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*Original Research Article*

# Possibilities of Inclusion of *Saccharomyces cerevisiae* as Replacement for Fish Meal or Poultry Meat By-Product in Broiler Chicken Diet

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## ABSTRACT

**The aim of this experimental work was to evaluation of efficiency of dietary inclusion of *SCY* as replacement for fish meal or poultry meat by – product in broiler diet. 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 Saccharomyces cerevisiae yeast (SCY) as replacement with fish meal or poultry by – product protein on broiler performance. 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. Inclusion of SCY as fish meal replacement in two levels (treatment 2 or 3) didn't have any negative effect on feed intake, weight gain or feed conversion ratio. Also dietary inclusion of SCY as replacement of poultry meat by-product (40% of poultry meat by-product proportion in diet) didn't have any negative effect on performance. Only inclusion of 60% SCY as replacement for poultry meat by-product had significant negative effect on performance includes feed intake, weight gain and feed conversion ratio (P<0.05).The results of this study indicated the use of SCY with 60 percent replacement of fish meal protein and poultry by-product protein can improve meat quality and broilers performance.**

**Key Words: Yeast, *Saccharomyces cerevisiae*, fish meal, poultry meat by-product, broiler**

## INTRODUCTION

Functional dietary additives were used in poultry nutrition for different purposes, for example to increase performance and decrease mortality rate. These grow promoter or performance optimizer additives include antibiotics, probiotics, coccidiostates and etc (Panda et al., 2000).

In recent years growth promoters like yeast are used in poultry industry in some countries of the world that can be effective in decreasing feed intake, cost and increase of gain weight. *Saccharomyces cerevisiae* yeast (SCY) as one of the most widely commercialized yeast, has long been fed to animals. It was reported that yeast feeding could improve weight gain and feed/gain ratio (Nilson et al., 2004). The enrichment of diets with yeast could favorably improve broiler meat quality (Peplller, 1970). Experiments had showed that inactive form of SCY cells is very effective as dietary supplement. Alive form of SCY, such as probiotics, has a low activity, this may be due to that inactive SC can lower defense from internal organs of the birds body (Bayrami, 2004).

Santin et al (2001, 2003) had showed that the cell membrane of SC improves intestinal mucosa efficiency and had suggested that it might be the explanation for the improvement of performance of broilers supplemented with cell wall of SC observed in the same study. Nilson et al., (2004) had reported broilers receiving yeast as replace part of the premix had better mean weight gain and feed conversion ratio. 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) had reported improvement for productive values when incorporating 5 to 20 % yeast in broiler diets. The aim of this experimental work was to evaluation of efficiency of dietary inclusion of *SCY* as replacement for fish meal or poultry meat by – product in broiler diet.

## MATERIALS AND METHODS

A completely randomized design with five treatments, each with three replicates include twelve chicks was conducted from 7-49 day of age to investigate the efficiency of replacement of *Saccharomyces cerevisiae*

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instead of some fish meal and the poultry by-product [Table1] as protein sources in the diets on broiler performance of broiler Arian strain broiler chicks.

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

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

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

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

**Table 1.** The chemical composition of *Saccaharomyces cerevisiae*, fish meal and poultry by-products.

| **Composition** | ***Sacchromyces cerevisiae*** | **Fish meal** | **Poultry by-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 |

## RESULTS AND DISCUSSION

The comparison of measured traits (feed intake, weight gain, feed conversion) during different weeks in the total period through LSD test by ANOVA statistical analysis in ($P<0.05$) was conducted and the results of table 2 showed the fifth treatment (yeast in replacement of 60% of poultry by product) in 3 traits in total period was different [table2].

**Table 2.** Comparison measured average traits (feed intake, weight gain and feed conversion ratio).

| **Treatment** | **Feed intake** | **weight gain** | **Feed conversion ratio** |
|---|---|---|---|
| 1 | $796.4^{a}$ | $366.1^{a}$ | $2.121^{b}$ |
| 2 | $809.3^{a}$ | $358.4^{a}$ | $2.194^{b}$ |
| 3 | $804.2^{a}$ | $360.5^{a}$ | $2.162^{b}$ |
| 4 | $795.8^{a}$ | $359.5^{a}$ | $2.165^{b}$ |
| 5 | $721.9^{b}$ | $311.3^{b}$ | $2.424^{a}$ |
| P value | 0.032 | 0.026 | 0.044 |
| SEM | 20.46 | 9.71 | 0.04 |

*a or b shows significant different between treatments.

Inclusion of SCY as fish meal replacement in two levels (treatment 2 or 3) didn't have any negative effect on feed intake, weight gain or feed conversion ratio. Also dietary inclusion of SCY as replacement of poultry meat by-product (40% of poultry meat by-product proportion in diet) didn't have any negative effect on performance. Only inclusion of 60% SCY as replacement for poultry meat by-product had significant negative effect on performance includes feed intake, weight gain and feed conversion ratio ($P<0.05$).

Hyginus (2003) observed that the dietary SCY and mannan oligosaccharide can reduce the deleterious effects of heat stress in white leghorn laying hens and body weight has increase in the groups fed SCY and mannan oligosaccharide supplements as 0.05% per kg of ration, the mean of weight gain has increase too. Egg production had increased from 31.25, 29.79 and 30.42% to 47.08, 49.38 and 49.38% via inclusion of SCY and

mannan oligosaccharide singly or in combined form. In another research by Duk et al (2004) using SCY supplement caused growth performance improvement of broilers fed different levels of SCY ($p<0.05$) and this increase can be observed in five week old as well as starter or grower periods. But by increasing the rate of SCY ($p<0.05$), feed intake has been low when it compared with gained weight. There was no significant difference between SCY treatment and control group ($p<0.05$).

Hosseini et al., (2006) had stated that dietary inclusion of SCY couldn't affect feed conversion ratio, egg quality characterizes, but in economical approach, the feed costs can be decrease via SCY inclusion in laying hen diet. Similar with present study, Romashko (2000) in a study with attempts for replacement of fish meal by yeast had reported that Replacement of fish protein by provide (a kind of yeast) at the 25% level increased the live weight by an average of 1.8% and reduced fodder consumption/kg weight gain by 4.3%; replacement at 50% did not lead to further improvement. No detrimental effect of substitution on sensory properties of meat was observed. The dietary inclusion of cassava yeast to broiler seems to have minimal influence on broiler performance (Chumpawadee et al., 2008). Mas et al., (2009) had concluded that brewer's yeast could replace protein of animal origin in feed mixtures for fattening chickens. The present findings are according to Mas et al., (2008), Chumpawadee et al., (2008) and Romashko (2000) that in their study inclusion of different kinds of yeast as protein supplement didn't have any detrimental effect on performance of chicks.

## CONCLUSIONS

Thus as conclusion, the results of present study indicated the use of yeast (SCY) to 60 percent replacement of fish meal protein portion in ration can be efficient and hasn't negative effect on broiler fattening performance.

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