

# INITIAL RESULTS OF THE PILOT STUDY TO IMPROVE THE PRODUCTIVITY, WHILE MINIZING ENVIRONMENTAL IMPACTS OF FISH FARMING IN HA LONG BAY, VIETNAM



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# Topics



- Ha Long
- Participants
- The Project
- Results
- Next steps

# Ha Long

- UNESCO World Heritage Site
- New 7 Wonders of the World
- Old coal mining area
- Tourist Mecca
  - ~1969 limestone islands
  - 1,553 km<sup>2</sup>



# Ha Long

- ⦿ Floating villages
- ⦿ Limited regulation and enforcement
  - Led to Increased pressure on environment from higher density of visitors
- ⦿ Economic development
  - Trade with neighboring China (on main highway)
  - Tourism companies having made arrangements with villages
  - Villages starting grow out farms for various fish

# Floating Villages

- Unique villages centered on fishing
- Villagers often too poor to afford housing on land
- Little to no facilities exist, waste water simply exist the homes
- Moderately self contained as villages even have schools

# Current Practices

- Feed is from trash fish
- Leads to decrease natural fisheries stocks
- Waste decreases already questionable water quality
- Several Species Farmed
  - Grouper (*Serranidae*),
  - Cobia (*Rachycentron canadum*),
  - Red Snapper (*Lutjanus campechanus*),
  - Anabas or climbing perch (*Anabas testudineus*).
  - Barramundi (*Latescalcarifer*) also called Asian Sea Bass,
    - Adaptable to the environment in Ha Long
    - Access to various sources of supply (either via Chinese or Vietnamese traders).

# Current Practices (in theory)



## Sanitary and disinfection

- Cages frequently monitored
  - checked 2 times /week to clean the fouling
  - increase the exchange of oxygen
  - control for disease

## Health and medicine administration

- Checks of fish health
- If disease extant
  - Attempt to determine disease and treat
    - Medicine or washing fish in fresh water

# Biology and Health



- Mostly fed via trash fish caught by fishermen
- Very limited use of medications was found
- High mortality rates are very common (average: 80%)
  - High loss period was predominantly when change from hot season to cold
  - Attributed to change in temperature and oxygenic concentration



# Current Situation

- High investment made by farmers in their stock in terms of start-up, stock purchase and maintenance costs
- No actual data recorded by farmers
- Input supplies are a major hindrance to production
  - Processed feed and animal health advisors currently not accessed
  - Trash fish and stock supplies are volatile and generally undersupply issues exist

# Concerns about current practices

- Use of trash fish
  - Uncontrolled reduction of wild fish - posing risks to biodiversity
  - Very inefficient
    - Majority drops freely in the water
    - Cause of major organic pollution



# Pilot Project



# The Players

- For BATIK: Mrs S. Benamozig & Ms Hang
- For INDOCHINA JUNK: Mrs Trieu Ngoc Huong
- For ASVELIS: Mr. Patrice Gautier, Ms Nguyen Thi Mai, Mr. Bui Duc Tri
- For OCIALIS: Mr. Marc Campet & Mr. Dao Duy Phong
- FARMER: Mr. Vu Van Nam, Mrs Huong.

# The villages

- ③ 3 floating villages: Vung Vieng, Cong Dam, Cap Na.
  - Households visited in the two target villages (Vung Vieng and Cong Dam)
- ③ Control noticeably poorer
- ③ All small-scale;
  - <50 to several thousand



# The Villages

- ⦿ Proved difficult to estimate annual production reliably
  - Nature of farming
  - Nonexistent data recording
  - Fluctuations in supply, demand and mortality
- ⦿ **Approximately 74,000 young fish are bought or caught per annum**

# The villages

#	Farmer	Number of fish	Age of fish (month)	Number of cage	Feed used
1	Mr.Nam	2,500	4	2	Processed feed
2	Mr.Dung	3,000	7	4	Trash fish
3	Mr.Thanh	10,000	7	12	Trash fish
4	Mr.Quyen	3,000	7	4	Trash fish

# The Project

## ⦿ Duration

- 4 Month Project August-December 2011,
  - 10-12 months, prelim ran 4 due to funding issues

## ⦿ FEED:

- Different types of processed feeds.
  - Nutrilis and Nanolis products were selected
    - Developed specifically for tropical fish farmed in cages without water pollution

## ⦿ CAGES:

- 2.5m x 3m x3m





# The Project

## ◎ FINGERLINGS

- Private fish hatchery in Vung Tau.
  - 4 gram/head and 5cm without disease
  - 16 Hour flight and travel time
    - Mortality due to lack of O<sub>2</sub>

## ◎ Controls

- Limited
  - Controls were on the same farm

# The Project

<b>Farmer</b>	<b>No fish</b>	<b>Weight of fish (g/head)</b>	<b>Density (head/m<sup>3</sup>)</b>
Mr.Nam	25,00	4	56
Mr.Dung	3,000	3	67
Mr.Thanh	10,000	3	185
Mr.Quyen	3,000	3	67

# The Project

- ⦿ Environmental Factors measured every month

- Temperature
- Salinity
- Dissolved oxygen concentration
- PH

- ⦿ MEDICATION:

- ⦿ Hadaclean for parasite treatment and Vitamin

- treated by washing in fresh water

# The Project results



# Environmental Factors

Month	Temp (°C)	Salinity (ppt)	DO (mg/l)	pH
December	32	25	6.36	7.7
October	29	26.5	6.55	7.6
November	27	25.5	6.93	7.4
December	22	25.5	7.5	6.8

# Weight Gain in Control

<b>Raising</b>	<b>Average body</b>	<b>Average body</b>	<b>Daily weight gain</b>	<b>Daily length gain</b>
<b>Month</b>	<b>weight (gram)</b>	<b>length (cm)</b>	<b>(g/head/day)</b>	<b>(cm/head/day)</b>
0	2.5	3	0	0
1	14	7	0.38	0.13
2	42	12	0.93	0.17
3	95	16	1.77	0.13
4	135	18.5	1.33	0.08
<b>Average</b>			<b>0.88</b>	<b>0.1</b>

# Weight Gain in Fed

<b>Raising</b>	<b>Average body</b>	<b>Average body</b>	<b>Daily weight gain</b>	<b>Daily length gain</b>
<b>Month</b>	<b>weight (gram)</b>	<b>length (cm)</b>	<b>(g/head/day)</b>	<b>(cm/head/day)</b>
0	4	5	0.00	0.00
1	11	8.5	0.23	0.12
2	53	16	1.40	0.25
3	105	18	1.73	0.07
4	140	19.3	1.17	0.04
Average			0.91	0.10

# Weight Gain Statistics



- t Stat 0.134494
- P(T<=t) two-tail 0.896334



# Issues

- ◎ Feed fed
  - Consistent feeding a problem
  - At times fish not fed 3 days
- ◎ Control fish
  - Quality, quantity not stable
  - Very short storage life - Rancid and unpalatable
  - May accelerate transmission of parasites and diseases
  - Generally recommended trash fish are cleaned, beheaded and gutted before feeding.
  - Farmers did not adhere to this practice at all
    - Feeding uncleaned, whole or chopped fish
    - Likely cause of disease and water quality issues

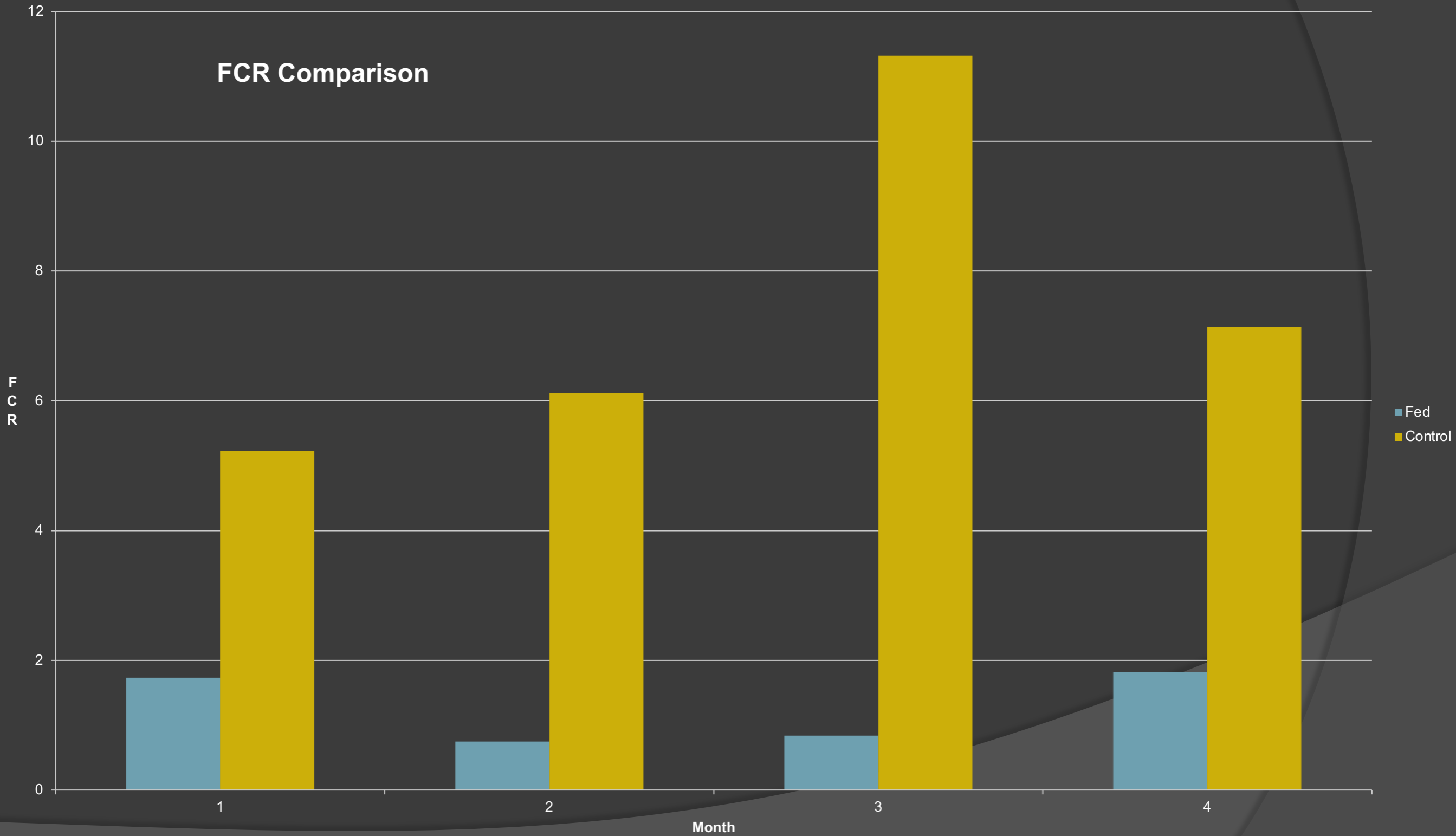


# FCR

<b>Month</b>	<b>FCR</b>	<b>Control FCR</b>
0	0	0
1	1.73	5.22
2	0.75	6.12
3	0.84	11.32
4	1.82	7.14
<b>Average</b>	<b>1.72</b>	<b>7.45</b>

# FCR

FCR Comparison



# FCR Statistics

- t Stat -4.4742
- P(T<=t) two-tail 0.020809
- Avg Fed FCR: 1.72
- Avg Control FCR: 7.45



# Total Feed Comparison

<b>Month</b>	<b>Total feed (kg)</b>	<b>Total trash fish (kg)</b>
0	0	0
1	28.57	600
2	37.85	1,200
3	55	1,800
4	49.25	2,100

# Economics

Fingerling

Total feed  
expense

Medicine and  
disinfection

Cage

Worker

	<b>Fed</b>	<b>Control</b>
<b>Costs (VND)</b>	<b>27,307,408</b>	<b>56,520,000</b>
<b>Income (VND)</b>	<b>32,310,000</b>	<b>59,280,000</b>
<b>Profit (VND)</b>	<b>5,002,592</b>	<b>2,760,000</b>

# The Project Economics

- Need 1.1 kilograms of factory feed (34,000 VND) to produce 1 kilogram of farmed fish, but need 7.45 kilogram of trash fish (44,700 VND) for same
- After 4 months,
  - Fish still small (140g/head)
    - Cannot be sold at this stage
  - Good early indication



# Discussion

- FCR of fish is higher with processed feed than with trash fish
- Processed feed has additional benefits-
  - Feed difficult to dissolve in water
  - Most of the processed feed is eaten before it falls to the bottom of the cage
- Initial results trial show economic efficiency of trial model higher than traditional model



# Conclusions

- ⦿ Improved method of fish farming represents a major innovation for Ha Long bay
  - (1) strengthen the aquaculture sector (as a good additional activity for villagers also involved in tourism)
  - (2) reduce the environment damages of fish farming by
    - (a) reduction in the catching of trash fish
    - (b) reducing the amount of organic materials wasted in the sea waters
  - (3) provide a marketing advantage for the tourism sector
    - tourists are more likely to want to visit eco-friendly sites within Ha Long Bay

# Limitations



## ● Needs:

- Tech support, local feed retailer (Hanoi closest OCIALIS shop)
- Micro-finance
- Quality Control
- Dissemination of information to obtain more buy-in by farmers
- Increased education programs for fisherman and farmers regarding negative impacts of traditional system

# Questions?

