World Journal of Fish and Marine Sciences 3 (4): 305-307, 2011
ISSN 2078-4589

Effects of Prebiotic on the Fingerling Rainbow Trout Performance Parameters (*Oncorhynchus mykiss*)

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Abstract: The present study was performed to determine the effect of A-max prebiotic addition in feeds, on the growth and food conversion ratio in rainbow trout. Four level of prebiotic (0, 500, 1000, 1500 and 2000 g/ton) were used. TWG, DWG, IWG and SGR significantly affected by prebiotic and 500 gram per ton prebiotic with higher content compared with control group and other treatments, result show that application of prebiotic could affect FCR and treatment of 500 g/ ton have best and improved FCR compared with control group.

Key words: Prebiotic · A-max · Rainbow trout · Gain performance · FCR

INTRODUCTION

Prebiotics and probiotics were originally proposed for human health-enhancing food [1]. Probiotics include viable lactic acid bacteria and other Bacilli that are able to survive in the intestine. Prebiotics include carbohydrates that are not digested in the upper part of the gastrointestinal tract, but selectively fermented by bacteria in the colon [1-6]. The stimulation of specific indigenous microflora by supplementing fish feed with indigestible carbohydrates that act as prebiotic, could be an interesting approach to increase the proportion of health-promoting bacteria in the gut. There are few studies dealing with the influence of prebiotics on the intestinal microflora of fish. Lactosucrose was used as substrate for the intestinal microflora and it increased the thickness of intestinal tunica muscularis in red sea bream, Pagrus major [7]. The present experiments were designed to study the effects of dietary prebiotic (A-MAX) on the body weight gain and feed conversion ration of fingerlings rainbow trout.

MATERIALS AND METHODS

Fish Rearing Conditions and Calculations: The experiment was carried out in controlled conditions. During the experiment, the physico-chemical parameters of water were maintained on relatively constant optimal levels for rainbow rout include water temperature (12±0.35), content of oxygen solved in water (7.98±0.29) and pH (7.84±0.21). The growth test lasted 50 days. The biological materials consisted of rainbow trout fingerlings from commercial farm with average individual weight of 40 g. The experiment was carried out in five treatments, each in four replications, 20 fingerling for each. In twenty pools with a size of 1.30 × 1.30 × 0.8 m with six liters of water entry in the minutes was kept. This experiment were performed based on completely randomized design and biometric traits during four periods 10 days apart were measured and the data for analysis of split-plot experimental design based on CRD was used.

Statistical Analysis: The performance and analytical data obtained were analyzed by variance analysis using the procedure described by the SAS version 9.1 [8]. The Tukey mean separation test was used to determine significant differences between mean values.

$$yikl = \mu + \sigma ik + \beta i + (\alpha\beta)\, kl + \varepsilon ikl$$

Where

$yikl$	=	All dependent variable
μ	=	Over all mean
αk	=	Effect of experimental diet
βi	=	Effect of biometric or period
$(\alpha\beta)kl$	=	Interaction of experimental effect and period
εikl	=	The random effect of residual

Diet Preparation: Experimental diets were formulated with four level of prebiotic A-max 500, 1000, 1500 and 2000 g/ton and composition of that shown in Table 1.

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Table 1: Composition of diet and prebiotic

Experimental diet composition	FFT2	A-max prebiotic composition (percent)	
		Crude protein	25.77
Crude protein percent	40	Ether extract	3.44
Digestible protein percent	37	Crude fiber	10.44
Gross energy(Kcal/Kg)	4400	Ash	3.22
Digestible energy(Kcal/Kg)	3700	ADF	12.33
Ether extract percent	12	NDF	37.00
Crude fiber percent	4	TDN	83.77

ADF: acid detergent fiber, NDF: neutral detergent fiber, TDN: total digestible nutrents

Table 2: Least square means of gain performance of rainbow trout with different level of A-max in total of breeding period

	TWG (g)	DWG (g per day)	IWG(g)	SGR (percent per day)
Control	25.85^{d}	0.640^{c}	0.0122^{d}	1.22^{d}
500 gr/ton	35.97^{a}	0.889^{a}	0.0157^{a}	1.57^{a}
1000 gr/ton	31.02^{b}	0.776^{b}	0.0141^{b}	1.41^{b}
1500 gr/ton	28.55^{c}	0.714^{c}	0.0132^{c}	1.32^{c}
2000 gr/ton	26.82^{d}	0.670^{d}	0.0126^{d}	1.26^{d}
P v	<0.0001	<0.0001	<0.0001	<0.0001
SEM	0.2	0.005	0.0006	0.007

TWG: total weight gain, DWG: Daily weight gain,
IWG: Immediate weight gain, SGR: Specific growth rate

Table 3: Least square means of feed conversion ratio of rainbow trout total of breeding period

	Feed conversion ratio
Control	1.25^{a}
500 gr/ton	0.96^{d}
1000 gr/ton	1.08^{c}
1500 gr/ton	1.16^{b}
2000 gr/ton	1.22^{a}
P value	<0.0001
SEM	0.005

RESULTS AND DISCUSSION

Least square means of gain performance of rainbow trout with different levels of prebiotic are shown in table 2. Total weigh gain (TWG) of fish significantly affected by prebiotic and 500 g/ton prebiotic with higher content compared with control group and other treatments had best effects. This condition were continue for daily gain weight and treatment with 500 g/ton with higher content significantly from 0.640 gram reached to 0.889 g, immediate weight gain (IWG) of fish affected by 500 g/ton prebiotic and from 0.0112 g in control group reached to 0.0157 g and compared with other treatments have good result. Specific growth rate (SGR), treatment with 500 g has good effect on the SGR trait and significantly reached to 0.057 percent. Studies performed so far, referring to the application of natural growth stimulators in the breeding of water organisms, have shown great possibilities of an improvement in the obtained results through the introduction to the diets of prebiotics. The results obtained in the present experiment indicated a distinct improvement of the breeding effects of juvenile forms of rainbow trout fed on feeds with an addition of a prebiotic. This confirms the directions of the new feeding strategies giving high possibilities for health improvement of fish and their resistance to infections [9]. Feed conversion ration shown in Table 3, results show that application of prebiotic could affect FCR and treatment of 500 g/ton improved FCR compared with control group and other treatments and this difference is significant. Treatments with 1000 and 1500 g/ton prebiotic with 1.08 and 1.166 FCR respectively significantly lower compared with control group but treatment with 2000 g/ton haven't significantly deference with control group. The current results showed that the 500 g/ton prebiotic have best effect on the performance parameters. Researcher reported application of prebiotic containing mannan oligosacaride could improve feed conversion ration in rainbow trout, carp and red tilapia [10-13]. Results of other research showed that prebiotic with increase intestinal health and eliminate pathogen microorganism and reinforcement of immune system could affect feed efficient and improve FCR.

CONCLUSION

Prebiotic of A-max could improve gain performance and feed conversion ratio and 500 g/ton is the best treatment.

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