


# Hatchery: Post Larvae made in Europe?

Gerrit Quantz

Dipl.-Biol. / Fisheries

FutureFish Aquaculture GmbH
Hafentörn 3 / mariCube
25761 Büsum, Germany

# Our History in Shrimp Aquaculture

1. Experiments with shrimp “raceway” at MariFarm, Strande

Participation in Shrimp Short Course at Texas A&M, Port Aransas, Texas

**2004**

# Our History in Shrimp Aquaculture

Pilot-scale raceway + RAS at MariFarm, Strande

30 x 5m

**2008**

# Our History in Shrimp Aquaculture

Realization of 3 commercial shrimp farms in Germany, Σ 60 tons

**2013-2015**




CRISTALLE
GARNELEN

# Our History in Shrimp Aquaculture

## Realization of pilot multi-tier fish / shrimp farm in Singapore

**2015-2017**



Currently under construction
Switzerland 60 tons

All these farms in Germany and all (?) other European shrimp farms have one in common

Dependency from a few shrimp hatcheries in the USA

In 2017 two events influenced the whole Shrimp industry in the EU:

26. Aug. „Harvey" a Cat. 4 hurricane made landfall in Texas

10. Sept. „Irma" a Cat. 5 hurricane made landfall in the Florida Keys

26. Aug. „Harvey“ a CAT 4 hurricane made landfall in Texas

10. Sept. „Irma“ a CAT 5 hurricane made landfall in the Florida Keys

## The results:

- Hatcheries in Texas and Florida had to close down production
- No PL delivered for almost 3 months
- Severe gap in production scheme
- No alternative suppliers available




# Imports of live shrimp for aquaculture into member countries of the EU are strictly regulated

Basis for the import regulations are the guidelines and proposals of the

World Organisation for Animal Health

Aquatic Animals Health Code 2017

The European Union established the

EC Council Directive 2006/88/EC

introducing controls for aquaculture animals.




# Imports of live shrimp for aquaculture into member countries of the EU are strictly regulated

EC Council Directive 2006/88/EC
introducing controls for aquaculture animals.

Animal health certification is required for live crustaceans

- for farming,
- for ornamental trade and
- for release into the wild (restocking).

Commission Regulation (EC) No 1251/2008 deals with conditions and certification requirements for implementation of the directive.

For shrimp the listed pathogens are:.




# Imports of live shrimp for aquaculture into member countries of the EU are strictly regulated

Comission Regulation (EC) No 1251/2008 deals with conditions and certification requirements for implementation of the directive.

For shrimp the listed pathogens are:

| | Diseases | Susceptible Species |
|---|---|---|
| **Exotic Diseases** | | |
| Crustaceans | TSV - Taurasyndrom Virus | L. setiferus, L. stylirostris, L. vannamei |
| | YHV - Yellowhead Disease Virus | L. japonicus, P. monodon, L. setiferus, L. stylirostris, L. vannamei, |
| **Non Exotic Diseases** | | |
| Crustaceans | WSSV – Whitespot Virus | All decapod shrimp |




# Imports of live shrimp for aquaculture into member countries of the EU are strictly regulated

## Implementation of Commission Regulation (EC) No 1251/2008

**COUNTRY**

**Aquaculture animals for farming, relaying, put and take fisheries and open ornamental facilities**

| | | | |
|---|---|---|---|
| II. | Health information | II.a. Certificate reference number | II.b. |

**Part II: Certification**

II.1. **General requirements**

I, the undersigned official inspector, hereby certify that the aquaculture animals referred to in Part I of this certificate:

II.1.1. have been inspected within 72 hours of loading, and showed no clinical signs of disease;

II.1.2. are not subject to any prohibitions due to unresolved increased mortality;

II.1.3. are not intended for destruction or slaughter for the eradication of diseases; and

II.1.4. originate from aquaculture farms which are all under the supervision of the competent authority;

II.1.5. ([1]) [in the case of molluscs, were subject to an individual visual check of each part of the consignment, and no molluscs species other than those specified in Part I of the certificate were detected.]




# Imports of live shrimp for aquaculture into member countries of the EU are strictly regulated

## Implementation of Commission Regulation (EC) No 1251/2008

II.2. (1)(2)(3) **[Requirements for species susceptible to Epizootic haematopoietic necrosis (EHN), Bonamia exitiosa, Perkinsus marinus, Mikrocytos mackini, Taura syndrome and/or Yellowhead disease**

I, the undersigned official inspector, hereby certify that the aquaculture animals referred to above:

*either* (1)(5) [originate from a country/territory, zone or compartment declared free from (1) [EHN] (1) [Bonamia exitiosa] (1) [Perkinsus marinus] (1) [Mikrocytos mackini] (1) [Taura syndrome] (1) [Yellowhead disease] in accordance with Chapter VII of Council Directive 2006/88/EC or the relevant OIE Standard by the competent authority of the country of origin, and

(i) where the relevant disease(s) is (are) notifiable to the competent authority and reports of suspicion of infection of the relevant disease(s) must be immediately investigated by the competent authority,

(ii) all introduction of species susceptible to the relevant disease(s) come from an area declared free of the disease(s), and

(iii) species susceptible to the relevant disease(s) are not vaccinated against the relevant disease(s)];

*or* (1)(3)(5) [in the case of wild aquatic animals, have been subject to quarantine in accordance with Decision 2008/946/EC.]]




# Imports of live shrimp for aquaculture into member countries of the EU are strictly regulated

## Implementation of Commission Regulation (EC) No 1251/2008

II.4. (1)(2)(3) **[Requirements for species susceptible to Viral haemorrhagic septicaemia (VHS), Infectious haematopoietic necrosis (IHN), Infectious salmon anaemia (ISA), Koi herpes virus (KHV), Marteilia refringens, Bonamia ostreae, and/or White spot disease**

I, the undersigned official inspector, hereby certify that the aquaculture animals referred to above:

*either* (1)(6) [originate from a country/territory, zone or compartment declared free from (1) [VHS] (1) [IHN] (1) [ISA] (1) [KHV] (1) [Marteilia refringens] (1) [Bonamia ostreae] (1) [White spot disease] in accordance with Chapter VII of Directive 2006/88/EC or the relevant OIE Standard by the competent authority of the country of origin, and

(i) where the relevant disease(s) is (are) notifiable to the competent authority and reports of suspicion of infection of the relevant disease(s) must be immediately investigated by the competent authority,

(ii) all introduction of species susceptible to the relevant disease(s) come from an area declared free of the disease(s), and




# Imports of live shrimp for aquaculture into member countries of the EU are strictly regulated

Commission Regulation (EC) No 1251/2008
also guidelines the third countries accredited for import of live shrimp for use in aquaculture

'ANNEX III

**List of third countries, territories, zones or compartments** (1)

(referred to in Article 10(1) and Article 11)

| Country/territory | | Aquaculture Species | | | Zone/Compartment | |
|---|---|---|---|---|---|---|
| ISO-code | Name | Fish | Molluscs | Crustaceans | Code | Description |
| AU | Australia | X (A) | | | | |
| BR | Brazil | X (B) | | | | |

Why only US Hatcheries?




# Commission Regulation (EC) No 1251/2008

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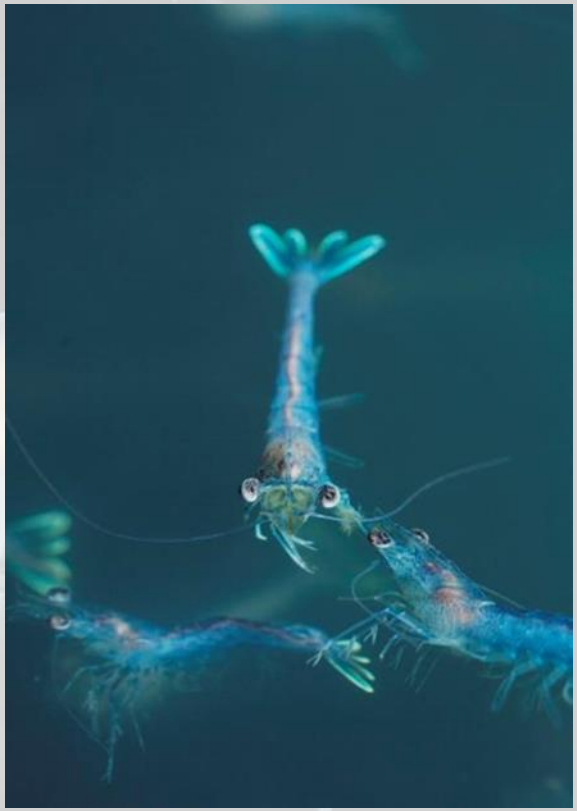
(referred to in Article 10(1) and Article 11)

| Country/territory | | Aquaculture Species | | | Zone/Compartment | |
|---|---|---|---|---|---|---|
| ISO-code | Name | Fish | Molluscs | Crustaceans | Code | Description |
| US | United States (G) | X | | X | US 0 (C) | Whole country |
| | | X | | | US 1 (D) | Whole country, except the following states: New York, Ohio, Illinois, Michigan, Indiana, Wisconsin, Minnesota and Pennsylvania |
| | | | X | | US 2 | Humboldt Bay (California) |
| | | | | | US 3 | Netarts Bay (Oregon) |
| | | | | | US 4 | Wilapa Bay, Totten Inlet, Oakland Bay, Quilcence Bay and Dabob Bay (Washington) |
| | | | | | US 5 | NELHA (Hawaii) |

## What is the way out?

- More countries with hatcheries listed in Annex III ?
- Establishing hatcheries in Europe ?






# A functional hatchery for *L. vannamei* should have the following essential components

| Maturation Tanks | Spawning / Hatching Tanks | Larval Rearing Tanks | Live Feed Section |
|---|---|---|---|
| Recirculation Aquaculture System RAS | | | Seawater Supply |
| Conditioning of broodstock to stimulate gonadal development | Control of spawning performance of single individuals. Nauplii development | Feeding and husbandry of larval stages in controlled environment | Preparation and supply of appropriate feed – cultured and/or formulated for larval stages. |

RAS to keep strict controls on optimal environmental conditions

# Maturation

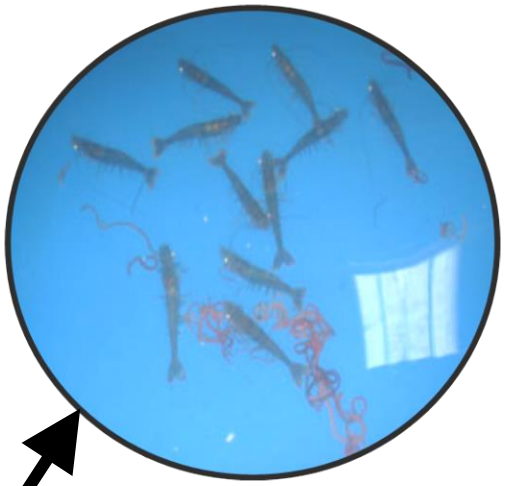
## Broodstock

5–6 Ind/m³

♀ : ♂ = 1 : 1

♂ > 40 g

♀ > 45 g



## Maturation Tank

Diameter > 3 m

Preferable round

Dark coloured

## RAS

Temp. 28°C

Sal. 32 – 35 ppt

Light 14 : 10 h

## Frequent Feeding

Bloodworm

Squid

Formulated maturation diets

**For a 10 Mio Hatchery:**

3 tanks,

Diam. = 4 m, 0,6 m water depth,

Vol = 7,5 m³/tank

23 females / tank

# Maturation – Induced Spawning

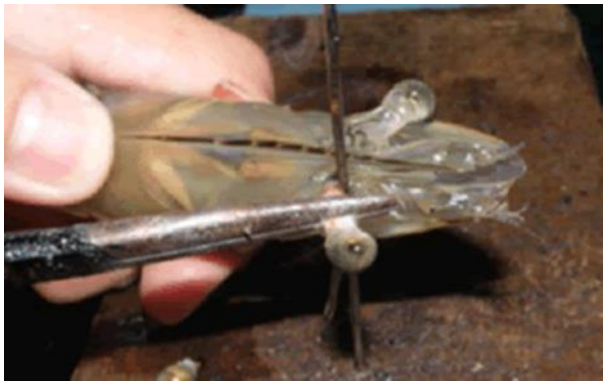
Broodstock

## Alternative options

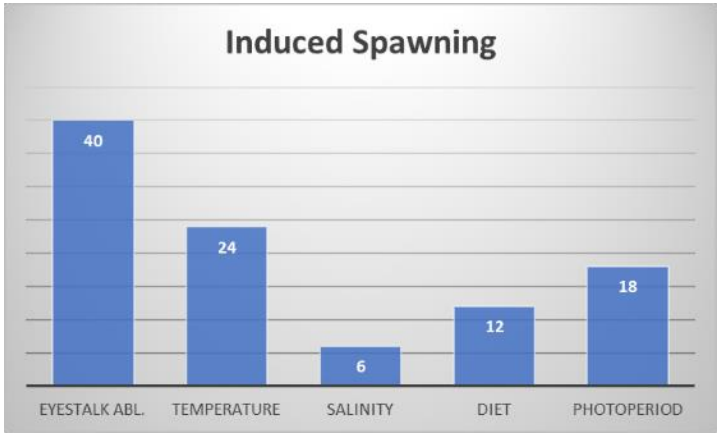
Manipulation of
Temperature
Salinity

Dietary additions

Serotonin injections
Others ????



~~Common practice~~
~~eyestalk ablation~~



# Maturation – Induced Spawning

Maturation Tank

Successful Mating

Artificial insemination

**For a 10 Mio Hatchery:**

10 tanks,
Diam = 0,8 m
Water depth = 0,6 m
Vol = 300 l/tank

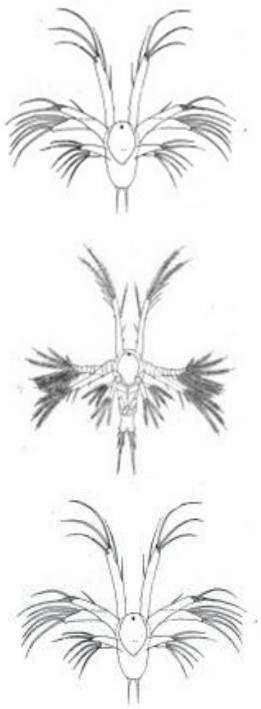
**Spawning Tanks**

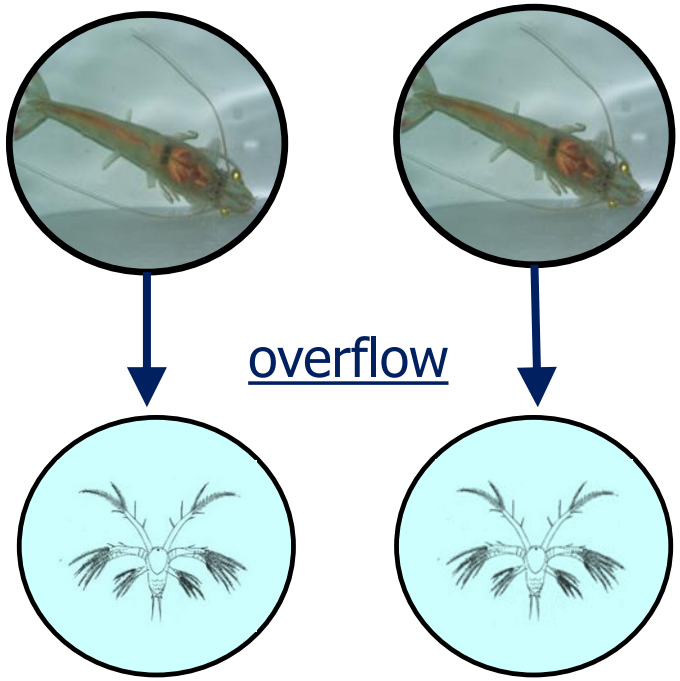
200 – 400 l, flat bottom

RAS
Temp. 28°C
Sal 32 – 35 ppt

# Spawning - Hatching

3 Nauplii stages , 2 days post hatch





overflow

For a 10 Mio Hatchery:

10 tanks,
Diam = 0,8 m
Water depth = 0,8 m
Vol = 400 l/tank

## Spawning Tanks

100.000 – 200.000 / female

## Hatching Tanks

Round, approx. 400 l

Temp. 28 - 30°C
Sal. 26 – 36 ppt

Stagnant, no feeding

# Larval Rearing

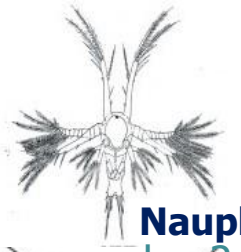
All nauplii >stage 5

Algae Feeding

Artemia Feeding

Formulated Diets

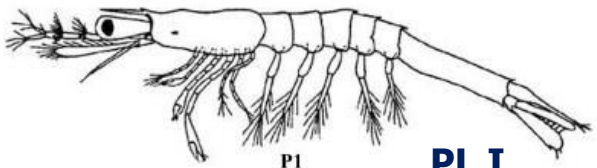
Flakes / Pellets



**Nauplii V**
day 2 ph

**Zoea III**
day 4 ph

**Mysis II**
day 10 ph



**PL I**
day 26 (=PL 15)

## Larval Rearing Tanks

Round or square,
Water depth 0,8 – 1,0 m

RAS
Temp. 28 - 30°C
Sal. 26 – 36 ppt

**For a 10 Mio Hatchery:**

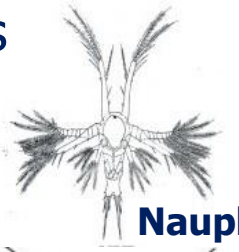
6 tanks,
Square 5,0 x 1,2 m
Water depth = 1,2 m
Vol = 6 m³/tank

# Larval Rearing

All nauplii >stage 5

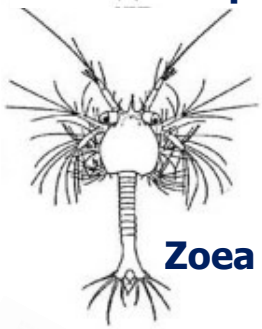
Survival Rates

90 %



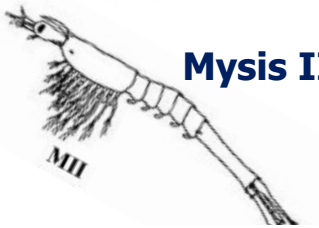
Nauplii V

0 – 70 %
Zoea Syndrom



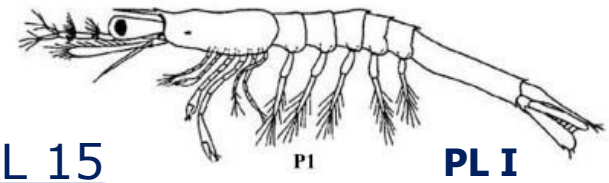
Zoea III

50 – 90 %



Mysis II

20 - 90 %

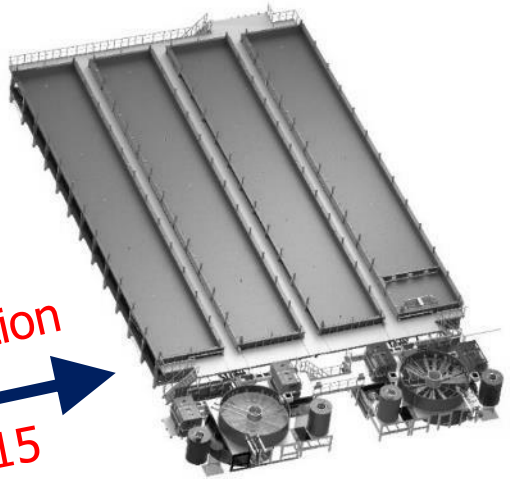


PL I

Σ 50% to PL 15

## Larval Rearing Tanks

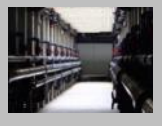
On-growing RAS farm



Transport / Acclimation

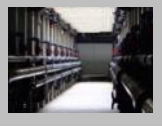
PL 10 - 15

# On-growing to market size

# Summary Shrimp Reproduction

- Operation of a shrimp hatchery has to comply with the EU regulations on “Alien Species”.
- A monitoring program on the disease situation in the farm is basis for later distribution of PL within the EU.
  - New facility 12 months regular checks on TSV, YHV and WSSV by an approved laboratory.
  - Existing or upgraded facility 24 months of testing.

# Summary Shrimp Reproduction

- Eye-stalk ablation - the most common method to induce spawning – is not accepted in EU.
- Alternative inducing procedures will result in smaller egg numbers / female.
- Research needed to substitute algae cultures and Artemia feeding due to high labor costs.

# Thank You for Your Attention

## - happy shrimpin´ -

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