96 Egypt. J. Vet. Sci. **Vol. 56**, No. 5, pp. 1043-1052 (2025)

Egyptian Journal of Veterinary Sciences

https://ejvs.journals.ekb.eg/

The Impact of Using Yeast or Tylosin as Growth Promoters on the Productive Performance and Physiological Characteristics of Broiler Quail

Mai A. Abd El-Atti, A. M. Ali, A. R. Roshdy and M. M. El-Kashef

Department of Animal and Poultry Production, Faculty of Environmental Agricultural Sciences, Arish University, Egypt.

Abstract

THIS STUDY investigated the effect of utilizing antibiotic (Tylosin) and yeast (*Saccharomyces cerevisiae*), as growth promoters, on the quail chicks' growth performance from day one to forty-two. During the first week of the trial, a basal diet consisting of 24% protein and 2800 Kcal ME/kg was given to each chick. From day seven of age, chicks were randomly divided into seven treatments (30) quail chicks each / three replicates. The dietary treatments were T1; control, chicks received basal diet, and T2, T3, and T4; chicks received basal diet + 1, 2 and 3 g yeast /kg diet, respectively. Whereas, T5, T6 and T7; chicks received basal diet + 0.1, 0.2, and 0.3 g Tylosin /kg diet, respectively. The findings demonstrated that chicks fed on a diet with 3 g yeast /kg diet had the heaviest final body weight and the best FCR ($P \leq 0.05$). In contrast to the other treatments, chicks received a diet with 2 g yeast /kg diet had the lowest feed intake. While, those fed on the diet with 0.1 g Tylosin /kg diet had higher feed intake ($P \leq 0.05$). When compared to the control group, the birds fed a diet containing 2 and 3 g/kg of yeast had the highest values of net revenue and economic efficiency. When comparing the various therapies to the control group, there was a statistically significant effect on blood biochemical markers. Conclusively, the results conclude that when yeast (*Saccharomyces cerevisiae*) was added to broiler quail's diet, both performance and economic efficiency increased without any adverse effects.

Keywords: Yeast, Tylosin, Growth performance, Blood parameters.

Introduction

Yeast has been recognized as an important additive in broiler chicken diets due to its rich nutritional content and beneficial effects on bird health and performance [1]. *Saccharomyces cerevisiae* is the yeast species most frequently utilized in poultry nutrition as a probiotic or prebiotic. [2]. This yeast has a lot of nutrients and also contains polysaccharides [3]. Diets containing Yeast have a significant impact on the absorption, retention, and activity of digestive enzymes, all of which can lead to increased growth in broiler chickens. [4]. And play an essential role in promoting microbial balance in the intestines of poultry [1].

Yeast has numerous positive impacts on animals, including growth rate, feed efficiency and animal health [5]. Since roughly 50 years ago, the poultry industry has employed antibiotic growth promoters (AGPs) to enhance poultry performance [6].

Antibiotics, which are produced by microorganisms, are natural substances utilized to stop the expansion of dangerous bacteria. Using them as feed for animals and poultry has been a common practice for many years. Besides their antimicrobial properties, antibiotics are also utilized as growth enhancers and to prevent or treat infectious diseases, which can lead to overall physiological improvements [7]. The poultry industry's expansion and prosperity have been greatly aided by the use of antibiotics in poultry feed by promoting growth, improving growth performance, reducing mortality rates and improving the overall health of poultry flocks [8]. Tylosin is frequently employed in the production of poultry, including quail farming, owing to its efficacy in combating a range of bacterial pathogens. This antibiotic is derived from Streptomyces fradiae and is considered one of the

*Corresponding authors: Mai A. Abd El-Atti, E-mail. jakoupmai@gmail.com:, Tel.: 01207097968
(Received 31/03//02024, accepted 25/05/2024)
DOI: 10.21608/EJVS.2024.278364.1944

most potent antimicrobial agents against several types of mycoplasma [9].

Therefore, this study objective was to assess how the quail diets including yeast (*Saccharomyces cerevisiae*) and antibiotic (Tylosin) affected the performance, selected blood parameters, digestibility coefficient and economic efficiency.

Material and Methods

Ethical approval

The birds were dealt with humanely and were placed in the laboratory under sterile conditions. The researcher obtained all ethical approvals from Fac. Environ. Agric. Sci., Arish University to start the study.

Experimental birds and design

Two hundred and ten quail chicks (a day-old), with similar live weights, were chosen for this study. Quail chicks were initially fed a basic diet comprising 24% protein and 2800 Kcal ME/kg diet for one week. At seven day of age, the chicks were split up into seven treatments at random, each consisting of three replicates of ten birds. The birds were raised for 42 day. Yeast (*Saccharomyces cerevisiae*) and antibiotic (Tylosin) were used as growth promoters in quail diets according to a completely randomized design.

This study included 7 experimental treatments as following.

TABLE 1. Experimental Design

Groups	Dietary treatment
T1	Basal diet (Control)
T2	Basal Diet+1 g. yeast / kg diet
T3	Basal Diet+2 g. yeast / kg diet
T4	Basal Diet+3 g. yeast / kg diet
T5	Basal Diet+0.1 g. antibiotic / kg diet
T6	Basal Diet+0.2 g. antibiotic / kg diet
T7	Basal Diet+0.3 g. antibiotic / kg diet

During the duration of the trial, the birds had free access to feed and water and were kept in battery cages with identical environmental and administrative settings. A feeder of 1 m was allocated for each 30 birds and an automatic drinker for each battery with multiple roles. Artificial light was available 24 hours a day. In order to maintain the necessary brood temperature, which was 34-36 ºC for the first week and 4 ºC lower each week for the following 5 weeks, electric heaters (equipped with thermostats) were utilized. During the fifth- and sixth-week temperature was maintained at 22-24ºC.

Experimental Diets

The basal diets used in the experiment were created based on the nutrient requirements recommended by NRC [10] for growing Japanese quail, and Table (2) presents the composition and calculated formulation of the basal diets used during the starting and growing periods.

Measurements

Growth performance

Throughout the experiment, daily records of mortality were kept. To calculate body weight gain (BWG, g), feed intake was tracked daily and body weight was recorded once a week.

BWG = final weight (g) – initial weight (g).

Feed conversion ratio (FCR) was calculated as the amount of feed required (g) for producing a unit of gain (g) based on the equation that follows:

FCR = feed intake (g)/weight gain (g).

Blood biochemical changes

At random, three birds were chosen from each replication, and their blood samples (5 ml) were taken in the morning before feeding, at the conclusion of the 42-day experimental period. To get serum, samples were gathered in test tubes devoid of heparin. Blood samples were kept until analysis after being centrifuged for 20 minutes at 3500 rpm. Serum samples were collected and then subjected to biochemical analysis of each parameter in accordance with the precise instructions provided by the kit manufacturer. Total cholesterol, albumin, and total protein were measured using the procedures outlined [11].

Digestibility trial and chemical analysis:

At 42 day of age, seven digestibility trials were conducted. Nine male birds were kept in individual cages for each trial, and for three days, they were given the experimental diets to help them get adjusted to their surroundings.

Excreta was quantitatively collected every 24 hours, sprayed with 2% boric acid solution to prevent ammonia loss, and daily intake was noted during the five-day collection period. After being free of feathers, the excreta were weighed and dried for 36 hours at 60 ºC in an oven. After that, the samples were pulverized and put in screw-top glasses for analysis.

According to the Association of Official Analysis [12], proximate analyses of the experimental diets and dried excreta were conducted for moisture, ash, dry matter (DM), organic matter

(OM), crude protein (CP), crude fibre (CF), ether extract (EE), and nitrogen free extract (NFE).

Economic Evaluation

The price of the quail birds and the feed components on the local market were used to compute the economic efficiency (EE, in percent) of the experimental diets:

Nr = Tr – Tc

EE (%) =) (Nr / Tc) × 100.

Where net revenue, total revenue, and total cost are represented, respectively, by Nr, Tr, and Tc. Assuming that the control diet REE is 100%, the relative economic efficiency (REE) is calculated by dividing the EE by the EE of the control diet.

Statistical Analysis

The data were subjected to analysis of variance (ANOVA) using the general linear model (GLM) procedure of the statistical analysis system institute [13]. Duncan's Multiple Range Test was used to compare means [14]. A value of $P < 0.05$ was considered statistically significant.

The ANOVA models used were:

$$Yij = \mu + Ti + Eij$$

Were:

Yij = the observation of ij.

μ = the overall mean.

Ti = the effect of i (treatments).

Eij = the experimental randomly error.

Results and Discussion

Growth Performance

From day 7 to day 42 of age, the quails fed diets with 3g yeast /kg diet had greater (P<0.05) final body weight (BW) and body weight gain (BWG) in contrast to those of quails of the other treatments. The chicks fed a diet with 0.1g Tylosin /kg diet had the greatest feed intake (P<0.05), Conversely, the birds with the lowest feed intake were those fed a diet containing 2g/kg of yeast. By introducing dietary yeast at levels of 2g/kg and 3g/kg at the conclusion of the experiment period, the feed conversion ratio was significantly enhanced (P<0.05) in comparison to the other groups.

The positive effects of yeast, including as enhanced nutritional digestibility, pathogen suppression, and interaction with the gut immune system, may be responsible for this improvement [15].

The outcomes support the conclusions made by [16] who found that the weight gain of quail birds was significantly improved by adding 3 g of yeast (*Saccharomyces cerevisiae*)/kg to the basal diet. Furthermore, [17] observed that hens supplemented with Neomycin (an antibiotic) and given diets with a probiotic yeast product of 3.0 g per kilogram meal had considerably larger bodies than the chickens in the control and nutrition groups. Also, [18] discovered that compared to the control group, broiler chicks fed diets comprising 3.0 g yeast/kg acquired more body weight and had a higher feed conversion ratio.

Moreover, [19] found that Japanese quails can benefit from increased dietary concentrations of 3.5% yeast to improve their growth performance. However, [20] noted that adding 2.0 g of probiotic yeast (*S. cerevisiae*) per kg to broiler diets enhanced feed conversion ratio and body weight gain. Also, [21] observed that giving birds diets containing yeast (*Saccharomyces cerevisiae*) at 1% or 2% of the basal diet improved body weight and body gain more than feeding them the control diet (P<0.05).

Furthermore, several writers discovered that elevating the yeast level boosted body weight. Also, [22] verified that probiotic yeast of *S. cerevisiae* origin increased BWG and FCR while decreasing feed intake when introduced to the diet of broiler chickens at a level lower than 10 g/kg feed. Yeast (*S. cerevisiae*) at 0.5 and 1.0 g/kg could be used to improve the nutritional digestibility, growth performance, and overall performance of broiler diets.

Conversely, several studies have demonstrated that the nutritional digestibility, enzyme activity, meat production, flock uniformity, mortality, and growth performance of healthy broiler chickens are not significantly affected by yeast prebiotic supplements [23]. Studies conducted by [24] demonstrated that laying hens body weight gain was not significantly affected by the addition of yeast to their diets at levels of 2, 3, and 4 g/kg. Additionally, [25] found that adding *Saccharomyces cerevisiae* to broiler diets at 0, 2.5, 5, and 7.5 g/kg did not significantly impact the birds carcass features or performance metrics.

Blood constituents

Table (4) displays the statistical analysis of the blood components in each of the several treatments. The study's findings showed that adding yeast to the diet at various levels (1, 2 and 3 g/kg) had no discernible effects on the levels of high-density lipoprotein (HDL), low-density lipoprotein (LDL), or the A/G ratio in contrast to the control group. Conversely, [1] found that broiler chicks fed diets comprising 3 and 4 g yeast /kg had higher HDL and LDL values than chicks fed the control diet.

According to the study's findings, quail chicks' blood total protein, albumin, and globulin concentrations significantly decreased when yeast was added to their diet at levels of 1, 2, and 3 g/kg after comparison with the control group, which had the highest values.

This outcome is in line with the finding of [26], who revealed that broiler chicks fed yeast had lower blood albumin levels than the control group. Also, [19] found that as compared to the group that did not receive yeast supplementation, adding yeast (at a range of 0.5 up to 3.5%) to the diet significantly raised the levels of serum total protein. In addition, [5] found that when Japanese quails were fed a meal enriched with 3 and 4 mg yeast/kg, respectively, their levels of albumin and total protein increased in comparison to the control group. Additionally, [21] observed that birds given meals containing yeast culture at 1% or 2% levels showed a substantial improvement ($P<0.05$) in the blood plasma levels of total protein, albumin, and globulin.

However, [27] discovered that nothing discernible altered in the blood total protein levels between the groups of quail that were supplemented with yeast and those that were not.

Feeding birds with meals containing 3 g/kg yeast (*Saccharomyces cerevisiae*) has demonstrated lower levels of triglycerides and cholesterol than the others treatments (Table 4).

These findings concur with [19] who discovered that, as compared to the group that did not receive yeast supplementation, adding yeast (at a range of 0.5% up to 3.5%) to the diet led to a substantial ($P < 0.05$) decline in serum cholesterol and triglyceride levels**.** Furthermore, [28] found that incorporating yeast into diet significantly ($P<0.05$) decreased the levels of serum cholesterol when compared to a diet without yeast.

In contrast, [26] discovered that there were no significant ($P\geq0.05$) variations in the triglyceride levels in the serum of quail chicks given meals supplemented with or without yeast. Also, [24] found that nothing significant changed in the serum levels of triglycerides when broiler chicks were fed *S. Servisiae*. The possibility that bacteria can absorb cholesterol or convert it into bile acids and then remove its conjugation to stop the cholesterol from being formed again could be the cause of the drop in cholesterol levels [29].

In the present study, birds fed the control diet demonstrated a significant ($P < 0.05$) rise in the serum levels of the aspartate aminotransferase (AST) and Alanine transaminase (ALT) compared to the birds fed different levels of yeast (Table 4). This is consistent with [21] who showed that birds given diets containing 1% or 2% yeast culture had considerably greater ($P<0.05$) levels of GOT and GPT than the control group. Conversely, [5] discovered that, in comparison to the control group, the addition of various levels of yeast to the diet dramatically raised the plasma concentrations of AST and ALT. However, [19] observed no differences in the serum blood AST and ALT concentrations between birds fed diets containing or lacking yeast (at 0.5%, 1.5%, 2.5%, and 3.5%) that were statistically significant ($P\geq0.05$). Also, [24] found that adding yeast autolysate to laying hen diets at levels of 2, 3 and 4 g/kg had no impact on the birds' blood ALT and AST levels.

Table (4) indicates that quail chicks fed nutritional yeast additions had higher serum glucose values ($P<0.05$) than the control group. This prior result is consistent with [30] observation that blood glucose levels rose in broiler chicks fed yeast at levels of 0.2% and 0.4% as opposed to control diets.

The findings demonstrated that there was no significant effect due to the tylosin levels in Albumin/ Globulin ratio in contrast to the control group**.** Also, adding Tylosin at levels of 0.1, 0.2, or 0.3 g/kg to the diet of quail chicks led to a significant reduction in the concentrations of serum total protein and albumin, compared to the control group which had the highest values. This confirms the findings of [31], who found that the blood albumin levels of laying hens were not significantly affected ($P>0.05$) by the administration of quinolone antibiotics.

The control group had the highest albumin level among all groups. However, [32] reported that adding antibiotics to broiler chicken diets significantly intensified total protein and albumin of blood in comparison to those of chicks in the control group.

The birds that were given diets containing 0.3 g Tylosin /kg of the diet had significantly higher serum levels of total globulin and glucose in contrast to those that were given diets with 0, 0.1, and 0.2 antibiotic ($P>0.05$). This is consistent with [32] who observed that adding antibiotic to broiler chicken diets caused a substantial rise in the levels of serum total globulin and glucose in comparison to the control group. Also, [33] observed that the broiler chickens that received 45 g *Polyalthia longifolia /L* of the water as an antibiotic had a considerably higher level of globulin than the control group. However, no significant alterations ($P>0.05$) were observed in the serum blood glucose levels due to the administration of antibiotics, in comparison to the control group [34].

Tylosin's presence in bird diets caused a reduction in the serum levels of cholesterol and triglycerides in comparison to those that did not receive antibiotic additives. The birds that were fed a diet with 0.3 g Tylosin /kg of the diet had the lowest levels of total cholesterol, while the birds given a diet with 0.1 g Tylosin /kg had the lowest levels of triglycerides, with the highest levels observed in the control group. This result not agree with [31] who noted that the impact of quinolones on cholesterol levels was observed to be statistically non-significant (P>0.05). However, [33] found that broiler chickens that received 15 g *Polyalthia longifolia /L* of the water had a significantly higher level of cholesterol compared to the control group.

In comparison to both the positive and negative control groups, the levels of aspartate aminotransferase (AST) and alanine transaminase (ALT) were significantly affected (P<0.05) by varying amounts of Tylosin. In this investigation, the birds that were fed diet with 0.3 g/kg exhibited a significant (P > 0.05) increase in the concentrations of (AST) and (ALT) when compared to the other treatments. The findings of this investigation are consistent with [32] who observed that the birds received antibiotics had higher levels of AST and ALT in comparison to the control group.

However, a study on the impact of Tylosin supplementation in the diet on liver and renal organs was done by [35] found that there were no significant impacts on ALT and AST on both day 14 and day 28.

When broiler chickens were fed Tylosin at levels of 0.1 and 0.3 g/kg as an antibiotic, it led to a significant (P>0.05) reduction in serum HDL compared to the birds that were fed 0 and 0.3 g/kg of Tylosin. However, the levels of Tylosin (0.1, 0.2 or 0.3 g/kg) significantly (P>0.05) reduced the serum LDL in contrast to the control group. Comparable results have been documented by [32] indicated that the administration of antibiotics to broiler chickens led to a significant reduction in serum LDL levels and a notable increase in serum HDL levels in contrast to the control group.

Digestion coefficients

The impact of experimental treatments on digestion coefficient of dry matter (DM), organic matter (OM), crude protein (CP), ether extract (EE), crude fibre (CF) and nitrogen free extract (NFE) is presented in Table (5).

Results showed that the best digestion coefficient values of CP, EE, CF, DM, OM, and NFE had been obtained by birds fed on diet 1g/kg yeast and 0.1 g Tylosin / kg in contrast to control and other treatment groups. The effectiveness of yeast culture in improving digestibility coefficient of nutrients due to adding yeast to quail diets were in agreement with [36] who demonstrated that quails fed diets supplemented with yeast culture (1.5 and 3 kg/ton) improved digestion coefficient of CP, EE, CF and NFE compared to other birds fed un supplemented diets with yeast culture. Also, [37] discovered that, in comparison to verginamycin and zinc bacitrcin, the addition of *Saccharomyces cerevisiae* and Bacillus S. and L. to growing diets greatly increased the digestibility coefficient of dry matter (DM) and crude protein (CP).

On the other hand, [38] observed that there were no statistically significant differences in dry matter, protein retention, and energy metabolizability between birds fed diets containing probiotic (*Pediococcus acidilactici*) and those fed basal diets without any probiotic.

Economic Evaluation

Table (6) shows the economic outcomes of quail chicks in various treatment groups throughout the experiment. The findings showed that the diet containing 2g/kg and 3g/kg of yeast (*Saccharomyces cerevisiae*) generated the highest net revenue, economic efficiency, and relative economic efficiency throughout the entire experimental period compared to the other groups. Nevertheless, the lowest values of net revenue, economic efficiency, and relative economic efficiency were seen in birds fed a diet containing 0.1 g tylosin/kg whole experimental period (7-42 day) .These findings are consistent with [29], who demonstrated that Quail birds fed a diet containing varying amounts of dried yeast showed the highest net revenue, economic efficiency, and relative economic efficiency. In contrast**,** [39] observed that the economic efficiency, relative economic efficiency, and net revenue did not improve in quail birds fed a diet supplemented with 0.5% and 1% of yeast in contrast to the control diet. These outcomes not agree with [40] who discovered that birds fed the antibiotic (Lincomycin) had more total income and net profit than the control group.

Conclusion

Broiler quail fed a basal diet with 3g/kg yeast (*Saccharomyces cerevisiae*) enhanced the performance and economic efficiency without any adverse. Therefore, it may be suggested that yeast (*Saccharomyces cerevisiae*) could be added to broiler quail diets as a growth promoter to enhance performance and economic efficiency without adversely affecting performance indexes.

Acknowledgment

We thank the staff of Dept. Ani. and Poult. Prod., Fac. Environ. Agric. Sci., Arish University., Egypt, for their help and encouragement throughout the experiment.

Conflict of interest

There is no conflict of interest disclosed by the authors.

Funding statement

Self-funding.

Author`s contribution

The researcher designed the research idea and prepared the practical part of the research, while conducting statistical analysis, writing, and final review of the research.

TABLE 2. Composition and calculated analysis of starter and grower diets.

Ingredients (%)	Starter period (7-21 day of age)	Grower period (22-42 day of age)
Yellow corn	54	59.7
Soybean (44%)	37.5	32
Wheat bran	1.9	1.6
Protein concentration 45 % CP	5	5
Calcium Carbonate	1.5	1.5
Salt (Nacl)	0.1	0.2
Total	100	100
Calculated analysis		
Metabolizable energy (ME Kcal / kg diet)	2803.45	2867.85
Crude protein (%)	23.8	21.8
Calcium (%)	0.92	0.9
Available phosphorus (%)	0.31	0.31
Methionine (%)	0.47	0.44
Lysine (%)	1.44	1.28
Methionine + Cystine (%)	0.86	0.80
Crude fiber (%)	2.95	2.83

TABLE 3. Growth performance of quail birds fed diets with varying levels of experimental diets during the experimental period spanning from day 7 to day 42.

Item	Control	Yeast (*Saccharomyces cerevisiae*)			Antibiotic (Tylosin)		
		1 g/kg	2 g/kg	3 g/kg	0.1 g/kg	0.2 g/kg	0.3 g/kg
Initial weight (g)	$24.65^{a}\pm$ 0.10	$24.69^{a}\pm$ 0.11	$24.63^{a}\pm$ 0.17	$24.63^{a}\pm$ 0.12	$24.62^{a}\pm$ 0.07	$24.52^{a}\pm$ 0.06	$24.67^{a}\pm$ 0.11
Final weight (g)	$183.88^{b}\pm$ 0.02	$185.32^{b}\pm$ 4.09	$194.98^{b}\pm$ 0.57	$199.30^{a}\pm$ 0.35	$194.42^{ab}\pm$ 1.44	$193.04^{ab}\pm$ 3.53	$187.97^{ab}\pm$ 6.12
Body weight gain (g)	$158.33^{b}\pm$ 0.10	$159.62^{b}\pm$ 4.16	$168.34^{b}\pm$ 0.43	$171.67^{a}\pm$ 0.46	$168.99^{ab}\pm$ 1.44	$169.12^{ab}\pm$ 3.57	$163.33^{ab}\pm$ 6.02
Feed Intake (g)	$497.64^{bc}\pm$ 0.65	$499.19^{ab}\pm$ 1.87	$481.19^{d}\pm$ 1.89	$485.77^{cd}\pm$ 7.24	$519.37^{a}\pm$ 7.67	$510.46^{ab}\pm$ 3.03	$500.50^{b}\pm$ 2.15
Feed conversion ratio (g /g)	$3.14^{a}\pm$ 0.01	$3.21^{a}\pm$ 0.03	$3.00^{ab}\pm$ 0.01	$2.93^{b}\pm$ 0.02	$3.08^{a}\pm$ 0.05	$3.04^{a}\pm$ 0.06	$3.09^{a}\pm$ 0.11

a, b, c, etc. indicates that the different litters at the same row are statistically different (P≤0.05).

TABLE 4. Effect of dietary levels of yeast and Tylosin on the blood biochemical constitutes of broiler quail.

Item	Control 0 g/kg	Yeast (*Saccharomyces cerevisiae*) 1 g/kg	2 g/kg	3 g/kg	Antibiotic (Tylosin) 0.1 g/kg	0.2 g/kg	0.3 g/kg
Albumin (g/dl)	1.49^{a}± 0.04	1.34^{b}± 0.01	1.17^{d}± 0.01	1.15^{d}± 0.03	1.28^{bc}±0.04	1.24^{cd}±0.02	1.18^{d}±0.03
Total Protein (g/dl)	5.20^{a}±0.04	4.87^{b}±0.03	4.78 ^{b}± 0.02	4.65^{b}± 0.12	5.06^{a}±0.03	5.07^{a}±0.02	5.16^{a}±0.03
Globulin (g/dl)	3.86^{ab}± 0.02	3.56^{cd}± 0.01	3.58^{c}± 0.01	3.40^{d}±0.10	3.81^{b}±0.04	3.84^{b}±0.02	3.93^{a}±0.01
A/G ratio	0.34^{a}± 0.00	0.31^{ab}± 0.01	0.30^{ab}± 0.01	0.33^{a}± 0.00	0.33^{a}±0.02	0.32^{ab}±0.02	0.30^{b}±0.01
Glucose (mg/dl)	305.00^{c}±9.72	334.16^{ab}±4.62	316.33^{bc}±2.91	340.16^{a}±1.04	361.33^{a}±10.06	353.67^{a}±17.55	294.17^{c}±3.24
AST (U/L)	309.16^{b}±10.36	248.83^{cd}±1.99	239.66^{d}±5.76	244.33^{cd}±7.40	267.67^{c}±0.42	314.67^{b}±14.92	352.83^{a}±0.48
ALT (U/L)	14.00^{c}±0.93	24.66^{a}±1.05	18.33^{b}±0.55	14.33^{c}±0.33	15.50^{c}±0.96	14.33^{c}±0.67	17.50^{b}±0.34
Total cholesterol (mg/dl)	280.66^{a}±2.97	277.83^{a}±6.50	228.00^{b}±20.24	231.16^{b}±12.77	265.67^{a}d±1.45	263.33^{a}±4.69	262.17^{a}±2.51
Triglycerides (mg/dl)	154.01^{a}±0.98	108.00^{c}± 5.76	99.11^{cd}±7.12	85.00^{d}±1.52	93.02^{c}±2.03	132.01^{b}±12.01	98.62^{cd}±0.99
HDL (mg/dl)	182.23^{a}±0.66	179.83^{a}±1.95	144.33^{b}±11.40	173.83^{a}±11.54	173.67^{a}±0.61	177.67^{a}±1.63	184.50^{a}±0.99
LDL (mg/dl)	62.66^{ab}±4.10	72.50^{a}±7.88	60.00^{ab}±11.18	51.24^{b}±0.66	75.50^{a}±1.69	57.77^{ab}±2.01	60.17^{ab}±1.14

a, b, c, etc. indicates that the different litters at the same row are statistically different (P≤0.05).

TABLE 5. Effect of dietary levels of yeast and Tylosin on digestion coefficient (%) of broiler quail.

Item	Control 0 g/kg	Yeast (*Saccharomyces cerevisiae*) 1 g/kg	2 g/kg	3 g/kg	Antibiotic (Tylosin) 0.1 g/kg	0.2 g/kg	0.3 g/kg
CP	87.66^{c}±0.33	91.39^{a}±0.53	88.59^{c}±0.34	88.27^{c}±0.27	89.65^{b}±0.11	89.55^{b}±0.09	90.20^{b}±0.19
EE	77.20^{b}±0.61	80.07^{a}±1.24	74.93^{c}±0.76	71.02^{d}±0.66	80.36^{a}±0.21	75.80^{bc}±0.22	73.68^{c}±0.51
CF	21.99^{ab}±2.09	28.74^{a}±4.44	25.19^{ab}±2.28	20.41^{b}±1.83	18.78^{b}±0.89	24.47^{ab}±0.71	21.48^{ab}±1.52
DM	68.49^{cd}±0.84	75.93^{a}±1.50	68.38^{cd}±0.96	67.51^{d}±0.74	76.80^{a}±0.25	72.26^{b}±0.26	70.49^{bc}±0.57
OM	74.15^{cd}±0.69	80.76^{a}±1.19	74.77^{cd}±0.77	73.34^{d}±0.61	81.07^{a}±0.20	77.23^{b}±0.21	75.91^{bc}±0.46
NFE	71.44^{cd}±0.76	79.00^{a}±1.30	71.78^{cd}±86	70.42^{d}±0.68	80.25^{a}±0.21	75.11^{b}±0.23	73.42^{bc}±0.51

a, b, c, etc. indicates that the different litters at the same row are statistically different (P≤0.05).

TABLE 6. Effect of dietary levels of yeast and Tylosin on the economic efficiency of broiler quail.

Item	Control	Yeast (*Saccharomyces cerevisiae*)			Antibiotic (Tylosin)		
	0 g/kg	1 g/kg	2 g/kg	3 g/kg	0.1 g/kg	0.2 g/kg	0.3 g/kg
Fixed cost (LE)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
feed intake (g)	497.64	499.19	481.19	485.77	519.37	510.46	500.5
price diets / kg (L.E)	19	19.1	19.2	19.3	19.05	19.1	19.15
Feed cost (LE)	9.46	9.53	9.24	9.38	9.89	9.75	9.58
Total cost (LE)	13.96	14.03	13.74	13.88	14.39	14.25	14.08
Total revenue (LE)	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Net revenue (LE)	6.04	5.97	6.26	6.12	5.61	5.75	5.92
Economic efficiency	43.32	42.51	45.57	44.14	38.95	40.35	42.00
REF (%)	100.00	98.13	105.21	101.90	89.91	93.16	96.96

References

1. Reda, F.M., El-Mekkawy, M.M., Sabry, R.M. and Alagawany, M. Effects of stocking density without or with yeast extract supplementation on the growth performance, digestive enzymes, blood metabolites, and intestinal microbiota of growing Japanese quail. *Egypt. J. Nutr. and Feeds*, **25** (1), 109-122(2022).
2. Dhama, K. and Singh, S.D. Probiotics improving poultry health and production: An overview. *Poult. Punch*., **26**(3), 26-41(2010).
3. Elghandour, M.M.Y., Tan, Z.L. and Abu Hafsa, S.H. *Saccharomyces cerevisiae* as a probiotic feed additive to non and pseudo-ruminant feeding: a review. *J. Appl. Microbiol.*, **128**(3), 658-674 (2019). doi: 10.1111/jam.14416.
4. Ahiwe, E. U., Tedeschi Dos Santos, T. T., Graham, H. and Iji, P. A. Can probiotic or prebiotic yeast (*Saccharomyces cerevisiae*) serve as alternatives to in-feed antibiotics for healthy or disease-challenged broiler chickens? a review. *J. Appl. Poult. Res*., **30**(3), 100164(2021).
5. Sabry, R.M., El-Maghawry, A.M. and Reda, F.M. Effect of dietary yeast extract supplementation on some carcass and blood traits of growing Japanese quail reared under high stocking density. *Zagazig J. Agric. Res*., **48** (6), 1401-1409(2021).
6. Ali, Kh., Fathollah, B., Behrouz, D. and Saeed, H. Comparison of Broiler Performance and Carcass Parameters When Fed Diets Containing a Probiotic, an Organic Acid or Antibiotic Growth Promoter. *Asian Journal of Animal and Veterinary Advances*, **7**, 318-325. (2012). doi: 10.3923/ajava.2012.318.325.
7. Ashraf, S., Bhatti, S.A., Kamran, Z., Ahmed, F. and Rahman, S.U. Assessment of refined functional carbohydrates as substitutes of antibiotic growth promoters in broilers: Effects on growth performance, immune responses, intestinal micro-flora and carcass characteristics. *Pak. Vet. J*., **39**, 157-162(2019).. https://doi.org/10.29261/ pakvetj/ 2019. 040.
8. Sahu, H.S. (2016). Effect of antibiotic growth promoters on quantitative morphology and histology of broiler. Pre-Ph D Course Work, Submitted to North Orissa University.
9. Kowalski, C., Roliński, Z., Sebastian, R. and Wawron, W. Pharmacokinetics of tylosin in broiler chickens. *Polish J. Vet. Sci*., **5**(3),127-130(2002). PMID: 12448074.
10. NRC (1994). National Research Council Nutrient requirements of poultry. 9th ed. Nat. Acad. Press, Washington. DC., USA.
11. Stein, E.A. (1986). *Textbook of Clinical Chemistry*, NW Tietz, ed. W.B. Saunders, Philadelphia, 879-886.
12. A. O. A. C. (2000). *Official Methods of Analysis. Chemists*, 17th ed. Association of Official Analytical Chemists. Washington, D.C. USA.
13. SAS Institute Inc. (2010). SAS/STAT User's Guide: ver. 9.22. SAS Institute Inc, Cary, NC, USA.
14. Duncan, D.B. (1955). Multiple Range and Multiple F-teste. *Biomet*., 11: 1-42.
15. Sun, H. Y. and Kim, I. H. Dietary supplementation of mixed yeast culture derived *from Saccharomyces cerevisiae* and *Kluyveromycesmaxianus*: Effects on growth performance, nutrient digestibility, meat quality, blood parameters, and gut health in broilers. *J. Poult. Sci*., **56**(2), 140-147(2019).
16. Hossain, M.E., Ko, S.Y., Kim, G.M., Firman, J.D. and Yang, C.J. Evaluation of probiotic strains for development of fermented Alisma canaliculatum and their effects on broiler chickens. *J. Poult. Sci*., **91**, 3121–3131(2012)..
17. Hana, S. E., Tyfor, M. H., Tabidi, I. N. and Mukhtar, M. A. Study of different levels of yeast on performance values and immune response in broiler chicken. *J. Anim. Vet. Sci*., **8**,1–5(2015).

18. Eltazi, S. M., Mohamed, K. A. and Mohamed, M. A. Response of broiler chicks to diets containing live yeast as probiotic natural feed additive. *Int. J. Pharm. Res. Allied Sci*., **3**, 40–46(2014).
19. Abd El-Wahab, A., Mahmoud, R., Marghani, B. and Gadallah, H. Effects of yeast addition to the diet of Japanese quails on growth performance, selected serum parameters and intestinal morphology as well as pathogens reduction. *Pak. Vet. J*., **40** (2), 219-223(2019).
20. Shankar, P. A., Premavalli, K., Omprakash, A. V., Kirubakaran, J. J. and Hudson, G. H. Effect of dietary yeast supplementation on the production performance of broilers. *Int. J. Advanc. Biol. Res*., **7**, 222–228(2017).
21. Ghally, K.A. and Abd El-Latif, S.A. Effect of dietary yeast on some productive and physiological aspects of growing Japanese quails. *Afr. Crop Sci. Conf. Proc*., **8**, 2147-2151(2007).
22. Ogbuewu, I. P., Okoro, V. M. and Mbajiorgu, C. A. Probiotic-yeast improves performance indicators in broiler chickens: Evidence from meta-analysis. *Appl. Ecol. Environ. Res*., **18**, 2823–2843(2020).
23. Munyaka, P. M., Echeverry, H., Yitbarek, A., Camelo-jaimes, G., Sharif, S., Guenter, W., House, J. D. and Rodriguez lecompte, J. C. Local and systemic innate immunity in broiler chickens supplemented with yeast-derived carbohydrates. *J. Poult. Sci*., **529**,2164–2172(2012).
24. Yalcin, S., Yalcın, S., Kemal, C., Eltan, O. and Dagasan, L. Effects of dietary yeast autolysate (*Saccharomyces cerevisiae*) on performance, egg traits, egg cholesterol content, egg yolk fatty acid composition and humoral immune response of laying hens. *J. Sci. Food Agric*., **290**, 1695 –1701 (2010).
25. Rezaeipour, V., Fononi, H. and Irani, M. Effects of dietary L-threonine and *Saccharomyces cerevisiae* on performance, intestinal morphology and immune response of broiler chickens. *SA J. Anim. Sci*., **42**, 266-273(2012).
26. Ahmed, M.E., Abbas, T.E., Abdlhag, M.A. and Mukhtar, D.E. Effect of dietary yeast (*Saccharomyces cerevisiae*) supplementation on performance, carcass characteristics and some metabolic responses of broilers. *Anim. Vet. Sci*., **3**(5-1), 5–10(2015)..
27. Pouraziz, S., Shahryar, H.A and Chekani-azar, S. Effects of dietary *saccharomyces cerevisiae* and butyric acid glycerides on performance and serum lipid level of broiler chickens. *Kafkas Univ. Vet. Fak. Derg.,* **19** (5), 903-907(2013). Doi:10.9775/kvfd.2013.9074.
28. Tomaszewska, E., Dobrowolski, P., Muszyński, S., Kwiecień, M., Kasperek, K., Knaga, S., Tomczyk-Warunek, A., Kowalik, S., Jeżewska-Witkowska, G. and Grela, E.R. Intestinal mucosa develops in a sex-dependent manner in Japanese quail (Coturnix japonica) fed Saccharomyces cerevisiae. *Br. Poult. Sci*., **59**(6), 689-697(2018). doi: 10.1080/00071 668.2018.1523536.
29. Aabid, A.G., Abdel Ghaffar, M.A., Said, K.A. and Ali, A.M. The effect of different levels of dietary protein and probiotic on quail performance. *Sinai J. Appl. Sci*., **5**, 1(2016)..
30. Omar, M.A.A. Economic evaluation of using dried brewer's yeast as feed additives for two broiler breeds. *Damanhour J. Vet. Sci*., **3** (1), 8-11(2020).
31. Rehman, A., Khan, A., Khan, S., Maris, H. and Khan, N. Effect of quinolones on blood glucose level and blood profile of laying hens. *J. Anim. Health Prod*., **7** (2), 51-57(2019).
32. Elbaz, A. and El-Sheikh, S. Effect of dietary probiotic, antibiotic or combination on broiler performance, cecum microbial population and ileal development. *Mansoura Vet. Med. J*., **21** (3), 74-79 (2020).
33. Shittu, M., John, A., Ojebiyi, O., Ojediran, T. and Adewale, R. Growth performance and haematological and serum biochemical parameters of broiler chickens given varied concentrations of *Polyalthia longifolia* leaf extract in place of conventional antibiotics. *Anim. Sci. and Genet*. **18** (2): 57-71(2022). doi: 10. 5604/01.3001.0015.9185.
34. Al-Saad, S., Abbod, M. and Abo Yones, A. Effects of some growth promoters on blood hematology and serum composition of broiler chickens. *Int. J. Agric. Res*., **9** (5), 265- 270 (2014).
35. Fitriana, I., Chotimah, A.C., Wijayanti, A.D., Purwandari, K.Y. and Pratama, A.M. Antibiotics combination effects of tylosin and enrofloxacin on liver and renal functions of broiler. *Indones. J. Vet. Sci*., **1**, 24-27(2020).
36. Ali, A. M., El-Nagmy, K. Y. and Abd-Alsamee, M. O. The effect of dietary protein and yeast culture levels on performance of growing Japanese quails. *Egypt. Poult. Sci*., **20** (IV Dec.), 777–787 (2000a).
37. Abaza, I. M., Shehata, M. A., Shoeib, M. S. and Hassan, I. Evaluation of some natural feed additive in growing chick diets. *Int. J. poult. Sci.*, **7**, 872-879 (2008).
38. Mikulski , D. , Jankowski , J. , Naczmanski , J. , Mikulska, M. and Demey, V. Effects of dietary probiotic (*Pediococcus acidilactici*) supplementation on performance, nutrient digestibility, egg traits, egg yolk cholesterol, and fatty acid profile in laying hens. *Poult. Sci*., **91**(10), 2691–2700 (2012). doi: 10.3382/ps.2012-02370.
39. Abd El-Latif, S.A., Ghally, K.A. and Shoulkamy, M.O. Effect of fenugreek and yeast additions to Japanese quail diet on digestibility and economical responses. *Acta Scient. Nutr. Health*, **3**(6), 78-82 (2019).
40. Nazir, A., Memon, A., Khan, S., Kuthu, Z., Rasool, F., Ahmed, Z., Ahmed, I., Shamim, A. and Aziz, A. Study on the Effects of Antibiotic (Lincomycin and Feed Additive (Niacin) on the Growth of Broilers. *Global Veterinaria*., **18** (5), 335- 342(2017). doi: 10.5829/ idosi.gv.2017. 335.342.

تأثير استخدام الخميرة أوالتايلوزين كمحفزات للنمو على الأداء الإنتاجي و الصفات الفسيولوجية لطيور السمان النامى

مي علي عبد العاطي ، احمد محمد علي ، عبدالفتاح رشاد رشدي و محمد مصطفى الكاشف

قسم الانتاج الحيواني والداجني - كلية العلوم الزراعية البيئية - جامعة العريش - مصر.

المستخلص

أجريت هذه الدراسة لمعرفة تأثير استخدام الخميرة أو المضاد الحيوي (التايلوزين) كمحفزات للنمو على الأداء الإنتاجي لطائر السمان من عمر 1 إلى 42 يوماً. تم تغذية طيور السمان بعمر يوم على علائق أساسية تحتوي على 24% بروتين و2800 ك.ك طاقة ممثلة/كجم علف لمدة أسبوع واحد. عند عمر سبعة أيام، تم توزيع الكتاكيت عشوائيا على سبع معاملات، كل معاملة تتكون من 30 طائر سمان، مع ثلاث مكررات. تم تغذية المجموعة الأولى على نظام غذائي أساسي بدون أي اضافات. وتم تغذية المعاملات الثانية والثالثة والرابعة على علائق تحتوي على 1 و 2 و 3 جرام خميرة/كجم علف وتم تغذيه المعاملات الخامسه والسادسة والسابعه على علائق تحتوى على 0.1 و 0.2 و 0.3 جرام مضاد حيوي (التايلوزين) /كجم علف . أظهرت النتائج أن الطيور التي تم تغذيتها على عليقة تحتوى على 3 جرام خميرة/كجم علف حققت أفضل وزن نهائي ومعدل تحويل غذائي معنوياً(P≤0.05) مقارنة بالمجموعات الأخرى. الطيور التي تم تغذيتها على عليقة تحتوي على 0.1 جرام مضاد حيوي /كجم استهلكت كمية علف أعلى (P≤0.05) ، بينما الطيور التي تم تغذيتها على عليقة تحتوي على 2 جرام خميرة/كجم استهلكت أقل كمية من العلف مقارنة بباقي المعاملات. الطيور التي تم تغذيتها على علائق مدعمة بـ 2 جرام/كجم و 3جرام/كجم من الخميرة حققت افضل عائد و كفاءة اقتصادية مقارنة بالمجموعة الكنترول و المعاملات الأخرى. كما تأثرت المعايير البيوكيميائية للدم (P>0.05) بين جميع المعاملات مقارنة مع مجموعة المقارنة.

لذا يوصى من هذه الدراسة بتغذية طيور السمان على علائق تحتوي على الخميرة كمنشط طبيعي للنمو بنسبه تصل إلى 3 جرام/كجم علف دون حدوث أي آثار جانبية على الأداء الإنتاجي أو الخصائص الفسيولوجية.

الكلمات المفتاحية: خميرة ، التايلوزين ، الأداء الإنتاجي ، معاملات الدم.