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YEAST AS FEED ADDITIVE IN *TILAPIA FINGERLINGS* DIETS

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SUMMARY

An experiment was conducted to evaluate the possibility of usage of dried baker's yeast (DBY) as feed additive in tilapia fingerling diets. Four experimetal diets were formulated to be isonitrogenous and isocaloric. Diet, 1 served as a control one, while diets 2,3 and 4 contained 1,2 and 3% DBY respectively. Diets were fed for an 8 weeks experimental period: Fish fed on diets contained 3% DBY showed very high mortality even with fish replacement. Fish fed on the control diet showed the best performance parameters (final body weight, weight gain, increase in total body length, FCR and PER). Fish fed on diets contained 1% DBY showed a closely related performance as control group while 2% DBY showed a negative effect. Apparent digestibility coefficient (ADC) was determined for all experimental diets using chromic oxide as an indicater. The results revealed that DBY at level of 1 or 2 % did not significantly affect the ADC of DM, GE, EE and CP of the diets.

INTRODUCTION

In the past, yeast was added to poultry diets in small amounts chiefly as a source of vitamins and its protein and energy content were incidental. Yeast is intended for use as a protein and energy source and its content of these become of prime importance (Shannon and McNab, 1972).Yeast is claimed to be used as a protein supplement in animal feed due to shortage of both soybean and fish meal in many countries, Daghir and Abdel-Baki (1977). A comparison of amino acids composition of L. type yeast with fish meal and extracted soybean meal showed considerable similarity in the most important amino acids,only methionine content of yeast has been being distinctly lower than that of fish meal (Weerden et al., 1970). In the last 20 years, more attention has been grown in usage of yeast in fish diets. As a sole source of protein, Matty and Smith (1978) used yeast (candida hypolytica) at levels of 20 and 40% in rainbow trout diets, while Atack et al., (1979), used pettro yeast for mirror carp. Rumsey et al., (1990 & 1991) found that, using of 50% baker's yeast with disrupted cell walls in salmonid diet had indicated similar growth rate to that of fish fed semipurified diet and faster than fish fed intact yeast cells. All available researches were done on cold water fishes. The present study was conducted to evaluate the effect of dried baker's yeast (DBY) as feed additives at levels of 1,2 and 3% in tilapia diet on the performance and nutrients digestibility in warm water tilapia fingerlings.

MATERIAL AND METHODS

Laboratory Conditions:

Eight glass aquari (120L) equipped with air pump were used. During the 8 weeks experimental period water temperature, pH and dissolved oxygen were within the optimum recommended values for tilapia fingerlings. Tap water was used and treated by antichlor reagent according to Boyd (1979).

Fish: Tilapias fingerlings were obtained from Fish Culture Research Station at El-Kanater El-Khairia, they were devided into 4-duplicate groups each of 15 fingerlings, the average intial body weight was 1.75 ± 0.1 g while average intial total length was 3.5 ± 0.1 cm.

Diet formulation:

Ingredients used to formulat experimental diets were analyzed (table 1) according to AOAC

(1980). Four diets were formulated to be isonitrogenous and isocoloric as far as possible (table 2). Diet (1) served as the control diet. Diets 2, 3 and 4 had 1, 2 and 3% of dried baker's yeast* (DBY) respectively on the expense of SBM. Diets were throughly mixed and used for feeding trails at a rate of 5% LBW in a mash form.

Digestibility trail:

The digestibility coefficient of the experimental diets were determined using the chromic oxide (Cr_2O_3) indicator which was added at a rate of 0.5% to the diet after the end of 8 weeks experimental period. The concentration of Cr203 was measured spectrophotometrically by the method of Furukawa and Tsukahara (1966).

Before the start, fish were starved for 2 days in order to cleer their alimentary tracts of food. Two hours before any fecal samples were taken, the aquaria were cleaned from feed and fecal reminants. Fecal collection technique was done for 10 day as the uncontaminated fecal material in each equaria was removed every 10 minutes by siphoning through fine mesh net and collected in individual jars and immediatly frozen to retard bacterial decomposition until later used for chemical analysis. Gross energy in the fecal samples was measured using an diabatic bomb calorimeter** according to Nijkamp (1971). Calculation of apparent digestability coefficent (ADC) was done as described by Hepher (1988) and apparent digestible energy was calculated as described by Abdel Ghany (1993).

Analysis of variance was put into function to examine the significance of difference between means of various dietary treatments (Snedecor and Cochran, 1980).

RESUTS AND DISCUSSION

The chemical analysis of ingredients used in formulating fish diets was found to be within the normal values reported by NRC (1983).
The availabel DBY used contained 30.2% CP which was lower than that reported by Scott et al.,

Table (1): Proximate chemical analysis of the ingredients used in experimental diets(%).

	Moisture	CP	EE	Ash
Fish meal	7.5	72.0	8.3	11.4
Soybean meal	11.0	44.0	1.1	6.4
Yellow corn	10.6	8.9	3.8	1.4
Dried baker'syeast	96.0	30.2	1.7	7.8

Table(2): Ingredients and calculated analysis of the experimental diets.

Subject	Control	1% DBY	2% DBY	3% DBY
Fish meal	31.0	31.0	31.0	31.0
SBM	40.0	39.0	38.0	37.0
Corn	25.0	25.0	25.0	25.0
Dried baker's yeast	--	1.0	2.0	3.0
Mineral mix*	2.0	2.0	2.0	2.0
Vitamin mix**	2.0	2.0	2.0	2.0
Calculated analysis				
CP	42.15	42.0	41.9	41.73
EE	4.03	4.03	4.04	4.01
CF	3.19	3.15	3.11	3.1
Methionine	0.89	0.89	0.90	0.90
Meth.+cystin	1.48	1.48	1.48	1.49
Lysine	2.8	2.26	2.27	2.28
Tryptophan	0.51	0.51	0.51	0.51
ME Kcal/kg	3442.70	3443.98	3454.64	3468.36
Cal/protein	81.6	81.99	82.45	82.9

* This premix was prepaired by mixing 50% dicalcium phosphate (25% Ca, 18% p), 25% Ramical trace mineral premix(Germany) and 25% Sodium chloride. Each Kg. of mineral premix contains Ca.125 gm , P 90 gm , Mg 25000 mg , Cu 2000 mg , Mn 60000 mg , I 200 mg , Se 100 gm , Zn 40000 mg and Nacl 250 gm.

** Each kg of vitamin premix contains Vit.A 4000,000 IU. , Vit.D 800 IU , Vit.E 1000 mg , Vit B_1 2000 mg , B_2 10000 mg , B_6 100 gm , Vit.K 1000 mg , B_{12} 3 mg , Vit.C 10 mg , Fotic acid 500 mg , Pantothenic acid 5000 mg and Niacine amide 5000 mg. (Ramical-Germany).

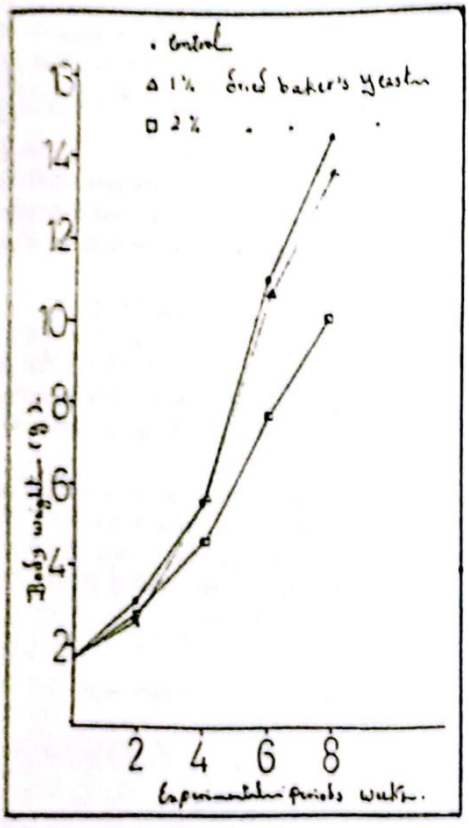
(1982) who stated that DBY should not contain less than 35% CP when used as feed additive in poultry. The parameters used to evaluated tilapia performence are presented in table (3). Fish fed the control diet showed the highest final body weight and weight gain (14.4 and 12.87 g respectively at the end of 8 weeks. The data showed that with the increase of DBY level (1 and 2%), there was a decrease in final body weight and weight gain (13.76, 12.06 g VS 10.04 and 8.21 g), respectively. The increase in body weight was prononced during the last 4 weeks of the experiment in fish fed control diet and that fed 1% DBY (Fig.1) when compared with that fed on 2% DBY.The increase in total body length of fish was similar in fish fed on cotrol diet and on 1% DBY while fish fed on 2% DBY showed the least

* El- Rehab Co. Matrooh
** In Fish Culture Research Station at El-Kanater El-Khairia

Table (3): Effect of dried baker's yeast (DBY) on tilapia performance

Subject	Control	1% DBY	2% DBY
Initial body weight / fish (g)	1.82±[illegible] 0.105	1.7±[illegible] 0.14	1.83±[illegible] 0.39
Final body weight / fish (g)	14.40±[illegible] 1.89	13.76±[illegible] 2.38	10.04±[illegible] 1.07
Weight gain / fish (g)	12.87	12.06	8.21
Mortality %	0.0	6.7	0.0
Initial total length (cm)	3.58±[illegible] 0.34	3.44±[illegible] 0.41	3.51±[illegible] 0.45
Final total length (cm)	6.65±[illegible] 1.1	6.84±[illegible] 1.4	6.11±[illegible] 0.9
Increase in length	3.07	3.7	2.6
Feed consumed g / group	580.8	536.8	437.4
Feed conversion ratio (FCR)	1.52	1.61	1.78
Protein efficiency ratio (PER)	1.56	1.48	1.34

Means ± SD means in rows with different superscripts are significantly different (P < 0.5)



increase in body length. Regarding mortality percentage, fish fed on control diet showed no mortality. Addition of DBY at levels of 1and 2% showed 6.7 and 0.0 mortality %, respectively, DBY at a level of 3% showed very high mortality approximately 90% within one week after the begining of the feeding trail, however, the replacement of fish of this group had induced the similar mortalities. The reason for frequent higher mortalities induced by 3% DBY is obscure. Several factors could be contributed for such results as type of yeast, weight of fish as well as water temperature.

Values of protein efficency ratio (PER) of various diets were 1.56, 1.48 and 1.34 for fish fed control, 1% DBY and 2% DBY diets respectively with no remarked difference this may be attributed to the same protein level of all diets. Ogino and Saito (1970) have shown that, in carp, PER increases as dietary protein level decreases. Atack et al., (1979) reported a higher values of PER for petroyeast (2.08) when petroyeast used as a sole source of protein for mirror carp.

Apparent digestibility coefficient (ADC) :

Table (4): Apparent digestibility coefficient (ADC) of gross energy and nutrients of experimental diets (%)*

ADC / Dietary treatments	DM	GE	CP	EE
Control diet	90.9 ±2.15	71.68 ±2.53	73.96 ±2.0	81.8 ±2.72
1% DBY	88.86 ±3.27	69.04 ±1.57	71.86 ±1.30	78.9 ±3.73
2% DBY	86.78 ±3.90	69.48 ±1.93	72.6 ±1.7	81.37 ±2.5

* means ± SD are insignificantly differed at p<0.05.

The results of ADC of dry matter, gross energy, crude protein and fat are shown in table (4).

All dietary treatments showed similar ADC of DM which ranged between 90.9 and 86.78%. These values are in agreement with that reported by El-Husseiny et al., (1993) who reported that DM digestibility was ranged between 92.6 and 96.28 % irrespective to carbohydrate and lipid sources in tilapia diets. In contrary, lower values (60-84%) reported by Osman (1988). Gross energy AOC was 71.68, 69.04 and 69.48% for fish fed control, 1% and 2 % DBY diets, respectively. El-Hussiny et al., (1993) reported lower values in tilapia than that found in this study but, with fish of higher body weight (106.2 g). Abdel-Ghany (1993) found similar values as ours, except a higher value in fish fed purified

diets (83.15). ACD values of crude protein were 73.96, 71.86 and 72.6 % for fish fed control, 1% DBY and 2% DBY diets, respectively, which indicates that DBY at a level of 1 and 2% had no significant effect on protein digestibility. Atack et al., (1979) reported very high protein digestibility (96.6%) in mirror carp fed petroyeast as a sole source of protein in the diet. Abdel-Ghany (1993) stated that protein of plant origin (Soy protein concentrate) showed better protein digestibility than for Anchovy fish meal in tilapia nilotica, he attributed this result to that tilapia are ominvorous with tendancy to prefer dietary vegetable protein than animal protein. Addition of DBY at rate of 1 and 2% had no significant effect on EE digestibility. The foregoing results are a like to those reported by El-Husseiny et al. (1993) when he fed tilapia on different energy sources. Hanley (1987) reported that in tilapias, there may be some degree of uncertainty attached to the estimation of the coefficients of digestibility of diets containing chromic oxide, especially when the feed parameters are estimated from the food offered rather than the actually ingested. It can be concluded that DBY as feed additive in fish diet at levels of 1 and 2% had no improving effect either on tilapia performance (growth, length, FCR, PER) or on nutrients digestiblity.

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