CULTURE OF RAINBOW TROUT IN COMBINATION WITH OVER-WINTERING CHANNEL CATFISH IN MISSISSIPPI

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ABSTRACT

The feasibility of raising rainbow trout with over-wintering channel catfish in 0.04 ha (0.1 acre) ponds was examined. Three treatments with three replications were used; (1) 200 rainbow trout fed three percent of fish weight per day, (2) 100 rainbow trout and 75 channel catfish fed three percent of trout weight per day, (3) 100 rainbow trout and 75 channel catfish not fed. Trout grown alone showed slightly higher gains than those grown with catfish and receiving feed, and were statistically significant ($P < .05$). Both trout and catfish not fed showed statistically significantly less gain than those receiving feed and the trout significantly lower survival than trout receiving feed. Catfish receiving feed showed a mean gain of 117 g. Trout receiving feed demonstrated a mean gain of 217 g in the 131 days of the study.

INTRODUCTION

The winter culture of rainbow trout, *Salmo gairderi* Richardson, in localities where they cannot survive year round, is not a new concept. Buck, Baur and Rose (1970) and Collins (1972) demonstrated winter freshwater cage culture of rainbow trout in southern Illinois and Arkansas respectively. Tatum (1973) showed the feasibility of brackish water cage culture in Alabama. The use of channel catfish, *Ictalurus punctatus* (Rafinesque) production facilities to produce a winter crop of rainbow trout was demonstrated by Hill, Chesness and Brown (1972) in Georgia raceways and Reagan and Robinette (1974) in Mississippi ponds.

Many catfish producers have adopted winter feeding regimes for over-wintering channel catfish. Lovell and Sirikul (1974) showed that alternate or warm day feeding regimes can produce substantial gains in the weight of over-wintering channel catfish. The purpose of this study was to determine the feasibility of raising rainbow trout with over-wintering channel catfish and obtain growth in both species.

MATERIALS AND METHODS

Three treatments with three replications, each in 0.04 ha (0.1 acre) ponds were chosen; (1) 200 rainbow trout fed three percent of fish weight per day, (2) 100 rainbow trout and 75 channel catfish fed three percent of trout weight per day, (3) 100 rainbow trout and 75 channel catfish not fed.

Channel catfish averaging 318 g in weight, from a prior feeding experiment, were stocked on 26 October 1974. Rainbow trout fingerlings were obtained from the National Fish Hatchery, Mountain Home, Arkansas. The trout were stocked on 23 November 1974 and averaged 57 g in weight.

Feeding was initiated on 25 November 1974. The fish were fed a commercial floating trout feed six days a week. Feeding "rings" measuring ten feet square, constructed of one inch PVC pipe, were used to prevent loss of feed blown against the banks. Feeding rates were adjusted biweekly using an assumed 1.5 conversion ratio for the rainbow trout. Total culture period was 131 days with 109 feeding days. Mean water temperature 30 cm deep was 12 C (54 F) during the study period. The experiment was terminated on 3 April 1975 and all fish were counted and weighed.

RESULTS AND DISCUSSION

There were no observable disease or environmental stress problems during the study period. Some predation on the trout by great blue herons (*Ardea herodias*) occurred during the first month of the study. The trout fed most actively on the floating feed on windless days.

Trout grown without catfish demonstrated the greatest gain (Table 1), but this was not statistically significantly different from trout grown with catfish and fed. As might be expected, trout grown with catfish and not fed showed virtually no gain.

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Table 1. Weight changes, feed conversions and survivals for rainbow trout, pond cultured with and without over wintering channel catfish[1]

Treatment	Pond	Average weight per fish (g) Stocking	Harvest	Gain	Feed Conversion (trout)	Feed Conversion (trout & catfish)	Percent Survival
200 Rainbow trout, fed 3% of fish weight	3	57	289	232	2.5	—	84
	6	64	325	261	2.2	—	88
	12	73	312	239	2.8	—	92
	mean	65	309	244[a]	2.5		88[a]
100 Rainbow trout and 75 channel catfish, fed 3% of trout weight	5	61	274	213	3.6	2.3	72
	8	77	254	177	4.1	2.7	91
	10	64	243	179	3.5	2.3	86
	mean	67	257	190[b]	3.7	2.4	83[a]
100 Rainbow trout and 75 channel catfish not fed	7	82	85	3	—	—	21
	9	75	79	4	—	—	23
	11	61	104	40	—	—	4
	mean	73	89	16[c]			16[b]

[1] Treatment means with the same superscript are not statistically different at $P<.05$

Feed conversion is significantly different ($P<0.1$) in the two treatments if the trout gain alone, in the trout and catfish treatment, is considered (Table 1). Although this feed conversion of 3.7 is not a true conversion value, it does indicate that the catfish did consume a substantial part of the feed that went into the ponds. However, with the inclusion of the weight gained by the catfish, feed conversions are almost identical in the two treatments (Table 1).

These feed conversion values are considerably higher than those reported by Hill et al. (1972). This was probably due to several factors. First, the feeding rate adjustment was based on an assumed 1.5 feed conversion, when the actual conversion was a full unit higher (Table 1). The second factor was the use of a three percent of body weight feeding rate. It is doubtful if trout can utilize this high rate over the entire growth period. Feeding tables by Deuel et al. (1952) suggest a feeding rate of approximately two percent of body weight per day for the size range of fish harvested in the current study in conjunction with the mean water temperature during the study period (54 F). Lastly, the difference in the culture system was probably a sizable factor in the difference in feed conversion.

Percentage survival values for trout (Table 1) are not statistically different in the two treatments receiving feed. Trout not receiving feed showed a low survival rate. Ponds not receiving feed became turbid during the second week of the study, and remained so for the entire study period. This turbidity was apparently caused by bottom feeding activity of trout and/or catfish.

Catfish not receiving feed demonstrated a net loss of weight (Table 2). Catfish in ponds receiving feed showed an average gain of 36 percent of mean stocking weight (Table 2). This percent gain was higher than that reported by Lovell and Sirikul (1974). The higher gain was probably due to the fish having twice as many opportunities to feed (six days per week as opposed to alternate or warm days). Survival values were lower for the unfed catfish (Table 2) but were not statistically significant.

It appears that rainbow trout and over-wintering channel catfish can be successfully grown together in ponds. Although statistically significant effects of channel catfish on trout growth were apparent, additional feed might allow the catfish to over winter with at least a 36 percent gain with no effect on trout growth. Assuming a winter daily gain of 0.03 percent (winter total 36 percent) and a winter feed conversion of 2.5 the daily winter feeding rate for the catfish should be in the range 0.75-1.0 percent of catfish body weight. This is feed in addition to feed allowed for trout production.

Table 2. Weight changes and survivals for channel catfish over-wintering in ponds with rainbow trout[2]

Treatment	Pond	Average weight per fish (g) Stocking	Harvest	Gain	Percent Wt. Gain	Percent Survival
100 rainbow trout and 75 channel catfish fed 3% of trout weight	5	322	446	124	38	95
	8	331	455	124	37	95
	10	318	421	103	32	100
	mean	324	441	117[a]	36	97[a]
100 rainbow trout and 75 channel catfish not fed	7	313	267	−46	−15	71
	9	318	308	−10	−3	100
	11	309	296	−13	−4	77
	mean	313	290	−23[b]	−7	83[a]

[2] Treatment means with the same superscript are not statistically different at $P < .05$.

LITERATURE CITED

Buck, Homer D., R. J. Baur and C. R. Rose. 1970. An experiment in the winter time culture of trout in cages floated in a Southern Illinois pond. Illinois Nat. Hist. Surv. 7 p. (Mimeo).

Collins, Richard A. 1972. Cage culture of trout in warm water lakes. Amer. Fish Farmer. 3(4):4.

Deuel, C. R., D. C. Haskell, D. L. Brockway and O. R. Kingsburg. 1952. New York State Fish Hatchery feeding chart, 3rd Ed., N. Y. Conservation Department, Albany, N. Y.

Hill, Thomas K., J. L. Chesnees and E. E. Brown. 1972. Utilization of rainbow trout, *Salmo gairdneri* Richardson, in a double-crop fish culture system in south Georgia. Proc. Twenty-sixth Ann. Conf. Southeast. Assoc. Game and Fish Commrs. 26:368-376.

Lovell, R. T. and B. Sirikul. 1974. Winter feeding of channel catfish. Proc. Twenty-eighth Ann. Conf. Southeast. Assoc. Game and Fish Commrs. (In press).

Reagan, Roland E., Jr. and H. Randall Robinette. 1974. Rainbow trout culture: a possible winter use of catfish ponds. MAFES Res. Highlights. 37(9):3.

Tatum, Walter M. 1973. Brackish water cage culture of rainbow trout (Salmo gairdneri), in south Alabama. Trans. Amer. Fish Soc. 102(4):826-828.