were housed in an optimal animal field of the Animal Resource Department in College of Agriculture, University of Baghdad during the period of July 5 to September 11, 2011. Hematological analysis of the collected bloodsamples of lambs was done by tubes without EDTA to estimate: Total triglyceride (12), cholesterol (13), High density Lipoprotein(HDL), Low Density Lipoprotein (LDL) and Very Low Density Lipoprotein(VLDL), (14) total protein(15) Total albumin (16), Total globulins(17). Serums(GOT),Serum ALT (GPT),Serum Total Bilirubin and Serum DirectBilirubin(18) and Serum Lipase. The blood samples were analyzed by using (Bio–Maiz France) spectrophotometer. The results were statistically analyzed by using Complete Randomized Design (CRD) and SAS(19) program. The Duncan Multiple Range Test (DMRt) was used to show the less significant differences LSD between the means of the experimental groups Significant differences among means were separated by (20).

Results and Discussion

Table1.The groups of experimental dieters

Treatment	%Concentrate Diet	Roughage% Diet	Adding SC gm./h/d
T1	40	60	0
T2	40	60	5
T3	60	40	0
T4	60	40	5

T1:LCON+H R without SC T2:LCON+HR with SC ; T3: HCON+LR without SCT4: HCON+LR with SC

Data in Table (2) clearly indicate that dietary supplementation of SC significantly increased($P<0.01$) blood total protein in 3hrs time with 40:60 concentrate: roughage ratio (56.53 and 63.70gm/dlT1 andT2) respectively, while no significant differences in 3hrs time with 60:40 concentrate: roughage ratio (58.29and 59.67g/dlT3 andT4)respectively.This result attributed to the addition, SC release of protein substances stimulated with SC. This result agreed with (21;22;23). Similar finding was noticed by (24).These results may be due to the improvement in metabolic process as a result of yeast supplementation. Result showed significant differences ($P<0.01$) in Albumin between without and with SC(29.50 and 34.15 T1andT2) respectively, after 3hrs of feeding, while dietary supplementation of SC significantly increased($P<0.01$)(30.25 and35.30 g/dl T3and T4)respectively of Albumin with 60:40ratio.The significant increase in blood albumin showed normal status of liver function where albumins are mainly synthesized, which means that SC supplementation did not damage or affect the liver function (AST and ALT).Whereas, several studies declared that the normal range of albumin/globulin ratio were from 0.8-1.3 in blood serum of sheep (25),while the obtained results are in accordance with these reported by (26) on sheep. Table 2 revealed that dietary supplementation of SC significantly increased ($P<0.05$) globulin in 3hrs time after feeding with 40:60 concentrate: roughage ratio (27.00and 33.20T1and T2)respectively. The yeast supplemented group might be related to a temporary improvement in liver function. While significantly decreasing about ($P<0.01$)within 60:40 concentrate: roughage ratio (30.40and 25.20 T3 andT4)respectively.These results agreed with the results of (27) declared that probiotic supplementation improved lamb performance. Dietary supplementation with probiotic had no impact on blood plasma parameters. On the hand, (22) noticed that albumin, was not altered by yeast culture supplementation, and blood parameters were not affected due to their supplementation (28).

Table 2.The effect of SC, low and high concentrate: roughage on blood proteins ofAwassi male lambs.

Parameters	Total protein g/dl	Albumin g/dl	Total globulin g/dl
Level of feeding : Time	40:60		
T1- SC 0hrs	62.19±0.05a	32.29±1.15a	29.50±1.15b
- SC3hrs	56.53±1.73b	29.50±0.28b	27.00±0.57bc
T2 +SC0hrs	58.38±1.15ab	30.80±1.15b	29.40±5.50b
+SC3hrs	63.70±1.73a	34.15±0.75a	33.20±1.15a
Significant	**	**	*
Level of feeding : Time	60:40		
T3 - SC 0hrs	56.44±1.74b	35.20±1.73a	21.10±0.57c
- SC3hr	58.29±1.15ab	30.25±0.25b	30.40±1.15ab
T4+SC0hrs	56.57±0.57b	31.00±1.15b	26.40±0.22bc
+SC3hrs	59.67±2.30ab	35.30±0.17a	25.20±0.25c
Significant	N.S	**	**

T1:LCON+H R without SC T2:LCON+HR with SC ; T3: HCON+LR without SCT4: HCON+LR with SC
a, b and c: Means in the same Colum for each item with different superscripts different significantly * ($P<0.05$) ** ($P<0.01$) N. S : No significant

As shown in Table (3) SC supplementation significantly decreased($P<0.01$) in total cholesterol,S. Total triglyceride,High density Lipoprotein (HDL) and Very Low Density Lipoprotein (VLDL) after 3hrs of feeding(46.00, 27.00,70.00 and7.00 ;32.00 ,11.00 ,23.00 and 2.00/ 100gm/Dl T1and T2respectively), and no significant differences with Low Density Lipoprotein (LDL) in level 40:60 ,whereas significantly increased ($P<0.01$) of serum cholesterol concentration, S. Total triglyceride, High density Lipoprotein (HDL) and Low Density Lipoprotein (LDL) (36.00,8.00,18.00,16.00 and 16.00; 44.00,15.00 ,70.00 and 18.00 /100 gm./Dl T3andT4 respectively) and no significant in Very Low Density Lipoprotein (VLDL) in level 60:40 of feeding . The differences between the results of the present study may be attributed to stimulation of bacterial lipid synthesis or due to anti-cholesteroleamic effect of SC treatments (29).In contrast, (25), (8) for sheep who found that feeding diets treated with yeast or fungi also resulted in a decrease in cholesterol concentration .While , normal ranges of Cholesterol values obtained by (30;31) using Awassi and Karadi lambs.While, normal ranges of Cholesterol values obtained by (25;8) using Awassi and Karadi lambs. The level of dietary protein,in addition of yeast and the interaction between them on the blood parameters had no significant effect on BTG (23;32) demonstrated that cholesterol and triglyceride concentrations were not altered by yeast culture supplementation**.**

Table 3.The effect of SC, low and high concentrate on blood lipids of Awassi male lambs.

Parameters 100 gm./Dl	S. Total cholesterol	S. Total triglyceride	High density Lipoprotein (HDL)	Low Density Lipoprotein (LDL)	Very Low Density Lipoprotein (VLDL)
Level of feeding : Time	40:60				
T1- SC 0hrs	42.50±3.50b	16.50±2.50b	44.00±0.57b	8.00±0.05c	6.00±0.11a
- SC3hrs	46.00±1.15a	27.00±0.57a	70.00±1.73a	8.00±0.05c	7.00±0.11a
T2 +SC0hrs	43.00±1.73a b	23.00±1.15a	67.00±1.15a	4.00±0.00c	5.00±0.05b
+SC3hrs	32.00±1.15b	11.00±0.57c	23.00±0.57b	7.00±0.11c	2.00±0.00bc
Significant	**	**	**	N.S	**
Level of feeding : Time	60:40				
T3 - SC 0hrs	47.00±1.15a b	10.00±0.57c	21.10±0.57 a	24.00±1.15a	2.00±0.00c
- SC3hr	36.00±1.15a b	8.00±0.11d	18.00±0.57 b	16.00±0.57ab	2.00±0.00c
T4+SC0hrs	48.00±1.15a	16.00±1.15b	29.00±0.57c	16.00±1.15b	3.00±0.11c
+SC3hrs	44.00±0.57a	15.00±0.00b	70.00±0.00a	18.00±0.57a	3.00±0.11c
Significant	**	**	**	**	N.S

T1:LCON+H R without SC T2:LCON+HR with SC ; T3: HCON+LR without SCT4: HCON+LR with SC

a, b and c: Means in the same Colum for each item with different superscripts different significantly * ($P<0.05$) ** ($P<0.01$) N.S : No significant

Results from table (4) has shownSC supplementation significantly increased($P<0.01$) in GOT,Lipase enzyme in 3hrs time with 40:60 concentrate : roughage ratio(72.00and138 U/I ; 0.85 and 1.40U/I and 0.02and 0.03mg/dl T1 andT2 respectively) and no significant in direct bilirubin ,while GPTand total bilirubin mg/dl was decreased ($P<0.01$) after 3 hrs of feeding(19.00and 13.00U/I T1 and T2 respectively).Also in table 4 has shown thatSC supplementation with 60:40 concentrate: roughage ratiosignificantly decreased ($P<0.01$) inGOT, GPT, Total bilirubin and no significant indirect bilirubin(115and 57U/I; 21 and 15U/I; 0.30and 0.07mg/dl; 0.10and 0.05 mg/dl T3 and T4 respectively) only significantly increased ($P<0.01$) inLipase enzyme after 3hrs.of feeding (1.20 and 1.90 T3 and T4). The activities of some liver enzymes (AST (GOT), ALT (GPT) in serum are considered generally as indicators of some pathological changes of tissues and organs. On the other hand, liver' s function of detoxification process whentoxins conjugated with glucornic acid and secreted them to bile juices to getridof them by the intestins.But when symbiosis occurred thelytic enzymes of harmful bacteria would liberate the pathogenic toxins from this conjugation,and then reduce the production and absorption of bile acids. In addition to its role of regulating the liver synthesis of lipids, and decreasing them and cholesterol in the blood serum.(33, 34) found out, that the values are ranged from 24 to 65 and 14 to 37 IU/L for GOT and GPT respectively, in goats and sheep. This aagreed with the findings of other authors (35;36:32) who demonstrated that the yeast had no effect on hepatic function and enzyme activities(ASTand ALT) by yeast culture supplementation**.**(24;37) also showed that plasma metabolites , liver enzymes and(AST , ALT) concentrations were unaffected by the inclusion of yeast in sheep. These results are in accordance with(29, 38)showed that fungi treatment have for GPT and GOT (24and 86 IU/L) respectively.

Table4. The effect of SC, low and high concentrates on liver function and lipase enzyme of Awassi malelambs.

Rameters	S.AST(GOT) U/I	S.ALT(GPT) U/I	Total bilirubin mg/dl	Direct bilirubin mg/dl	Lipase enzyme
Level of feeding : Time	40:60				
T1- SC 0hrs	21.00±0.57c	5.00±0.00d	0.05±0.005b	0.04±0.00b	3.60±0.11a
- SC3hrs	72.00±1.15b c	19.00±0.57ab	0.08±0.005b	0.02±0.00c	0.85±0.00c
T2 +SC0hrs	68.00±1.15b	15.00±0.57a	0.03±0.00c	0.03±0.00c	0.90±0.05c
+SC3hrs	138.±1.73a	13.00±0.28c	0.03±0.00c	0.03±0.00c	1.40±0.23bc
Significant	**	**	**	N.S	**
Level of feeding : Time	60:40				
T3 - SC 0hrs	60.00±2.30b	11.00±0.57b	0.30±0.00a	0.10±0.00b	1.90±0.05b
- SC3hr	115.00 ±2.88a	21.00±0.57a	0.30±0.00a	0.10±0.00b	1.20±0.11c
T4+SC0hrs	61.00±2.30b	11.00±0.57b	0.30±0.05a	0.20±0.05a	3.20±0.11a
+SC3hrs	57.00±1.15c	15.00 ±1.15ab	0.07±0.00b	0.05±0.00b	1.90±0.05b
Significant	**	**	**	N.S	**

T1:LCON+H R without SC T2:LCON+HR with SC ; T3: HCON+LR without SCT4: HCON+LR with SC
a, b and c: Means in the same Colum for each item with different superscripts different significantly * ($P<0.05$) ** ($P<0.01$) N.S : No significant.

Table5 revealed no significantdifferenceon heads weights ,legs weights ,skin weights ,digestive system weights, hearts girth gain and feed conversion ratio when the lambs fed with a diet supplemented with and without SC.(39) showed that significant difference of yeast culture in the finishing diet of dairy calves had no effect on their growth rate, feed conversion ratio, carcass characteristics or meat quality, On the other hand values of some of the non-carcass component measurements for the yeast-treated calves (hide, head, rear and front feet and total offal) are reflected in lower cold carcass weights for those calves. The higher average gain might be related to a higher feed intake of yeast for those calves during the same period.Whileother workers found no effect of yeast culture supplementation on carcass weights of lambs (40).

Table5. The effect of SC low and high concentrate on liver ,spleen ,heart and kidney weights of Awassi male lamb.

Organ weight	T1 -SC(40:60)	T2 +SC(40:60)	T3 -SC(60:40)	T4 +SC(60:40)	Significant
Liver (gm.)	532±42.500	537±7.50	562±12.500	502±52.50	N.S
Spleen (gm.)	47.0±2.500	100±15.00	90.0 ±0.00	92.0±27.50	N.S
Heart (gm.)	135 ±10.00	125±5.00	137±7.500	152±17.50	N.S
Kidney (gm.)	95.0±15.00	102±12.500	105±0.00	105±15.00	N.S

T1:LCON+H R without SC T2:LCON+HR with SC ; T3: HCON+LR without SCT4: HCON+LR with SC
Means in the same raw for each item with different superscripts N.S : No significant

Table (6) has shown SC supplementation significantly increased(P<0.05) on skin weight gain (kg)with 60:40 concentrate : roughage ratio, while no significant in (Head weight , Leg weight , Digestive system weight/kg and Heart girth/cm) .This may be due to the DMI or effect of SC on percentage of body fat, whereas(41) found an increase in body fat content of goat offered yeast culture .In buffalo, these probiotics + herbs supplementation also reduced percentage of offal, however, the reduction was caused not only by decreased intestinal content but also decreased lung and lymph content (42).(43)demonstrated thataddition of combined probiotics + herbs in the diet of beef cattle there was a reduction in the percentage of offal due to decreasing of intestinal weight in the treated animal.

Table6 Effect of SC, low and high concentrate ratios on offal's weight and heart girthof Awassi male Lambs

Treatment	T1-sc	T2+sc	T3-sc	T4+sc	
Level of feeding	40:60		60:40		Significant
Head weight(kg)	2.29±0.0	2.18±0.18	2.16±0.04	2.24±0.06	N.S
Legweight(kg)	0.902±0.90	0.94± 0.03	0.892± 0.04	0.94±0.01	N.S
Skin weight(kg)	4.45± 0.25a	3.55±0.26b	3.54 ±0.26b	4.20± 0.17ab	*
Digestive system weight(kg)	2.94±0.33	2.31±0.09	2.93± 0.12	2.62±0.04	N.S
Heart girth(cm)	79.0±0.0	79.50±0.86	79.00±0.0	76.0±2.30	N.S

T1:LCON+H R without SC T2:LCON+HR with SC ; T3: HCON+LR without SCT4: HCON+LR with SC
a and b: Means in the same raw for each item with different superscripts different significantly * (P<0.05)
N.S : significant

Conclusions:

1-The present study has designed the using of SC as growth promoting in lambs.
2-The useful obtained results conclude that the using of SC as growth promoting agent for lambs will increase the nutritional value of low diet in order to decrease the diet costs..

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