"Larvi09" Gent-Belgium

# Cobia (*R. canadum*) aquaculture in Vietnam: recent developments and prospects

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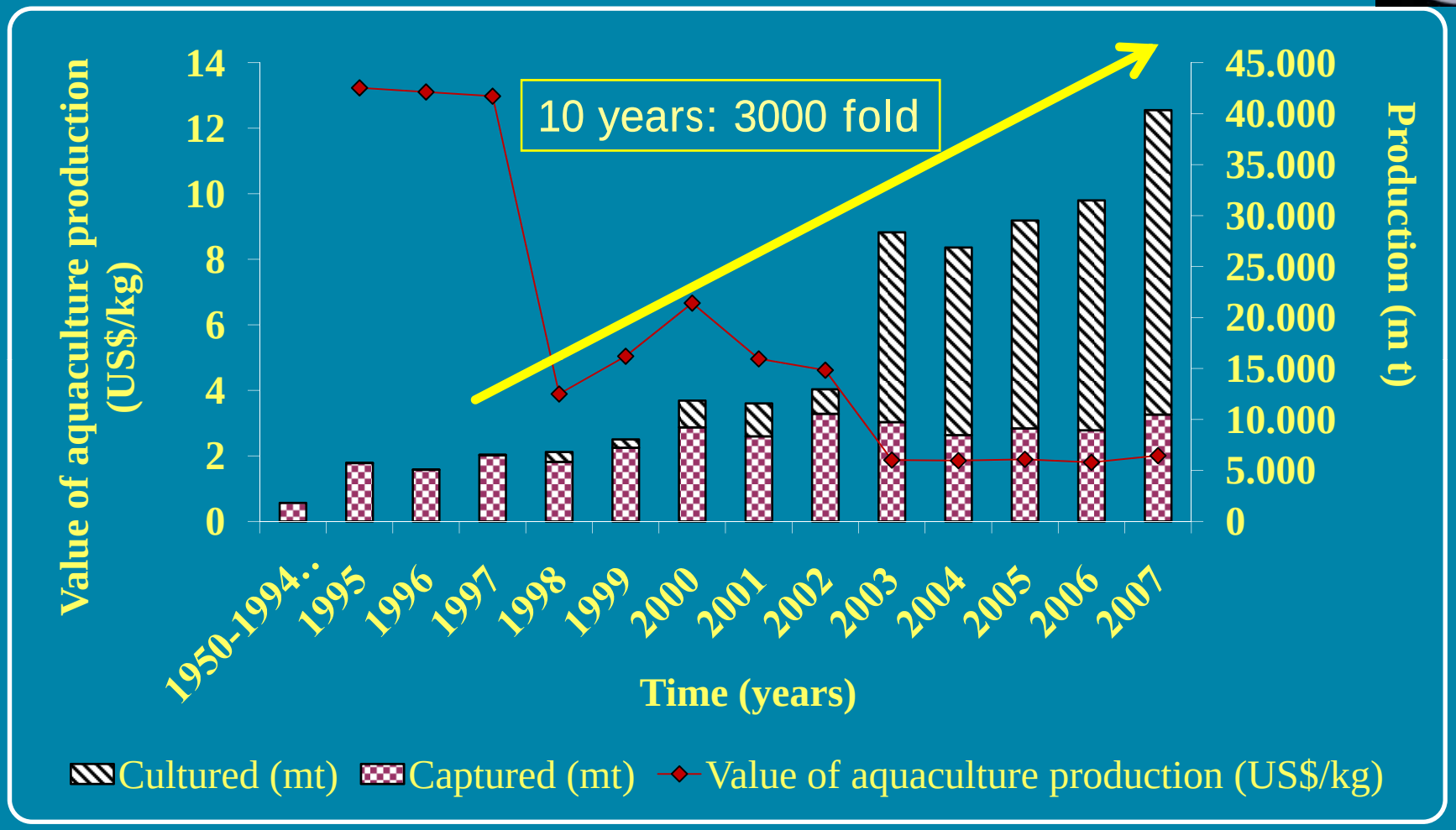
# Introduction and background




**Global production and value of cobia (FAO, 2009)**

# 23 countries and territories involved in cobia aquaculture

- **Asia-pacific (11)**
  - ✓ PR China (25,855 mt)*
  - ✓ Taiwan (3,998 mt)*
  - ✓ Vietnam (1,500 mt)**
  - ✓ Singapore
  - ✓ Indonesia
  - ✓ Malaysia
  - ✓ India
  - ✓ Thailand
  - ✓ Philippines
  - ✓ Australia
  - ✓ Japan
- **Americas and others (12)**
  - ✓ United States
  - ✓ Mexico
  - ✓ Brazil
  - ✓ France
  - ✓ Panama
  - ✓ Belize
  - ✓ Guatemala
  - ✓ Cuba
  - ✓ Reunion/Mayotte (6 mt)*
  - ✓ Oman
  - ✓ Abu Dhabi
  - ✓ Iran

(*) FAO, 2007; (*) Estimated by the authors, year 2008

# History of cobia aquaculture in Vietnam

- ✓ 1998: research on reproduction commenced
- ✓ 1999: first success with production of 12,000 fingerlings
- ✓ 2002: Commercial production of 20,000 fingerlings
- ✓ 1999: Tested the HDPE circular floating cages for grow-out

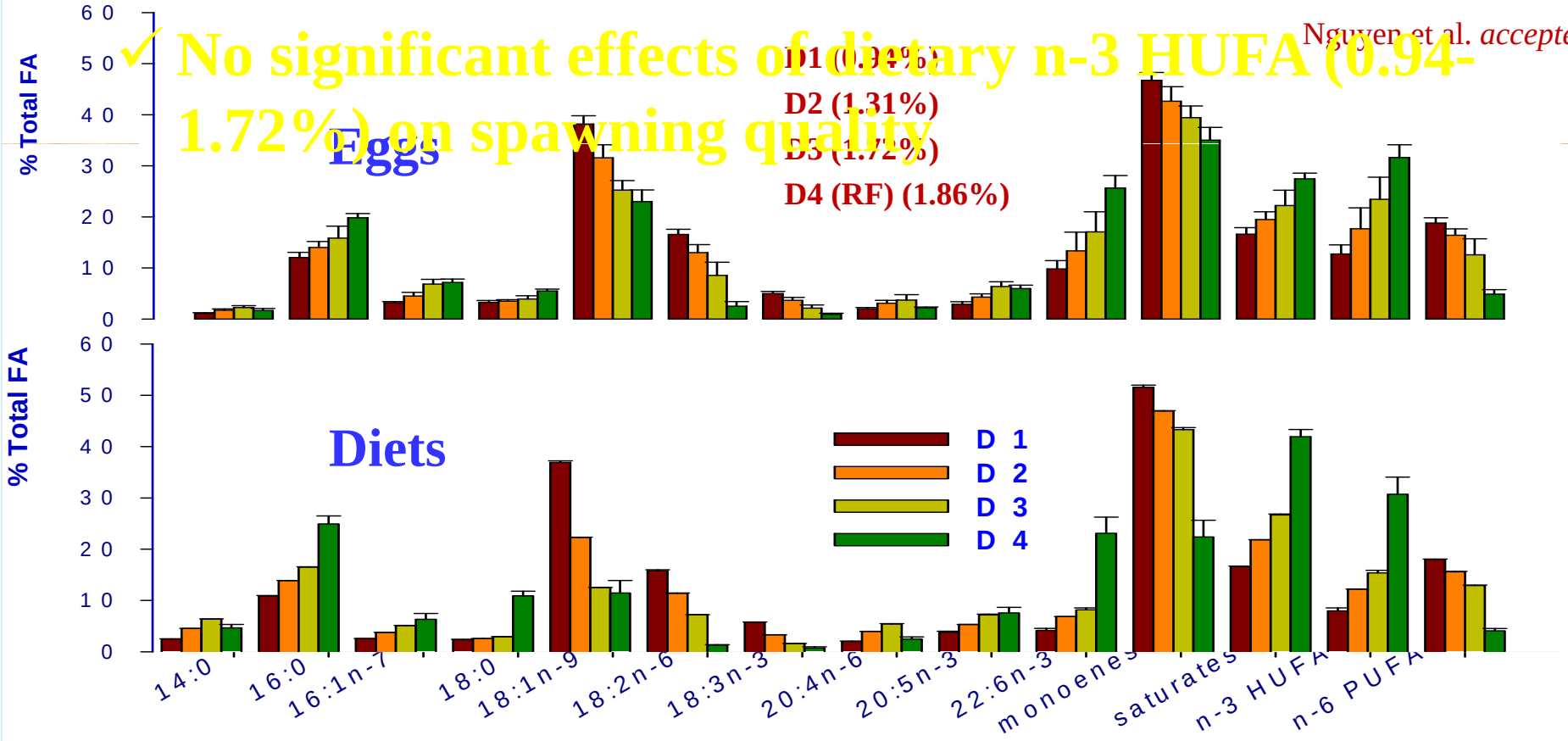
# Broodstock management and conditioning

- Cultured and conditioned in sea cages
- Diet based on trash fish supplemented with squid liver oil and vitamins
- Spawning in tanks (50-70 cubic)

# Effects of broodstock diets on egg quality

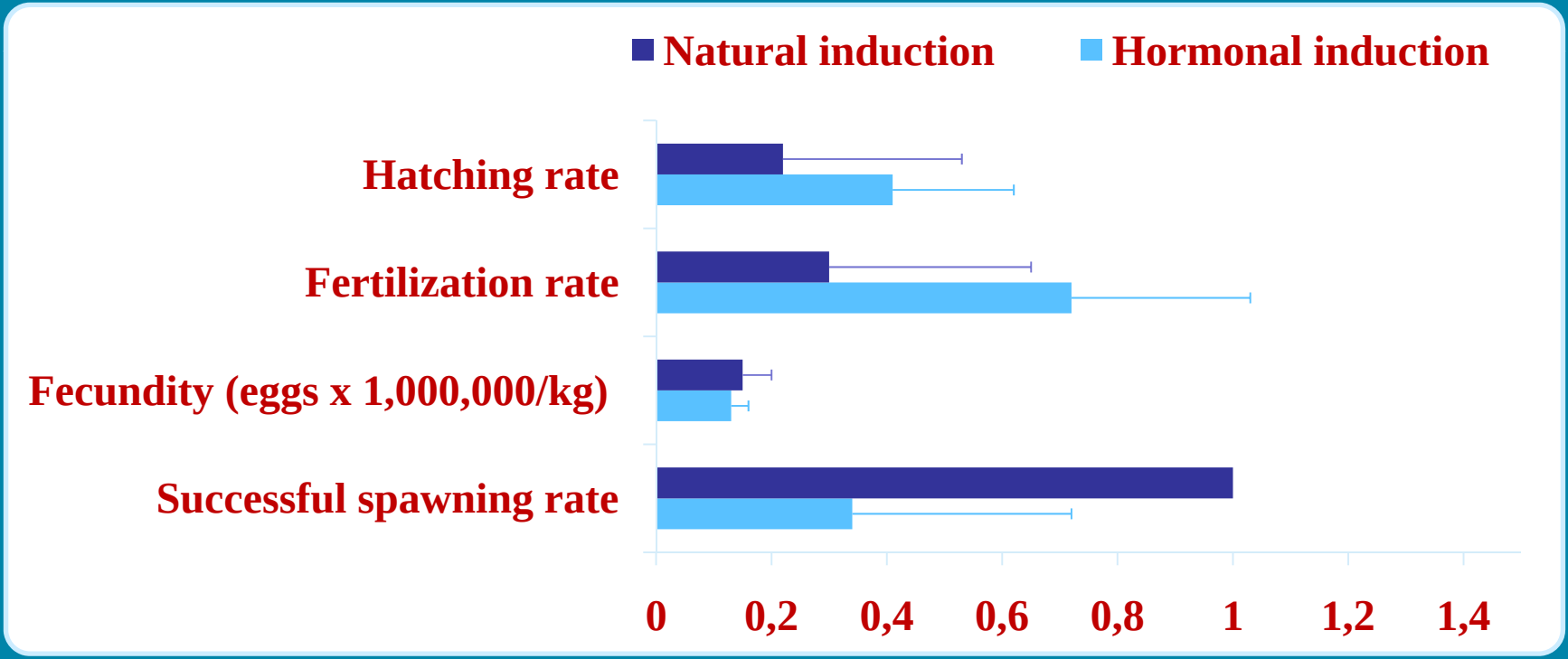
- ✓ FA composition of the eggs reflected the dietary n-3 HUFA levels in the diets
- ✓ No significant effects of dietary n-3 HUFA (0.94-1.72%) on spawning quality

Nguyen et al. *accepted*



# Comparison of breeding induction methods

- ✓ Natural induction: recognized by big belly and chasing behavior
- ✓ Hormonal induction: injection of LH-$RH_a$ at 20 μg $kg^{-1}$, 12-36 h

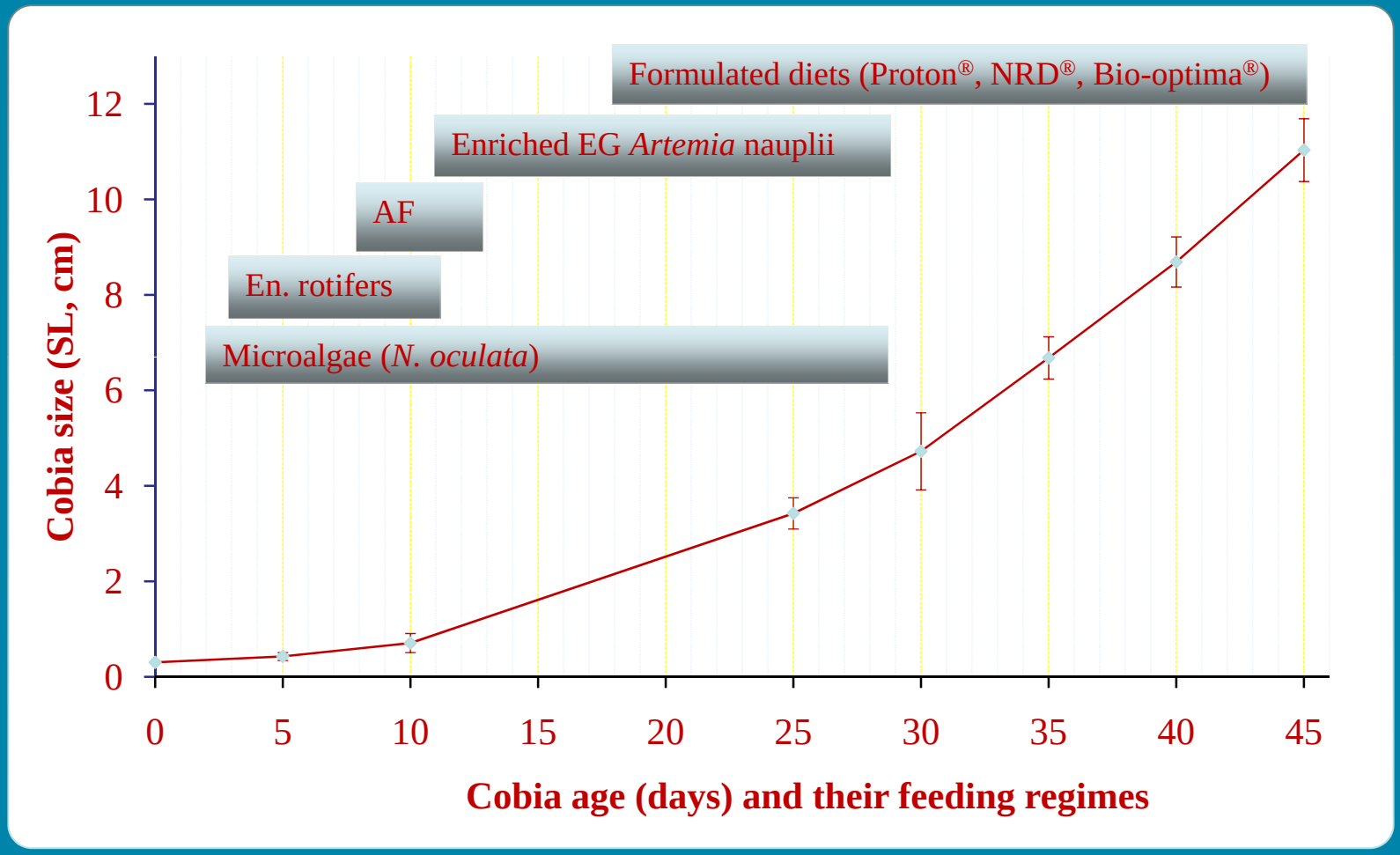


# Larviculture of cobia

- ✓ **Intensive technology**
  - **Live food production**
  - **Using RAS**
  - **High density (30-50 larvae/L)**

- ✓ **Semi-intensive technology**
  - **Natural zooplankton**
  - **500 $m^2$ outdoor ponds**
  - **Low density (2 larvae/L)**

# Intensive larviculture technology



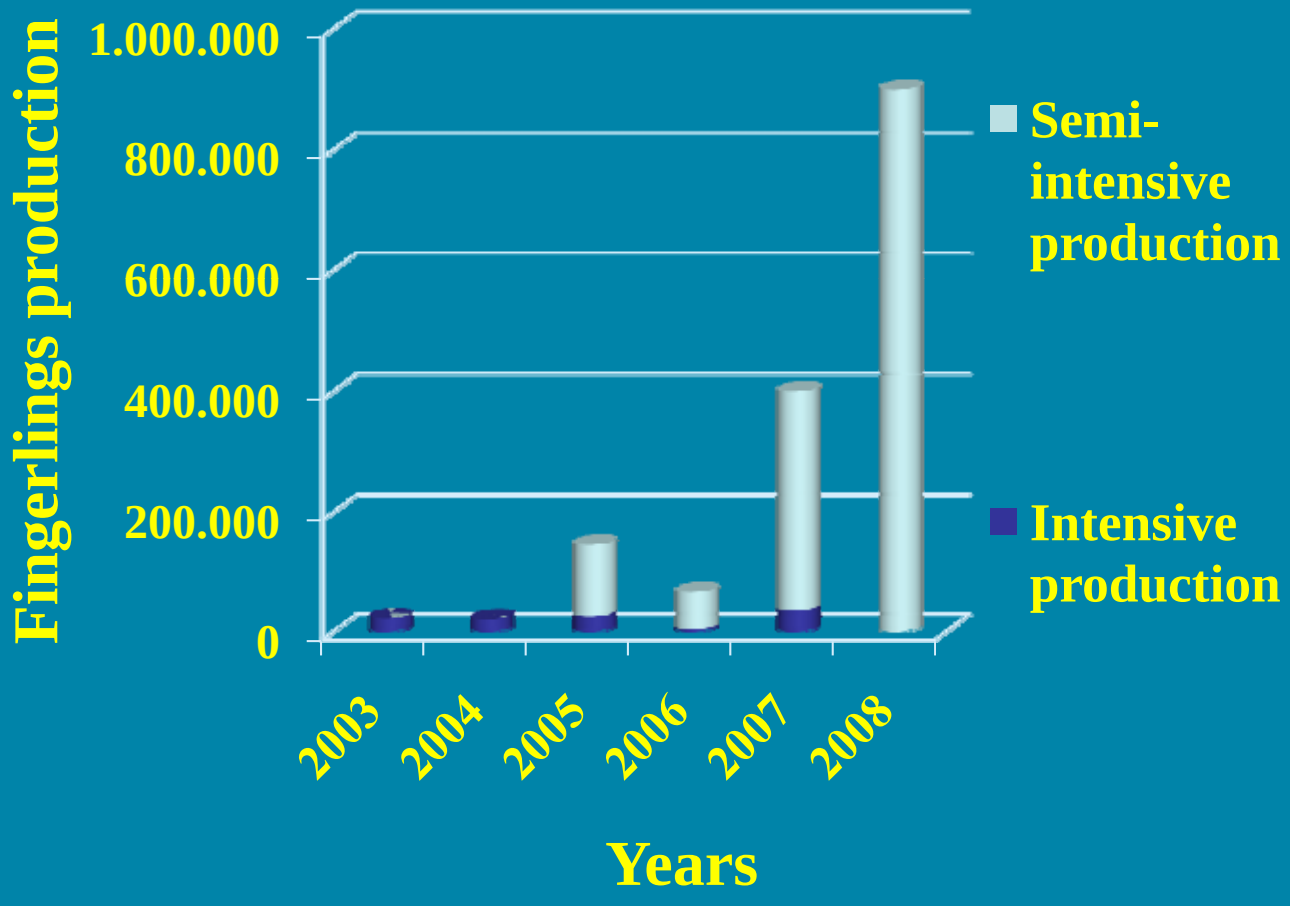

## Feeding regime and growth pattern of cobia larvae and juveniles

# Semi-intensive larviculture technology




**Diagram of cobia larviculture in semi-intensive system**

## Comparison of intensive and semi-intensive productions




## Substitution of enriched rotifers by UAF (Nhu et al., 2009)

Aquaculture

journal homepage: www.elsevier.com/locate/aqua-online

Can umbrella-stage *Artemia franciscana* substitute enriched rotifers for Cobia (*Rachycentron canadum*) fish larvae?

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- ✓ **Cobia larvae are able to ingest and digest umbrella *Artemia* at first feeding**
- ✓ **Umbrella *Artemia* only resulted in lower growth and quality by 8 dph, but no significant difference by 18 dph**

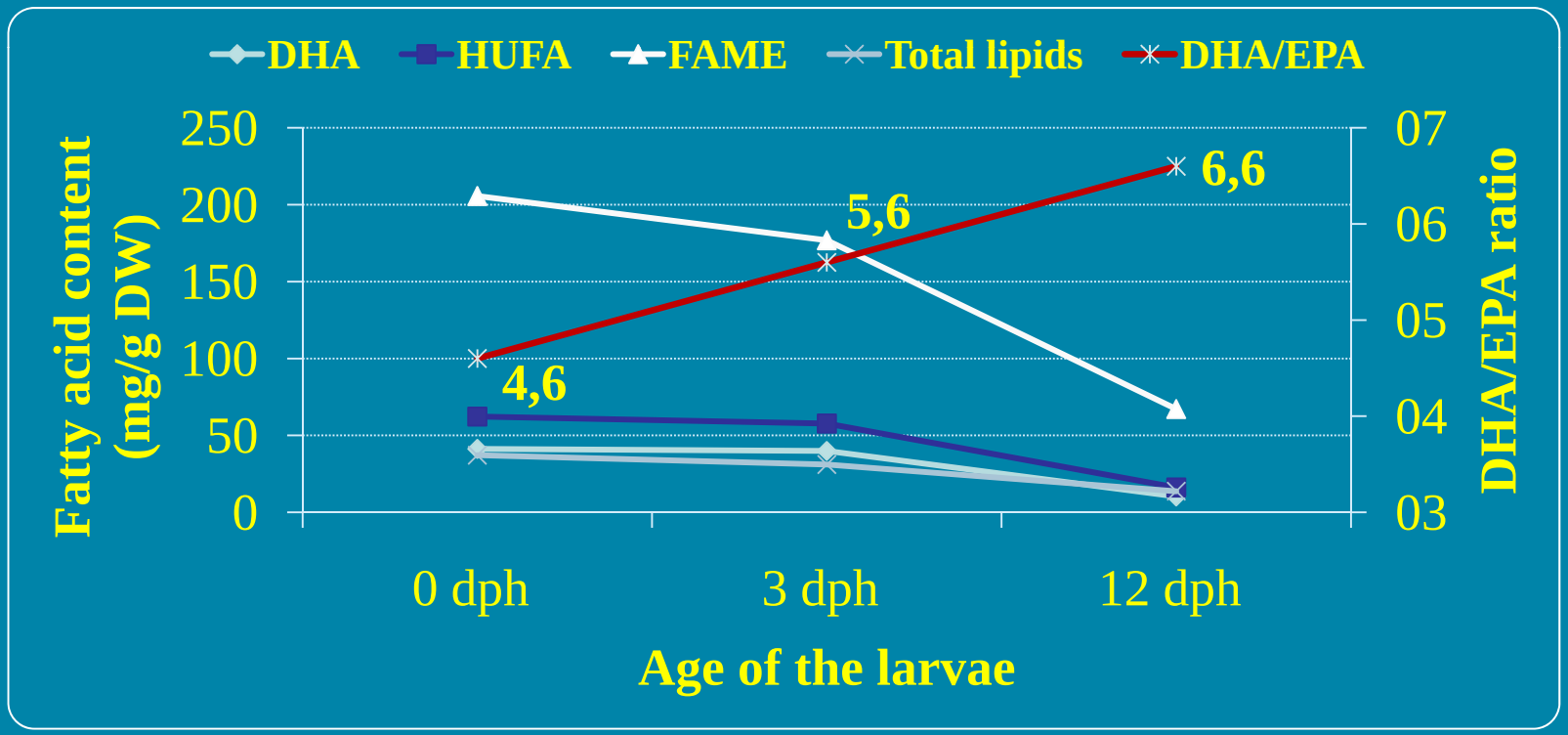
## **Early co-feeding** (Nhu et al., 2009)

- ✓ **Early co-feeding of Proton® as of 8 dph supports growth, but not survival**

| | Standard length (mm) | Body weight (mg) | CV (%) | Survivals (%) |
|---|---|---|---|---|
| P1-D8 | 18.8±2.1$^{a}$ | 62.5±15.5$^{a}$ | 47.25±5.82$^{b}$ | 11.4±3.2$^{a}$ |
| P2-D13 | 16.0±2.4$^{b}$ | 40.5±17.6$^{b}$ | 56.49±7.23$^{ab}$ | 14.5±2.7$^{a}$ |
| P3-D18 | 15.3±2.5$^{b}$ | 37.0±16.8$^{b}$ | 65.18±6.05$^{a}$ | 15.7±2.9$^{a}$ |

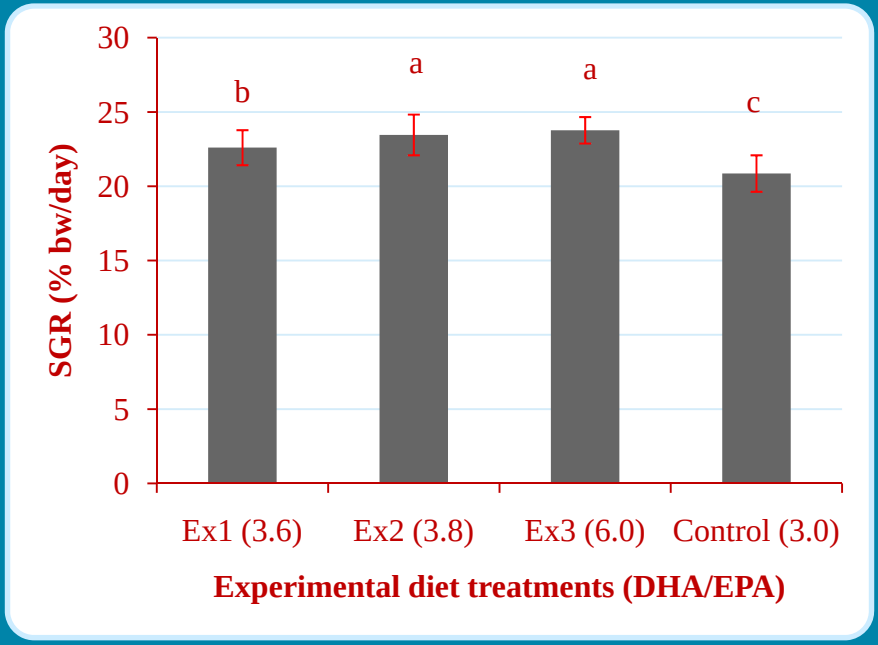
## Fatty acids of cobia at different development stages (Nhu et al., unpubl.)

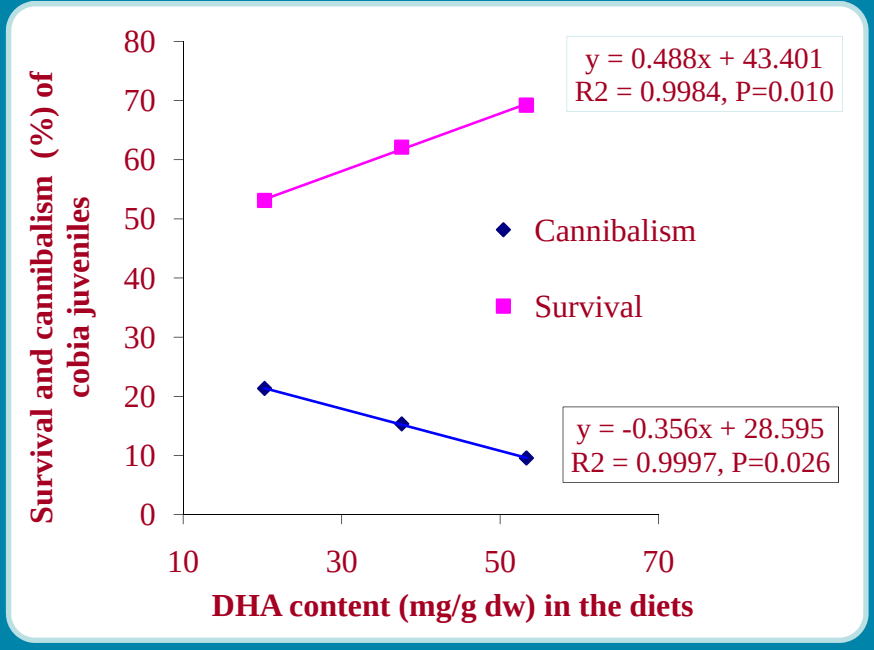
- ✓ DHA and other fatty acids as well as total lipids decrease
- ✓ DHA/EPA ratio increased – DHA tends to be preserved rather than other fatty acids.



## Effects of dietary DHA and DHA/EPA ratio (Nhu et al., unpubl.)

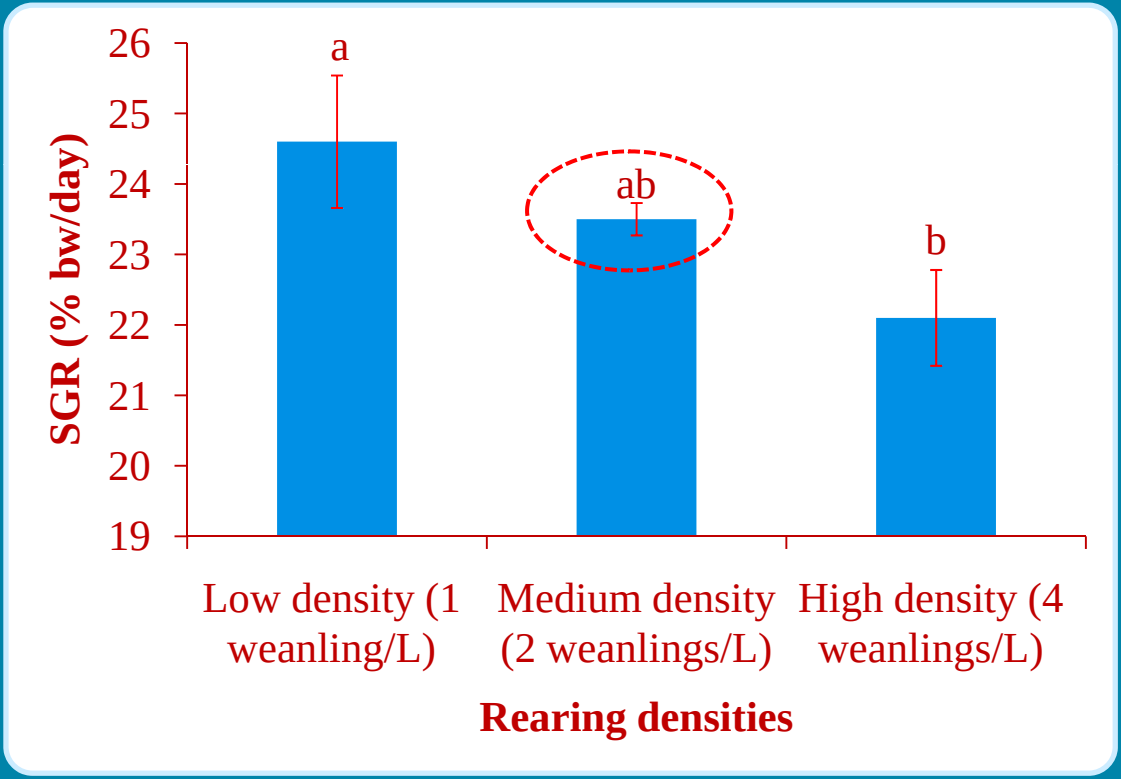
- ✓ **High dietary DHA level and DHA/EPA ratio resulted in better growth performance (12-30 dph)**
- ✓ **Dietary DHA contents correlated negatively to cannibalism and positively to survival**



## Husbandry factors during weaning (Nhu et al., 2007)

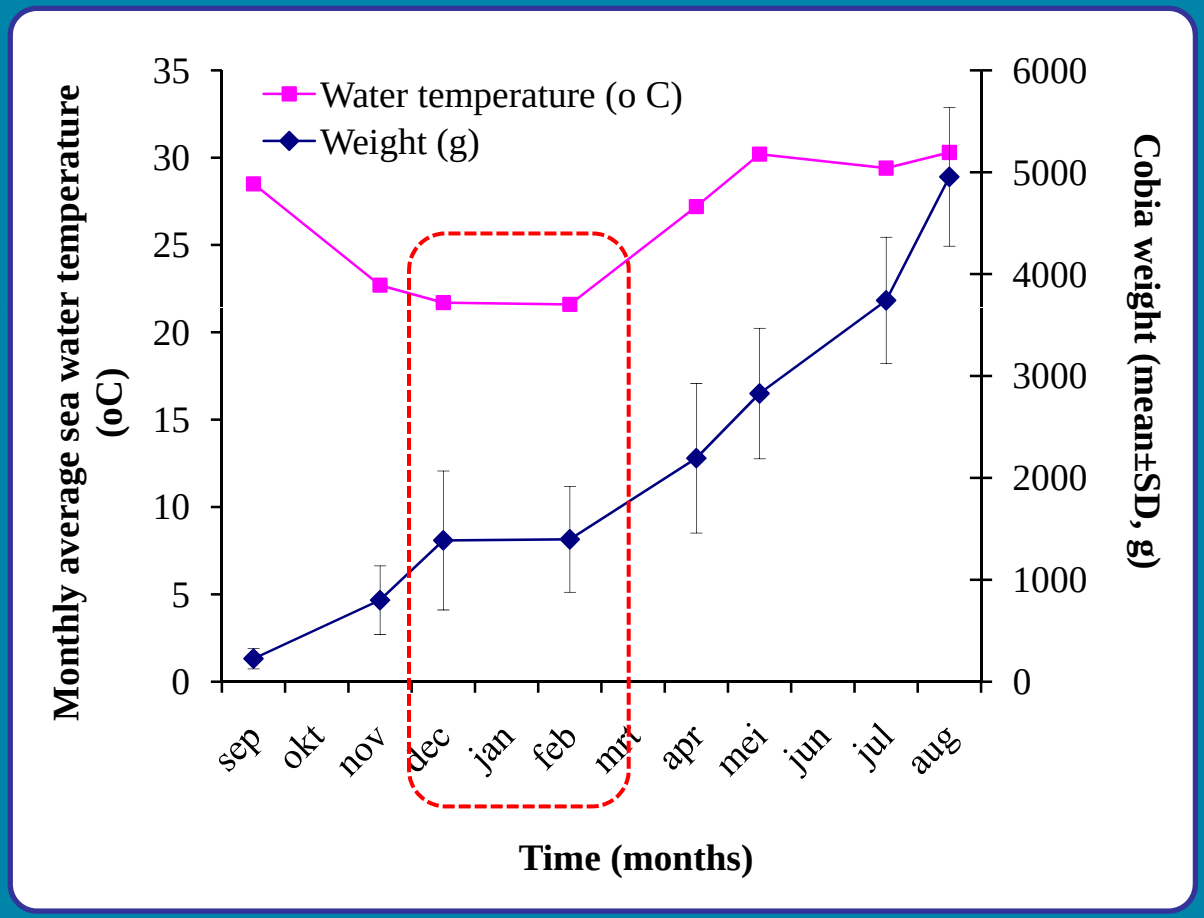
# ✓Growth and survival affected by the rearing density, but not by the feeding frequency




# Cobia farming in Vietnam

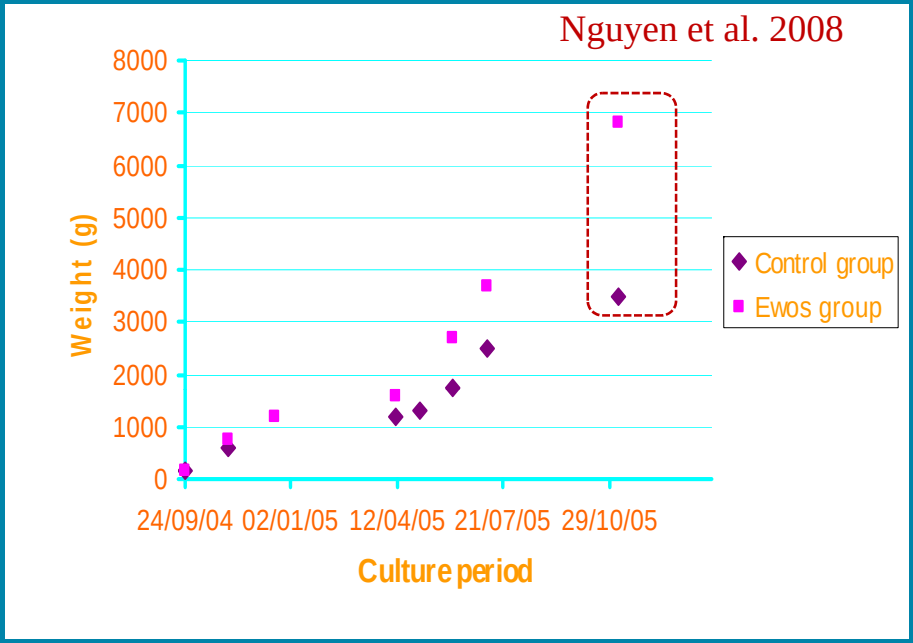
## Grow-out pattern of cobia in sea cages (300 cubic)

- Trash fish diet
- $SGR_w$=0.86% /day (0.2-5.0 kg)
- No growth when temp < 22°C
- Stop eating below 18°C



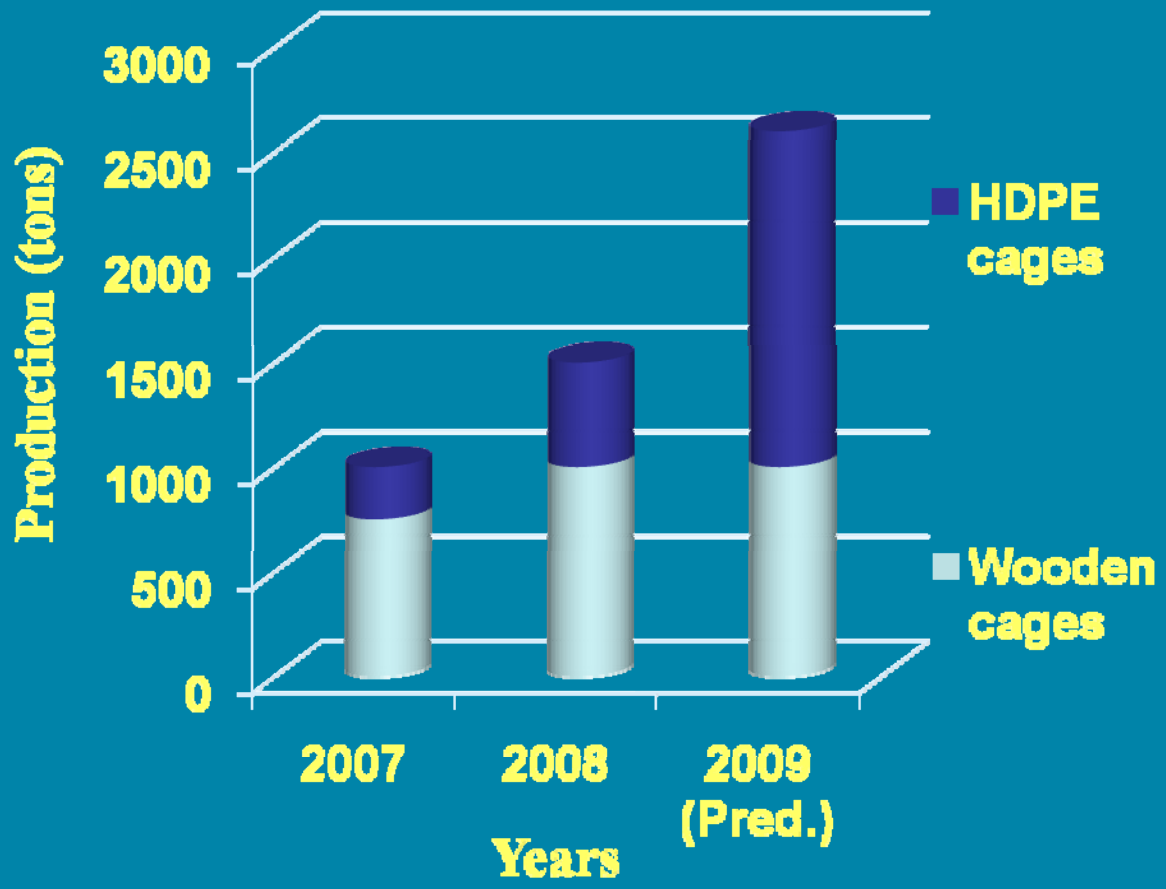
## Comparison of using extruded feed (EWOS Ltd) and trash fish

- ✓ **Advantages of extruded EWOS feed**
  - **Double final weight**
  - **Lower FCR**
  - **Higher biomass gained**
  - **Lower feed cost (15.8%)**




| | Control (TF) group | EWOS group |
|---|---|---|
| Stage (wt) | 1.3-3.5 kg | 1.2-3.7 kg |
| SGR (% wt/ day) | 0.50±0.01 | 0.60±0.00 |
| FCR (dry basis) | 2.40±0.01 | 1.80±0.03 |

## Grow-out productions of cobia in sea cages



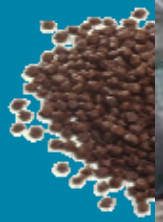

**Production of cobia in Vietnam**

# Major challenges:

- ✓ **Harsh weather conditions**
  - **7-10 storms/ season (disaster in 2005)**
  - **Monsoon winds during winter**

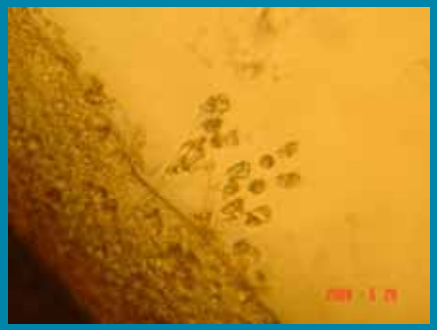
- ✓ **Low water temperature during winter**
  - **Low growth rate, stop eating and cease growing at 18$^{o}$C**
  - **Mass mortality in 2008: 15$^{o}$C for 5 weeks**

- ✓ **Shortage of locally extruded feed**
  - **Imported feed for large-scale farms**
  - **Trash fish for small-scale farms**



## Major challenges

- ✓ **Parasites during hatchery phase:**
  - **Protozoa infection during larvae & juvenile stages: *Benedenia* sp, *Epistylis* sp., *Trichodina* sp…**
  - **High mortality caused by *Amyloodinium ocellatum* in gills and skin juveniles**
- ✓ **Bacteria and virus:**
  - **Viral Nervous Necrosis (VNN)**
  - **Bacteria: Vibrio**
  - **Associated with low water temperature and/or bad weather (starving)**



# Future developments

✓ **Improve quality and quantity of intensive fingerling production, selective breeding, …**

✓ **Development of new cage types (submergible), land-based systems …**

✓ **Local production of extruded feed, efficient diet to lower FCR**

✓ **Post-harvest and processing technologies and marketing**

# Thank you for your attention!