Growth Performance of Goldenfin Pompano at Two Stocking Densities in Near-Shore Ocean Cages at Hainan, China

Results of ASA/China 2003 Feeding Trial 35-03-121

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ABSTRACT

Goldenfin pompano growth performance in coastal cages was evaluated from juvenile to market size at two stocking densities using the ASA LVHD cage production model and ASA extruded, marine fish feeds. The cage trial was conducted in Xincun Bay at Ling Shui, Hainan, China. Pompano were stocked in 8.0-m^3 cages at densities of 250 fish per m^3 (2,000 fish per cage) and 375 fish per m^3 (3,000 fish per cage), with three replicates of each stocking density. Juvenile pompano were fed to satiation daily with a 47% crude protein and 15% crude fat feed (47/15) to fish size 25 g, and with a 43% crude protein and 12% crude fat feed (43/12) from fish size >25 g. Both feeds were fed in extruded, floating pellet form. Pompano stocked at 250/m^3 grew from 5 g to 389 g in 157 days of feeding, while pompano stocked at 375/m^3 grew from 5 g to 385 g in the same period. Fish growth at the two densities was not significantly different ($P>0.05$). Gross production per m^3 of cage volume at harvest was 88.3 kg at the 250/m^3 stocking density and 117.3 kg at the 375/m^3 stocking density. Gross production at harvest was significantly different ($P<0.05$) for the two stocking densities. Average FCR with the combination of 47/15 and 43/12 feeds was 2.11:1 for fish at the 250/m^3 and 2.26:1 for fish at the 375/m^3 stocking density. Average fish survival was 90.8% at the 250/m^3 density and 81.2% at the 375/m^3 density. Fish survival and FCR were both significantly different ($P<0.05$) for the two stocking densities. Net economic return and return on investment (ROI) were RMB 2,806/cage (RMB 351/m^3) and 24.8%, respectively, for fish stocked at 250/m^3, and RMB 3,161/cage (RMB 395/m^3) and 20.3%, respectively, for fish stocked at 375/m^3. Neither net economic return nor ROI were significantly different ($P>0.05$) at the prevailing market price of RMB 20/kg for goldenfin pompano. Feed cost per kg of fish growth with the ASA feeds was RMB 10.13 for fish stocked at 250/m^3 and RMB 10.85 for fish stocked at 350/m^3. Results of the trial indicate that goldenfin pompano can be cultured at high density in LVHD ocean cages, but that FCR and fish survival are negatively impacted at the higher density. Fish growth performance was good at both densities and did not decline, even when carrying capacity in the high density cages reached 117 kg/m^3.

INTRODUCTION

The American Soybean Association (ASA), in cooperation with Mr. Liang Xing Xui of Cage Farm No. 0601, Ling Shui, Hainan, conducted a cage feeding trial with goldenfin pompano (*Trachinotus ovatus*) in 2003. The objective of the trial was to evaluate

goldenfin pompano growth performance and economic return at stocking densities that would yield fish biomass >50 kg/m^3 of cage volume at harvest.

MATERIALS AND METHODS

Six, 8.0-m^3 cages at Cage Farm No. 0601 in Xincun Bay at Ling Shui, Hainan Province, were used for the trial. Cages were constructed of nylon mesh netting with a rigid top frame, opaque covers and a feed enclosure to contain floating, extruded feed pellets. Cages were arranged on the perimeter of the farm with a minimum of two meters of open water on all sides of each cage to facilitate water exchange. Juvenile goldenfin pompano were stocked in the six cages in May 2003 at densities of 250 fish and 375 fish per m^3, with three replicates of each stocking density randomly assigned to the six cages.

Fish in all cages were fed the ASA 47/15 (47% crude protein and 15% crude fat) marine fingerling feed in extruded, floating pellet form from fish size 5 g to fish size 25 g (Table 1). When fish reached size 25 g, they were weaned to the ASA 43/12 (43% crude protein and 12% crude fat) marine growout feed (Table 2). The 43/12 growout feed was formulated with 35% dehulled soybean meal, as a partial replacement for fish meal, to reduce feed cost. Both feeds were formulated by ASA and produced by the Shanghai DaJiang aquafeed mill. Pompano were fed to satiation three times daily for the first month, and twice daily thereafter. Fish in replicate cages of each stocking density were fed identically at each feeding.

Trial management was based on the ASA LVHD cage production model. Fish in all cages were sampled once per month on approximately the same date each month. All cages were harvested at the conclusion of the trial to determine average fish weight, gross and net production, feed conversion ratio (FCR) and survival. Production input costs were recorded throughout the trial and net income and ROI were calculated at the end of the trial.

RESULTS

Goldenfin pompano were fed 158 days between 22 May and 27 October 2003. Pompano at the 250/m^3 stocking density grew from 5 g to an average weight of 389.3 g, while fish at the 375/m^3 stocking density grew from 5 g to an average weight of 385.5 g (Figure 1; Table 3). Fish growth was not significantly different ($P<0.05$) at the two densities. Gross fish production per m^3 of cage volume at harvest averaged 88.3 kg at the 250/m^3 stocking density and 117.3 kg at the 375/m^3 stocking density. Gross production was significantly different ($P<0.05$) for the two stocking densities, with the higher stocking density cages yielding 32.8% more fish biomass at harvest than the lower stocking density cages. Average FCR with the combination of 47/15 and 43/12 feeds was 2.11:1 for fish at the 250/m^3 and 2.26:1 for fish at the 375/m^3 stocking density. Average fish survival was

90.8% at the 250/m^3 density and 81.2% at the 375/m^3 density. Fish survival and FCR were both significantly different ($P<0.05$) for the two stocking densities.

Net economic return and return on investment (ROI) were RMB 2,806/cage (RMB 351/m^3) and 24.8%, respectively, for fish stocked at 250/m^3, and RMB 3,161/cage (RMB 395/m^3) and 20.3%, respectively, for fish stocked at 375/m^3. Neither net economic return nor ROI were significantly different ($P>0.05$) at the prevailing market price of RMB 20/kg for goldenfin pompano. Feed cost per kg of fish growth with the ASA soy-inclusion, extruded feeds was RMB 10.13 for fish stocked at 250/m^3 and RMB 10.85 for fish stocked at 350/m^3, at an average feed cost of RMB 4.8/kg.

SUMMARY AND CONCLUSIONS

Results of the trial indicate that goldenfin pompano can be cultured at high density in LVHD ocean cages, but that FCR and fish survival are negatively impacted as density increases. Fish growth performance was good at both stocking densities and did not decline or differ, even when carrying capacity in the high-density cages reached 117 kg/m^3. Fish were uniform in size at harvest with both stocking densities.

Economically here was no advantage to stocking at the higher 375 fish/m^3 density, as net income and ROI were not statistically different than for fish produced at 250 fish/m^3 stocking density.

Goldenfin pompano fed aggressively and exhibited good growth with the ASA soy-inclusion, extruded feed. The trial cooperator reported that the same batch of pompano fed on a local feed grew to only 250 g during the same time period that pompano fed the ASA feeds grew to 385 g.

ACKNOWLEGEMENTS

ASA gratefully acknowledges Mr. Liang Xing Xiu of Ling Shui Cage Farm No. 0601 for his close cooperation in conducting this trial with the American Soybean Association.

Chinese Currency and Production Unit Conversions:

RMB 8.26 = US$1.00
1.0 kg = 2.2 lb

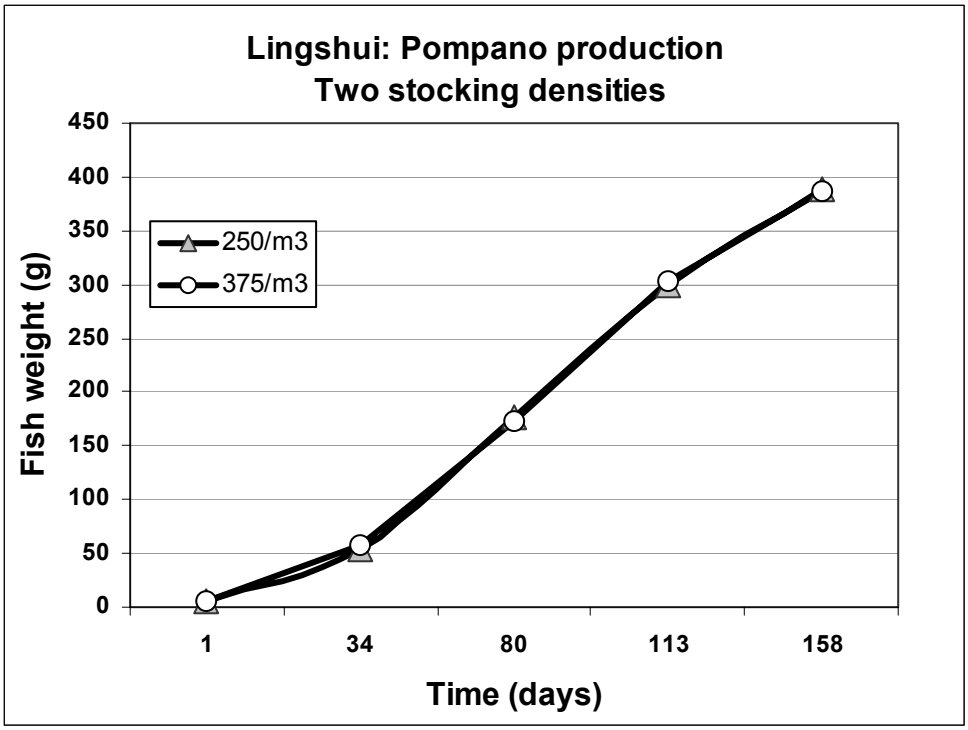

FIGURE 1. Growth curves for goldenfin pompano cultured at stocking densities of 250 fish and 350 fish per m^3 of cage volume in 8-m^3 cages in an ASA ocean cage feeding trial conducted at Ling Shui, Hainan, China. There was no difference in pompano growth at the two stocking densities. Pompano exhibited good growth performance when fed extruded aquafeeds with dehulled soybean meal as a partial replacement for fishmeal.

Table 1. Formula for the ASA 47/15 marine fingerling feed used in the 2003 goldenfin pompano trial conducted at Ling Shui, Hainan Province, China.[1]

Ingredient	Percentage of feed
Fishmeal, anchovy 67/7-8	48.70
Wheat flour 10	20.00
Soybean Meal	10.00
Wheat gluten 68	10.00
Fish Oil, Unspecified PV=10<20	10.50
Min PMX T&S 1	0.25
Vit PMX F2	0.50
Stable Vit C35	0.03
Ethoxyquin 66	0.02
TOTAL	100.00

[1]The numerical component of the feed description refers to the percentage of protein and fat, respectively, in the ration, i.e. 47/15 indicates 47% crude protein and 15% crude fat.

Table 2. Formula for the ASA 43/12 marine fish growout feed used in the 2003 goldenfin pompano trial conducted at Ling Shui, Hainan Province, China.[1]

Ingredient	Percentage of feed
Soybean Meal	35.00
Fishmeal, anchovy 63/6.5	37.00
Wheat Flour 10	14.20
Wheat Gluten	4.60
Fish Oil, Unspec.	8.40
Vit PMX	0.50
Min PMX	0.25
Stable Vitamin C35	0.03
Ethoxyquin	0.02
TOTAL	100.00

[1]The numerical component of the feed description refers to the percentage of protein and fat, respectively, in the ration, i.e. 43/12 indicates 43% crude protein and 12% crude fat.

Table 3. Results of the 2003 ASA aquaculture trial that evaluated goldenfin pompano growth performance at in 8.0-m^3 cages at two stocking densities with 47/15 and 43/12 extruded aquafeeds at Ling Shui, Hainan Province, China.

Cage No.	Feeds[1]	Stocking rate (fish/m^3)	Initial fish weight (g)	No. days fed	Fish harvest weight (g)	Survival (%)	P_G[2] (kg/m^3)	FCR	Net income (RMB/m^3)	ROI (%)
1	ASA	250	5.0	157	391.4	89.0	87.0	2.14:1	324.9	22.9
2	ASA	250	5.0	157	382.6	89.8	85.9	2.17:1	301.9	21.3
3	ASA	250	5.0	157	393.9	93.5	92.1	2.02:1	425.7	30.0
Mean		250*	5.0**	157**	389.3**	90.8*	88.3*	2.11:1*	350.8**	24.8**
4	ASA	375	5.0	158	390.9	78.6	115.2	2.30:1	352.5	18.1
5	ASA	375	5.0	158	385.5	83.1	120.1	2.21:1	450.5	23.1
6	ASA	375	5.0	158	380.1	81.8	116.7	2.28:1	382.5	19.6
Mean		375*	5.0**	158**	385.5**	81.2*	117.3*	2.26:1*	395.2**	20.3**

* Significant difference ($P<0.05$)
**No significant difference ($P>0.05$)

[1] Pompano were fed a combination of the ASA 47/15 marine fingerling and 43/12 marine growout feeds in extruded, floating pellet form
[2] P_G = Gross Production, expressed as fish weight per cubic meter of cage volume