SUPPLEMENTAL FEEDING FOR RED TILAPIA CULTURE IN BRACKISHWATER

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Introduction

- The results from previous study showed that Thai red tilapia grew better at 10 ppt than at other salinities in fertilized ponds.
- Supplentary feed is needed to produce large size fish for consumer market

Objectives

- To determine appropriate feeding rate to produce larger size fish in fertilized brackishwater ponds.
- To determine the economic return of tilapia production with supplemental feed

Experimental conditions

- Venue: Asian Institute of Technology (AIT), Thailand,
- Time: March-June 2001.
- Fish: Sex-reversed fingerlings of Thai red tilapia (33.2-33.4 g size); acclimation to 10 ppt by raising salinity level 5 ppt every two days.
- Stocking density: 62.5 fish m-3 in all cages.

Experiment design

- Treatments arranged: Randomized complete block design in 15 cages (1x1x1.2m) suspended in a 200-m2 fertilized earthen pond at 10 ppt salinity.
- *Five treatments were used to test effects of different supplemental feeding regimes:*
  - 1) 0% (no feeding);
  - 2) 25% satiation feeding;
  - 3) 50% satiation feeding;
  - 4) 75% satiation feeding;
  - 5) 100% satiation feeding.
- Fertilization: Weekly with urea and triple super phosphate (TSP) at 4 kg N and 1 kg P ha-1 d-1.
- Water depth: 1 and 0.8 m,
- Aeration: All cages were aerated for 6 hours daily from 0200-0800 h using one airstone in each cage.

Measurements

- Fish: Average weights biweekly by bulk weighing 50% of the initial stock in each cage; daily weight gain (g fish-1d-1), yield (kg m-3) were calculated at the harvest.
- Water quality: all parameters were analysed biweekly; diel measurements were made monthly for temperature, DO and pH .

Data analysis

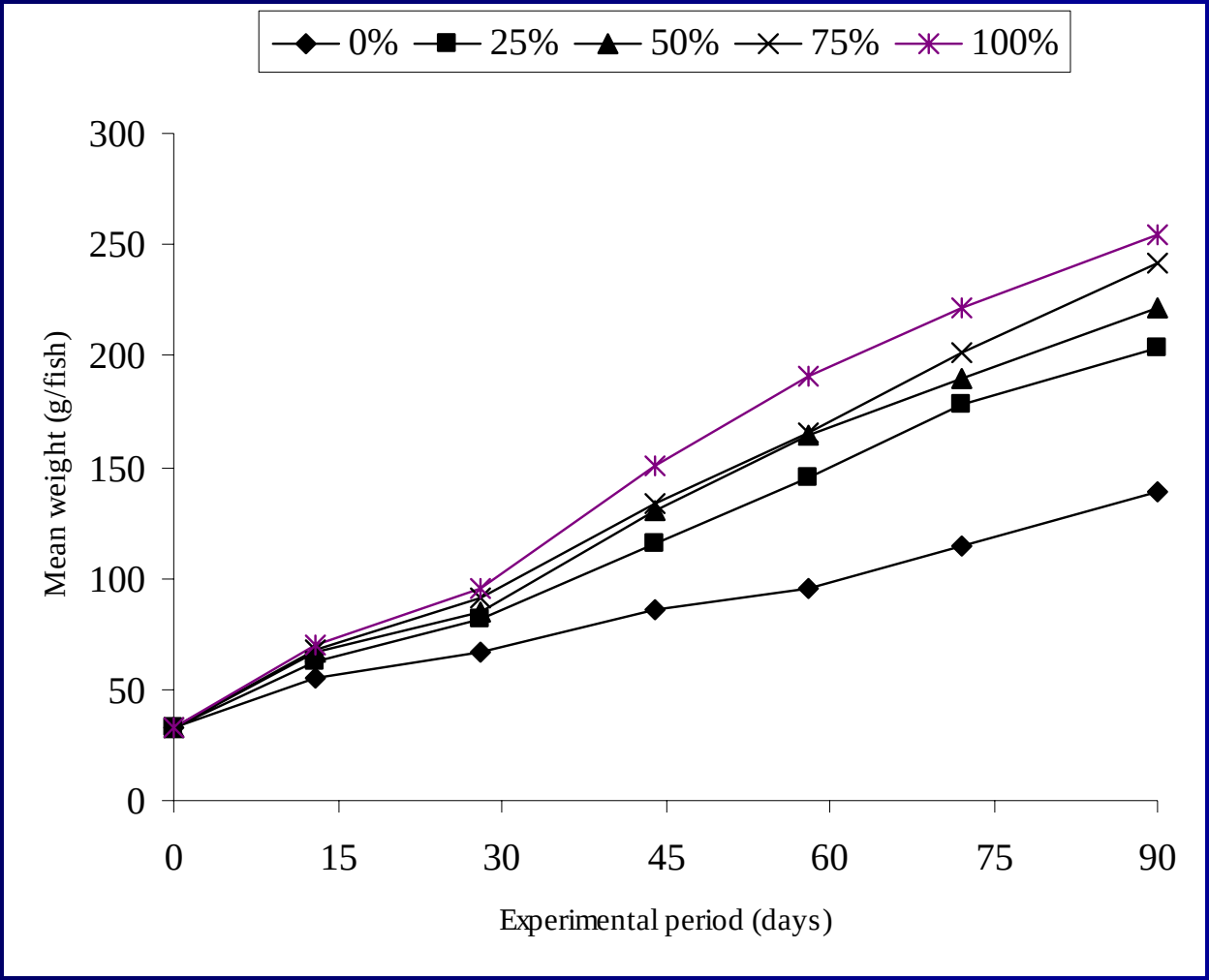
- Data were analyzed statistically using analysis of variance, paired-sample t-test and linear regression
- Differences were considered significant at an alpha of 0.05.
- Statistical analyses for survival rates (%) were performed on data after arcsine transformation.
- Mean values of survival rates in this text are listed in normal scale followed by their confidence limits.
- The economic analysis was based on current farm-gate prices in Thailand in US$

Fish growth performance fed at 0%, 25%, 50%, 75% and 100% of satiation. Mean values with different superscript letters in the same row were significantly different among treatments ($P < 0.05$).

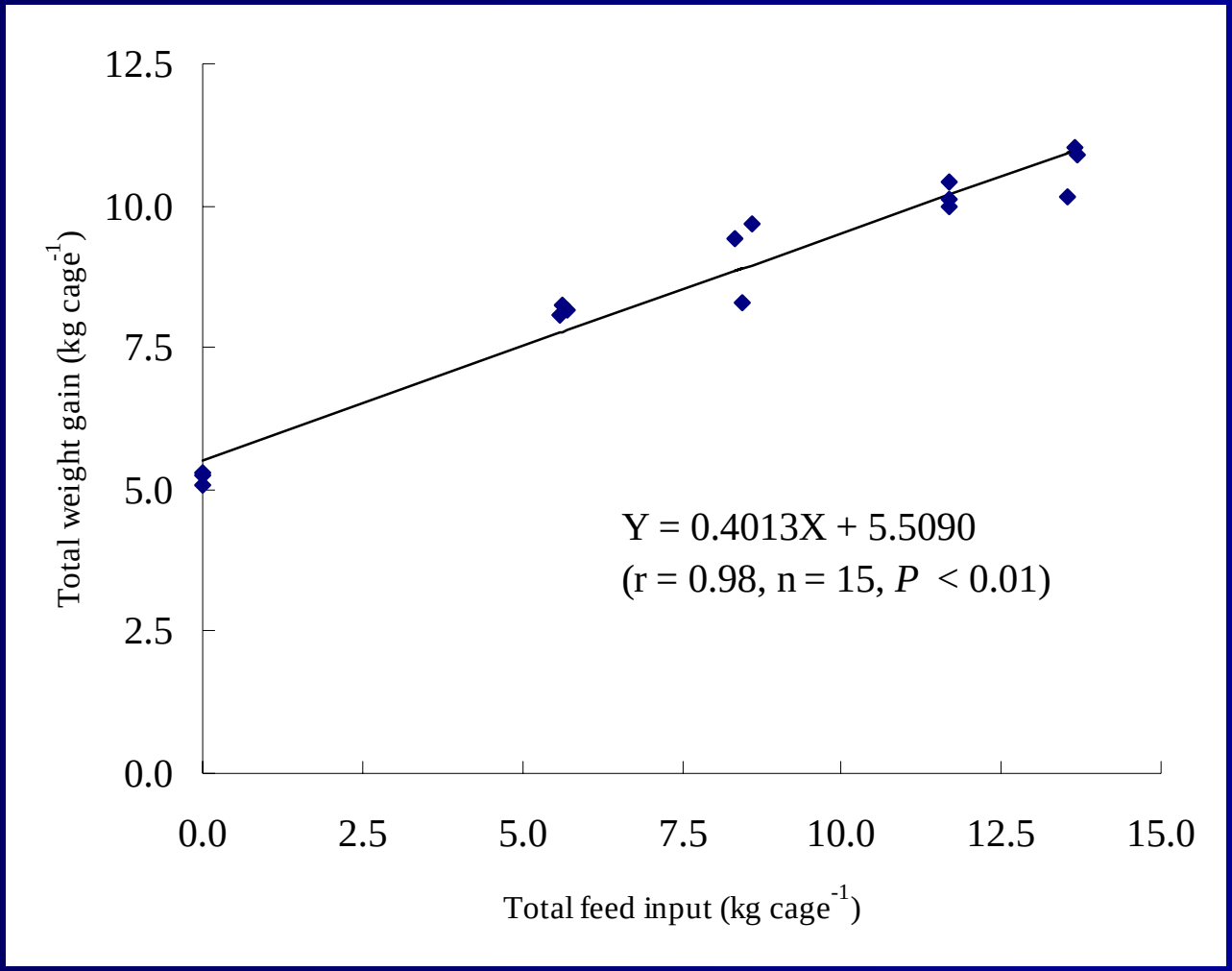
Performance measures		Treatments				
		0%	25%	50%	75%	100%
Stocking						
Total weight	(kg cage^{-1})	1.7±0.0	1.7±0.0	1.7±0.0	1.7±0.0	1.7±0.0
Mean weight	(g fish^{-1})	33.3±0.0	33.3±0.1	33.3±0.0	33.3±0.0	33.3±0.0
Harvest						
Total weight	(kg cage^{-1})	6.9±0.1^{a}	9.8±0.1^{b}	10.8±0.4^{c}	11.8±0.1^{d}	12.4±0.3^{d}
Mean weight	(g fish^{-1})	138.4±2.2^{a}	203.2±2.5^{b}	221.5±5.0^{c}	241.9±5.1^{d}	253.9±2.8^{d}
Mean weight gain	(g fish^{-1})	105.1±2.2^{a}	169.9±2.5^{b}	188.2±5.0^{c}	208.6±5.1^{d}	220.6±2.8^{d}
Daily weight gain	(g fish^{-1} day^{-1})	1.17±0.10^{a}	1.92±0.14^{b}	2.11±0.18^{c}	2.33±0.15^{d}	2.47±0.19^{e}
Net yield	(kg m^{-3} crop^{-1})	6.5±0.1^{a}	10.2±0.1^{b}	11.4±0.5^{c}	12.7±0.2^{d}	13.4±0.3^{d}
	(kg m^{-3} year^{-1})	26.4±0.4^{a}	41.3±0.3^{b}	46.3±2.2^{c}	51.6±0.6^{d}	54.2±1.4^{d}
Gross yield	(kg m^{-3} crop^{-1})	8.6±0.1^{a}	12.3±0.1^{b}	13.5±0.5^{c}	14.8±0.2^{d}	54.2±1.4^{d}
	(kg m^{-3} year^{-1})	34.8±0.4^{a}	49.8±0.3^{b}	54.7±2.2^{c}	60.0±0.6^{d}	62.6±1.4^{d}
FCR		----	0.67±0.01^{a}	0.93±0.04^{b}	1.15±0.01^{c}	1.28±0.03^{d}
Survival	(%)	99.8 (93.8-100.0)	96.7 (93.0-99.1)	98.3 (82.0-100.0)	99.3 (82.1-100.0)	98.3 (82.0-100.0)

Survival of red tilapia in cages ranged from 96.7% to 99.8%, and did not differ significantly among treatments ($P > 0.05$).

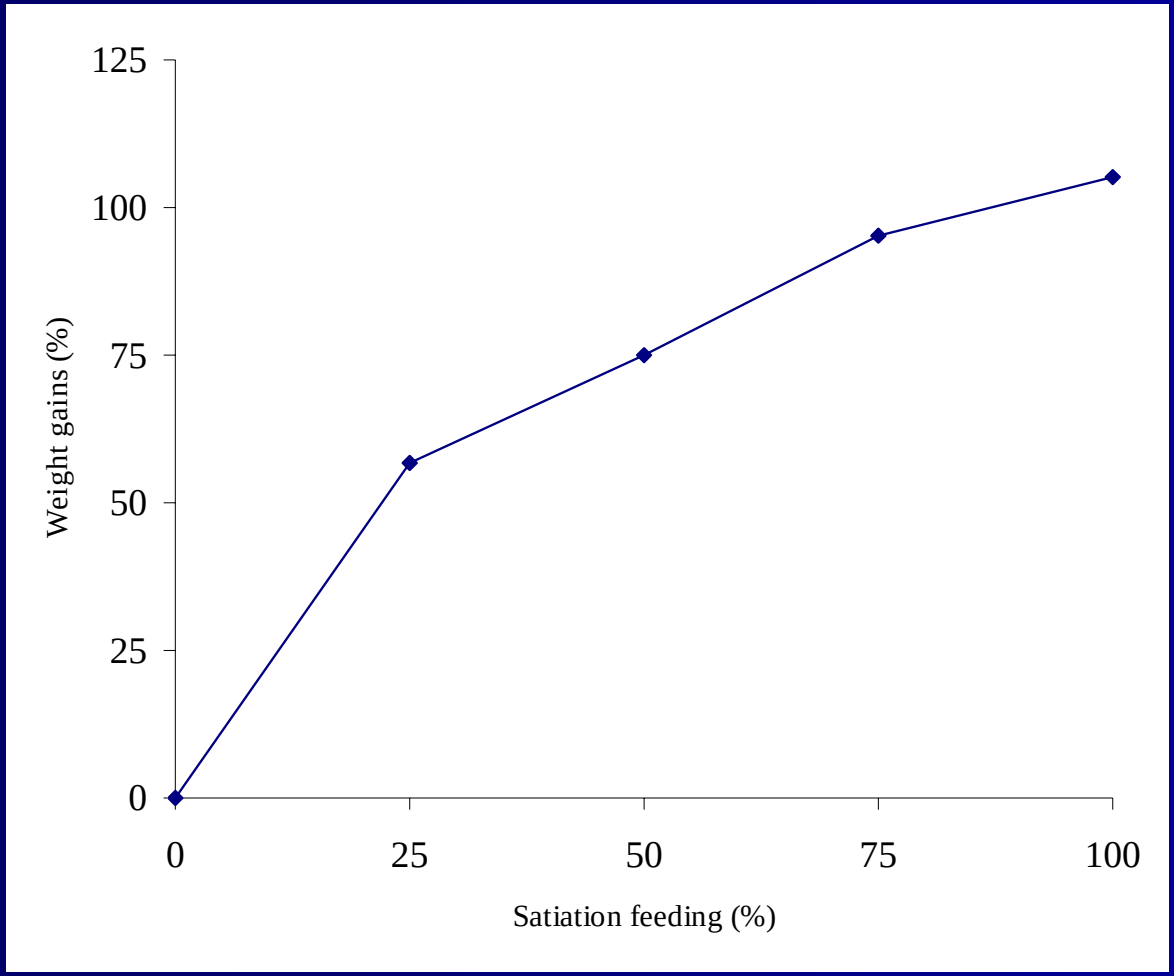
Growth of Thai red tilapia fed at 0%, 25%, 50%, 75%, and 100% satiation feeding levels over the 90-day experimental period.



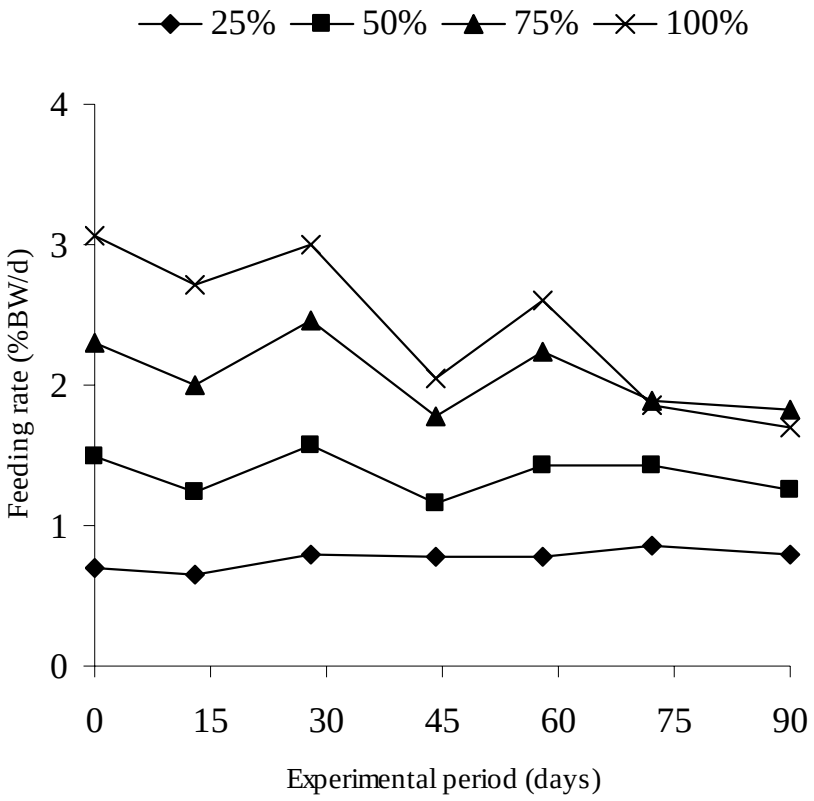
Relationship between total feed input to cages and total weight gain of caged red tilapia



Percentages of total weight gains for each feeding treatment compared to the total weight gain of non-feeding treatment.



Feed efficiency



Water quality

- All water quality parameters except Secchi disk visibility were measured in cages and open water, and no significant differences were found among cages or between cages and open water ($P > 0.05$).

Mean (± S.E.) values of water quality parameters .

Parameters	Day 6	Day 19	Day 34	Day 47	Day 60	Day 74	Day 88
*DO at dawn (mg L^{-1})	4.61±0.00	—	2.33±0.02	—	1.68±0.01	—	0.30±0.00
Temperature (C)	31.8±0.0	32.2±0.0	30.0±0.0	32.9±0.0	31.0±0.0	29.9±0.0	30.3±0.0
*pH	7.9±0.0	6.5±0.0	6.2±0.0	6.7±0.0	6.5±0.0	5.2±0.0	5.9±0.0
*Alkalinity (mg L^{-1} as $CaCO_3$)	78±1	42±1	42±1	37±0	15±1	10±0	13±1
*TAN (mg L^{-1})	0.56±0.03	2.30±0.02	4.59±0.04	3.62±0.15	0.89±0.09	2.21±0.02	2.84±0.03
*Nitrite-N (mg L^{-1})	0.05±0.00	0.24±0.00	0.24±0.00	0.80±0.00	0.28±0.00	0.02±0.00	0.03±0.00
*TP (mg L^{-1})	0.16±0.00	0.10±0.00	0.43±0.00	0.17±0.00	0.22±0.00	0.91±0.01	0.44±0.01
*SRP (mg L^{-1})	0.01±0.00	0.03±0.00	0.14±0.00	0.00±0.00	0.01±0.00	0.43±0.01	0.07±0.00
*Chlorophyll *a* (mg m^{-3})	61±3	14±1	33±1	39±4	49±1	52±4	100±3
Secchi disk visibility (cm)	55	100	64	64	62	61	41

Economic analysis (in US$) for red tilapia in each experimental treatment.

Parameter	Feeding Treatment				
	0%	25%	50%	75%	100%
GROSS REVENUE					
Red tilapia	3.45	7.35	8.10	8.85	9.30
Total	3.45	7.35	8.10	8.85	9.30
VARIABLE COST					
Red tilapia fingerlings	0.63	0.63	0.63	0.63	0.63
Urea	0.21	0.21	0.21	0.21	0.21
TSP	0.21	0.21	0.21	0.21	0.21
Pelleted feed	0.00	2.75	4.12	5.69	6.64
Electricity	1.35	1.35	1.35	1.35	1.35
Cost of working capital	0.19	0.41	0.52	0.65	0.72
Total	2.59	5.56	7.04	8.74	9.76
NET RETURN	0.86	1.79	1.06	0.11	-0.46

Conclusions

- The red tilapia stocked at high density without feeding grows well on natural foods
- Supplemental feed was more effective at lower percentages of satiation feeding, 50% satiation feeding is the most efficient rate.
- Feeding rates varied greatly from 0.64 to 3.06% body weight per day and increased with increasing percentage of satiation feeding levels
- Feeding rates also appeared to decline over time in the highest feeding treatments.
- The fish growth is sub-optimal due to low DOand stagnant pond environment

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