Menoufia J. Animal, Poultry & Fish Prod., Volume 9 Issue 6 (2025): 105 – 124

MENOUFIA JOURNAL OF ANIMAL, POULTRY AND
FISH PRODUCTION

https://mjapfp.journals.ekb.eg/

EFFECT OF YEAST (*SACCHAROMYCES CEREVISIAE*) SUPPLEMENTATION ON PRODUCTIVE PERFORMANCE, IMMUNE RESPONSE, CECAL MICROBIAL COUNT AND SOME INTESTINAL HISTOMORPHOLOGICAL MEASUREMENTS OF BROILER CHICKS

Zanaty, G. A.; Abd El-Rahman, S. A.; Abou El-Naga, Manal K.;
Hussein, Eman A. and Khalaf, H. M.
Department of Poultry and Fish Production, Faculty of Agriculture, Menoufia University,
Shibin El – Kom, Egypt.

Received: Jun. 1, 2025 Accepted: Jun. 16, 2025

ABSTRACT: A total of one hundred and twenty unsexed, one-day-old Ross 308 broiler chicks were randomly allocated and divided evenly into 4 dietary treatment groups. Every group was represented by birds in 3 replicates of 10 chicks apiece. Broiler chicks were fed dietary treatments as: T1, basal diet without supplementation (control), T2, T3, and T4, fed a basal diet with 0.05, 0.10, and 0.15 g yeast/ kg diet, respectively, throughout the period of 1- 42 days of age. Ad libitum water and feed were supplied during the experimental period. The results indicated that: birds fed diets supplemented with yeast (Saccharomyces cerevisiae, Sc.) achieved the highest body weight gain, the best rate of feed conversion ratio, with a significant decrease in feed intake compared to birds in the control treatment. The percentage of dressing, weight of certaingiblets and weight of some immune organs in the treated birds fed on diets supplemented with yeast were greater compared to the control group birds, and the best of them were the birds of the fourth treatment fed on 0.15 g yeast/ kg of diet at 42 days of age. Adding yeast atvariedlevels (0.05, 0.10, 0.15 g yeast/ kg diet) to the diet led to anote worthy increase ($P \leq 0.05$) in some blood serum components (total protein, globulin, high-density lipoprotein (HDL) and glutathione peroxidase (GPx) activity) and a significant decrease ($P \leq 0.05$) in the level of total lipids and total cholesterol, low-density lipoprotein (LDL) and malondialdehyde (MDA) activity in the blood serum of birds compared to the control group. The concentrations of immunoglobulin (IgA, IgM, and IgG) in the blood serum of birds fed the diets supplemented with yeast were significantly improved ($P \leq 0.05$) compared to the control group. The number of harmful bacteria decreased significantly ($P \leq 0.05$) while the number of beneficial bacteria increased significantly ($P \leq 0.05$) in the intestines of birds fed the diet supplementation with yeast compared to the control group. Histological measurements in the intestines of treatment birds fed on diets supplemented with Sc. showed a significant increase ($P \leq 0.05$) in the height and width of the villi and a significant decrease ($P \leq 0.05$) in the depth of the villi compared to control birds. Economic effectiveness and relative economic efficiency improved by adding yeast (Saccharomyces cerevisiae) at varying levels to the feed, and the highest values were discovered in the fourth treatment (0.91, 146.77, respectively) to which 0.15 g yeast/ kg diet was added versus the control group (0.62, 100, respectively). In general, based on the results obtained from the experiment, from a nutritional and economic perspective, it can be recommended to add yeast (Saccharomyces cerevisiae) to broiler chick diets at a rate of 0.15 g yeast/ kg diet - to obtain the best growth performance, carcass characteristics, oxidative and immune status, and intestinal health, without any negative effects on the health of broiler chicks under the conditions.

Keywords: Yeast, broiler chicks, histomorphological measurements, immune response, performance, and cecal microbial count.

*Corresponding author: eman.hussien@agr.menofia.edu.eg

INTRODUCTION

The progressive reduction and in many instances the complete removal of Antibiotics have now moved towards increasing dependence on several specialized feed ingredients and in-feed additives. This is complemented by the implementation of effective vaccination programs and other management adjustments (Abd El-Atti *et al.,* 2025). Advancements in scientific knowledge and the introduction of alternative products to antibiotics have greatly contributed to promoting the principles of responsibility and reduction in antimicrobial stewardship.

The animal agriculture industry now provides a broad range of antibiotic alternatives to assess and apply in various contexts. Notable among these are prebiotics, probiotics, and organic acid additives, which contribute significantly to maintaining epithelial health and strengthening animals' immune systems (Kumar *et al.,* 2022).

In recent years, Interest in bio-additives has been steadily increasing, with a particular emphasis on optimizing organic additives and introducing innovative ingredients developed through biotechnological processes. This movement leverages living organisms and their byproducts across multiple industries. One area significantly impacted is poultry production, which faces considerable challenges in keeping up with the growing global demand for meat and eggs, driven by consistent population growth. Moreover, a number of countries are phasing out the use of prophylactic antibiotics in animal feed as part of efforts to combat antibiotic resistance in livestock (Fathima *et al.,* 2023).

One of the probiotics that has generated considerable interest in recent research is yeast. Yeast and its derived products were frequently used as feed additives in animal nutrition (Okasha *et al.,* 2023). The main purpose of incorporating these feed additives into livestock diets is to supply the nutrients, enhance the feed's palatability, boost growth performance, and maximize the utilization (Selim *et al.,* 2024). A potential method to boost the productivity of broiler chicks is by supplementing their diet with dry yeast. This addition has been shown to improve nutrient digestibility, gut health, and immune function in various animal species.

Saccharomyces cerevisiae (yeast) products have provided efficient in-feed utilization pathogen reduction (Haldar *et al.,* 2011) and minimizing adverse environmental impacts (Cheng *et al.,* 2014). Yeast can be included in poultry feed in several forms, such as live yeast, dried yeast, fermented products, and yeast cell wall components. In broilers, supplementing yeast has been observed to enhance performance, reduce pathogens, modulate gut microflora, support the immune system, improve intestinal health, and elevate overall meat quality (Roy and Ray, 2023). Yeast comprises α-D mannan, chitin, β-D-glucan, along with calcium, magnesium, and zinc. This study aimed to assess the impact of dietary supplementation with dry yeast (Saccharomyces cerevisiae) on broiler growth performance, carcass characteristics, specific blood serum biochemical indicators, antioxidant status, immune function, cecal microbiota composition, select histomorphological parameters, and the economic efficiency of broiler chicks.

MATERIALS AND METHODS

This study was carried out on a private farm located in Ashmoon, Menoufia Governorate, Egypt, during the experimental period spanning August to September 2023.

1. Experimented diets

Two corn-soybean meal-based diets were developed for broilers to be fed during both the starter phase (1 to 21 days) and the finisher phase (22 to 42 days). These diets were designed to meet the nutritional requirements outlined by the National Research Council (NRC, 1994) and were used as the basis for formulating the basal diet, as shown in Table 1.

The basal corn-soybean meal starter diet contained approximately 22.28% crude protein (CP) and 3,045 kcal of metabolizable energy (ME) per kilogram, while the finisher diet comprised 19.81% CP and 3,118 kcal per kilogram. Both diets were provided in mash form.

The basal starter and finisher diets were further fortified with four graded supplementation levels of *Saccharomyces cerevisiae* (Sc.), namely 0.00, 0.05, 0.10, and 0.15 g /kg diet at respective of (T_1, T_2, T_3, and T_4) during the experimental periods. Yeast (*Saccharomyces cerevisiae*) containing 2 × 10^{13} CFU/ g was provided from Angel Yeast Co., Ltd, Yichang, China. Yeast (Sc.) was mixed with the experimental diets every week.

2. Chick assay procedures

On the day of hatching, 120 mixed-sex Ross 308 chicks were selected for the experiment. Each chick was wing-banded, weighed, and randomly assigned to one of four treatment groups, with three replicates of 10 chicks per group. Efforts were made to ensure that the initial body weights across groups were similar, averaging around 40 g. The chicks were housed in pens with wheat straw litter and reared from day one until 42 days of age. Throughout the six-week experimental period, they were provided with unlimited access to food and water. The management practices for the broiler chicks adhered to the guidelines outlined in the Ross 308 Broiler Commercial Management Guide (Aviagen, 2018). A lighting schedule of 23 hours of lighting followed by 1 hour of darkness was maintained throughout the experiment. The initial temperature was set at 33°C on the first day and was gradually reduced by approximately 2°C per week until reaching 24°C, which was maintained until the end of the study. Environmental conditions, including temperature, humidity, lighting, and ventilation, were kept consistent across all treatment groups. Vaccination protocols were implemented according to breeder standards and were uniform for all experimental groups. All necessary husbandry practices were carefully observed to ensure proper care of the chicks throughout the study.

Table 1: Composition and calculated analysis of the experimental diets fed during the starter (1 – 21) and finisher period (22 - 42) days of age.

Ingredients	**Starter diet (%)**	**Finisher diet (%)**
Ground yellow corn (8.5%)	50.19	56.96
Soybean meal (44%)	40.95	34.01
Vegetables oil	5.03	4.95
Limestone ground	1.34	1.50
Di-calcium phosphate	1.70	1.76
Vitamins and minerals Mixture[1]	0.30	0.30
DL- methionine[2]	0.19	0.22
Salt (sodium chloride)	0.30	0.30
Total	**100**	**100**
Calculated values[3]:		
Crude protein %	22.28	19.81
ME, Kcal/ kg diet	3045.40	3118.33
C/ P ratio	136.69	157.41
Lysine, %	1.32	1.14
Methionine, %	0.37	0.33
Calcium, %	1.06	0.98
Available phosphorus, %	0.46	0.44

[1]Vitamin and mineral mixture at 0.30 % of the diet supplies the following per kilogram of the diet: Vit. A, 12000 IU; Vit. D_3, 3000 IU; Vit. E, 40 mg; Vit. K_3, 3 mg; Vit. B_1, 2mg; Vit. B_2, 6 mg; Vit. B_6, 5mg; Vit. B_{12}, 0.02mg; Nicotinic acid, 45mg; Biotin, 0.075 mg; Folic acid, 2mg; Pantothenic acid, 12mg; Manganese, 100mg; Zinc, 60 mg; Iron, 30mg; Copper, 10mg; Iodine, 1mg; Selenium, 0.2mg; Coblat, 0.1 mg.

[2]DL-methionine: 98% feed grade (98% methionine).

[3]Calculated according to NRC (1994).

3. Growth performance parameters

The following parameters were measured:

- Body weight gain, feed intake, and feed conversion ratio:

The total body weight gain in grams over the entire period (1–42 days) was calculated by subtracting the initial live weight from the final live weight, as follows:

$$BWG = BW_2 - BW_1$$

BW1 represents the body weight at the beginning of a specific period, while BW2 corresponds to the body weight at the end of that same period. The average live body weights and body weight gains were rounded to the nearest gram. For precision, measurements were taken weekly for each replicate, calculated by subtracting the remaining feed from the initially provided amount. To determine the feed intake per chick, the following formula was utilized:

$$FI = \frac{\text{feed intake (g)/ period/ pen}}{\text{Number of birds intaking feed}}$$

Feed intake calculations were conducted over the entire period spanning from day 1 to day 42 of age.

Feed conversion values were determined by dividing the total feed intake per chick by the corresponding weight gain. This was calculated using the following formula (Singh and Panda 1992) as follows:

$$\text{Feed conversion ratio (FCR)} = \frac{\text{Amount of feed intake (g/ bird/ day)}}{\text{Body weight gain (g/ bird/ day)}}$$

- Slaughter and carcass information:

At 42 days of age, six birds from each dietary treatment group were weighed and slaughtered after a 12-hour feed withdrawal period. This was done to measure the empty carcass weight (excluding the head, neck, and legs) and the total weight of giblets (liver, gizzard, and heart), which were expressed as percentages relative to the empty carcass weight. Additionally, the bursa of Fabricius, spleen, and thymus (all lobes on the left side of the neck) were carefully removed and weighed to the nearest milligram. The collected data was then utilized to calculate the dressing percentage using the following method:

$$\text{Dressing\%} = \frac{\text{Empty carcass weight (g) + giblets weight (g)}}{\text{Pre-slaughtering weight (g)}} \times 100$$

Average pre-slaughter weights of birds, empty carcass, liver, gizzard, and total giblets were rounded to the nearest gram.

4. Serum blood parameters, antioxidant activity, and the immunological status of broiler chicks

Blood samples were collected from each bird at the time of slaughter. These samples were transferred into tubes without heparin, and the serum was separated via centrifugation at 3500 rpm for 15 minutes. The serum was then frozen at –20°C until further analysis. Serum total protein and albumin levels were measured using a chemical testing method. Globulin concentrations were calculated by subtracting albumin levels from the corresponding total protein values. Additionally, the albumin/globulin (A/G) ratio was determined by dividing the albumin levels by the globulin levels Coles, 1974). Blood total serum lipids, total cholesterol, and serum high-density lipoprotein (HDL) and low-density lipoprotein (LDL) were determined according to the methods described by Stein and Myers (1995).

The activity of glutathione peroxidase (GPx) was measured in 2 ml of whole blood. The blood was washed and centrifuged at 748 g for 10 minutes, repeated three times using a 0.9% NaCl solution (Hosseini-Vashan *et al.*, 2015). The volume of washed and centrifuged erythrocytes was adjusted to 2 ml using cold, redistilled water. The lysate was then prepared following the instructions provided in the commercial kits from Spectrum Diagnostics, Albour, Cairo, Egypt, for GPx activity analysis. The concentration of serum malondialdehyde (MDA) was measured following the protocol established by Yagi (1984). Spectrophotometric measurements were conducted at 520 nm, and the results were reported as nmol/ml TBARS (thiobarbituric acid reactive substances) index.

Serum immunoglobulins IgA, IgM, and IgG concentrations were measured at 42 days of age. The levels of chicken immunoglobulins (IgA, IgM, and IgG) were determined using commercial ELISA quantification kits specifically designed for chickens. These tests were conducted in a laboratory clinic in Egypt. The total serum immunoglobulin concentration was calculated as the sum of the respective concentrations of serum IgA, IgM, and IgG (Mountzouris *et al.*, 2010).

5. Cecal microbiota account and Histomorphological parameters

During the slaughtering process, similar birds used to assess carcass traits were included in a microbiological study. Six birds from each treatment group were chosen for the collection of cecal content samples. Segments of the cecum, along with their contents, were aseptically retrieved using sterilized scissors, scalpels, and forceps. From each segment, 1 gram of the sample was placed into a sterile 2 ml Eppendorf tube and subsequently stored in a freezer at -20°C. Nutrient agar was used to determine the total bacterial count (TBC), while Eosin Methylene Blue (EMB) agar was applied for the enumeration of total E. coli count (TEC). For Lactobacillus, the colony-forming units (CFU) were assessed using a modified method as described by previous researchers, Baurhoo *et al.* (2007), which differed only in I agar used.

Villus height and crypt depth were assessed using samples from the duodenum and ileum. To obtain these measurements, 2 cm segments from each sample were collected from the midpoint of the tissue, flushed, and preserved in a 10% neutral buffered formalin solution. The segments were then dehydrated through a graded series of alcohols, cleared with methyl benzoate, and embedded in paraffin wax. Thin sections, measuring five micrometers, were prepared, stained with hematoxylin and eosin, and analyzed using digitized images captured by a Bx40 Olympus camera linked to a PC microcomputer via a 3153 data translation card. Morphometric analysis was conducted using HL Image software (Diagnostic Instruments, Inc., Sterling Heights, MI). For each sample, 10 intact and properly oriented crypt-villus units were randomly selected under 40x magnification. Villus height was measured from the top of the villus to the villus-crypt junction, while crypt depth was defined as the measurement of the invagination between adjacent villi.

6. Economic efficiency

The economic efficiency was determined using an input-output analysis approach (Heady and Jensen, 1954), Assuming that other overhead costs remain unchanged, the calculation is as follows: (Price per kg of weight gain – Feed cost per kg of weight gain) / Feed cost per kg of weight gain under experimental conditions.

7. Statistical analysis

Data were statistically analyzed by completely randomized design using the SPSS (2011) program, and the differences among means were determined using the Duncan multiple range test (Duncan, 1955). Percentages were transformed to corresponding arcsine values before performing statically analysis (Snedecor and Cochran, 1982). The following statically model was applied:

$Y_{ij} = \mu + \alpha_i + E_{ij}$ Where: Y_{ij} = Observed traits, μ = Overall mean,

α_i = Effect of treatment (i = 1, 2, 3 and 4) and E_{ij} = experimental random error.

RESULTS AND DISCUSSION

Effect of dietary yeast supplementation on broiler growth performance:

Body weight gain (BWG), Feed intake (FI), and feed conversion ratio (FCR)

The growth performance of birds, including body weight gain, feed intake, and feed conversion ratio, under different experimental dietary treatments (0.00, 0.05, 0.10, and 0.15 g yeast per kg of diet) is summarized in Table 2. The dietary yeast supplementation significantly improved body weight gain ($P \leq 0.05$), with values recorded at 50.84, 53.09, and 55.83 g for T_2, T_3, and T_4, respectively, compared to the control group (T_1, 49.46 g) throughout 1 to 42 days of age. Yeast is widely recognized for its various health benefits in humans and animals. Additionally, yeast and its cell wall components have been extensively utilized as feed supplements in poultry and livestock industries (Abou El-naga *et al*., 2012; Broadway *et al.*, 2015; Hussein and Selim, 2018; Zanaty and Hussein, 2021; and Selim *et al*., 2022). The increased body weight gain observed in chicks fed with yeast throughout the experimental period could be attributed to improved nutrient retention in the broilers. Yeast provides a rich supply of small peptides and free amino acids, which are highly digestible and readily absorbed, potentially enhancing overall broiler performance. The inclusion of S. cerevisiae in broiler diets has demonstrated comparable effectiveness in promoting growth, significantly contributing to their development (Lin *et al.,* 2023, and Roy and Ray, 2023).

The findings of Hussein and Selim (2018) supplementing broiler chicks' diet with 0.25% *S. cerevisiae* and a multi-strain probiotic resulted in higher body weight at 35 days of age compared to the control group. Also, Sampath *et al.* (2021) and Aziz and Abdulrahman (2023) showed that incorporating a yeast supplement into the diet of broilers was shown to significantly enhanced their growth performance, specifically in terms of body weight gain (BWG). The results revealed that yeast exerted a notable impact on BWG throughout the growth phases of the study.

The contrast, Brummer *et al.* (2010) studied yeast cell wall extracts for only fifteen days and Adebiyi *et al.* (2012) used a lower concentration of yeast for the broilers. Both experiments indicated no significant difference in BWG. Similarly, a notable decrease in weight gain was observed in broilers given a diet supplemented with 5% *Saccharomyces cerevisiae,* compared to the control group, under conditions of heat stress (Mohamed *et al.,* 2022). Body weight gain was significantly reduced in broiler turkeys fed a diet supplemented with 1g/kg during 7-8 weeks of age when compared to the control group (Özsoy and Yalçın, 2011).

All experimental chicks from T_2 to T_4 showed lower feed intake compared to chicks in the first group (T_1) during the total experimental period (1-42 days of age). In general, during the experimental period (1- 42 days of age), birds in the fourth treatment (15 g yeast/kg feed) had significantly lower daily feed intake (90.99 g/chick/ day) compared to birds in the first treatment (95.58 g/chick/day, Table 2). The above results agree with He *et al.* (2021), Roy and Ray (2023), and Okasha *et al.* (2023), who showed that feed intake wasloweringg the addition of yeast on broiler diets. Also, Abdalla et al. (2023) it was observed that increasing yeast supplementation in the diet of broiler chicks led to a linear reduction in feed intake. Likewise, Pascual *et al.* (2020) reported that the addition of 250 - 500g of yeast/ton had significantly ($P \leq 0.01$) decreased feed intake (114 to 111g/ d) of broiler chicks.

On the other hand, the present results disagreed with those observed by Zhang *et al.* (2005) and Oyedeji *et al.* (2008), who investigated that the inclusion of different levels of yeast in broiler chicks' diets found no significant effect ($P \geq 0.05$) on feed intake.

The results presented in Table 2 demonstrate the impact of various dietary yeast levels on the feed conversion ratio (FCR) during the experimental period spanning 1 to 42 days of age. The data revealed a significant improvement in FCR with yeast supplementation across this period. Chicks fed the basal control diet (T_1) exhibited an FCR of 1.93 from days 1 to 42, while a gradual improvement in FCR was observed with increasing levels of yeast supplementation (0.05, 0.10, and 0.15 g yeast/kg diet). The most favorable FCR value of 1.63 was recorded for diet T_4, which included 0.15 g yeast/kg diet. Overall, the inclusion of yeast in the basal diet notably enhanced the FCR compared to the control group that did not receive any supplementation in the broiler chicks' diet (Roy and Ray, 2023).

Recent studies have examined the improved feed conversion ratio (FCR) in birds fed with yeast, highlighting reduced feed intake alongside enhanced feed efficiency. These findings were explored by Kumar and Kumari (2021). Enhancements in the feed conversion ratio are associated with the stimulated growth of beneficial intestinal microflora in birds, a result of dietary supplementation with yeast as a probiotic.

The improved performance of Saccharomyces cerevisiae can be linked to its various advantageous components, including vitamin B sources, cellulolytic enzymes, phytase, and cell wall elements such as mannan oligosaccharides (MOS) and glucomannan. These components contribute to better intestinal health and more efficient nutrient utilization. Additionally, this approach may hold promising potential for applications related to Motor Neuron Degenerative Disease (MNDD) (Zhang *et al.,* 2005). The improved FCR values observed in the treatment group receiving yeast supplementation might result from enhanced intestinal morphology and cell proliferation, as indicated by increased villi height and density. This could lead to more efficient feed utilization (Lawrence *et al.*, 2018).

These findings align with those reported by Pascual *et al.* (2020), who observed significant differences in feed conversion ratios when dry yeast and yeast cell wall extracts (YCW) were added, compared to the control group, in broiler chicks aged 1 to 42 days.

Abdalla *et al.* (2023) Supplementing with yeast was shown to significantly improve the feed conversion ratio in broiler chicks compared to the control group. This enhancement can likely be attributed to improved intestinal morphology and increased cell proliferation, as evidenced by higher villi density and height, which may contribute to more efficient feed utilization (Lawrence *et al.,* 2018). Furthermore, the beneficial effects of yeast and yeast derivatives on the gastrointestinal tract, along with the eradication of pathogenic bacteria such as Salmonella and E. coli, may elucidate this phenomenon (Ghosh *et al.,* 2012). Also, early colonization of beneficial yeast may have played a critical role the establishment of favorable microbial environment in the gut, resulting in better feed utilization and nutrient absorption (Shankar *et al.*, 2017). Abo-Sriea *et al.* (2024), the feed conversion ratio showed significant improvement in broiler chicks provided with yeast-derived components (beta-1,3; 1,6 glucose, mannans, and nucleotides) and those treated with florfenicol in water, compared to the control group.

Table 2: Effect of dietary yeast supplementation on body weight gain, feed intake, and feed conversion ratio of broiler chicks during the experimental period (1- 42 days of age).

Dietary treatments[1]	Body weight gain, (g/ chick/ d)	Feed intake, (g/ chick/ d)	Feed conversion ratio, (g feed/ g gain)
T_1	$49.46^{b,2,3}$ ± 0.80	95.58^{a} ± 0.71	1.93^{a} ± 0.03
T_2	50.84^{b} ± 0.88	$93.93a^{b}$ ± 0.59	1.85^{b} ± 0.03
T_3	53.09^{ab} ± 0.67	$92.41a^{b}$ ± 0.57	1.74^{c} ± 0.04
T_4	55.83^{a} ± 0.94	90.99^{b} ± 0.55	1.63^{d} ± 0.04
Significans	*	*	*

[1]T_1, control, basal diet without supplementation, T_2, basal diet + 0.05g yeast/ kg diet, T_3, basal diet + 0.10g yeast/ kg diet, T_4, basal diet + 0.15g yeast/ kg diet;

[2]Mean ± S.E. of 3 replicates treatment;

[3]a, b, c, and ……exe. means within the same column with each different superscript are significantly different (P ≤ 0.05); * significant.

Effect of dietary supplementation on carcass characteristics and immune organs of broiler chicks.

The experimental results on the impact of dietary yeast supplementation on carcass characteristics, giblets, and immune organ parameters at 42 days of age are presented in Table 3. At this age, supplementing the diet with varying levels of yeast (0.05, 0.10, and 0.15 g/kg) led to a significant (P ≤ 0.05) increase in both pre-slaughter and empty carcass weights, with the highest levels of yeast supplementation showing the most pronounced effects. The recorded pre-slaughter weights were 2163 g, 2235 g, and 2350 g, while the empty carcass weights were 1748 g, 1850 g, and 1991 g, respectively. In comparison, the control group (T_1) showed lower values, with a pre-slaughter weight of 2099 g and an empty carcass weight of 1605 g for broiler chicks at 42 days of age (Table 3). According to Çalışlar and Kana (2021) and Maksimović *et al*. (2022), they found that adding *Saccharomyces* improved dressing yield and lowered abdominal fat than the control group of broiler chicks. Also, Roy and Ray (2023) found that adding *Saccharomyces* improved dressing yield, gizzard, and heart weight compared to the control group.

On the other hand, meat quality parameters were not affected by the addition of yeast; this is the finding of Sharif *et al.* (2018). Also, Abo-Sriea *et al*. (2024). It was observed that supplementing 250 Saccharomyces cerevisiae per ton did not produce a significant impact on dressing percentages or yields when compared to the control group. This inconsistency in Sc supplementation could be linked to differences in the type and dose of Sc, alongside variations in dietary composition and the overall health condition of the chicks (Al-Khalaifah, 2018).

The addition of different levels of yeast (T_2, T_3, and T_4) resulted in a decrease in the level of abdominal fat weight in the carcass of broiler (30.22, 29.88, and 28.09g) in comparison with the control group (31.21g). Findings from this research suggest probiotic supplementation in a broiler diet may reduce abdominal fat, possibly lessening costs tied to disposing of abdominal fat waste. These results suggest that the majority of feed energy was utilized efficiently for bird growth, which could otherwise become abdominal fat without a yeast-culture probiotic (PB). The reduction in abdominal fat after introducing yeast to the gut might be due to the presence of *Saccharomyces* in the digestive tract of birds interfering with the absorption of cholesterol and fatty acids, thereby lessening fat absorption and storage in the abdomen of birds fed the probiotic (yeast) supplement. A similar conclusion was also proposed by Roy and Ray (2023) that the inclusion of *S. cerevisiae* in the broiler's diet significantly reduced abdominal fat. Also, Zhang *et al.* (2022) demonstrated that supplementing with 2.0% yeast culture (YC) significantly ($P \leq 0.05$) reduced the abdominal fat percentage in broiler chicks.

In this study, liver and gizzard weights were significantly affected by the nutritional yeast levels (0.05, 0.10, and 0.15 g/kg) compared to the control group at 42 days of age, while the heart was not affected by the yeast addition. In the same evening, adding varying levels of yeast supplementation substantially ($P \leq 0.05$) raised the giblets weight (T_4, 0.15g yeast/ kg diet), which was 148g versus the unsupplemented treatment (T_1, 117g). The greater carcass yield and visceral weight of poultry diets including yeast is a result of the fact that yeast improves digestion and provides additional nutrients, encompassing vitamins and minerals needed for muscle growth (Zhang *et al.*, 2022).

While Li *et al.* (2019) reported an increased carcass yield and gizzard weight by supplementing yeast up to 0.3% in the diets for broilers. Also, Abdel-Hafeez *et al.* (2017), adding three types of feed additives (prebiotic, probiotic, or symbiotic) to broiler diets, enhance the gizzard, spleen, and bursa of Fabricius, and both (excluding the probiotic). Also, the current findings correspond with those documented by Attia *et al.* (2020).

Table 3 also shows the effect of a 0.15g/kg yeast diet on immune organs of the relative weights of the spleen, thymus, and bursa of Fabricius at 42 days of age in broiler chicks. The relative weight of spleen, thymus, and bursa increased by the addition of different levels of yeast, especially the higher level of *Saccharomyces cerevisiae*. The highest values were reported for (0.15g yeast/ kg diet, T_4), being (2.31, 3.59, and 3.93g) for spleen, thymus, and bursa weights, respectively, in comparison with other treatments at 42 days of age. These results agree with those reported by (Sampath *et al.*, 2021). Research demonstrated that birds fed a diet enriched with yeast as a probiotic exhibited heavier immune organs, such as the bursa of

Fabricius and the thymus. *Saccharomyces cerevisiae* contains cell wall components and compounds that enhance the host's immune responses by promoting the production of immune cells and molecules involved in identifying and combating potential pathogens.

Table 3: Effect of dietary yeast supplementation on carcass characteristics and immune organs at 42 days of age of broiler chicks.

Items	Dietary treatments[1]				Sig.
	T_1	T_2	T_3	T_4	
Carcass traits					
Pre-slaughter weight, g	$2099^{d,2,3} \pm 33.41$	$2163^{c} \pm 28.01$	$2235^{b} \pm 25.79$	$2350^{a} \pm 19.77$	*
Empty carcass weight, g	$1605^{d} \pm 20.33$	$1748^{c} \pm 20.02$	$1850^{b} \pm 22.02$	$1991^{a} \pm 21.65$	*
Dressing percentage, %	$82.04^{c} \pm 0.08$	$86.78^{bc} \pm 0.08$	$88.99^{ab} \pm 0.07$	$91.02^{a} \pm 0.09$	*
Abdominal fat, g	$31.21^{a} \pm 1.29$	$30.22^{b} \pm 0.82$	$29.88^{d} \pm 1.92$	$28.09^{b} \pm 2.17$	*
Giblets					
Liver weight, g	$49^{d} \pm 0.59$	$54^{c} \pm 0.59$	$60^{b} \pm 0.82$	$64^{a} \pm 0.86$	*
Gizzard weight, g	$59^{c} \pm 0.82$	$67^{b} \pm 0.86$	$70^{ab} \pm 0.79$	$75^{a} \pm 0.83$	*
Heart weight, g	8.75 ± 0.01	8.29 ± 0.02	8.58 ± 0.02	8.98 ± 0.07	NS
Giblets weight, g	$117^{d} \pm 1.55$	$129^{c} \pm 1.56$	$139^{b} \pm 1.78$	$148^{a} \pm 1.87$	**
Immune organs					
Spleen weight, g	$1.39^{c2,3} \pm 0.03$	$1.44^{c} \pm 0.05$	$1.77^{b} \pm 0.14$	$2.31^{a} \pm 0.02$	*
Thymus weight, g	$2.47^{c} \pm 0.09$	$3.02^{b} \pm 0.12$	$3.42^{a} \pm 0.11$	$3.59^{a} \pm 0.13$	*
Bursa gland weight, g	$3.02^{d} \pm 0.15$	3.17c ± 0.17	3.49b ± 0.19	$3.93^{a} \pm 0.17$	*

[1]T_1, control, basal diet without supplementation, T_2, basal diet + 0.05g yeast / kg diet, T_3, basal diet + 0.10g yeast / kg diet, T_4, basal diet + 0.15g yeast / kg diet;
[2]Mean ± S.E. of 3 replicates treatment;
[3]a, b, c, and ……exe. means within the same row with each different superscript are significantly different ($P \leq 0.05$).
* Significant. NS, Non-significant.

Effect of dietary yeast supplementation on some blood serum biochemical, antioxidant activity, and immune globulin contents of broiler chicks.

Data concerning the effect of different levels of yeast on blood serum constituents at 42 days of age are shown in Table 4. The data revealed that chicks fed diets containing a high level of yeast (T_4, 0.15g/ kg diet) significantly ($P \leq 0.05$) improved total protein, albumen, globulin, and A/ G ratio compared to the control group. Globulin is a source of antibody production, so its level in the serum is a good indicator of immune responses, consequently better disease resistance (Ghazalah *et al.*, 2011, and Abdel-Fattah and Zenat, A. Ibrahiem, 2013).

Our findings agree with Kumar *et al.* (2019) supplemented 1.0, 1.5, and 2.0g/ kg into the broiler's diet and found a significant improvement in the serum concentration of albumen. Okasha *et al.* (2023) reported that the addition of *S. cerevisiae* at levels of 0.25, 0.50, and 0.75 % was significantly ($P \leq 0.05$) of total protein and albumen concentration of broiler chicks blood at 42 days of age in comparison with the control group. Serum trend conducted by Abo-Sriea *et al.* (2024) observed those serum biochemical parameters of birds supplemented with dietary 250g *S. cerevisiae*/ ton revealed significant elevations in serum proteins, albumen, and globulins.

The results of serum total lipids (TL), total cholesterol (TC), high-density lipoprotein (HDL), and low-density lipoprotein (LDL) concentration showed a statistical effect of different levels of yeast in broiler chicks (Table 4). Serum levels of total lipids, total cholesterol, and low-density lipoprotein (LDL) were decreased by different levels of yeast (0.05, 0.10, and 0.15 g/ kg diet; T_2, $T_{3,}$ and T_4) compared to the control group. While the high-density lipoprotein (HDL) was increased (67.80 mg/dl; T_4) compared to (43.01 mg/dl; T_1) at the respective. These results are partially consistent with results Abo-Sriea *et al.* (2024) observed that serum biochemical parameters of birds supplemented with dietary yeast revealed significant evaluations low in serum cholesterol and triglyceride levels. Kannan *et al.* (2005) supported these findings, as they reported that yeast nucleotide supplementation to poultry lowered cholesterol levels due to the ability of yeast to regulate serum cholesterol via bile acid deconjugation.

In contrast, Okasha *et al.* (2023) found insignificant changes in triglycerides and total cholesterol in broiler chickens fed diets supplemented with yeast at doses of 0.25, 0.50, and 0.75%. Similarly, He *et al.* (2021) observed no effect was observed on serum total cholesterol and triglyceride concentrations in broiler chickens fed diets supplemented with yeast at doses of 0.5 and 1.0 g/kg. The variation in results could be due to differences in the supplement levels used.

The results of serum blood glutathione peroxidase (GP_x) and malondialdehyde (MDA) activity showed a statistical effect of dietary different levels of yeast supplementation in broiler chicks (Table 4). Significant variations were observed in serum blood GPx activity and MDA concentration across the treatments. Glutathione peroxidase (GPx) plays a key role in antioxidant defense by catalyzing the reduction of hydrogen peroxide and lipid peroxides into less harmful hydroxides, thereby contributing to oxidative protection. (Brigelius and Leopold, 2020). Also, it is an important index of lipid peroxidation and oxidative damage caused by reactive oxygen (ROS) (Nielsen *et al.*, 1997). Similarly, He *et al.* (2021) reported that malondialdehyde (MDA) was lower in the live yeast supplemented fed group than the control group on day 42, supports the hypothesis that live yeast has a role in antioxidant functions in broilers fed diets with yeast cell wall powder, MDA levels was lower on day 42 (Li *et al.*, 2019). Also, Zhang *et al.* (2022) showed that yeast supplementation decreased MDA contents in the serum of broiler chicken. Similarly, Tagang *et al.* (2013) reported that yeast probiotic supplementation enhanced serum antioxidant enzyme activities in broilers, but they found no effect on MDA levels.

As shown in Table 4, different levels of yeast dietary supplementation in the experiment affected the immunoglobulin (Ig) contents in the serum blood of broiler chicks. Yeast dietary supplementation significantly improved some immunoglobulin (Ig) contents ($P \leq 0.05$) for IgG, IgM, and IgA, respectively. The IgM content was the highest in birds with 0.15g yeast/ kg diet (T_4), while the control group's IgM content was the lowest. IgG and IgA levels were values being, 802.26 and 139.89, then IgG 250.18 and IgA 119.55 for the control group at 42 days of age of broiler chicks. These results are coordinated with Sun *et al.* (2020) noted that the contents of IgA and IgG in serum were significantly increased by yeast-supplemented diet compared to the control groups during 21 and 42 days of age. The results were also similar to other previous findings (Zhang *et al.*, 2014, and Yitbarek *et al.*, 2012). The yeast enhances the immune function and contributes to the health and growth of the broiler, dietary inclusion of yeast-derived (Ding *et al.*, 2019), which justified our current finding for serum immunity. Live yeast cell wall cloud produces same trophic substances and has a role as an immune cofactor (Wang *et al.*, 2022).

Table 4: Effect of dietary yeast supplementation on blood serum parameters, antioxidant status, and immunoglobulin (Ig) contents of broiler chicks at 42 days of age.

Items	Dietary treatments[1]				Sig.
	T_1	T_2	T_3	T_4	
Blood serum parameters					
Total protein, g/dl	$4.26^{c,2,3} \pm 0.15$	$4.45^{b} \pm 0.15$	$4.56^{ab} \pm 0.16$	$4.65^{a} \pm 0.26$	*
Albumin (A), g/dl	$2.35^{c} \pm 0.12$	$2.42^{b} \pm 0.06$	$2.48^{ab} \pm 0.07$	$2.51^{a} \pm 0.06$	*
Globulin (G), g/dl	$1.91^{c} \pm 0.03$	$2.03^{b} \pm 0.04$	$2.08^{ab} \pm 0.05$	$2.14^{a} \pm 0.06$	*
A/G ratio	$1.23^{a} \pm 0.01$	$1.19^{b} \pm 0.02$	$1.19^{b} \pm 0.02$	$1.17^{b} \pm 0.02$	*
Total lipids, mg/dl	$589.11^{a} \pm 0.68$	$450.22^{b} \pm 0.56$	$430.46^{c} \pm 0.66$	$429.37^{c} \pm 0.72$	**
Total cholesterol, mg/dl	$163.29^{a} \pm 0.52$	$152.34^{b} \pm 0.33$	$139.82^{c} \pm 0.47$	$136.03^{c} \pm 0.32$	*
High density lipoprotein (HDL), mg/dl	$43.01^{c} \pm 0.34$	$62.13^{b} \pm 0.44$	$65.73^{ab} \pm 0.52$	$67.80^{a} \pm 0.59$	*
Low density lipoprotein (LDL), mg/dl	$67.29^{a} \pm 0.52$	$59.13^{b} \pm 0.55$	$56.86^{b} \pm 0.52$	$50.13^{c} \pm 0.57$	*
Antioxidant status					
GP_x activity, mg/dl	$1.01^{d} \pm 0.01$	$2.49^{c} \pm 0.04$	$3.42^{b} \pm 0.02$	$3.88^{a} \pm 0.04$	*
MDA activity, mg/dl	$192.63^{a} \pm 0.04$	$156.41^{b} \pm 0.04$	$146.93^{c} \pm 0.02$	$141.39^{c} \pm 0.03$	*
Immunoglobulin contents					
IgG, mg/ml	$250.18^{d} \pm 9.82$	$494.45^{c} \pm 13.72$	$637.26^{b} \pm 19.34$	$802.26^{a} \pm 4.26$	*
IgM, mg/ml	$69.75^{c} \pm 6.13$	$119.23^{b} \pm 6.98$	$122.79^{b} \pm 6.98$	$133.29^{a} \pm 11.73$	*
IgA, mg/ml	$119.55^{c} \pm 3.33$	$135.63^{b} \pm 3.62$	$137.25^{ab} \pm 3.99$	$139.89^{a} \pm 3.92$	*
Total Ig, mg/ml	$439.30^{d} \pm 19.23$	$749.31^{c} \pm 12.75$	$897.30^{b} \pm 20.76$	$1075.44^{a} \pm 22.33$	**

[1]T_1, control, basal diet without supplementation, T_2, basal diet + 0.05g yeast / kg diet, T_3, basal diet + 0.10g yeast / kg diet, T_4, basal diet + 0.15g yeast / kg diet;
[2]Mean ± S.E. of 3 replicates treatment;
[3]a, b, c, and ……exe. means within the same row with each different superscript are significantly different ($P \leq 0.05$).
* Significant. **Highly significant

Effect of dietary yeast supplementation on the cecal content bacterial population of broiler chicks

Our study revealed that dietary supplements contributed to a reduction in *E. coli* when compared to the control group. Conversely, they led to an elevation in *Lactobacillus* levels and total aerobic compared to the control group (Table 5). Birds supplemented with 0.05, 0.10, and 0.15g yeast/ kg diet significantly increased *Lactobacillus* (8.569, 9.873, and 10.022 $\log_{10}$ CFU/ g, respectively) compared to 7.426 $\log_{10}$ CFU/ g for the control group (T_1). On the other hand, *Saccharomyces cerevisiae* yeast addition in broiler diets can lower *E. coli* counts.

Studies have shown that *Saccharomyces cerevisiae* yeast extracts and 0.1% nucleotide supplementation can lower *clostridia* levels (Ismael *et al.*, 2022, and Abo-Sriea *et al.*, 2024). Yeast as a probiotic can be beneficial intestinal bacteria such as *Lactobacillus*, which block the pathogen attachment sites and resist pathogens such as *clostridia* (Yuan *et al.*, 2020). Roy and Ray (2023) showed that the addition of *Saccharomyces cerevisiae*, a yeast-cultured probiotic (PB), significantly reduced E. coli levels in the duodenum and ileum of broiler chicks compared to the control group (P = 0.01). Probiotic-fed groups also exhibited a relatively higher total viable count than the control group.

This is attributed to probiotics supporting normal intestinal microflora through comprehensive and antagonistic exclusion mechanisms. (Mulatu *et al.,* 2019). Supporting commercial lactic acid bacteria while decreasing harmful bacteria can aid in preserving gut morphology and increase broiler production performance (Yang *et al.,* 2009). Furthermore, by greater colonization resistance and stimulating the immunological response, *S. cerevisiae* may operate as a bio-regulator of the gut microbiome and strengthen the host's inherent defenses. A lower *E. coli* count is always desirable in poultry farming, and our results in lowering this pathogenic bacterium are in line with the findings of Mulatu *et al.* (2019). The efficacy of *Saccharomyces* is proven to modulate the gut microbiota and suppress pathogens (Czech *et al.*, 2020). In this study, the tested probiotics, *S. cerevisiae,* were shown to significantly reduce overall *E. coli* count in the small intestine, which might be because of decreasing intestinal pH, boosting the synthesis of volatile fatty acids, and improving nutritional absorption. Similarly, results were reported by Hoque *et al.* (2021) and Roy and Ray (2023).

Table 5: Effect of dietary yeast supplementation on cecal content bacterial population of broiler chicks at 42 days of age.

Bacterial population (log_{10} CFU/ g)	Dietary treatments[1]				Sig.
	T_1	T_2	T_3	T_4	
Lactobacillus	$7.426^{d,2,3} \pm 0.14$	$8.569^{c} \pm 0.16$	$9.873^{b} \pm 0.19$	$10.022^{a} \pm 0.23$	*
***E.coli* count**	$5.83^{a} \pm 0.19$	$3.403^{b} \pm 0.29$	$2.156^{c} \pm 0.40$	$1.792^{d} \pm 0.31$	*
Total aerobic	$8.103^{b} \pm 0.15$	$8.636^{ab} \pm 0.16$	$9.737^{a} \pm 0.19$	$9.896^{a} \pm 0.19$	*

[1]T_1, control, basal diet without supplementation, T_2, basal diet + 0.05g yeast/ kg diet, T_3, basal diet + 0.10g yeast /kg diet, T_4, basal diet + 0.15g yeast/ kg diet.

[2]Mean ±S.E. of 3 replicates treatment;

[3]a, b, c, and ……exe. means within the same row with each different superscript are significantly different ($P \leq 0.05$).

*****Significant.

Effect of dietary yeast supplementation on intestinal morphological parameters of broiler chicks

The average villus height, width, crypt depth, and villus height: crypt depth in duodenum and ileum of broiler chicks measurements at 42 days of age are presented in Table 6. Data showed that significant increase ($P \leq 0.05$) in villi height of duodenum and ileum when added highly yeast supplementation for birds fed 0.15g yeast/ kg diet (T_4); 1679.19 and 793.46 µm as compared with other treatments and control group (1603.13, 1422.02 and 1379.54 µm) for duodenum villus height and 746.29, 693.72 and 672.29 µm for ileum villus height; T_3, T_2 and T_1, respectively. Villi intestine width value being 129.78 and 68.73 µm for T_4 of duodenum and ileum, compared to the control group (103.79 and 49.96 µm), respectively. The results obtained from this study also indicated that adding different levels of yeast to broiler diets resulted in a significant ($P \leq 0.05$) decrease in crypt depth (CD) and a significant ($P \leq 0.05$) increase in villus height: crypt depth ratio at 42 days of age.

The improvement the intestinal health by dietary yeast supplementation was related to genes and anti-microbial peptides genes (Zhang *et al.*, 2023). He *et al.* (2021), higher villus height and an increased villus height-to-crypt depth ratio in the ileum in groups supplemented with live yeast. These enhancements were linked to improved nutrient absorption and greater average daily weight gain during the finisher period. Similarly, studies reported that the inclusion of 0.5% live yeast could elevate the villus height-to-crypt depth ratio in the jejunum and ileum of broilers. (Wang *et al.,* 2017). In another study, Abdaljaleel *et al.* (2018) reported that ileum villus height was improved in broilers fed diets with live yeast wall compared to the control diet. Furthermore, dietary inclusion of live yeast in broilers challenged with succharide was very effective for intestinal absorption and broiler function in broilers (Wang *et al.*, 2021). The dietary addition of live yeast and mannan-oligosaccharide at a concentration of 100 g/kg has been found to positively influence intestinal histomorphology and enhance the growth performance of broilers during both the starter and finisher phases (Tufail *et al.*, 2019).

Dietary supplementation of yeast has been shown to have a positive impact on improving the gut mucosal development in broilers (Abdaljaleel *et al.,* 2018). This study suggests that the enhancement of intestinal morphology in broiler chickens through live yeast supplementation could be attributed to the yeast promoting the release of polyamines into the intestinal lumen. This, in turn, stimulates a higher proliferation rate of intestinal epithelial cells. Supporting this finding, earlier research has shown that yeast supplementation leads to an increase in villus height (Lee *et al.*, 2025 and Roy and Ray, 2023). A significant decrease ($P \leq 0.05$) in crypt depth has found by studies (Czech *et al.*, 2020 and Roy and Ray, 2023) upon *S. cerevisiae* feeding. Villus height is essential for efficient gut functions for boosting health (Matur and Eraslan 2012). The crypt may be thought of as the villus manufacturer, and continual cell turnover is essential for maintaining villi length and hence, absorption compability (Pluske *et al.,* 1997). In our experiment, lower crypt depth in probiotic treated groups might be an indication of greater villi production which indicates that probiotics are efficient for ensuring the gut health of broilers.

Table 6: Effect of dietary yeast supplementation on gut morphology of broiler chicks at 42 days of age (Mean ± S.E.).

Items	Dietary treatments[1]				Sig.
	T_1	T_2	T_3	T_4	
	Duodenum (µm)				
Villus height	$1379.54^{d2,3}$ ± 24.26	1422.02^{c} ±12.67	1603.13^{b} ±14.56	1679.19^{a} ±22.13	*
Villus width	103.79^{c} ±3.25	118.20^{b} ±8.63	125.03^{ab} ±8.69	129.78^{a} ±8.96	*
Crypt depth	691.98^{a} ±19.33	480.84^{b} ±11.77	463.25^{c} ±12.02	387.62^{d} ±11.89	*
Villus height : Crypt depth	1.99^{d} ± 0.05	2.96^{c} ± 0.23	3.46^{b} ± 0.09	4.33^{a} ± 0.12	*
	Ileum (µm)				
Villus height	672.29^{b} ±11.22	693.72^{b}±8.22	756.29^{ab} ±7.36	793.46^{a} ± 8.82	*
Villus width	49.96^{d} ± 2.30	53.47^{c} ± 2.75	61.77^{b} ± 2.56	68.73^{a} ± 2.79	*
Crypt depth	116.75^{a} ± 6.34	88.75^{b}±5.69	63.29^{c}±7.12	60.44^{d}±2.96	*
Villus height: Crypt depth	5.76^{d} ± 0.36	7.82^{c} ± 0.42	11.95^{b} ± 0.39	13.13^{a} ± 0.16	*

[1]T_1, control, basal diet without supplementation, T_2, basal diet + 0.05g yeast/ kg diet, T_3, basal diet + 0.10g yeast /kg diet,T_4, basal diet + 0.15g yeast/ kg diet.

[2]Mean ±S.E. of 3 replicates treatment;

[3]a, b, c, and ……exe. means within the same row with each different superscript are significantly different ($P \leq 0.05$). *Significant.

Effect of dietary yeast supplementation on the economic efficiency of broiler chicks

Data about dietary yeast supplementation on the relative economical efficiency (REE) are presented in Table 7. In comparison with the control treatment (100), the supplementation of yeast improved REE by 11.29, 27.42, and 46.77% for T_2, T_3, and T_4 with supplemented 0.05, 0.10, and 0.15 g yeast/ kg diet. Eltazi *et al.* (2014) studied the effect of feeding broiler chicks on diet containing different levels of backer's yeast

Saccharomyces cerevisiae (Sc.) as probiotic natural feed additive on economic efficiency was studied. Broiler chicks fed, the first group (A), fed on the diet without a feed additive (control group). The other groups B, C, and D were fed on a basal diet supplemented with yeast (Sc.) at levels of 0.1, 0.2, and 0.3%, respectively. The experimental diets were fed for a 7-week duration. The economic evaluation showed that supplementation of dietary (Sc.) improved the performance of broiler chicks and resulted in economic benefits. Profitability ratio (1.12) of group 0.3% yeast (Sc.) was the highest of the test groups. This result agreed with those obtained by Abaza *et al.* (2008), who reported that, addition of (Sc.) at level 0.3% to broiler diet gave the better relative economic efficiency compared to the control diet.

Table 7: Effect of dietary yeast supplementation on economical efficiency of broiler chicks during experimental period.

Items	**Dietary treatments[1]**			
	T_1	**T_2**	**T_3**	**T_4**
Initial body weight, g	39.72	39.70	39.89	39.87
Final body weight, kg	2.12	2.18	2.27	2.38
Body weight gain, kg	2.08	2.14	2.23	2.34
Total revenue[2], LE	156	160.5	167.25	175.5
Feed intake, kg	4.01	3.95	3.88	3.82
Price of one kg feed, LE	24.000	24.008	24.015	24.023
Feed cost, LE	96.24	94.83	93.18	91.77
Net revenue[3], LE	59.76	65.67	74.07	83.73
Economic efficiency[4]	0.62	0.69	0.79	0.91
Relative economic efficiency	100	111.29	127.42	146.77

[1]T_1, control, basal diet without supplementation, T_2, basal diet + 0.05g yeast/ kg diet, T_3, basal diet + 0.10g yeast /kg diet, T_4, basal diet + 0.15g yeast/ kg diet.

[2]Total revenue = live body weight gain × marketing price (75 LE/ 1 kg live body weight according to price, in September 2023).

[3]Net revenue = Total revenue – Feed cost. [4]Economical efficiency = Net revenue / Feed cost.

Conclusion

In general, based on the results obtained from the experiment, from a nutritional and economic perspective, it can be recommended to add yeast (*Saccharomyces cerevisiae*) to broiler chick diets at a rate of 0.15 g yeast/ kg diet - to obtain the best growth performance, carcass characteristics, oxidative and immune status, and intestinal health, without any negative effects on the health of broiler chicks under experimental conditions.

REFERENCES

Abaza, I. M.; Shehata, M. A.; Shoieb, M. S. and Hassan, I. I. (2008). Evaluation of some natural feed additives in growing chick diet. International Journal of Poultry Science, 7 (9): 872 - 879.

Abdalla, O. A. M.; Abdelnaeim, N. S. and Alahmady, S. A. (2023). Clinic pathological Effects of Magnetic Water and Yeast Supplementation (Saccharomyces cerevisiae) on Broilers. Suez Canal Veterinary Medicine Journal, 28 (1): 99 - 113.

Abdaljaleel, R. A.; Al-Ajeeli, M.; Jameel, Y.; Hashim, M. M. and Bailey, C. A. (2018). Assessing effects of yeast cell wall supplementation on threonine requirements in broilers as measured by performance and intestinal morphology. Poultry Science, 97, Issue 7: 2473 - 2478.

Abd El-Atti, M. A.; Ali, A. M.; Roshdy, A. R. and El-Kashef, M. M. (2025). The impact of using yeast or tylosin as growth promoters on the productive performance and Physiological characteristics of broiler quail. Egyptian Journal of Veterinary Sciences, 56 (5): 1043 - 1052.

Abdel-Fattah, S. A. and Z. A. Ibrahiem (2013). Influence of anti-heat stress agents on growth, immunity, lipid oxidation and some physiological traits in Japanese quail during hot summer season. Egyptian J. Anim. Prod., 50 (1): 39 – 52.

Abdel-Hafeez, H. M.; Saleh, E. S.; Tawfeek, S. S.; Youssef, I. M. I. and A. S. A. Daim (2017). Effect of probiotic, prebiotic, and symbiotic with and without feed restriction on performance, hematological indices and carcass characteristics of broiler chickens. Asian-Austral J. Anim. Sci., 30: 672 – 682.

Abou El-Naga (2012). Effect of dietary yeast supplementation on broiler performance. Egypt. Poult. Sci., 32 (1): 95 - 106.

Abo-Sriea, T. M.; Elshaimaa, I.B.; Sobhi, M.; Hassan, N. H.; Elleithy, E. M. M.; Omar, S. A.; A. M. Soliman, F., A. Ramadan (2024). Impact of dietary-nucleotides and *Saccharomyces cerevisiae*-derivatives on growth-performance, antioxidant-capacity, immune-response, small-intestine histomorphometry, caecal-Clostridia, and litter-hygiene of broiler-chickens treated with florfenicol. International Journal Veterinary Science and Medicine, 12 (1): 11 - 24.

Adebiyi, O.A.; Makanjuola, B. A.; Bankole, T. O. and Adeyori, (2012). Yeast culture (*Saccharomyces cerevisae*) supplementation: Effect on the performance and gut morphology of broiler birds. Global Journal of Science Frontier Research Biological Sciences, 12 (6): 1 - 16.

Al-Khalaifah, H. S. (2018). Benefits of probiotics and/or prebiotics for antibiotic-reduced poultry. Poultry Science, 97 (11): 3807 - 3815.

Attia, Y.; Al-Khalaifah, H.; El-Hamid, H. A.; Al-Harthi, M. and El-Shafey, A. (2020). Growth performance, digestibility, intestinal morphology, carcass traits and meat quality of broilers fed marginal nutrients deficiency-diet supplemented with different levels of active Yeast. Livest. Sci., 233, 103945.

Aziz, N. H. and Abdulrahman, N. M. (2023). A study of the effect of adding dry yeast on the productive performance of Ross 308 broiler chicks. Journal of Survey in Fisheries Sciences, 10 (3S) 5690 – 5697.

Baurhoo, B.; Phillip, L. and Ruiz-Feria, C. A. (2007). Effects of purified lignin and mannan oligosaccharides on intestinal integrity and microbial populations in the ceca and litter of broiler chickens. Poultry Science, 86: 1070 – 1078.

Brigelius, R. F. and Leopold, F. (2020). Regulatory phenomena in the glutathione peroxidase superfamily. Antioxidants and Redox Signaling, 33, (7), Review Article.

Broadway P. R.; J. A. Carroll and Sanchez, N. C. (2015). Live yeast and yeast cell wall supplements enhance immune function and performance in food-producing livestock: A Review. Microorganisms, 3: 417 - 427.

Brummer, M.; Rensburg, C. and Moran, C. A. (2010). Saccharomyces cerevisiae cell wall products: the effects on gut morphology and performance of broiler chickens. South African Journal of Animal Science, 40 (1): 14 – 21.

Çalışlar, S. and Kana, R. (2021). A research on the comparative effect of active dry yeast and inactivated stabilized probiotic yeast (Thepax) added at different levels to diets on broiler performance. Turkish Journal of Agriculture - Food Science and Technology, 9 (12): 2219 - 2225.

Cheng, G.; Hao, H.; Xie, S.; Wang, X.; Dai, M.; Huang, L. and Yuan, Z. (2014). Antibiotic alternatives: the substitution of antibiotics in animal husbandry. Frontiers in Microbiology, 5: 217, 1 - 15.

Coles, M. G. H. (1974). Physiological activity and detection: The effects of attentional requirements and the prediction of performance. Biological Psychology, 2 (2): 113 - 125.

Czech, A.; Sembratowicz, W. and Zieba, G. (2020). Effect of the use of Yarrowia lipolytica and *Saccharomyces cerevisiae* yeast with a probiotic in the diet of turkeys on their gut microbiota and immunity. Veterinarni Medicina, 65 (4): 174 – 182.

Ding, B.; Zheng, J.; Wang, X.; Zhang, L.; Sun, D.; Xing, Q.; Pirone, A. and Fronte, B. (2019). Effects of dietary yeast beta-1,3-1,6-glucan on growth performance, intestinal morphology and chosen immunity parameters changes in Haidong chicks. Asian-Australas J. Anim. Sci., 32 (10): 1558 – 1564.

Duncan, D. B. (1955). Multiple Range and Multiple F Tests. Biomet., 11: 1- 42.

Eltazi, S. M.; Mohamed, K. A. and Mohamed, M. A. (2014). Response of broiler chicks to diets containing live yeast as probiotic natural feed additive. International Journal of Pharmaceutical Research and Allied Sciences, 3 (2): 40 - 46.

Fathima, S.; Shanmugasundaram, R.; Sifri, M. and Selvaraj, R. (2023). Yeasts and yeast-based products in poultry nutrition. Journal of Applied Poultry Research, 32(2):100 – 345.

Ghazalah, A.; M.Abd-Elsamee and E. Moustafa (2011). Use of distillers dried grains with solubles (DDGS) as replacement for soybean meal in laying hen diets. International Journal of Poultry Science, 10 (7): 505 – 513.

Ghosh, K.; Haldar, S.; Bedford, M. R.; Muthusami, N. and Samanta, I. (2012). Assessment of yeast cell wall as replacements for antibiotic growth promoters in broiler diets: Effects on performance, intestinal histo-morphology and humoral immune responses. Journal of Animal Physiology and Animal Nutrition, 96 (2): 275 - 284.

Haldar, S.; Ghosh, T. K. and Bedford, M. R. T. (2011). Effects of yeast (*Saccharomyces cerevisiae*) and yeast protein concentrate on production performance of broiler chickens exposed to heat stress and challenged with Salmonella enteritidis. Animal Feed Science and Technology, 168: 61 - 71.

Heady, E. O. and Jensen, H. R. (1954). Farm management economics. Pentice- Hall Inc. Englewood Cliffs, N. J., USA.

He, T.; Mahfuz, S.; Piao, X.; Wu, D.; Wang, W.; Yan, H.; Ouyang, T. and Liu, Y. (2021). Effects of live yeast (Saccharomyces cerevisiae) as a substitute to antibiotic on growth performance, immune function, serum biochemical parameters and intestinal morphology of broilers. Journal Applied Animal Research, 49 (1): 15 – 22.

Hosseini-Vashan, S. G.; Golian, A. and Yaghobfar, A. (2015). Growth, immune, antioxidant, and bone responses of heat stress-exposed broilers fed diets supplemented with tomato pomace. International Journal of Biometeorolog, orginal paper, ISSN 0020-7128 Int J Biometeorol DOI 10.1007/s00484-015-1112-9.

Hoque, M. R.; Jung, H. I. and Kim, I. H. (2021). Effect of yeast culture (*Saccharomyces cerevisiae*) supplementation on growth performance, excreta microbes, noxious gas, nutrient utilization, and meat quality of broiler chicken. The Journal of Poultry Science, 58 (4): 216 - 221.

Hussein, E. and Selim, S. (2018). Efficacy of yeast and multi-strain probiotic alone or in combination on growth performance, carcass traits, blood biochemical constituents, and meat quality of broiler chickens. Livestock Science, 216: 153 - 159.

Ismael, E.; Ismail, E. M.; Khalefa, H. S.; Elleithy, E. M.; Elmosalamy, S. H.; Marouf, Sh. And K. N. Fahmy (2022). Evaluation of *Saccharomyces cerevisiae* yeast fermentate and xylanase in reduced energy diet fed to broiler chicken. International Journal of Veterinary Science, 11 (2): 141 -150.

Kannan, M; R. Karunakaran; V. Balakrishnan, and T. Prabhakar (2005). Influence of prebiotics supplementation on lipid profile of broilers. Int. J. Poult. Sci., Citeseer.

Kumar, S.; Yadav, S. P.; Chandra, G.; Sahu, D. S.; Kumar, R.; Maurya, P. S. and Ranjan, K. (2019). Effect of dietary supplementation of yeast *(Saccharomyces cerevisiae*) on performance and hemato-biochemical status of broilers. Indian Journals. com, 54 (1), 15-19.

Kumar, H. and Kumari, S. (2021). Effect of probiotics on growth performance and carcass characteristics in broilers at farmer's door. Advances in Research, 21 (5): 1 - 5.

Kumar, A.; Sharma, N. K.; Kheravii, S. K.; Keerqin, C.; Ionescu, C.; Blanchard, A. and Wu, S. B. (2022). Potential of a mixture of eugenol and garlic tincture to improve performance and intestinal health in broilers under necrotic enteritis challenge. Animal Nutrition, 8: 26 – 37.

Lawrence, A. O. O.; A. A. A. Saka, Okotie, U. J.; Awodele, O. A. and Isegbe, E. I. (2018). Effect of yeast (*Saccharomyces cerevisiae*) supplementation on the growth performance, haematological and serum biochemical parameters of broiler chicken. Nigerian Journal of Animal Science, 20 (1): 119 – 125.

Lee, J.; Goo, D.; Sharma, M. K.; Ko, H.; Shi, H.; Paneru, D.; Sesha, V.; Choppa, R.; Liu, G. and Kim, W. K. (2025). Effects of graded yeast cell wall supplementation on growth performance, immunity and intestinal development of broiler chickens raised in floor pens for 42 days. Poultry Science, 104 (2): 1 - 9.

Li, C.; Wang, J.; Zhang, H.; Wu, S.; Hui, Q.; Yang, C.; Fang, R. and Qil, G. (2019). Intestinal morphologic and micro biota responses to dietary *Bacillus spp*. in a broiler chicken model. Original Research article, Frontiers in Physiology, 9 (1), 1 - 18.

Lin, J.; Comi, M.; Vera, P.; Alessandro, A.; Qiu, K.; Wang, J.; Wu, S. G.; Qi, G. H. and Zhang, H. J. (2023). Effects of *Saccharomyces cerevisiae* hydrolysate on growth performance, immunity function, and intestinal health in broilers. Poultry Science 102 (1): 102 - 237.

Maksimović, Z.; Starčević, M.; Šefer, D.; Janjić, J.; Radovanović, A.; Radulović, S. and Marković, R. (2022). Effects of adding different dosages of *Saccharomyces cerevisiae* in diet on growth performance, carcass characteristics, intestinal morphology, and gut microflora of broilers. Kafkas Univ. Vet. Fak. Derg., 28, 461- 468.

Matur, E. and Eraslan, E. (2012). The impact of probiotics on the gastrointestinal physiology. New Advances in the Basic and Clinical Gastroenterology, 1 (1): 51 - 74.

Mohamed, H. E.; Ibrahim, W. A. and Gaafar, R. E. (2022). Impact of Moringa olifera leaves or saccharomyces supplementation on carcass quality, mRNA of heat shock proteins and antioxidants in broilers exposedto heat stress. SVU-International Journal of Veterinary Sciences, 5 (4): 193 - 227.

Mountzouris, K. C.; Tsitrsikos, P.; Arvaniti, A.; Mohnl, M.; Schatzmayr, G. and Fegeros, K. (2010). Effects of probiotic inclusion levels in broiler nutrition on growth performance, nutrient digestibility, plasma immunoglobulins, and cecal microflora composition. Poult. Sci., 89 (1): 58 - 67.

Mulatu, K.; Ameha, N. and Girma, M. (2019). Effects of feeding different levels of baker's yeast on performance and hematological parameters in broiler chickens. Scienceline Publication J. World Poult. Res., 9 (2): 38 - 49.

Nielsen, F.; Mikkelsen, B. B.; Nielsen, J. B.; Andersen, H. R. and Grandjean, P. (1997). Plasma malondialdehyde as biomarker for oxidative stress: reference interval and effects of life-style factors. Clinical Chemistry, 43 (7): 1209 – 1214.

NRC (1994). Nutrient Requirements of Poultry (9th Ed.). National Academy Press, Washington, DC.

Okasha, E. G.; Hassan, H. A. and Ismail, Z. S. H. (2023). Effects of yeast (*Saccharomyces cerevisiae*) supplementations on the blood parameters and productive performance of broiler chickens. SVU- International Journal of Agricultural Sciences, 5: 130 – 140.

Oyedeji, O. J.; Ajayi, H. I. and Egere, T. (2008). The effects of increasing levels of yeast culture (Levucel SB) in high fiber diet on the performance and nutrient retention of broiler chicks. Asian Journal of Poultry Science, 2 (1): 53 – 57.

Özsoy Bülent, B. and Yalcin, S. (2011). The effects of dietary supplementation of yeast culture on performance, blood parameters and immune system in broiler turkeys. Ankara Üniversitesi Veteriner Fakültesi Dergisi, 58: 117 - 122.

Pluske, J. R.; Hampson, D. J. and Williams, I. H. (1997). Factors influencing the structure and function of the small intestine in the weaned pig: a review. Livest. Prod. Sci. 51: 215 – 236.

Pascual, A.; Pauletto, M.; Giantin, M.; Radaelli, G.; Ballarin, C.; Birolo, M.; Zomeño, C.; Dacasto, M.; Bortoletti, M.; Vascellari, M.; Xiccatoand, G. and Trocino, A. (2020). Effect of dietary supplementation with yeast cell wall extracts on performance and gut response in broiler chickens. Journal of Animal Science and Biotechnology, 11 (40): 1 - 11.

Roy, B. C. and Ray, B. C. (2023). Potentiality of *Saccharomyces cerevisiae* in replacing antibiotic growth promoters on growth, gut microbiology, histology, and serum antibody titers of commercial broilers. The Journal of Applied Poultry Research, 32: 100352, 1 - 13.

Selim, S.; AbdelMegeid, N. S.; Khalifa, H. K.; Fakiha, K. G.; Majrashi, K. A. and Hussein, E. (2022). Efficacy of various feed additives on performance, nutrient digestibility, bone quality, blood constituents, and phosphorus absorption and utilization of broiler chickens fed low phosphorus diet. Animals, 12 (1): 17 – 42.

Selim, S. A.; N. S. Abdel-Megeid, Y. R. Alhotan; Z. A. Ebrahim and E. A. Hussein (2024). Nutraceuticals vs. antibiotic growth promoters: differential impacts on performance, meat quality, blood lipids, cecal microbiota, and organ histomorphology of broiler chicken. Poultry Science, 103(2) 1 - 15.

Singh, K.S. and Panda, S. (1992). Feed additives. In: Poultry Nutrition. 2nd ed. Kalyani Publ. Dellu, pp. 134 - 143.

Sampath, V.; Han, K. and Kim, I. H. (2021). Influence of yeast hydrolysate supplement on growth performance, nutrient digestibility, microflora, gas emission, blood profile, and meat quality in broilers. Journal of Animal Science and Technology, 63 (3): 563 - 574.

Shankar, P. A.; Premavalli, K.; Omprakash, A. V.; John Kirubakaran, J. and Hudson, G. H. (2017). Effect of dietary yeast supplementation on the production performance of broiler. International Journal of Advanced Biological Research, 7 (2): 222 - 228.

Sharif, M.; Shoaib, M.; Rahman, M. A. U.; Ahmad, F. and Shahid Ur Rehman (2018). Effect of distillery yeast sludge on growth performance, nutrient digestibility and slaughter parameters in Japanese quails. Scientific Report 8 Article number: 8418.

Snedecor, G.W. and Cochran, W.G. (1982). Statistical Method. 7th Edition, Iawa State University Press, Ames, 325 - 330.

SPSS (2011). SPSS 11.0 for Windows. SPSS Inc., Chicago. Standardization administration of China. 2005. National Feed Industry Standards for Enzyme Assays in China.

Stein, E. A. and Myers, G. L. (1995). National cholesterol education program recommendations for triglycerides measurement: executive. Clinical Chemistry, 41: 1421 - 1426.

Sun, Z.; T. Wang; N. Demelash; S. Zheng; W. Zhao; W. Chen; X.. Zhen and G. X. Qin (2020). Effect of yeast culture (Saccharomyces cerevisiae) on broilers: A preliminary study on the effective components of yeast culture. Animals, 10 (68): 1 - 18.

Tagang, A.; Kawu, M.; Raji, M.; Dzenda, T.; Govwang, F.; Sinkalu, V. and Ayo, J. (2013). Effect of yeast Probiotic on growth, antioxidant enzyme activities and malondialdehyde concentration of broiler chickens. Antioxidants, 2: 326 - 339.

Tufail, M.; Chand, N.; Shakoor, A.; Khan, R. U.; Mobashar, M. and Naz, Sh. (2019). Mannanoligosaccharide (MOS) in broiler diet during the finisher phase: 2. Growth traits and intestinal histomorpholgy. Pakistan J. Zool., 51 (2): 597 - 602.

Wang, S.; Peng, Q.; Jia, H. M.; Zeng, X. F.; Zhu, J. L.; Hou, C. L.; Liu, X. T.; Yang, F. J. and Qiao, S. Y. (2017). Immunology, health and disease prevention of *Escherichia coli* infection in broiler chickens with *Lactobacillus plantarum* B1. Poultry Science, 96: 2576 – 2586.

Wang, T.; Cheng, K.; Yu, C. Y.; Li, Q. M.; Tong, Y. C.; Wang, C.; Yang, Z. B. and Wang, T.

(2021). Effects of a yeast-derived product on growth performance, antioxidant capacity and immune function of broilers. Poultry Science, 100 (1), 22 - 31.

Wang, T.; Cheng, K.; Yu, C.; Tong, Y.; Yang, Z. and Wang, T. (2022). Effects of yeast hydrolysate on growth performance, serum parameters, carcass traits, meat quality and antioxidant status of broiler chickens. J. Sci. Food Agric., 102: 575 – 83. doi: 10.1002/jsfa.1138.

Yagi, K. (1984). Assay of blood plasma or serum. Methods Enzymol., 109: 328 -331.

Yang, Y.; Iji, P. A. and Choct, M. (2009). Dietary modulation of gut microflora in broiler chickens: a review of the role of six kinds of alternatives to in-feed antibiotics. World's Poultry Science Journal, 65: 97 – 114.

Yitbarek, P. A.; Echeverry, H.; Brady, J.; Hernandez-Doria, J.; Camelo-Jaimes, G.; Sharif, S.; Guenter, W.; House, J. D. and Rodriguez-Lecompte, J. C. (2012). Innate immune response to yeast-derived carbohydrates in broiler chickens fed organic diets and challenged with *Clostridium perfringens*. Poultry Science, 91 (15): 1105 - 1112.

Yuan, X.; Liang, L.; Liu, K.; Xie, L.; Huang, L.; He, W.; Chen, Y. and Xue, T. (2020). Spent yeast as an efficient medium supplement for fucoxanthin and eicosapentaenoic acid (EPA) production by Phaeodactylum tricornutum. Journal of Applied Phycology, 32 (1): 59 – 69.

Zanaty, G. A. and Hussein, E. A. (2021). Effect of adding different sources of probiotics to diets containing oxidized palm oil on some productive and reproductive traits in Gimmizah laying hens. Egyptian J. Nutrition and Feeds, 24 (3): 411- 429.

Zhang, A. W.; Lee, B. D.; Lee, S. K.; Lee, K. W.; An, G. H.; Song, K. B. and Lee, C. H. (2005). Effects of yeast (Saccharomyces cerevisiae) cell components on growth performance, meat quality, and ileal mucosa development of broiler chicks. Poultry Science, 84: 1015 – 1021.

Zhang, Z.; Ji, H.; Gong, G.; Zhang, X. and Tan, T. (2014). Synergistic effects of oleaginous yeast Rhodotorula glutinis and microalga Chlorella vulgaris for enhancement of biomass and lipid yields. Bioresource Technology, 1(164): 93 - 99.

Zhang, J.; Yang, Y.; Lei, X.; Wang, Y.; Li, Y.; Yang, Z. and Yao, J. (2023). Active dry yeast supplementation benefits ruminal fermentation, bacterial community, blood immunoglobulins, and growth performance in young dairy goats, but not for intermittent supplementation. Animal Nutrition, 13: 289 - 301.

Zhang, X.; Liang; H.; Xu, L.; Zou, B.; Zhang, T.; Xue, F. and Qu, M. (2022). Rumen fermentative metabolomic and blood insights into the effect of yeast culture supplement on growing bulls under heat stress conditions. Frontiers in Microbiology, 13, 947822.

تأثير إضافة الخميرة على الأداء الإنتاجى، الإستجابة المناعية، عدد ميكروبات الأعور وبعض الصفات الهستولوجية لأمعاء كتاكيت اللحم

جمال عبد الستار زناتى، سيد عبد الفتاح عبد الرحمن، منال كمال أبو النجا، إيمان عاشور حسين، حامد محمد خلف

قسم إنتاج الدواجن والأسماك – كلية الزراعة – جامعة المنوفية – مصر.

الملخص العربى

استخدم في هذه الدراسة عدد 120 كتكوت تسمين روص 308 - عمر يوم غير مجنس. قسمت الكتاكيت عشوائيا إلى 4 معاملات غذائية تجريبية متماثلة - احتوت كل معاملة على 3 مكررات بكل منها 10 كتاكيت. غذيت كتاكيت المعاملة الأولي على العليقة الأساسية (كنترول) بدون أي إضافة، ومن المعاملة الثانية إلى الرابعة أضيف إلى العليقة الأساسية مستويات مختلفة من الخميرة 0,05، 0,10 و0,15 جم/ كجم عليقة على التوالي خلال الفترة من 1 إلى 42 يوم من العمر. قدمت العلائق والماء بصورة حرة للطيور .وأشارت النتائج إلى أن: جميع الطيور التي غذيت على علائق مضافة إليها الخميرة (*S. cerevisiae*) حققت زيادة في وزن الجسم المكتسب، أفضل معدل تحويل غذائي، انخفاض معنوى في استهلاك الغذاء مقارنةً بطيور معاملة الكنترول. وتفوقت كتاكيت المعاملة الرابعة التي غذيت على ٠,١٥ جم خميرة/ كجم عليقة على طيور جميع المعاملات الأخرى. كانت نسبة التصافي، وزن بعض الأحشاء المأكولة ووزن بعض الأعضاء المناعية فى طيور المعاملات التى غذيت على علائق مضاف إليها الخميرة (*S. cerevisiae*) أعلى مقارنة بطيور مجموعة الكنترول، وكان أفضلها طيور المعاملة الرابعة التي غذيت على ٠,١٥ جم خميرة/ كجم عليقة. أدت إضافة الخميرة بمستوياتها المختلفة (0,05، 0,10 و0,15 جم خميرة/ كجم عليقة) إلى العليقة إلي زيادة معنوية ($P \leq 0.05$) لبعض مكونات سيرم الدم (البروتين الكلي، الألبيومين والجلوبيولين، الكوليستيرول عالي الكثافة (HDL) ونشاط إنزيم الجلوتاثيون بيرأوكسيديز (GP_x)) وإنخفاض معنوى ($P \leq 0.05$) فى مستوي الدهون الكلية، الكوليستيرول الكلى، مستوي الكوليستيرول المنخفض الكثافة (LDL) ونشاط إنزيم المالون داي ألديهايد (MDA) في سيرم الدم مقارنة بطيور مجموعة الكنترول. تحسنت معنويا ($P \leq 0.05$) تركيزات الإميونوجلوبيولين (IgA, IgM, IgG) فى سيرم دم الطيور المغذاه على العلائق المضاف إليها الخميرة مقارنة بمجموعة الكنترول. انخفضت معنويا ($P \leq 0.05$) أعداد البكتيريا الضارة بينما زادت معنويا ($P \leq 0.05$) أعداد البكتيريا النافعة في أمعاء الطيور المغذاه على العلائق المضاف إليها الخميرة مقارنة بمجموعة الكنترول. كما أوضحت القياسات الهيستولوجية في أمعاء طيور المعاملات التى غذيت على علائق مضاف إليها الخميرة زيادة معنوية ($P \leq 0.05$) فى إرتفاع وعرض الخملات وانخفاض معنوي ($P \leq 0.05$) فى عمق الخملات مقارنة بطيور معاملة الكنترول. تحسنت الكفاءة الاقتصادية والكفاءة الاقتصادية النسبية بإضافة الخميرة بمستوياتها المختلفة إلى العلائق وكانت أعلي قيم للمعاملة الرابعة (0,91، 146,77 على الترتيب) المضاف إليها 0,15 جم خميرة/ كجم عليقة مقارنة بمجموعة الكنترول (0,62، 100 على الترتيب). بصفة عامة وبناءً على النتائج المتحصل عليها من التجربة، من الناحية الغذائية والاقتصادية يمكن التوصية بإضافة الخميرة (*Saccharomyces cerevisiae*) إلى علائق كتاكيت التسمين بمعدل 0,15 جم خميرة/ كجم عليقة – للحصول على أفضل أداء للنمو، صفات ذبيحة، حالة تأكسدية ومناعية وصحة الأمعاء، دون حدوث أي تأثيرات سلبية على صحة كتاكيت اللحم تحت ظروف التجربة.