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# The Effect of *Saccharomyces cervisiae* (Thepax) on Performance, Blood Parameters and Relative Weight of Lymphoid Organs of Broiler Chicks

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**Abstract:** This research was carried out to evaluate the effect of *Saccharomyces cervisiae* (probiotic) yeast on growth performance, blood parameters and the relative weight of immune organs in broiler chicks. A total number of 240 day old broiler chicks (Ross 308) were raised throughout study period (42d). A total number of 160 birds were allocated into four groups 40 birds with 4 replicate and 10 chicks in each pen. Experimental diets included: Control (without probiotic) and other groups provided to supplement basal diets with the level of 0.05, 0.1 and 0.15% probiotic, 2, 3 and 4 groups, respectively. Body weight, feed intake, mortality and feed conversion ratio were weekly recorded. At the end of study, 4 birds (0ne bird per replicate) were selected from any group with closest weight to mean treatment. Sample blood collected from bronchial vein and entered it two tube glass (with/without EDTA). Serum removed and stored in-20°C to further analysis and immediately birds slaughtered. Visceral tissue such as: liver, heart, SI, abdominal fat, gizzard and immune organs as bursa of Fabricius, spleen and thymus were removed and weighed. Results showed that levels of 0.1% diet Probiotic had significantly increased body weight at 42 days in comparison with control ($p<0.05$) and improved feed conversion ratio ($p>0.05$). Abdominal fat and small intestine had significantly decreased as compared with control ($p<0.05$). Blood parameters such as: Hb, total protein (TP) and albumin increased as compared with the control group, with no significant differences. Different levels of probiotic had significantly decreased cholesterol and TG concentration as compared with control ($p<0.05$). Adding probiotic to the diet increased weight of immune organs with any level in comparison with control ($p>0.05$). The results indicated that supplemented diet with the levels of 0.05 and 0.1% caused: 1) Improved growth performance; 2) Decreased cholesterol and TG concentration of sera 3) Thepax as Probiotic can improved immune system response by means of effect it on lymphoid organs specially, bursa Fabricius.

**Key words:** Broiler · Blood parameters · Performance · Immune organs · *Saccharomyces cervisiae*

## INTRODUCTION

Growth Promoter Antibiotics has been used in chicks feeding as additives for more than 50 years ago; administration of low doses for long periods of time creates ideal conditions for resistance induction [1]. Dietary antibiotics are reported to have beneficial effects on animal and poultry growth and feed conversion efficiency and the inhibition of pathogen growth [2]. The recent European Union ban on the prophylactic use of in-feed antibiotics has escalated the search for alternatives for use within the poultry industry [3]. The use of compounds that may have probiotic effects is a possible way to improve growth performance in the absence of antibiotic growth promoters. This obliges coasted that nutritionists continually put their efforts into producing better and more economical feed. As natural alternatives for GPA, such as probiotics, organic acid, medicine plant [4]. Probiotics are live microorganisms of nonpathogenic and nontoxic in nature, which when administered through the digestive route, are favorable to the host's health [5]. Previous researchers found that using a *Saccharomyces cerevisiae* fermentation product as probiotic caused an increase in immune function of broilers when fed for 42 d [6]. Enhancement of colonization resistance and /or direct inhibitory effects against pathogens is important factors where probiotics have reduced the incidence and duration of diseases. The removal of potential pathogens from the intestinal tract of growing animals may provide a more favorable environment for the digestion, absorption and metabolism of growth-enhancing nutrients. The aims of this study were to investigate the effect of thepax on:

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- Economic traits or growth performance
- The relative weight of immune organs
- Some of metabolites and blood parameters of broiler chicks.

## MATERIALS AND METHOD

**Birds and Experimental Design:** In this study, 200 one-day old mail broiler chickens (Ross 308) were used in a randomized completely design (CRD) with 4 group 40 birds and 4 replicates and 10 birds in each replicates and reared on the floor pens for 21 days. A basal diet was formulated as control according to NRC [7] recommendations for starter (1-21 days) and grower (22-42) period (Table 1). The basal diet was mixed with different levels of thepax (As probiotic) to create the different treatments. Each pen was fitted with a nipple drinker and tube feeder to allow *ad libitum* access to drinking water and feed. The room temperature was initially adjusted to 32 °C and then gradually lowered to reach approximately 18-21°C and this condition fixed until end of study. Temperature was monitored on a daily basis and light was continuously provided for the duration of the experiment. The treatments were as follows: T1) basal diet (without additive); T2) basal diet+ (0.005g/kg probiotic); T3) basal diet+ (1g/kg probiotic) and 4: basal diet + (1.5g/kg probiotic).

**Growth Performance:** Feed intake (FI), body weight gain (BWG), mortality (Mor) as weekly recorded and, calculated feed conversion and mortality percentage in the final of research by means of reveal formula.

**Blood Sample:** At the end of the experimental period, about 5 ml blood was collected from wing vein from 4 birds in each treatment. Blood samples were divided two subsamples: 1) The whole blood (agglutinated) and, 2) other remaining blood sample was used to collect serum by centrifugation (2000g for 15 min) and after removed it, serum stored at -20°c until further analyzed such as measuring of different blood parameters (Glucose, Total protein, Albumin, Cholesterol, Triglyceride and High Density Lipoprotein (HDL) using appropriate laboratory kits [8, 9]. The serum globulin was calculated by subtracting serum albumin from total serum of protein. After drawing blood, birds slaughtered to separate of visceral tissue and lymphoid organs such as liver, small intestine, pancreas, gizzard, heart and spleen, bursa of Fabricius, thymus. The weight of those calculated by mean of the following equation and expressed as percentage of live body weight.

Table 1: Ingredients and composition of basal diets

| Ingredient (%) | Starter (1-21) | Grower (22-42) |
|---|---|---|
| Corn grain | 60.8 | 53.09 |
| Soybean meal | 33.8 | 30.78 |
| Dicalcium phosphate (DCP) | 1.68 | 1.28 |
| Salt | 0.25 | 0.26 |
| Soybean oil | 1.80 | 2.20 |
| DL-Methionine | 0.25 | 0.24 |
| L-Lysine | 0.16 | 0.16 |
| Vitamine and mineral premix[1] | 0.60 | 0.60 |
| Sodium bicarbonate | 0.17 | 0.12 |
| Anticoccidioacetate | 0.05 | 0.05 |
| Calculated analyses | | |
| ME (kcal/kg) | 3100 | 3000 |
| Protein (%) | 21.80 | 21.26 |
| Ca | 0.92 | 0.85 |
| Available P | 0.44 | 0.40 |
| Sodium | 0.16 | 0.16 |
| Arginine | 1.38 | 1.30 |
| L-ysine | 1.35 | 1.18 |
| DL-Methionine | 0.67 | 0.56 |
| Methionine + Cystine | 1.01 | 0.90 |

[1]Per kg premix supplied: Co 250 mg/kg; Cu 7000 mg/kg; I 500 mg/kg; Fe 40,000 mg/kg; Se 200 mg/kg; Mn 100,000 mg/kg; Zinc 60,000 mg/kg, Vitamin A 60,000 U; Vitamin K3 3000 mg; Ca. Pantothenate 40,000 mg; Vitamin D3 15,000 U; Vitamin B1 5000 mg; Vitamin B12 250 mg; Folic acid 2000 mg; Vitamin E 40,000 U; Vitamin B2 20,000 mg; Nicotine 75,000 mg; Biotin 150 mg.

$$\text{Weight of organs (g) / body weights} \times 100$$

**Statistical Analysis:** Data were subjected to ANOVA using a GLM procedure SAS Institute [11]. Significant differences among treatments were tested by Duncan's multiple range test at $P < 0.05$ level [12]. The statistical model was the following:

$$Y_{ijk} = \mu + T_i + e_{ijk}$$

Whereas:
$Y_{ijk}$ = an observation; $\mu$ = overall mean; T = effect of thepax level; i= (1, 2 and 3); and $e_{ijk}$ = Random error.

## RESULTS AND DISCUSSIONS

**Growth Performance:** The effects of probiotic thepax on performance and mortality broiler chicks were presented in table 2. Probiotic had significantly ($p<0.05$) increased body weight gain in the birds fed diets supplemented with different levels of probiotic than the control group.

Table 2: Effect of of *Saccaromyces csrvisiae* (Thepax) on performance in 42

| Treatment | FI (kg) | LBW (kg) | FCR | Mor (%) |
|---|---|---|---|---|
| T1. Control | 2.20±39.40a | 4.47±163.55b | 2.07±0.09 | 60±4.87 |
| T2. Control+ 0.5g/kg probiotic | 2.38±37.17a | 4.56±108.82a | 2.02±0.03 | 45±5.23 |
| T3. Control+ 1 g/kg probiotic | 2.23±45.45a | 4.60±45.41 a | 2.01±0.03 | 30±4.09 |
| T4. Control+ 1.5g/kg probiotic | 2.02±41.89a | 4.43±29.31b | 2.06±0.12 | 45±5.10 |

[1] Data was presented as (Mean±S.E)

[a,b] Means with different superscripts within the same row differ significantly (P<0.05).

FI=Feed Intake; LBW= Live Body Weight; FCR= Feed Conversion Ratio; Mor = mortality

Table 3: Effect of of *Saccaromyces csrvisiae* (Thepax) on visceral organs *at 42d (%LBW)1*

| Treatment | liver | gizzard | heart | Small intestinal | Abdominal fat |
|---|---|---|---|---|---|
| T1. Control (without additive) | 2.63±1.09 | 2.45±1.01 | 0.53±1.09a | 5.43±1.01a | 2.52±1.11a |
| T2.Control+ 0.5g/kg probiotic | 2.61±1.20 | 2.53±1.11 | 0.51±1.20a | 5.23±1.19a | 2.42±1.06a |
| T3.Control+ 1 g/kg probiotic | 2.55±0.98 | 2.59±1.28 | 0.49±0.98a | 4.48±1.09b | 2.12±1.02b |
| T4.Control+ 1.5g/kg probiotic | 2.51±1.03 | 2.64±1.09 | 0.46±1.03a | 4.71±1.14a | 2.27±0.98b |

[1]Data was presented as (Mean±S.E)

[a,b] Means with different superscripts within the same row differ significantly (P<0.05).

This result was not in agreement with findings by Eng berg *et al.* [13] and Izat *et al.* [14], whereas they have reported that probiotics have no significant effect on BWG of broiler chicks. The results indicated that feed intake in the control treatment was higher in comparison with others groups, but were no significant. Therefore, this effect may be related to improvement of digestion and absorption of nutrient due to add probiotic to diets. In accordance with this result, other researchers indicated that the addition of probiotics and organic acids to the broilers diet either numerically or significantly improves FI [15]. Also, FCR of the treatments that fed different levels of probiotic had improved than the control treatment (p<0.05). The lowest FCR observed in treatment which using 1g/kg diet. This result was in accordance with other research that, due to adding probiotic and other additive to ration of broiler caused to decrees of pH of digestive organs and then could lead to better digestion, absorption and utilization of nutrients [16].

**Mortality:** The percent mortality of broilers among the experimental groups of T1, T2, T3 and T4 were 45, 60, 30 and 45%, respectively. Inclusion of probiotic of thepax at the recommended commercial level of (1000g/ton ration) had resulted in 30% in comparison with treatment control of birds. The similar effects reported before by others [17].

**Visceral Organs:** The results presented in table 3 indicated that biotic has not significantly effect on relative organs weight such as liver, gizzard and heart (p>0.05). But, caused that the value of abdominal fat and small intestine (SI) had significantly decreased (p<0.05) in birds fed diets supplemented with probiotic compared with control treatment. The lowest weight belongs to T3 (1g probiotic/kg diet). The reason of decreasing abdominal fat may be related to improve of digestion and absorption of nutrients. Jin *et al.* [18] reported that probiotics increase and improve digestibility of different nutrients such as carbohydrate. The results of other researches has showed that inclusion of probiotic had effect optimum in SI of broiler such as production of such as short-chain fatty acids (inhibitory substances) and other alternatives growth promoters providing a selection advantage, e.g. by lowering the pH value, without suppressing the desirable intestinal micro flora; this is the case for lactic acid and hydrogen peroxide. Several mechanisms have been hypothesized, which include enzymatic deconjugation of bile acids by bile-salt hydrolase of probiotics, assimilation of cholesterol by probiotics [19, 20] and cholesterol binding to cell walls of probiotics [20, 21].

**Immune Organs Weight:** The results related to effect of probiotic thepax on immune organs was presented in table 4. Adding probiotic to diet caused that weight of immune organs were increased in comparison with control treatment (p<0.05). In fact, observed an increasing trend lymphoid organ weight coincide with raising levels of probiotic in the other treatments. The lowest weight of these organs related to control at 42 d of age. The reasons of this condition may be attributed to effect of *Saccharomyces cervisiae* yeast on microbial population

Table 4: Effect of *Saccaromyces csrvisiae* yeast on relative weight immune organs at 42d of age (%LBW)[1]

| Treatments | Bursa of Fabricius | Spleen | Thymus |
|---|---|---|---|
| T1. Control (without additive) | 0.14±0.01 | 0.10±0.01 | 0.53±0.01 |
| T2.control+ 0.5g/kg probiotic | 0.15±o.03 | 0.12±0.01 | 0.54±0.04 |
| T3.control+ 1 g/kg probiotic | 0.19±0.05 | 0.13±0.02 | 0.56±0.02 |
| T4.control+ 1.5g/kg probiotic | 0.18±0.06 | 0.12±0.01 | 0.56±0.01 |

[1]Data was presented as (Mean±S.E)

LBW= Live Body Weight

Table 5: Effect of *Saccaromyces csrvisiae* on blood parameters of birds at 42d[1]

| Treatment | Hb (%) | TP (g/dl) | Alb ( g/dl) | TG (mg/dl) | Chol (mg/dl) |
|---|---|---|---|---|---|
| T1. Control(without additive) | 13.20±0.65 | 3.85±0.05 | 1.81±0.08 | 93.12±5.35a | 157.12±1.05a |
| T2.control+ 0.5g/kg probiotic | 14.02±0.85 | 3.87±0.06 | 1.82±0.06 | 90.22±6.05a | 153.12±5.05a |
| T2.control+ 1 g/kg probiotic | 13.89±0.45 | 3.86±0.05 | 1.80±0.07 | 81.32±4.02b | 141.12±2.05b |
| T2.control+ 1.5g/kg probiotic | 14.2±0.35 | 3.87±0.05 | 1.79±0.08 | 84.02±8.07b | 144.12±3.15b |

[a,b]Means with different superscripts within the same row differ significantly ($P<0.05$).

Chol =Cholesterol; Alb= Albumin;

[1]Data was presented as (Mean±S.E)

of gut. Teo and tan [21] observed that the birds provided feed supplemented with *bacilliuse subtilis* PB6 had a significantly heavier bursa weights compared with the antibiotic supplementation and negative control groups. Probiotics can affect the microbial stabilization in gastrointestinal system like antibiotics and this situation may be modify the microflora which those are the origin of some gastrointestinal sickness or favor the healthy intestine microflora [22,23].

**Blood Parameters:** The effects of probiotic thepax on blood parameters are presented in Table 5. These results showed that probiotic had significantly decreased the cholesterol and TG level of serum in the groups fed diet supplemented with 1g/kg probiotics as compared to control and other group. Results current study was in agreement with other finding by researchers. *L. acidophilus* is capable to deconjucate glycocholic and taurocholic acids under anaerobic condition. Deconjucation of gallbladder acids in small intestine can affects control of serum cholesterol, while deconjucated acids are not capable to solve and absorb fatty acids as conjucated acids. As consequence, they prevent from absorption of cholesterol. Also free gallbladder acids attach to bacteria and fibers and this can increase the excretion of them. There was a significant decrease in the serum level of triglycerides between control group and groups treated with *L. acidophilus and L. casei* supplemented in male broiler diet. Decreasing of plasma cholesterol by adding of probiotic to diet was reported by other researchers, Kabir *et al.* [5] showed the mechanism of decreasing cholesterol is improvement its digestion and renovation. Kalavthy *et al.* [20, 24] found that supplementation of probiotic (*lactobacillus*) increases serum HDL and decreases LDL. These researchers indicated that decreasing blood cholesterol value can be attributed by absorption of cholesterols via lactobacillus microbes in the small intestine. Also, Decreasing of blood HDL and LDL values by adding supplementation of probiotic to broiler diet was also observed in the studies of panda *et al.* [16].

In conclusion, results of the current study indicated that:

- Adding probiotic (Thepax) broiler diets could be acted as one of the alternative for antibiotic growth promoters (AGP) in poultry production without any risk for broilers and consumers of product and improvement traits of performance.
- The best level that can use in the supplied poultry nutrition on basis the results of this research is 1g/kg (1kg/ton diet) probiotic Thepax.
- Thepax may be stimulated indirect of the immune system by means of change in balance of microflora of gut oriented to guest useful.
- Decreasing environmental pollution related to AGP, because probiotic caused that to improve absorption, utilization of nutrients from small intestine and feed efficiency in applied broiler nutrition.

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