



NFRDI

## Economic Analysis of Offshore Aquaculture in Korea:

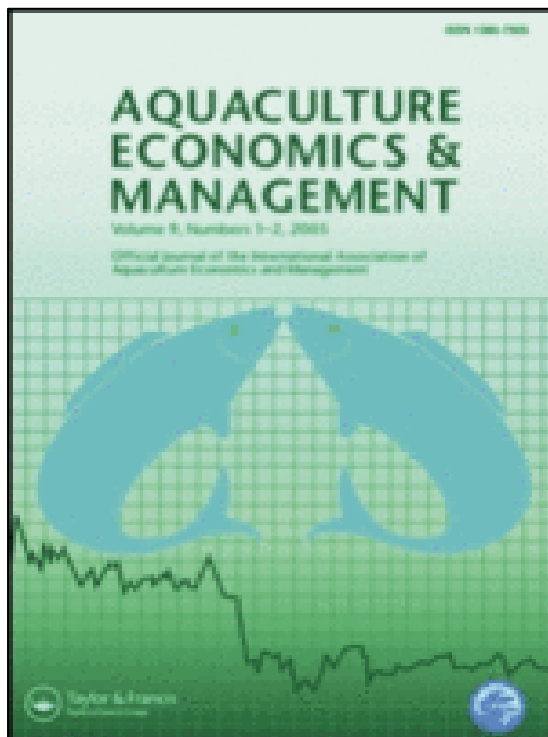
A Financial Evaluation based on Rock Bream (*Oplegnathus fasciatus*)  
Production

2008 YSLME Regional Mariculture Conference, 2008. 9.10

Dohoon Kim

OFFICE OF  
FISHERIES  
ECONOMICS

NFRDI



## **I. Introduction**

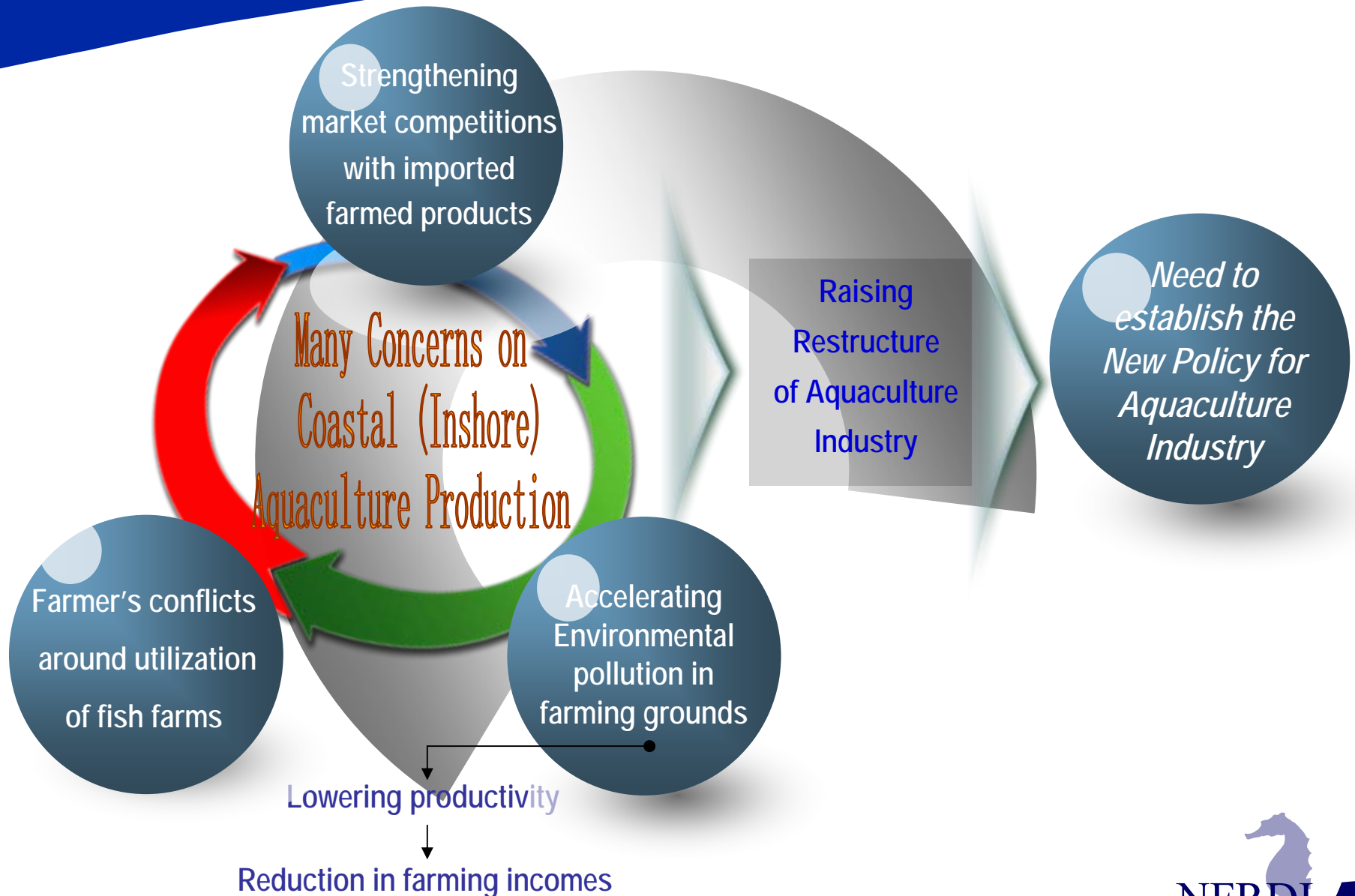
- Concerns & Problems of Coastal Aquaculture Production
- Objective of Study

## **II. Economic Analysis of Offshore Aquaculture**

- Analytical Data, Method, and Results

## **III. Conclusion & Policy Implication**

# 1. Introduction



# 1. Introduction

## ● Interest is growing on Offshore Aquaculture Production

- ▶ Protecting environmental negative impacts and large-scale production system
- ▶ Establishing a new farm's utilization system
- ▶ Reorganizing aquaculture industry => Restructure fish farms

## ● Industrializing Offshore Aquaculture

- ▶ Need to review on technical feasibility, institutional revision, economic analysis, etc.
- ▶ Environmental gains may be offset by higher investment costs and greater risk

# 1. Introduction

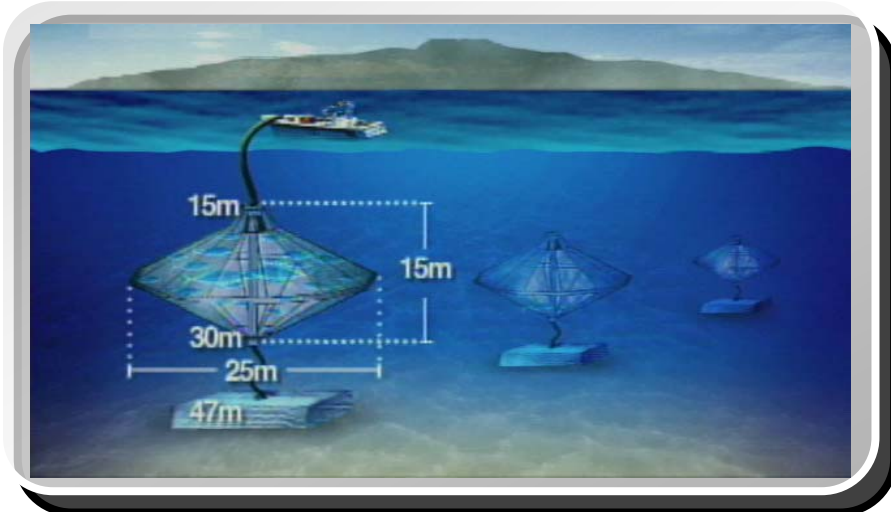
## ● A Pilot Project on Offshore Aquaculture Production in Jeju, Korea

- ▶ Offshore pilot farming has started since 2005, targeting Rock bream
- ▶ The offshore cage system : the SeaStation 3000™ (3 cages)
- ▶ The economic analysis with first-year data was accomplished

## ● Developing Offshore Aquaculture

- ▶ Cages and target species has increased : 9 cages, targeting seabream, mackerel, etc.
- ▶ The economic analysis with second-year data (2005-2006) is under working

# Offshore Aquaculture Cage



# Objective of Study

- Aimed to evaluate the **Economic Viability of Offshore Aquaculture**, Pilot Project in Jeju Island, Korea
- Objective of Economic Analysis on Offshore Aquaculture Policy Project is to investigate its **Economic Viability** and to analyze **Profitability** according to changes of costs and returns
- Providing **Policy Information** and **Implications** for Development of Offshore Aquaculture through the Economic Analysis



# Analytical Method

## ● **Analyzing with biological and economic data from the actual performance**

- ▶ A total of 400,000 fingerlings were stocked and 108 tons were produced
- ▶ Operating costs : fingerling (12%), feed(17%), labor(35%), depreciation (13%)
- ▶ Initial Investment costs : US\$673,208, including cages, nets, and diver equipments, etc.

## ● **Utilizing Monte Carlo model for Analyzing Offshore Farming**

- ▶ Analyzing productivity and profitability (NPV & IRR) up to a 10-year time horizon
- ▶ Considering uncertainty on variables via Monte Carlo simulations
- ▶ Key parameters : survival rate, FCR, market weight, price

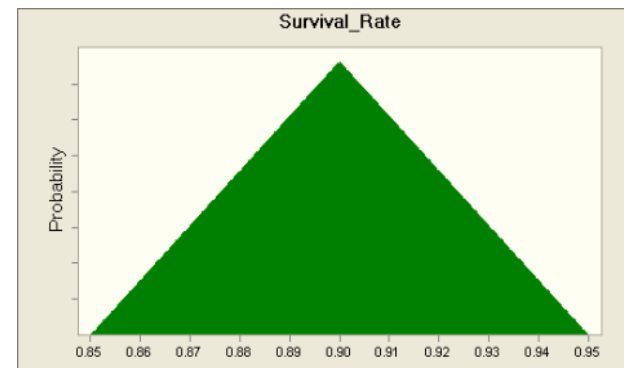
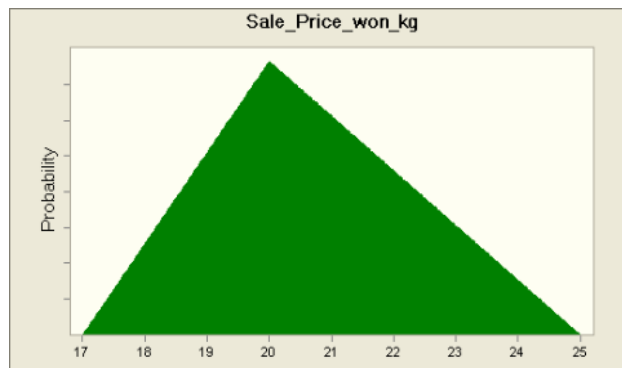
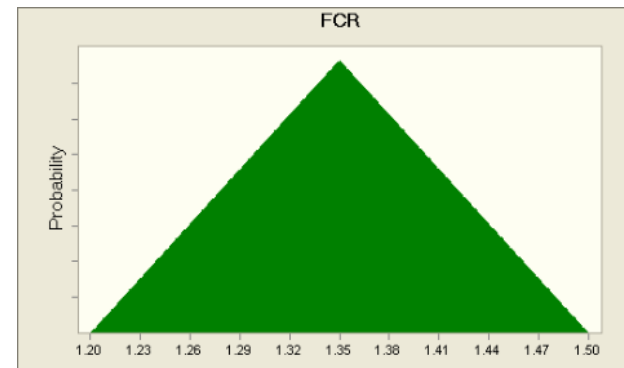
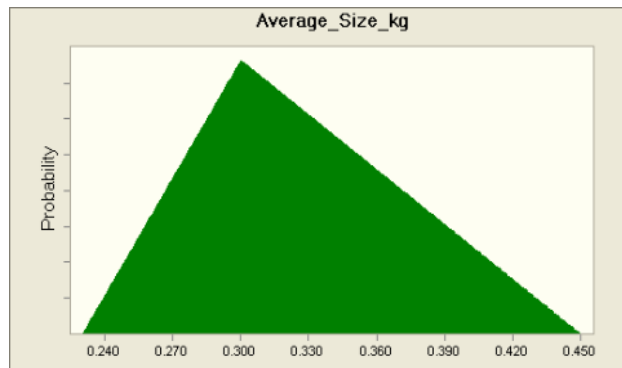
<Table. 1> Production parameters for offshore rock bream culture

Parameter	Value
Time to Market	17 months
Initial Stocking	400,000 fingerlings
Survival Rate	90%
Feed Conversion Ratio (FCR)	1.35
Average Market Size	300g

<Table. 2> Assumed uncertainty levels for variables

Variable	Mean	Minimum	Maximum
Survival Rate	90%	85%	95%
FCR	1.35	1.2	1.5
Market Size	0.3kg	0.23kg	0.45kg
Market Price	US\$20	US\$17	US\$25

\*Triangular Distributions were assumed (Taha, 1989; Valerrama and Engel, 2001)



# Results

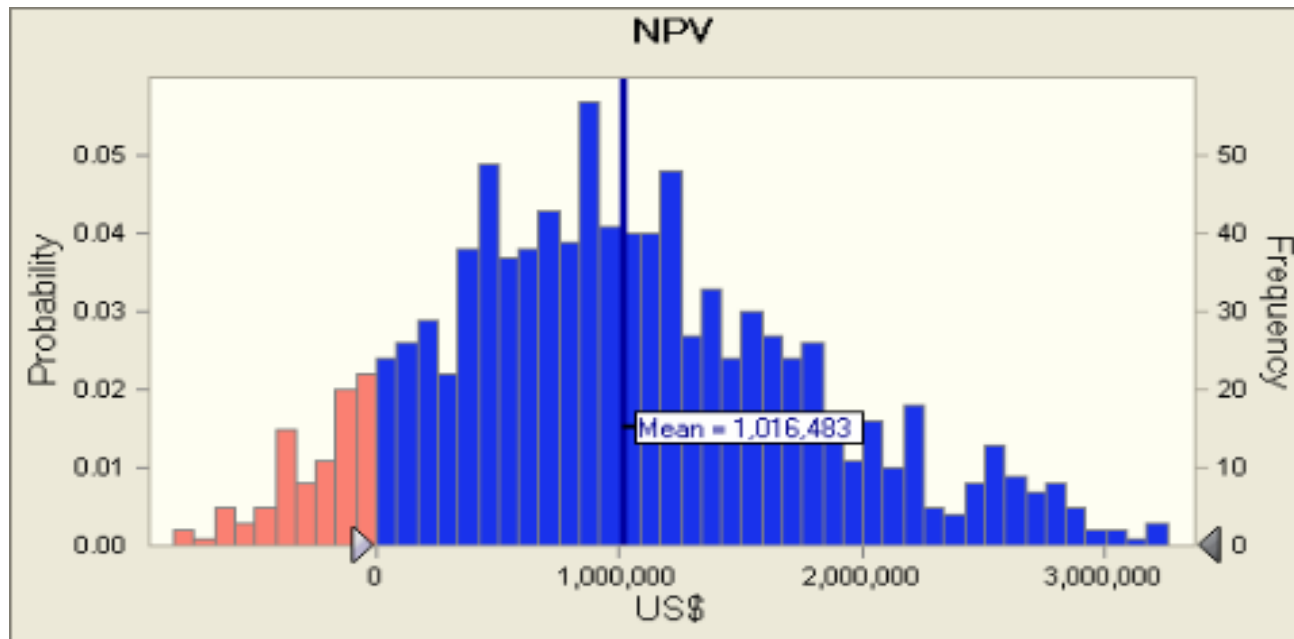
<Table. 3> Economic Results of the Offshore Rock Bream Culture

	Mean	Minimum	Maximum
<b>NPV</b>	US\$1,016,483	US\$-828,482	US\$4,000,911
<b>IRR</b>	21.8%	-	49.4%

- NPV is calculated with 7.5% discount rate for a 10-year period
- Uncertainty on parameters (survival rate, FCR, market price, etc.) are considered via Monte Carlo simulations

# Results

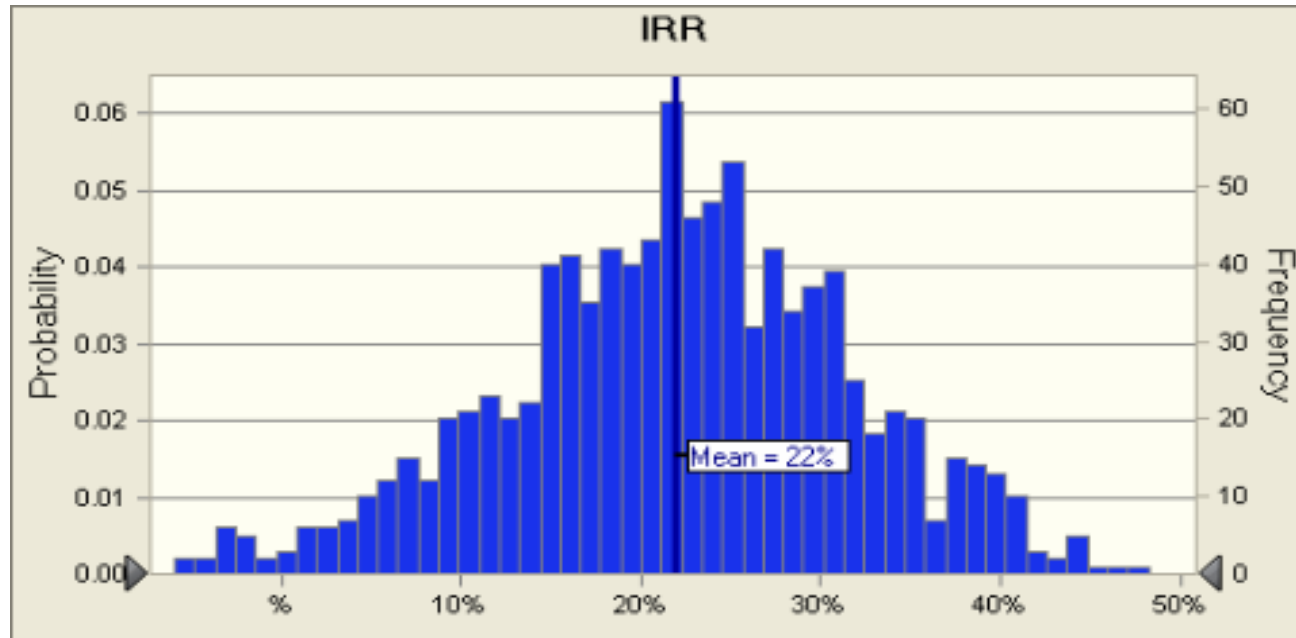
<Fig. 1> A Result of NPV



\*Certainty Level is **90.8%** from US\$0.00 to +Infinity

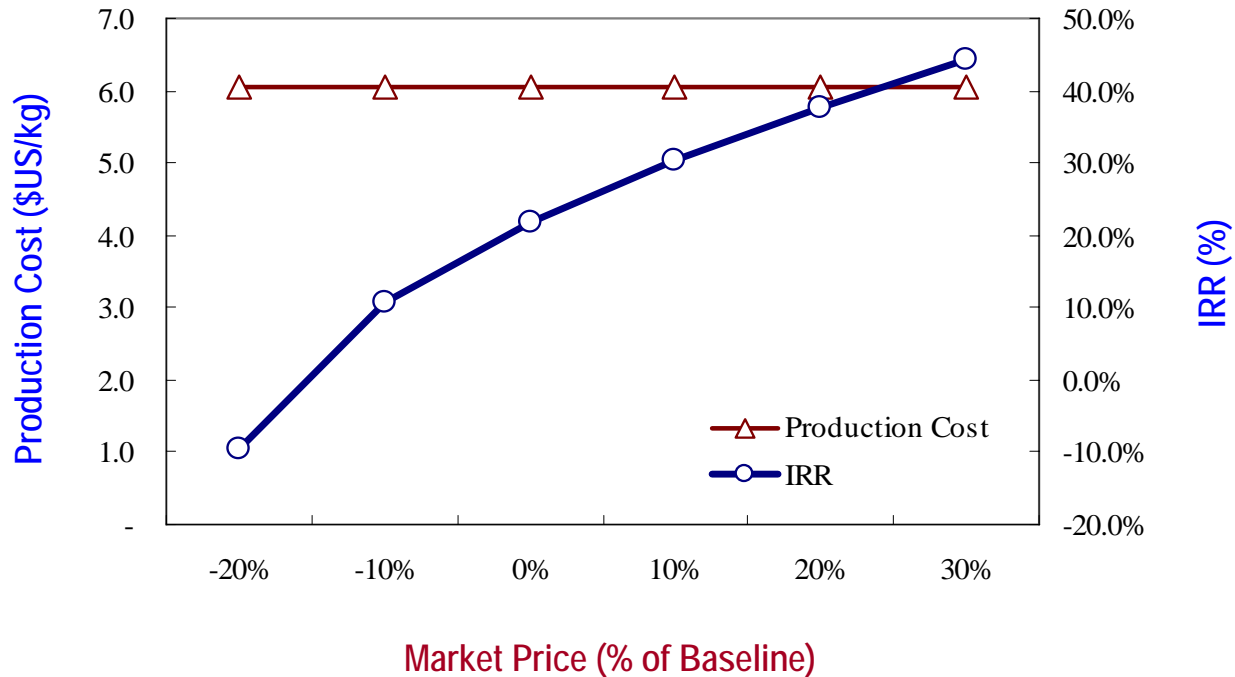
# Results

<Fig. 2> A Result of IRR



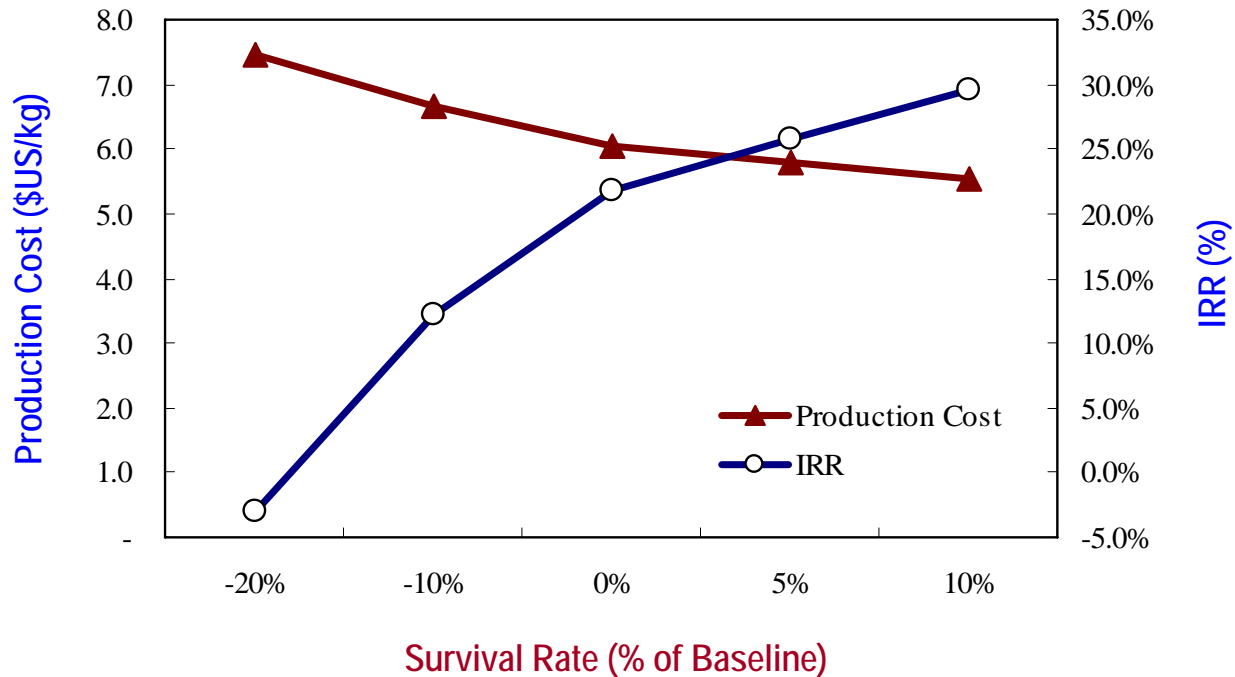
# Results

<Fig. 3> Results of Sensitivity Analysis on Market Prices



# Results

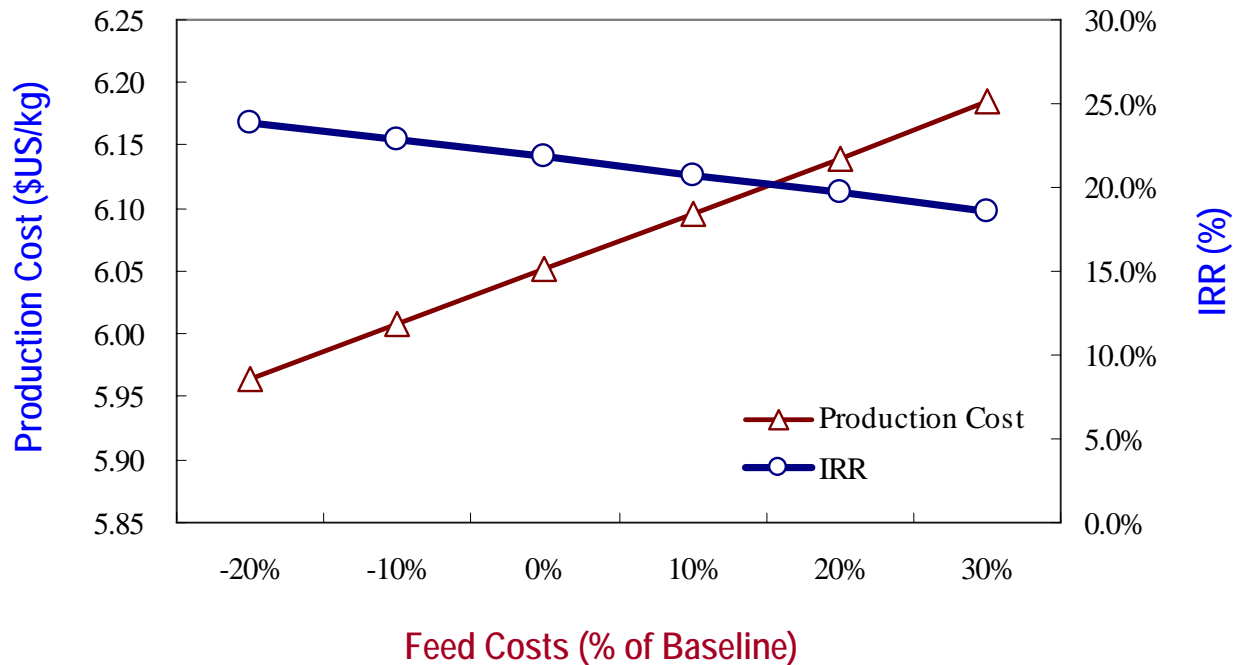
<Fig. 4> Results of Sensitivity Analysis on Survival Rates





# Results

<Fig. 5> Results of Sensitivity Analysis on Feed Costs



# Conclusion & Policy Implications

- **Under ideal condition, offshore culture might be low risk and highly profitable**
  - ▶ Reducing operating costs and farming period, and improving survival rates could make more profitable
- **Concerns on lowering profitability by reductions in price and survival rate**
  - ▶ Need to review carefully on installing sites and target species for the development of offshore culture
- **More detailed analysis by Region for development**
  - ▶ Need independent analysis of offshore cultures for expanding to the other regions
  - ▶ Need to investigate impacts on the marine environment and to compare to inshore cultures

# Thank you for kind attention

**\*Any Questions on the Presentation,**

**Please feel free to contact by +82-51-720-2081 /  
[delaware310@nfrdi.go.kr](mailto:delaware310@nfrdi.go.kr)**