



## Effect of *Saccharomyces cerevisiae* as a Feed Additive on Some Aspects of Productive and Reproductive Performance in Adult Awassi Lambs.



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THE study was carried out in the animal house at the College of Veterinary Medicine/ University of Tikrit for the period from January to July 2017, using 16 Awassi lambs at the age between 10-12 months, and an average weight (36 kg). The animals were divided into four groups each one included four lambs. The first group was considered as control (T1), and kept without the addition of bread yeast to foods. The diets in the others groups (T2, T3 and, T4) contained the yeast in the proportions of (3, 5 and, 7 g /animal / day), respectively. Wheat straw was introduced as a free coarse feed as well as concentrated feed at 2.5% of weight which is measured weekly for 75 days.

The aim of this study was to investigate the effect of several levels of dry bread yeast (*Saccharomyces cerevisiae*) on some productive, reproductive traits, and number of blood parameters. The results showed no significant differences for all studied traits (final weight, Body condition score, concentration of testosterone, blood glucose, protein and cholesterol). From all testicular and epididymis measurements were taken from animals after slaughter (weight and size of testicles, length and diameter of testis, weight of epididymis and length of one of them) the only testicular weight and size showed significant increases in all groups were given bread yeast to foods and the group that given high levels of yeast (T4) appeared highest increases compared with other treated group (T2 and T3).

In conclusion, the present study demonstrates that the using of *Saccharomyces cerevisiae* supplementation in lambs feed leads to improving the reproductive performance in spite of insignificant changes in the production trait and blood parameters.

**Keywords:** *Saccharomyces cerevisiae*, reproductive performance, adult Awassi lambs.

### Introduction

The yeast *Saccharomyces cerevisiae* is a type of yeast widely used in various fields, including the manufacture of bread. Taxonomically it is classified as follow: Class: Ascomycete, Order Endomycetales, Family Saccharomycetaceae, Genus: Saccharomyces. and the Species: *Cerevisiae* [1]. This yeast is a transitional microorganism and its presence provides anaerobic conditions because it consumes oxygen

and does not affect the activity of cellulose-analytic bacteria that need anaerobic conditions [2]. In the past few years, they have been used as nutritional enhancers in feeding cows [3] and sheep [4]. The first attempt to use yeast as a probiotic agents was due to ruminant diets to regulate fermentation in the rumen until 1950 [5,6]. It was found that the addition of yeast to the diet increases the number of bacteria in the rumen and stimulates their growth [6], and as a result increases the process food intake and improves

digestion [4] and, the animal's weight increases [7]. Yeast contains many enzymes, vitamins and cofactors that increase the rumen activity [8], and thus improve the nutritional conversion [9] which increases the rate of animal growth [10].

Several studies have been carried out to determine the effect of yeast supplementation on cattle production [10-12], buffaloes [13] and ewes [14]. Some studies have also indicated that the addition of yeast to lamb diets has positive effects through improving the metabolism and increased weight gain [7, 15, 16].

This study was designed to determine the effect of yeast supplementation as feed additives on some aspects of productive, reproductive and physiological performance of adult Awassi lambs.

### **Materials and Methods**

The present study was conducted in the animal house of the College of Veterinary Medicine / University of Tikrit from (January to July 2017) using 16 Awassi lambs, aged between (10-12) months with an average weight of (36±0.34kg) divided into four equal groups distributed (four lambs in each group) as follows:

1. Group I T1 (control): without yeast added.
2. Group II T2: (3 g yeast / animal / day).
3. Group III T3: (5 g yeast / animal / day).
4. Group IV T4: (7 g yeast / animal / day).

The lambs were randomly distributed on single cages with dimensions of (1.25 x1.75m). Each cage contained two types of nutrients, the first for concentrated feed and the second for coarse feed (wheat hay), as well as a water manhole, with a metal salt block. The lambs underwent a two-week introductory period in order to accustom to the place and fodder.

The coarse feed was provided as free feeding, while the concentrated feed was provided at 2.5% of the weekly body weight for two times at 6a.m. and 8p.m., for the duration of the study which was 75 days.

**TABLE 1. Shows the composition of the concentrated feed used.**

<b>Contents</b>	<b>The rate %</b>
barley	49
yellow corn	39
Soybean	10
Salts	1
Minerals and vitamins	1
Percentage of protein in the diet	13.77

All lambs underwent veterinary program in the animal house, which included vaccination against apthous fever, intestinal poisoning, drug dosing against pulmonary, tapeworm and hepatic worms, as well as Ivermectin injections against external parasites with 2 ml subcutaneously.

### *Testicular measurements*

#### *Measurement of scrotal circumference and Body condition score*

The circumference of the scrotum was measured using a tape measure. The elastic tape measure was placed around both testicles inside the scrotum from the widest area. The body condition score was measured by sensing the amount of muscle growth and lipid storage above and around the lumbar vertebrae. it was classified in the sternum according to the amount of fatten to five degrees:

1: lean 2: weak 3: mild 4: fat 5: very fat.

### *Blood tests*

5ml of blood was withdrawn from each animal of the jugular vein, then the samples were left for 20 minutes for clotting, then kept in the refrigerator for 24 hours, after that the serum was isolated using a centrifuge (3000 rpm) and the serum were kept at (-200C) until Perform the analysis.

Glucose, protein and cholesterol were measured using a spectrophotometer according to a special kit for each variable. The level of testosterone was measured using Elisa technology.

### *Data analysis*

Data were analyzed using statistical analysis system (SAS), version (9.1) (17) and comparison of averages by Duncan test. Differences were considered as significant at the level of 0.05 or less.

### **Results and Discussion**

The results shown in Table 2 that there are no significant differences in the final weight and the body condition score, but it can be seen that the

control group, and the third treatment groups (T3) were similar in their final weights ( $48.75 \pm 1.64$  and  $48.75 \pm 2.39$  kg, respectively) and converged in the body condition score ( $4.125 \pm 0.239$  and  $4.00 \pm 0.204$ , respectively).

The convergence also appear in the final weight and body condition score of (T2) and (T4) groups, which were  $46.13 \pm 2.20$  and  $46.75 \pm 2.39$  kg (final weight, respectively),  $3.250 \pm 0.144$  and  $3.750 \pm 0.204$  (body condition score, respectively). This result is in agreement with [18]. Yalcin et al. [19] pointed to make further studies on the effect of yeasts on the performance of small ruminants (sheep and goats) to determine the nature of their work and the mechanism of action.

Figure 1 refers to the concentration of testosterone in the serum for two periods at a beginning, and the end of the study where there was no significant effect of the treatments on this characteristic. The absence of this effect of significance may be consistent with the result of Mousa et al. [20] who found that the different

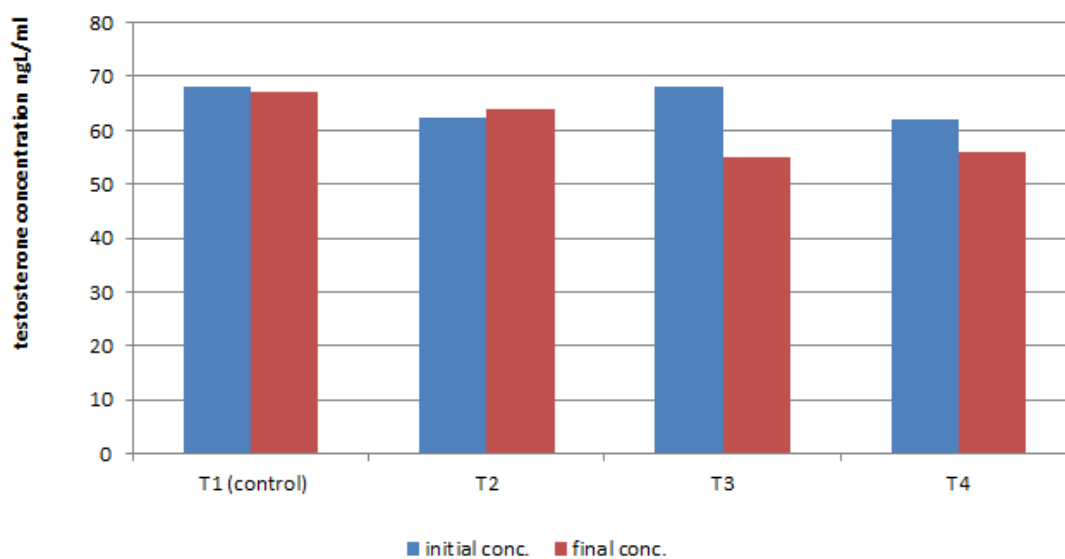
levels of added *Saccharomyces cerevisiae* on reproductive traits in Rahmani ewes while there was no significant effect observed (of the fertility rate, fertility, the rates of lambs born alive or stillborn).

The results in Table 3 showed no significant difference in the concentration of glucose according to the different treatments. However, there was a decrease (noticeable with increasing the level of the addition yeast to ( $67.252.62$ ,  $67.254.32$ ,  $65.003.1$  and  $61.752.62$  g / dl). [21].

However, Beauchemin et al. [22] observed during his study on 12 "male goats" when they added *Saccharomyces cerevisiae* by 3 g yeast / kg feed to their diet that there was no significant increasing in this characteristic in the yeast treatment group. This was due to the fact that the yeast stimulates the bacteria consuming lactic acid which leads to the stability of pH for rumen, and this creates a favorable environment for the growth of cellulose-decomposing bacteria and thus an improvement in fiber digestion and these results has been agreed with Areej et al. [23].

**TABLE 2. Effect of treatments on final weight and body condition score (mean± Standard Error).**

Treatments parameters	T1(control)	T2	T3	T4
Final weight kg	$48.75 \pm 1.64$	$46.13 \pm 2.20$	$48.75 \pm 2.39$	$46.75 \pm 2.39$
Body condition score (BCS)	$4.125 \pm 0.239$	$3.250 \pm 0.144$	$4.000 \pm 0.204$	$3.750 \pm 0.204$



**Fig.1. Effect of yeast in testosterone concentration in rams.**

The results in the same table showed that there was no significant difference of protein concentration in the all treatments groups. Note that there was a significant increase ( $p \leq 0.05$ ) recorded with the increased level of yeast added. They attributed this to the fact that yeast improves the metabolic processes which lead to increase the total protein concentration.

In Table 3 it is noted that there was a decrease but did not reach the significant in the concentration of total cholesterol, which reached 76.000.4 and 69.25±4.67 g / dl, for both the first (T1), and fourth groups (T4), respectively, and this result is similar to Fuller [24]. The reason for this is that the addition of yeast stimulates the synthesis of lipid microorganisms as well as the activation of anti-cholesterol [25].

The data in Table 4 indicated that the fourth treatment increase significantly ( $p \leq 0.05$ ) comparative with the other treatments in the

testicular weight (g) and testicle volume (ml) which reached to (460±41.733g) and (175±14.434 ml), while the second treatment did not differ significantly from the third group for the two above grades. However, the significance was clear ( $p \leq 0.05$ ) between them and the first treatment group (control) which was (436±40.382g and 167±16.520ml), (425±28.358g, 162±14.361ml), and (395±49.958g, 157±19.311ml) for the third, second and first treatments of testicle weight and volume, respectively.

While there was no significant differences for the rest of the traits with the four treatments (0, 3, 5 and 7 g / animal / day). This is similar to Ahmed, and Salah[26] reported regarding the length and circumference of the testicles, but this result differed with Ahmed and Salah (26) which they observed a significant differences in the two above traits, when feeding Awassi lambs on cornmeal treated with sodium hydroxide 1% and added the yeast for 72 hours.

**TABLE 3. Effect of treatments on the level of glucose, protein and blood cholesterol (mean ± standard error).**

Treatments Parameters		T1 Control	T2	T3	T4
Glucose	Initial	74±1.68	64.75±4.93	66.75±1.60	68.75±2.68
	g/dl Final	67.25±2.62	67.25±4.32	65±3.1	61.75±2.62
Protein	Initial	6.12±0.19	5.92±0.22	5.47±0.31	5.90±0.17
	g/dl Final	6.72±0.30	6.17±0.16	6.05±0.18	5.65±0.43
Cholesterol	Initial	73.5±2.21	82.75±1.03	76.25±1.25	78.75±3.42
	g/dl Final	76±0.4	74.75±2.28	77.75±3.30	69.25±4.67

**TABLE 4. Effect of treatments on Some Testis and Epididymis Measurements (mean± Standard Error).**

Traits treatments	Scrotum circumference (cm)	Testis weight (g)	Testis volume (ml)	Testis length (cm)	Testis diameter (cm)	Epididymis Weight (g)	Epididymis length (cm)
T1 control	29.500 ± 1.555	395.000 ± 49.958C	157.500 ± 19.311c	12.000 ± 0.408	17.250 ± 0.854	50.000 ± 8.165	20.000 ± 0.816
	29.750 ± 0.629	425.000 ± 28.358B	162.500 ± 14.361b	12.000 ± 0.408	17.750 ± 0.250	50.000 ± 7.071	20.250 ± 0.250
T2	29.750 ± 1.031	436.250 ± 40.382B	167.500 ± 16.520b	11.750 ± 0.250	18.750 ± 0.750	50.000 ± 8.165	20.000 ± 1.000
	30.000 ± 1.225	460.000 ± 41.733A	175.000 ± 14.434a	11.500 ± 0.289	18.250 ± 0.750	52.500 ± 12.583	20.250 ± 0.250

Different letters within a column indicate a significant difference ( $p \leq 0.05$ )

In conclusion, The present study demonstrates that the using of *Saccharomyces cerevisiae* as supplementation in lambs feed lead to improve the reproductive performance in spite of insignificant changes in the production trait and blood parameters.

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#### Funds statement

This study was supported by private funds from the authors only.

#### Conflict of interest

The data were taken without any selection so we could say it done in unbiased way.

#### Ethical consideration

The procedures of this study were approved by the animal care and use committee of (Tikrit University) and were in accordance with the university's guidelines of animal research and also the slaughter according to the Islamic way.

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## تأثير إضافة خميرة الساركوميسيز سيرفيسيز في العلائق على أداء بعض النواحي الانتاجية والتناسلية للحملان العواسية البالغة

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أجريت الدراسة في البيت الحيواني التابع لكلية الطب البيطري / جامعة تكريت للفترة من يناير ٢٠١٧ إلى يوليو ٢٠١٧ ، باستخدام ١٦ من الحملان العواسية بعمر بين ١٠-١٢ شهراً ، ومتوسط الوزن (٣٦ كجم) ، تم تقسيم الحيوانات إلى أربع مجموعات ، كل منها تضم أربعة حملان ، المجموعة الأولى كانت تعتبر السيطرة (T1) ، ودون إضافة خميرة الخبز للعليقة ، المجاميع الثلاثة الأخرى أضيفت لها الخميرة بنسب (٣ ، ٥ ، و ٧ جم / حيوان / يوم) ، على التوالي. تم تقديم تبين الحنطة كعلف خشن بشكل حر وكذلك علائق مركزة بنسبة ٢,٥٪ من الوزن الذي يتم قياسه أسبوعياً لمدة ٧٥ يوماً.

هدفت هذه الدراسة الى معرفة تأثير عدة مستويات من خميرة الخبز الجاف على بعض الصفات الإنتاجية والتناسلية وعدد من مقاييس الدم. أظهرت النتائج عدم وجود فروق معنوية لجميع الصفات المدروسة (الوزن النهائي ، درجة حالة الجسم ، تركيز هرمون التستوستيرون ، نسبة الجلوكوز في الدم ، البروتين والكوليسترول). أخذت جميع قياسات الخصية والبربخ من الحيوانات بعد الذبح (وزن وحجم الخصيتين وطول وقطر الخصية ووزن البربخ وطول واحد منهم) أظهر كل من وزن وحجم الخصية زيادة معنوية في جميع المجموعات. خاصة المجموعة التي أعطت مستويات عالية من الخميرة (T4) مقارنة مع المجموعتين الثانية والثالثة.

يستنتج من هذه الدراسة الحالية أن استخدام خميرة الخبز كمكمل في تغذية الحملان أدى الى حصول تحسن الأداء التناسلي على الرغم من عدم وجود تغيرات معنوية في الحالة الانتاجية ومقاييس الدم .

**الكلمات المفتاحية :** خميرة الخبز ، الاداء التناسلي ، الحملان العواسية البالغة.