Performance of Red Pacu, *Piaractus brachypomus*, cultured alone or co-cultured with Chinese Catfish, *Clarius fuscus*

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Project Details

- Contract No. 2008-201
- Project Period: February 1, 2010 – May 31, 2011
- Funding Level: $50,000
- Support: CTSA, Maui County, UH Sea Grant, CTAHR, USDA, NOAA

Sea Grant University of Hawai'i

University of Hawai'i College of Tropical Agriculture and Human Resources

CENTER FOR TROPICAL AND SUBTROPICAL AQUACULTURE

USDA

County of Maui State of Hawaii

National Oceanic and Atmospheric Administration NOAA U.S. Department of Commerce

Why pacu?

- **Rapid growth**
- **Amenable to high densities**
- **Hardy to marginal water quality**
- **Ability to utilize high carbohydrate/low protein diets**
- **Potential polyculture (tilapia, carp, crustaceans)**
- **High marketability as a food fish and ornamental fish**

"good sized, deep-bodied fish….they were delicious eating."

Theodore Roosevelt, Through the Brazilian Wilderness


ROGER CORMAN'S
CULT CLASSICS
PIRANHA

Objective: Compare growth and survival in monoculture and polyculture (e.g., Chinese catfish and red pacu) growout trials.

- **Windward Community College facility.**
- **Two shipments (n= 600) of Red Pacu arrive on August 30, 2010 and October 6, 2010.**
- **Fish are distributed into quarantine tanks.**
- **During month quarantine, mortalities occurred due to Ich parasite.**

Objective: Compare growth and survival in monoculture and polyculture (Chinese catfish and red pacu) growout trials.

- On November 11, 2010 the polyculture of pacu and Chinese catfish experiment was initiated. Ten 600 gallon tanks with the following treatments:
  - 14 pacu + 0 Chinese catfish
  - 14 pacu + 50 Chinese catfish
  - 14 pacu + 100 Chinese catfish
  - 14 pacu + 200 Chinese catfish
  - 14 pacu + 300 Chinese catfish
- Pacu avg body wgt = 88.1 grams
  Chinese Catfish = 23.3 grams
- Final volume in all tanks set at 300 gallons with continuous source of freshwater and aeration.

Objective: Compare growth and survival in monoculture and polyculture (Chinese catfish and red pacu) growout trials.

- Average body weight and length of Chinese Catfish (n=20) and pacu (n=7) are obtained at monthly intervals
- Five minute rule for feeding is observed for each tank. Feed input monitored for each tank.
- Temperature, pH, DO, Conductivity, TAN, Nitrite, and Nitrate monitored weekly.

Compare growth and survival in monoculture and polyculture grow-out trials. Trial ends on March 10, 2011 = 113 day ≈ 0.3 year grow-out period.

Species	Treat	Survival (%)	Weight (g)	Length (mm)	CFI (%)	Biomass (Kg/m^3)
Catfish	Pacu+ 50	100.0	125.8 a	239.2a	0.88a	6.6
Catfish	Pacu+100	86.0	158.7b	252.7b	0.95b	14.4
Catfish	Pacu+200	90.6	146.2b	247.3ab	0.96b	28.0
Catfish	Pacu+300	86.0	139.7b	240.0ab	0.97b	37.9
Pacu	Pacu only	100.0	258.0a	225.9a	2.23a	3.8
Pacu	Pacu + 50	88.0	267.4a	242.2b	1.90b	3.5
Pacu	Pacu+100	89.3	256.6a	237.7ab	1.89b	3.4
Pacu	Pacu+200	96.5	225.8a	226.8a	1.93b	3.2
Pacu	Pacu+300	82.2	190.7b	219.5a	1.79b	2.3

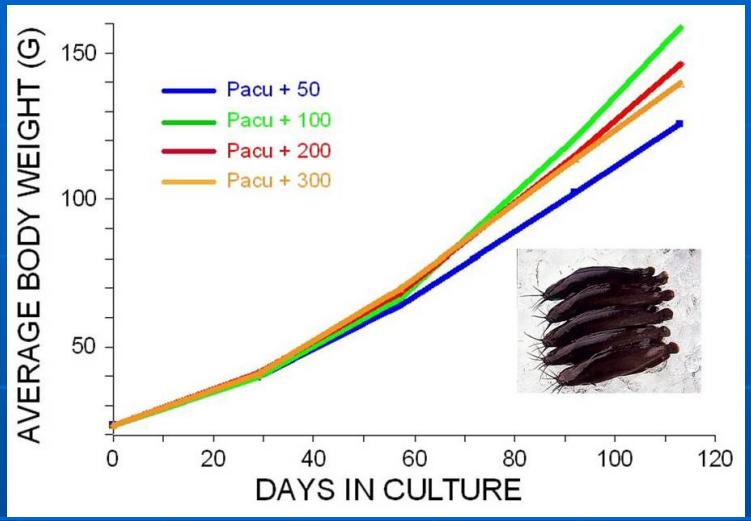
Objective 2: Compare growth and survival in monoculture and polyculture (e.g., Chinese catfish and red pacu) growout trials.

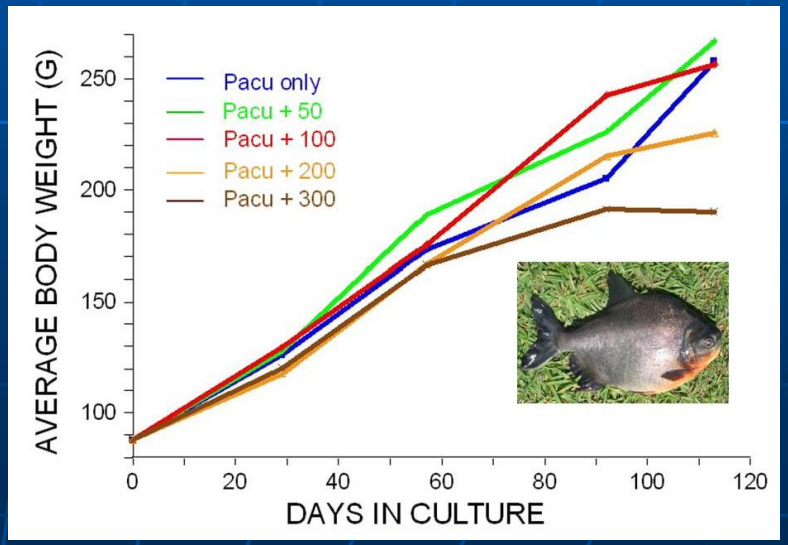
Treatment	Food Conversion Ratio	Feed Cost of Production
Pacu only	2.45 0.08	$1.59/lb
Pacu + 50 Chinese catfish	1.46 0.03	$0.95/lb
Pacu +100 Chinese catfish	1.34 0.09	$0.87/lb
Pacu +200 Chinese catfish	0.99 0.28	$0.64/lb
Pacu +300 Chinese catfish	1.25 0.19	$0.81/lb

Nelson's Silver Cup Trout Feed 3.5 = $0.66/lb

Objective 2: Compare growth and survival in monoculture and polyculture (Chinese catfish and red pacu) growout trials.

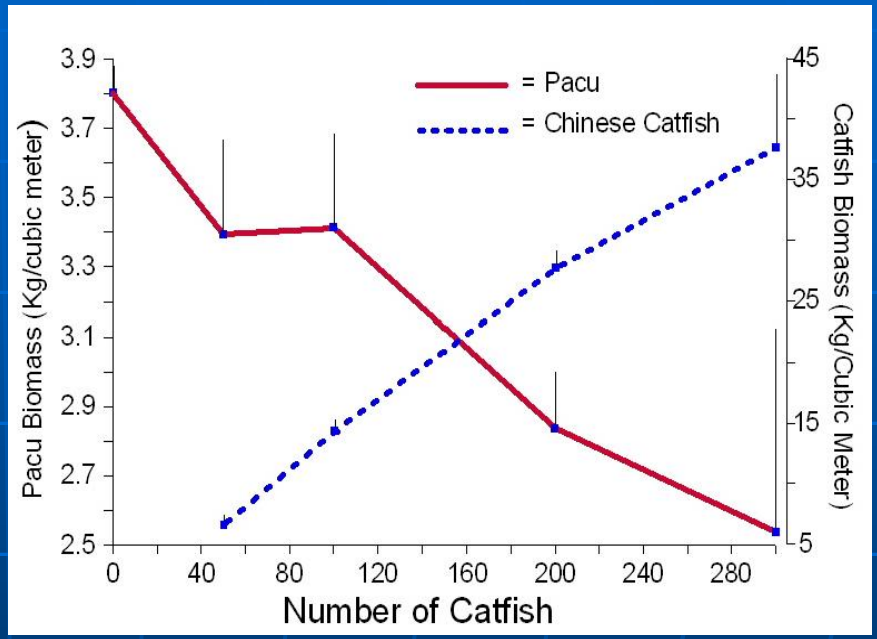
- **Temporal changes in body weight**
  - **Chinese catfish grow best at stocking densities at or above 100 individuals per tank ≈ 3.3 individuals/gallon or 2.0 kg/m^3**
  - **Pacu grow best when cultured alone or with a maximum stocking of Chinese catfish at 100 individuals per tank ≈ 3.3 individuals/gallon or 2.0 kg/m^3**





Objective 2: Compare growth and survival in monoculture and polyculture growout trials.

- Biomass obtained from different stocking densities of Chinese catfish reveals impacts on pacu
- Highest biomass obtained when pacu were reared alone.
- No impacts on stocking density were observed for Chinese catfish that already exceeded 30 kg/m^3



Additional Inputs
Flow Through System

- **Daily turnover:**
  ≈ 4.4 times/day/tank
- **Ten tanks ≈ 8,360 gals/day (31,768 l/day)**
- **Estimated water consumed ≈ 944,680 gallons**
- **Using today's Board of Water Supply rate of $2.79/1,000 gallons the cost in just water is estimated at $2,636.**

Objective 2: Compare growth and survival in monoculture and polyculture growout trials: Aquaponic Format

- **March 23, 2011 fish restocked with the following treatments:**
  - **20 pacu only**
  - **20 pacu + 100 Chinese catfish**
  - **50 Chinese catfish only**
  - **100 Chinese catfish only**
  - **200 Chinese catfish only**

  All treatments run in duplicate
- **All tanks equipped with two 26 gallon ebb and flow cinder beds with airlifts and run as recirculating aquaponic systems.**

Some of the Plants Grown


Sweet Basil June 11, 2011


Egg Plant Waimanalo Long
June 11, 2011


Green Onion June 11, 2011


Stavia, June 11, 2011

Objective 2: Compare growth and survival in monoculture and polyculture growout trials: Aquaponic Format, one month duration.

Species	Treatment	Final Weight (g)	Final Length (mm)	CFI
Chinese catfish	50 Individuals	244.5	295.7	0.92a
Chinese catfish	100 Individuals	240.6	288.5	0.93a
Chinese catfish	200 Individuals	201.8	282.6	1.99b
Chinese catfish	100 Catfish + 20 Pacu	222.2	285.6	2.04b
Pacu	100 Catfish + 20 Pacu	392.2	269.5	0.88
Pacu	20 Pacu Only	456.4	279.4	0.97

Objective 2: Compare growth and survival in monoculture and polyculture growout trials: Aquaponic Format, one month duration: Water Quality Parameters

Species	Treat	Temp (C)	DO (ppm)	pH	Cond. (msm/cm)	TAN (ppm)	Nitrite (ppm)	Nitrate (ppm)
Catfish	50	24.7	5.85	6.0	0.3	2.7	0.4	81.2
Catfish	100	25.0	3.83	5.9	0.4	16.7	1.3	110.0
Catfish	200	24.2	4.87	6.1	0.3	4.4	0.3	73.0
Pacu	100 + Pacu	24.9	4.68	6.0	0.4	11.4	0.6	115.0
Pacu	Pacu Only	24.6	4.05	6.0	0.5	25.7	1.6	120.0

hiroshi

EURASION TAPAS

Alan Wong's

RESTAURANTS

town

kaimuki

3435 Waialae Avenue

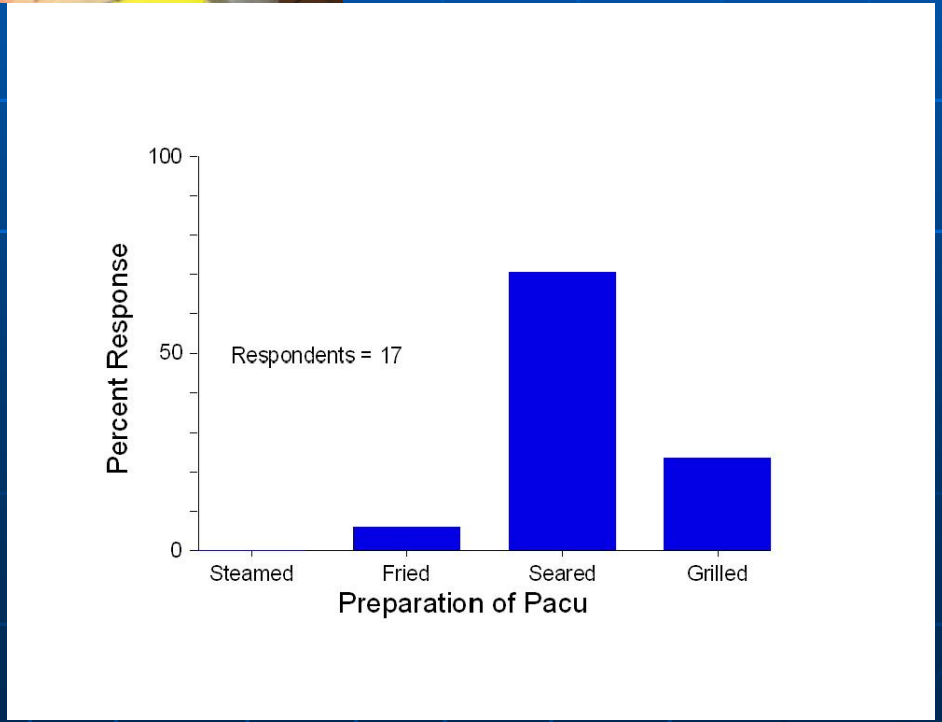
Honolulu, Hawaii

808.735.5900

Reservations | Map

- Live fish market
- N= 8
- All sold same day
- $15.00/lb

town
kaimuki
3435 Waialae Avenue
Honolulu, Hawaii
808.735.5900
Reservations | Map

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