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Experiment on growth response and Feed Conversion Ratio (FCR) of fishes by feeding BR Sludge from distillery spent wash at distillery factory in Yangon, Myanmar

Abstract

The two freshwater fishes, the catfish *Pangasius pangasius* (Hamilton, 1822) and the catla fish *Catla catla* (Hamilton, 1822)were experimented in small culture ponds for growth response and feed conversion ratio during the study period from October 2018 to January 2019. The *Pangasius pangasius* fish growth rates of test and control ponds were almost equal. The control growth rates of *Catla catla* fish were higher than the test pond. Among these fishes, the fish *Catla catla* was the soft bottom habitat and they preferred mud bottom sediments. Among them, the growth rates of fish *Catla catla* was less than other species. The FCR values of the test ponds are 12.7 of *Pangasius pangasius* fish and 21.5 of *Catla catla* fish. The FCR values of the control ponds are 14.9 of *Pangasius pangasius* fish and 23.8 of *Catla catla* fish. In the present study, the results of FCR values are very useful for BR Sludge from Distillery Spent Wash. The feeding ratio (FCR) of test ponds is less than control ponds that is very good useful for these culture fishes.

Keywords: catfish, catla fish, distillery spent wash, feed conversion ratio, freshwater fishes, growth rate, small culture pond

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Introduction

Rapid increase in world population needs food for its growth. Shortage of food especially protein is very serious problem for human population. Fish is a good source of protein and also has essential amino acids with minerals like zinc, magnesium, sodium, etc. fish farming and aquaculture industry play significant role in contributing fish protein to large Asian population. Advancement of aquaculture is largely depended on availability of compatible and acceptable diet. The success of commercial aquaculture operations depend on a variety of factors relating to the fields of biology, engineering and economics. One key biological component is the availability of suitable diets that are efficiently digested and provide the required nutrients for optimum growth.

Semi-intensive and intensive fish farming is gaining importance in Myanmar. As a result, use of supplementary feed has become inevitable for the success of fish culture. Supplementary feeding is known to increase the carrying capacity of culture systems and can enhance fish production by many folds. Attempts have been made to understand the gross level of nutrient requirements such as proteins, lipids, carbohydrates, vitamins and mineral for tested fish.

The growth and feed conversion ratio (FCR) of a fish is remarkable tool to compute the acceptability of artificial feed. The proper information of FCR on locally available ingredients will provide the basis to develop acceptable feed, though the task of preparing acceptable and suitable artificial feed for major fish is complicating due to its feeding preference. The main objectives of the present study are (1) to know the survival rate of fish, (2) to examine the growth rate of fish within three months and (3) to know Food Conversion Ratio (FCR) of fish by using "Spent Wash BR Sludge" to be used in animal feed as supplementary.[1–5]

Materials and methods

The catfish, *Pangasius pangasius* and the catla fish, *Catla catla* by Hamilton, 1822 were collected from the Hatchery of Department of Fisheries and kept in the ponds for two weeks of acclimatization where they were fed on reference diets. The experiment was conducted in six tarpaulin ponds. The areas of the pond were 5×7 square feet and the height was 7 feet respectively. The water level was filled 4 feet depth. The 40 fingerlings were stocked into each pond. Fingerlings were fed the rate of 5%, 10% and 15% of the body weight twice (morning and evening) a day. Remaining food was collected at the end of the day by siphoning. Each pond was changed two-third of water and refilled with water. The two test diets were composed for test ponds and the control ponds. Among them, Spent Wash BR Sludge, rice bean and groundnut meals are food for test pond and rice bean and groundnut meals are also food for control ponds. All ingredients were mixed manually in bucket for 5 minutes.[6–10]

The mean weight of fingerlings in each pond was calculated to work out the feeding rate for next two weeks. The diet used by fingerlings was calculated by subtracting resting diet from quantity of diet given. Food Conversion Ratio (FCR) for each treatment was computed by the following equation:

$$Feed\ Conversion\ Ratio(FCR) = \frac{F}{Wf - Wo}$$

F is the weight of food supplied to fish during the study period, Wf is the live weight of fish at the beginning of the study period and Wo is the live weight of fish at the end of the study period.

Dissolved oxygen and pH of water in each pond was monitored by changing water daily and by using aerators and blowers. The range of temperature ranged 25-29°C during the study period. There are six ponds for fish culture such as three ponds are controls and another is tests. The feeding ratio was 5%, 10% and 15% of total body weight in each pond for first, second and third months. The food for control ponds were mixed with 50% of rice bean and groundnut mesh. The 50% of rice bean and sluge of test ponds for first two months and 50% of groundnut mesh and sluge for last month. Fish should be fed 4 to 6 per cent of the fish body weight up to 2 months and 1.5 to 3 per cent for the rest of the grow-out period.

Results and discussion

The fish culture for growth rate by feeding BR Sludge from Distillery Spent Wash at Distillery Factory is a four months experiment culture focused on Setse Aquaculture Research Center, Mawlamyine University which started from October, 2018 to January, 2019. This report describes the results of fish culture project activities implemented during the four months such as first month is water fertilization and last three months are taken culture. The body weight, the body total length and FCR values in *Pangasius pangasius* and *Catla catla* fed on control and test diets are given in Table 1-2 and Figures 4 and 5. The initial total length of *P. pangasius* was 12cm and the harvesting total body length was 25cm for test pond and 28cm for control pond in each fish. The fish *C. catla* was 13cm in initial total length and the harvesting total body length was 25cm for test pond and 24cm for control pond in each fish. The initial weight of each *P. pangasius* fish was 50g and the harvesting weight of this fish was 185g for test pond and 170g for control pond. The 50g of initial weight was *C. catla* fish and this fish harvesting weight was 105g for test pond and 135g for control pond. Among them, the growth rates of *P. pangasius* fish at test pond were increased more than *C. catla* fish. The *P. pangasius* fish growth rates of test and control ponds were almost equal. The control growth rates of *C. catla* fish were higher than the test pond.

Table 1 Nutrient contents of various fish meals

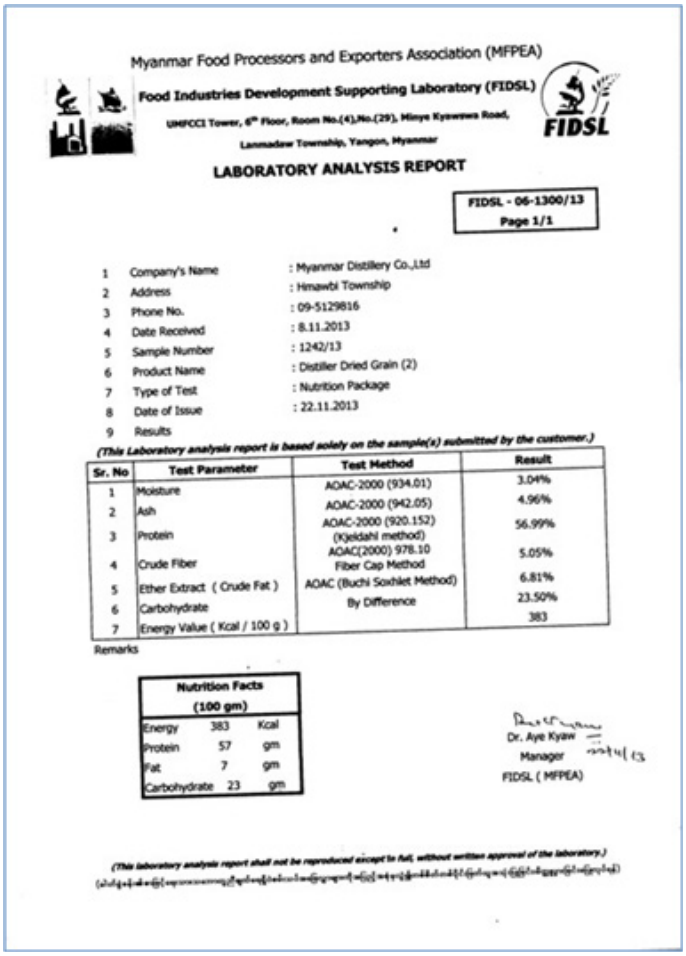
Nutrition	Food			Control	Test
	Sluge (100g)	GM (100g)	RB (100g)		
Protein (g)	57	26	6	32	83
Fat (g)	7	49	6	55	56
Carbohydrate (g)	23	16	43	59	39
Energy (kcal)	383	567	244	811	950

Daily feeding amount =total weight of all pond fish × feeding rate

Feeding rates			
Month	November	December	January
Monthly amount (%)	5	10	15
Daily Feeding Times	2	2	2

Table 2 Growth rates of fishes in each individual pond

Sr. No.	Periods (Weeks)	*Pangasius pangasius*		*Catla catla*	
		Test pond(g)	Control pond(g)	Test pond(g)	Control pond(g)
1	Initial weight	50	50	50	50
2	Third	70	74	76	95
3	Fifth	82	90	77	96
4	Seventh	106	107	78	105
5	Ninth	109	108	80	115
6	Eleventh	114	120	105	135



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FIDSL

LABORATORY ANALYSIS REPORT

FIDSL - 06-1300/13
Page 1/1

1	Company's Name	: Myanmar Distillery Co.,Ltd
2	Address	: Hmawbi Township
3	Phone No.	: 09-5129816
4	Date Received	: 8.11.2013
5	Sample Number	: 1242/13
6	Product Name	: Distiller Dried Grain (2)
7	Type of Test	: Nutrition Package
8	Date of Issue	: 22.11.2013
9	Results	

(This Laboratory analysis report is based solely on the sample(s) submitted by the customer.)

Sr. No	Test Parameter	Test Method	Result
1	Moisture	AOAC-2000 (934.01)	3.04%
2	Ash	AOAC-2000 (942.05)	4.96%
3	Protein	AOAC-2000 (920.152) (Kjeldahl method)	56.99%
4	Crude Fiber	AOAC(2000) 978.10 Fiber Cap Method	5.05%
5	Ether Extract (Crude Fat)	AOAC (Buchi Soxhlet Method)	6.81%
6	Carbohydrate	By Difference	23.50%
7	Energy Value (Kcal / 100 g)		383

Remarks

Nutrition Facts (100 gm)		
Energy	383	Kcal
Protein	57	gm
Fat	7	gm
Carbohydrate	23	gm

Dr. Aye Kyaw
Manager
FIDSL (MFPEA)

(This laboratory analysis report shall not be reproduced except in full, without written approval of the laboratory.)

Figure 1 Laboratory analysis report of Spent Wash BR Sludge.

The survival rates of *P. pangasius* fish was 100% survival in test and control pond (Table 3). For *C. catla* fish, the survival rate of test pond fishes was 33% and 28% of control pond fishes (Table 4). Among these fishes, the fish *C. catla* was the soft bottom habitat and they preferred mud bottom sediments.

All culture species were almost equals the growth rates. Among them, the growth rates of fish *C. catla* was less than other species.

The FCR values of the test ponds are 12.7 of *P. pangasius* fish and 21.5 of *C. catla* fish. The FCR values of the control ponds are 14.9 of *P. pangasius* fish and 23.8 of *C. catla* fish. In the present study, the results of FCR values are very useful for BR Sludge from Distillery Spent Wash. The feeding ratio (FCR) of test ponds is less than control ponds so this is very good for these culture fishes.[11–23]

Figure 2 Pond design and construction. (A) Pond digging. (B) Framing of the pond. (C) Setting up the blower pipe. (D) water filling into the pond. (E) Terracing with pond. (F) cabin and store with ponds.

Figure 3 Food designs and feed trays taking on the ponds. (A) mixed normal food. (B) mixed test food. (C) normal food ball. (D) test food ball. (E-F) taking food trays.

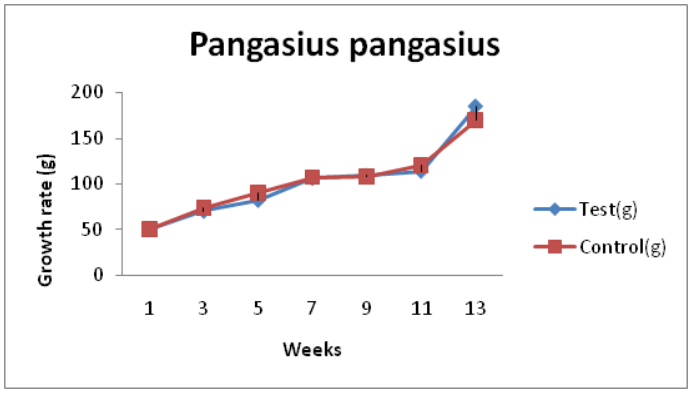

Figure 4 Growth rates of *Pangasius pangasius* fishes test and control ponds.

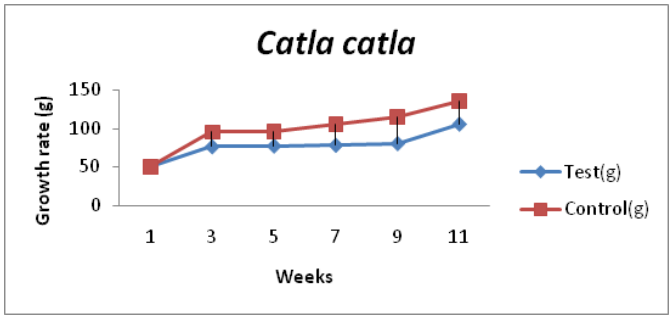

Figure 5 Growth rates of *Catla catla* fishes test and control ponds.

Figure 6 The initial sizes of individual fishes in the present study. (A) *Pangasius pangasius*. (B) *Catla catla.*

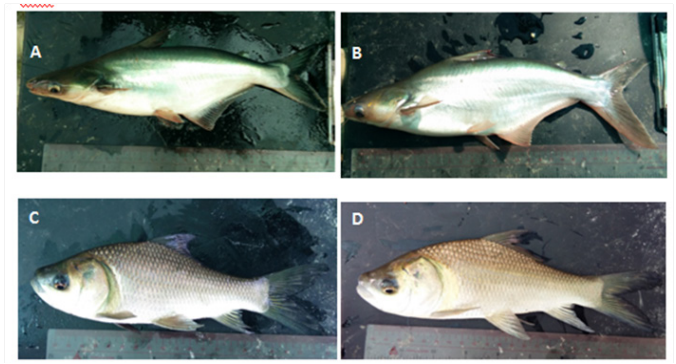

Figure 7 The harvesting sizes of individual fishes in the present study. (A) *Pangasius pangasius* fish of test pond. (B) *Pangasius pangasius* fish of control pond. (C) *Catla catla* fish of test pond and (D) *Catla catla* fish of control pond.

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Table 3 Survival rates of *Pangasius pangasius* fishes test and control ponds

	***Pangasius pangasius* (Test pond)**			***Pangasius pangasius* (Control pond)**		
	Stocking	**Har-vesting**	**Survival (%)**	**Stocking**	**Har-vesting**	**Survival (%)**
No. of fish	40	40	100	40	40	100

Table 4 Survival rates of *Catla catla* fishes test and control ponds

	***Catla catla*(Test pond)**			***Catla catla*(Control pond)**		
	Stocking	**Har-vesting**	**Survival (%)**	**Stocking**	**Har-vesting**	**Survival (%)**
No. of fish	40	13	33	40	11	28

Conclusion

The present study revealed that growth performance of *Pangasius pangasius* fingerlings was higher than *Catla catla* fish for test pond. This showed that BR Sludge from Distillery Spent Wash are the suitable and compatible ingredients for *Pangasius pangasius* fingerlings and these ingredients could preferably be included in fish feed formulation. In addition, our research ponds were used by tarpaulin this is why the fishes couldn't take the natural nutrients in the soil. If we used the earthern ponds by feeding BR Sludge from Distillery Spent Wash, the growth rates of the fishes were increased more than the present study.

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Conflicts of interest

The authors declare that there are no conflicts of interest.

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