The effect of yeast (*saccharomyces cerevisiae)* in replacement with fish meal and poultry by – product protein in broiler diets

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Abstract:
A completely randomized design with five treatments, each with three replication of twelve chicks each was conducted from 7-49 day of age to investigate the effects of yeast (*saccharomyces cerevisiae*) in replacement with fish meal protein and poultry by – product protein on broiler performance and organoleptic quality of meat .Treatments include: 1) control group 2 and 3: yeast in replace with 40 and 60 percent of fish meal protein 4and 5: yeast in replace with 40 and 60 percent of poultry by-product protein. For this purpose the performance parameters, carcass composition, organoleptic test and length of intestine were determined. Body weight, feed conversion ratio, carcass parameters and mortality were not significantly ($p<0.05$) influenced by dietary treatments. Although the breast weight in control group was lower than other groups, it was not affected by yeast levels. Ratio of gut weight to body weight and length of intestine significantly increased in 28th day, but were not significant in the final test. The results of this study indicated the use of yeast (*saccharomyces cerevisiae*) with 60 percent replacement of fish meal protein and poultry by-product protein can improve meat quality and broilers performance.

Keyword: yeast; *saccharomyces cerevisiae;* fish meal; poultry by-product; broiler

Introduction

Feed additives were used in poultry industry for different purpose for example to increase performance and decrease of mortality rate. These additives are including antibiotics, probiotics, coccidiostates and etc(1,15).
In recent years used of growth promoters, like yeast in poultry industry the world over of some can effective in decrease of feed intake, cost and increase of gain weight and amend of violations. *Saccharomyces cerevisiae* (SC), one of the most widely commercialized yeast, has long been fed to animals. It was reported that feeding yeast to chicks improved weight gain and feed/gain ratio (13). The enrichment of diets with yeast could favorably improve broiler meat quality(2). Experiments showed that inactive form of SC cells very effective. Alive form of SC, such of probiotics have a low active, this possible by reason that inactive SC can lower defense from internal organs of the body(2).
Recent study of Santin et al (2001,2003) showed the cell wall as SC improve the intestinal mucosa aspects and suggested that it might be the explanation for the improve in performance of broilers supplemented with cell wall of SC observed in the same study(17,18).Nilson and et al (2004) reported broilers receiving yeast to replace part of the premix had better average weight gain and feed conversion ratio (13). Other researchers, like Churchil et al. (2000),Yalcin et al. (1993) and Yadav et al. (1994) found better weight gain and feed conversion in broilers fed from 0,2 to 1 % brewer's yeast(3,20,21). Also, Sentihilkumar et al (1997) registered improvement in productive values when incorporating 5 to 20 % yeast in broiler diets(19).

Table 1 - chemical composition of Saccaharomyces cerevisiae, fish meal and poultry by-products(12)

Composition	Sacchromyces cerevisiae	Fish meal	Poultryby-product
Dry matter%	93	92	93
ME(kcal/kg)	1990	2820	2650
Crude protein%	44.4	60	55
Crude fat%	1	9.4	13
Crude fiber%	2.7	0.7	1.5
Ca%	0.12	5.11	3
P%	1.4	2.88	1.7

Materials and Methods

A completely randomized design with five treatments, each with three replication of twelve chicks each was conducted from 7-49 day of age to investigate the replace of yeast bread (Saccharomyces cerevisiae) protein instead of some fish meal protein and the poultry by-product protein in the diets on broiler performance and meat quality of broiler Arian chickens.

The diets with isocaloric and isonitrogenios based on NRC – 1994 recommendation.The treatments were:

1) Control group
2) yeast in replace 40% of fish meal protein used in control group
3) Yeast in replace 60% of fish meal protein used in control group
4) Yeast in replace 40% of poultry by product protein used in control group
5) Yeast in replace 60% of poultry by product protein used in control group

The statistical model of the plan was on completely random design (CRD).

$$X_{ij} = u + T_i + Eij$$

In the end of test the feed intake, gain weight, feed conversion ratio,carcass composition, Organoleptic test and measurement of small intestine length was conducted.

Result and Discussion

The comparison of measured traits (feed intake, weight gain, feed conversion) during different week in the total period through LSD examination in (P>0.05) was conducted and the results of table 2 showed the fifth treatment (yeast in replace 60% of poultry by product protein) in 3 trait in total period was different and it was put in the second level. The other treatment in 3 trait non significant and had the same effects. As there was not significant difference between diets in variance analysis on the composition of carcass, the mean comparison did not take. Results of variance analysis and mean comparing the measured traits in five treatments showed that using yeast Saccharomyces cerevisiae instead of protein and vitamin source in the diets of broiler and consequently with decreasing the animal sources of the diet does not have any malnutrition and histopatological effects in the examined groups. In comparing the mean of length and weight of small intestine in different treatments, ratio of gut weight to body weight and length of intestine significantly increased in 28th day, but were not significant in the final test in using the yeast in the diets.

there was not so much difference regarding the weight of animal, proportion to weight of body in using the yeast in the diets.

Hyginus and et al (2003) surveyed the dietary Saccharomyces cervisiae and mannan oligosaccharide in reduced the deleterious effects of heat stress on White leghorn laying hens and the results proved that the mean of weight has increased in the groups having *Saccharomyces cervisiae* and mannan oligosaccharide were added singly and combined at 0.05% per kg of feed, the mean of gain weight has been 58 g among groups. Egg production increased from 31.25, 29.79 and 30.42% to 47.08, 49.38 and 49.38% with the inclusion of *Saccharomyces cervisiae* and mannan oligosaccharide singly and combined (9).

Daribashi and Damir(2004) reported that using mannan oligosaccharide has a significant improvement in feed conversion compared with broilers which had received probiotic in plus to organic acids(5). The results of research by Dimovelis et al (2004) pointed that adding Biomass (oligosaccharide) to the diet of poults increases the rate of egg production around 2.19% and the eggs would have strong shell and very colored yolks, also the blood stains of the eggs would decrease(6).

In another research by Duk Lee et al (2004) using of Saccharomyces cerevisiae supplement on the growth performance showed that the performance of the broilers which were fed from different levels of SC has had increase in three-week old ($p<0.05$) and this increase can be witness in five week old as well. But by increase the rate of SC in ($p<0.05$) feed intake in the groups fed by enriched SC has been low compared with gain weight. On the whole they point that there was no significant difference between treatment and control group used from SC in ($p>0.05$)(8,11). The present study showed also a less gain weight of treatment broiler compare with the control group in using Saccharomyces cerevisiae to replace the part of fish meal and poultry by-products in their diets and even the feed conversion of change was higher, but were not significant. This can be dependent on the kind of Saccharomyces which is used alive or dead (enriched, non enriched). The SC used in this research was the non-enriched type used in bakery as yeast. But with regard to the vitamin and minerals existing in SC making use of it can prevent several diseases and lack of vitamins specially vitaminB which prevents nervous disorders(14). Especially that yeast can be an exchange for lack of B6 vitamin in diets. Selenium and zinc supplemented to the diet of laying hens in organic forms (dry yeast *Saccharomyces cerevisiae* enriched with Se and Zn) were of a higher availability by 2.5 and 3.1%, if compared to sodium selenite (61.1%) and zinc oxide (35.4%). Content of eggs from hens received selenium enriched yeast contained a higher concentration of Se by 10.47% ($p<0.05$), if compared to sodium selenite group(7). Measuring the length and weight of small intestine in different treatment group did not show so much difference regarding the weight of animal to the weight of body in the used yeast. In surveyed of Karimi(2004) adding of different levels of probiotic to female chicks diets in ages 28, 36 and 42 days didn't change gut weight($P>0.05$)(10).

Thus, like protein using SC in the poultry diet can be a replacement for part of vitamin premix and minerals(13). Also the nutritionist researchers has found improvement in nutritive parameters by addition of more SC or its mixture with antibiotics(4). In the Organoliptic test of thigh and breast of each experimental treatment is non significant difference between flavors of experimental treatments, there is no significant difference between thigh and breast. Thus the results of this study indicated the use of yeast (*saccharomyces cerevisiae*) with 60 percent replacement of fish meal protein can improve meat quality and broilers performance.

Table 2 - comparison measured average traits (feed intake, gain weight and feed conversion)

Treatment	Feed intake	Gain weight	Feed conversion
1	796.4a	366.1a	2.12a
2	809.3a	358.4a	2.19a
3	804.2a	360.5a	2.16a
4	795.8a	359.5a	2.16a
5	721.9b	311.3b	2.42b

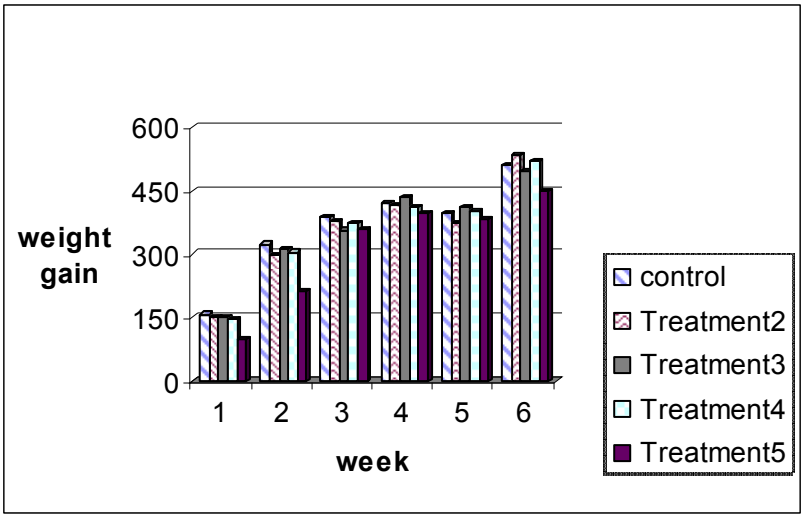

Figure1- Comparsion weight gain mean weekly

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