# Intake of natural food and supplemental feed in milkfish *Chanos chanos* (Forsskål) in commercially managed ponds in Panay island, Philippines

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# General Overview

## The milkfish…

- most important cultured fish species in the Philippines
- 204,000 t produced, 89% in brackishwater ponds
- mainly semi-intensively

## Culture system…

- growth of natural food is enhanced
- supplemental food may also be given
- degree of human intervention for classification of production systems (after Huet, 1979)

# Culture practice

## Commercial feeding…

- feeding up to 4% BME widely practiced
- 2-3 times a day, from morning till evening
- mainly manual

## Experimental ponds…

- supplemental feed is only partly ingested immediately
- Kühlmann (1997) found only around 30% direct intake

## Aim of study…

- evaluation of feed intake in milkfish ponds under commercial management

# Material & methods I

**Two farm study…**

- intensive culture system (1 ha pond size) with compound feed at 3.75% BME
- Feeding 3 times a day; at 9:00, 13:00 and 17:00
- from a catwalk

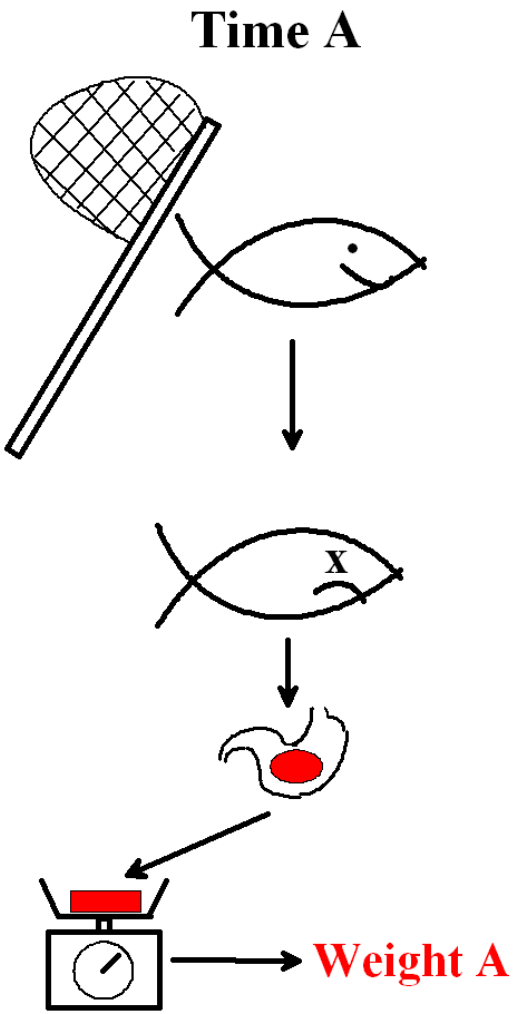
- semi-intensive culture system (30 ha ponds on farm), no supplemental feeding
- fertiliser for enhancing growth of natural food

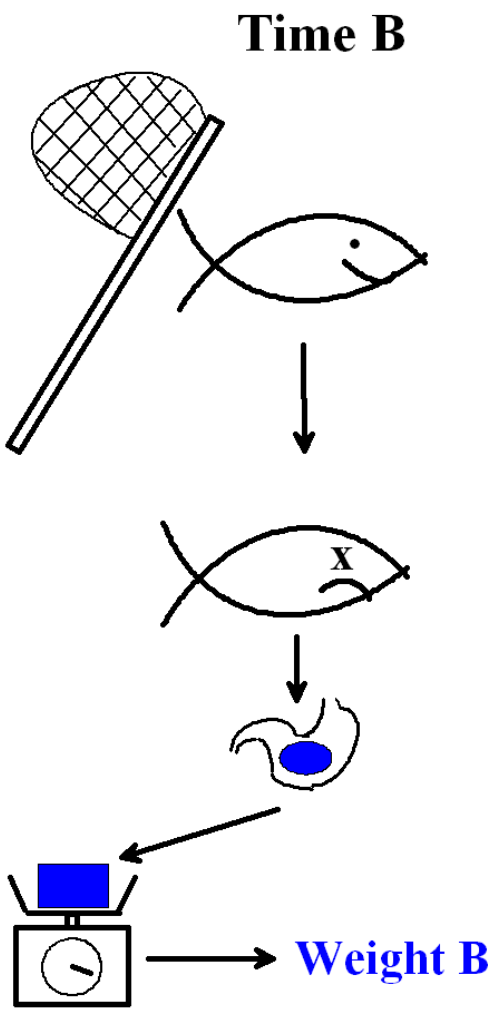
# Material & methods II

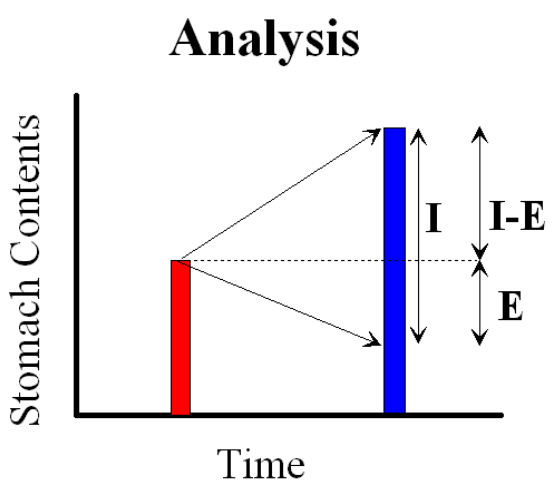
## Fish facts…

- 132 fish from both stations (82 from intensive, 50 from semi-intensive system); mean final weight: 334 g v. 233 g respectively
- sampled with a cast net
- every hour of the day was covered
- collected data included fish size and stomach content (qualitatively and quantitatively)
- data applied in stomach content model (Elliott & Persson) for estimation of daily ration

# Principle of Stomach Content Analysis for Daily Ration Estimation




I = Ingestion

E = Evacuation

**Consumption (A to B) = (I-E) + E**

**Consumption (24 hours)**

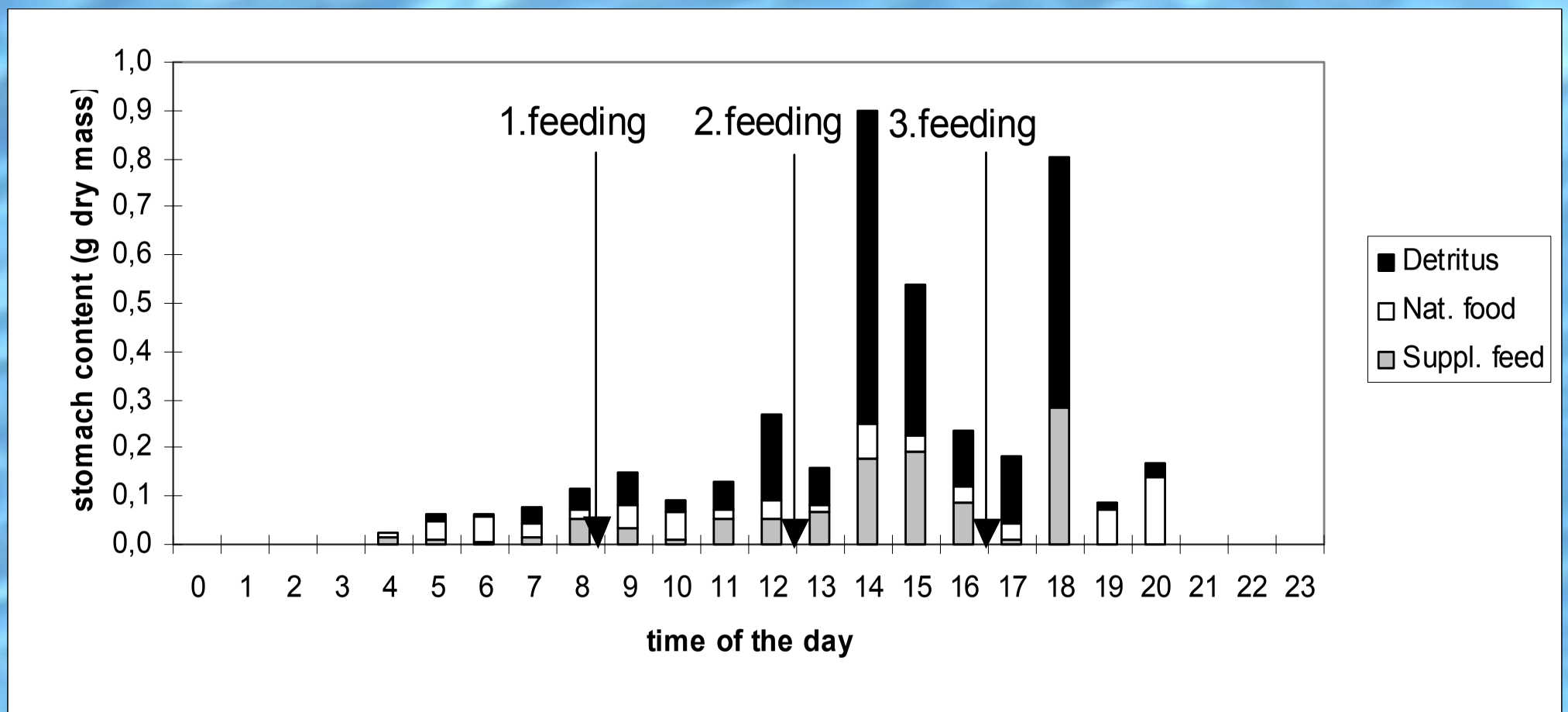
**= (A to B) + (B to C) + ...**
**... + (A'-1 to A')**

# Results

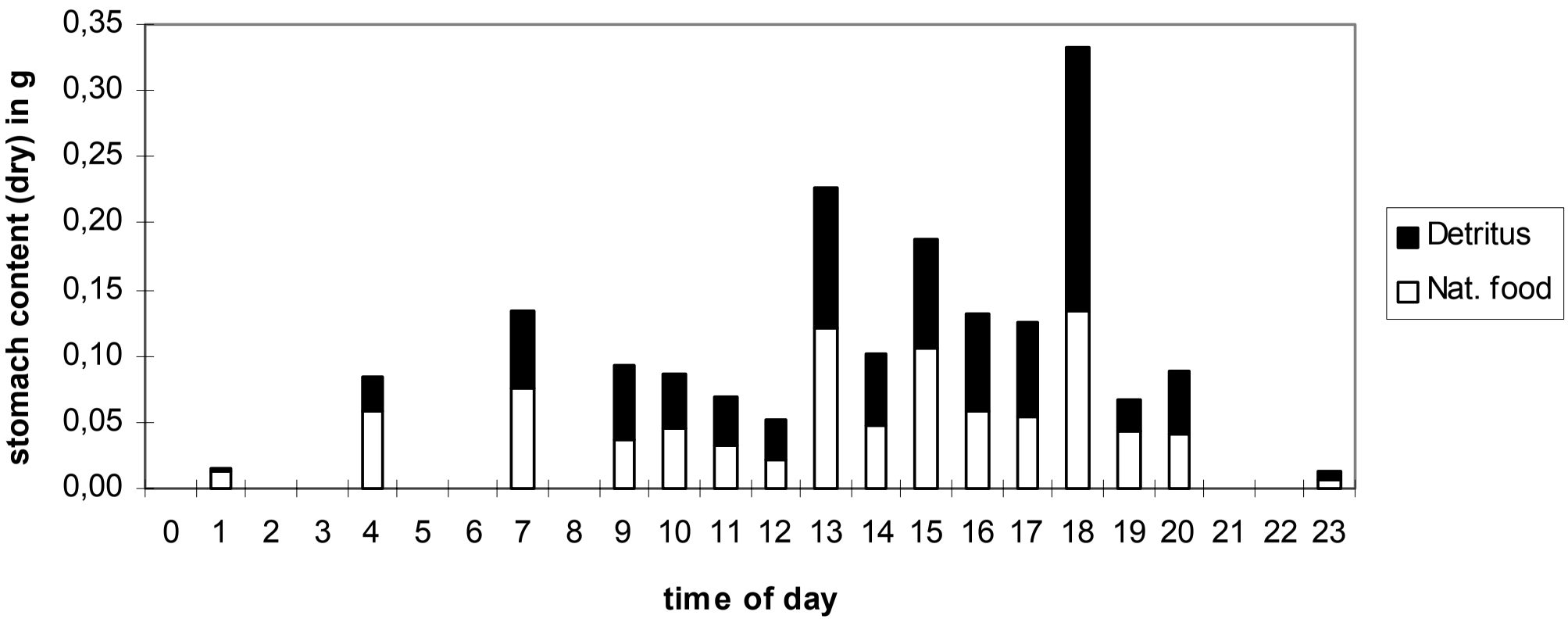
## Stomach content - qualitative

| mg / kg fish | **Intensive** | **Semi-intensive** |
|---|---|---|
| **Suppl. Feed** | 168 ± 217 | - |
| **Algae** | $57^{b}$ ± 86 | $123^{a}$ ± 99 |
| **Crustacea** | 11 ± 22 | 9 ± 17 |
| **Diatoma** | 45 ± 52 | 53 ± 61 |
| **Others** | $2^{b}$ ± 3 | $49^{a}$ ± 55 |
| **Detritus** | 360 ± 490 | 240 ± 160 |

# Diurnal stomach content distribution – Intensive system



# Diurnal stomach content distribution – Semi-intensive system



# Stomach content - quantitative

| | Intensive | Semi-intensive |
|---|---|---|
| **No. of fish** | 82 | 50 |
| **Mean weight [g]** | 334.7 | 232.8 |
| **Feed begin [time]** | 4:00 | 1:00 |
| **Duration of feed uptake [h]** | 18 | 18 |
| **Evacuation rate [$h^{-1}$]** | 0.57 | 0.29 |
| **Hourly evacuation [%]** | 43 | 25 |
| **Half-life of stomach content [min]** | 73 | 143 |
| **Daily ration [% BME $d^{-1}$]** | 0.71 | 0.25 |

# Related feed efficiency

**Feeding facts…**

- daily ration in the intensive system: 0.71% BME $d^{-1}$
- of that, only 45% was compound feed

- only around 9% of the given compound feed was taken in directly by the fish
- furthermore, compound feed intake peaked at 14:00 and 18:00 only ; almost no compound feed was consumed following the first feeding at 9:00

# Related growth of fish

## Growth parameters…

| | Intensive | Semi-intensive |
|---|---|---|
| **Culture period [d]** | 98 | 78 |
| **Final body mass [g]** | 334.7 | 232.8 |
| **Weight gain [g]** | 214.7 | 188.3 |
| **Growth rate [g/d]** | 2.2 | 2.4 |
| **SGR [%]** | 1.0 | 2.1 |

# Discussion

## Intensive system…

- inefficient compound feeding based on the used stomach content model
- waste of feed resources and money (loss of 20 USD a day)

## Semi-intensive system…

- fast growth of fish due to well maintained natural food resources
- supplemental feeding could be reduced or even abandoned

# Outlook

## Estimation of daily ration…

- crucial factor in aquaculture
- presented results are based on it
- model need to be chosen carefully, based on feeding, type of fish and stomach content
- recent findings suggest underestimation of daily ration with the use of present models
- data verification with new models suggested

# Thank you!

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