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Short communication

A NEW TECHNOLOGY OF SHRIMP *MARSUPENAEUS JAPONICUS* CULTIVATION IN SEMI-INTENSIVE METHOD IN ALBANIA

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The results obtained in the rearing of *Marsupenaeus japonicus* in Albania, using semi-intensive methods are described. The experiment took place in an existing Carp Farm, partially transformed in an extensive Shrimp Farm by a joint-venture (Italo-Albanian), which will be established as a Research Unit for shrimps production. The Research Unit is located in an area of approximately 6 hectares. The size and the number of utilized ponds will be very flexible and not cost effective. Four ponds of 0.5 ha each of them, are stocked with a number of Post-larvae (PL22) which will vary 5PL/m². With water exchange from a minimum of 5% to a maximum of 20%. Alimentation will be based on fresh food and dry food depending on price and availability. 100,000 juveniles with an average weight of 0.02g each were released into the rearing ponds. After 120 days of rearing 1100kg of shrimps were collected weighing on average 20 g each. The final survival rate was 65% with a food conversion of 1.4.

Key words: *Marsupenaeus japonicus*; ponds; post-larvae

НОВА ТЕХНОЛОГИЈА ЗА ОДГЛЕДУВАЊЕ НА МОРСКИ РАКОВИ *MARSUPENAEUS JAPONICUS* СО ПОЛУИНТЕНЗИВЕН МЕТОД ВО АЛБАНИЈА

Опишани се резултати добиени од одгледувањето на морски ракови од видот *Marsupenaeus japonicus* во Албанија со употреба на полуинтензивни методи. Експериментот е реализиран на фарма на крапови, делумно трансформирана и во екстензивна фарма на морски ракови (со заеднички италијанско-албански капитал), каде што ќе се основа и истражувачка единица за производство на морски ракови. Истражувачката единица ќе зафаќа површина од околу 6 хектари. Големината и бројот на вештачки езерца ќе бидат флексибилни и нема да бараат голема потрошувачка. Четири вештачки езерца од по 0,5 ha се населени со post-larvae (PL22), чиј број ќе се движи околу 5PL/m². Промената на водата ќе биде од минимум 5% до максимум 20%. Одгледувањето ќе се базира на свежа и сува храна во зависност од цената и достапноста. Во езерата за одгледување беа распределени 100.000 младенчиња, со просечна тежина од 0,02 g. По 120 дена одгледување беа собрани 1100 kg морски ракови со просечна маса од 20 g. Конечната стапка на преживување беше 65% со конверзија на храна од 1,4.

Клучни зборови: *Marsupenaeus japonicus*; вештачки езера; post-larvae

1. INTRODUCTION

The majority of fish consumed by human comes from capture fisheries, but the natural supply is not yet sufficient to satisfy the increasing consumption of such resource, so aquaculture will have great potencial all over the world, in the near future. In many countries the expansion of aquaculture is limited because of land and water availability, even if the demand of fish is increasing. Increasing aquaculture production will not only satisfy the global demand of fish, but even allow some stock of fish from the brink of extinction.

The aim of this study was to restore the country's previous capacity in aquaculture and explore the potential fur further development of aquaculture, particularity for high value species. From further investigations, Albania demonstrated to be the ideal candidate due to the fact that it has considerable potential in the aquaculture industries and abundance of suitable sites for marine aquaculture (offshore and inshore).

An exiting carp farm, partially transformed in an extensive Shrimp Farm by a Join-venture (Italian-Albanian), will be established as a Research Unit for shrimp production *Marsupenaeus japonicus*. As soon as the research unit will be set and tested, it will be evaluate the opportunity of testing other species (Sea bass and Sea Bream). The research unit will accomplish the following purposes:

1) Create a multipurpose center (Research, Training, Demonstration, Reference point) for future farmers.

2) Demonstrate the technical feasibility of semi-intensive aquaculture in Albania.

3) Demonstrate the financial feasibility of semi-intensive technology.

4) Stimulate interest in the marine aquaculture sector.

5) Expose the Albanian staff involved in the project to all the aspects of the establishment and management of aquaculture facilities for marine species.

6) Lay the foundation for future projects in marine aquaculture (Fish and Shrimp Hatchery, Fish grow out).

Semi-intensive technology is considered more appropriate as a starting point in relation to the social and economical environment. It will sensibly be a starting point to the social and economical risks and will allow a progressive training program of the local staff. Low investments will guarantee more flexibility of change if shrimps will not demonstrate a good source of seawater, it will be reasonably convenient, at the end of the first phase, to establish experimentation of the other species (Sea bass and Sea bream).

2. MATERIAL AND METHODS

Different experimentations were carried out during the five years span of the project, by using a phase approach to minimize risks. This approach does not only minimize risks, but also allows to shift from one activity to another. All the infrastructures were constructed to guaranty a certain level of flexibility, so that they will be suitable for different purposes. At the and of every phase a technical and economical evaluation indicated whether or not to proceed with the following phase.

An semi-intensive technology is followed. If we consider the natural system at one and (e.g. lake or the ocean) and the recirculating water system at the other, a semi-intensive system can be placed in between, even if the technology level required to develop and operate the system can be very considerable. Even within a given type of culture system e.g. ponds, there can be a considerable amount of variation in the level of intensity. It follows that it is almost impossible to define exactly a semi-intensive system. In relation to the number of ponds available, different trials set up for shrimps culture, do not exceed the stocking densities. At least for the first two years it was convenient to reduce dependence on technology (particularity on electricity) as well as pressure on water quality. The higher the stocking densities the higher the chances of crop failure. Every trial proposed was characterized by the following technical modifications in the system:

1) Post larvae / Fry stocking density.

2) Percent of water exchange.

3) Feed rate.

Together with experimentation of shrimps feasibility in Albania the project aims to determine which technology is more appropriate by using a phase approach. It will be possible not only to minimize risks, but to explore other opportunities of marine aquaculture, if shrimps will not prove to be the right candidate.

Ponds are stocked with a number of Postlarvae which vary from 3/m^2 up to 5/m^2. Water exchange was from a minimum of 5% to a maximum of 20%. No supplementing oxygen was utilized. Alimentation based on fresh food and dry food depended on the price and availability.

The main objective of this study is to evaluate production per hectares based on water exchange and stocking density.

In the semi-intensive system large earthwork ponds are used with water inlets and outlets. Typical ponds size is between 0.5–5 ha. The use of pomps is required to guarantee a good water m^2. A compound fed is given to integrate natural feed. Annual yields, which depend on climatic conditions, number of cycles per year, and management are between 700–1500 kg/ha.

Lowering salinity, improving water quality oxygen level in the water and extra feeding, will at least double production per hectare, and with a good management much more will be expected.

3. RESULTS

The Cycle: May–September 2008

Number of ponds	4
Production area (m^2)	24000
Total volume of water (m^3)	36000
Total number of PL	100000

Four ponds of 0.5 ha each of them, are stocked with a number of Post-larvae (PL22) which will vary 5 PL/m². Water will exchange from a minimum of 5% to a maximum of 20%. Alimentation will be based on fresh food and dry food depending on price and availability. 100,000 juveniles with an average weight of 0.02 g each were released into the rearing ponds. After 120 days of rearing 1100 kg of shrimps were collected weighing on average 20 g each. The final survival rate was 65% with a food conversion of 1.4.

The characteristics of two ponds are as following:

The first pond

Production surface (m^2)	6000
Total volume of water (m^3)	9000
Population density PL/m^2	3
Total number of PL	18000
Water exchange/day	5%
Water requirements (m^3/day)	450
Feed coefficient	2–10%
FCR	2:1
Total food (kg)	504
Duration of a cycle, days	90–120
Percentage of survivors	70%
Production quantity (kg)	252
Production kg/ha	420

The second pond

Production surface (m^2)	6000
Total volume of water (m^3)	9000
Population density PL/m^2	5
Total number of PL	30000
Water exchange/day	10%
Water requirements m^3/day	900
Feed coefficient	2–10%
FCR	2:1
Total food, kg	840
Duration of a cycle, days	90–100
Percentage of survivors	60%
Production quantity, kg	320
Production kg/ha	600

The third pond

Production surface (m^2)	6000
Total volume of water (m^3)	9000
Population density PL/m^2	3
Total number of PL	18000
Water exchange/day	5%
Water requirements (m^3/day)	450
Feed coefficient	2–10%
FCR	2:1
Total food (kg)	504
Duration of a cycle (days)	90–100
Percentage of survivors	70%
Production quantity (kg)	252
Production (kg/ha)	420

The fourth pond

Production surface (m^2)	6000
Total volume of water (m^3)	9000
Population density PL/m^2	5
Total number of PL	30000
Water exchange (day)	10%
Water requirements (m^3/day)	900
Feed coefficient	2–10%
FCR	2:1
Total food (kg)	840
Duration of a cycle (days)	90–100
Percentage of survivors	60%
Production quantity (kg)	320
Production (kg/ha)	600

4. CONCLUSIONS

The first aim of the study was to introduce marine aquaculture in Albania and the shrimp farming has to be considered as the first step. Even if the Shrimp Farming in the Mediterranean region has so far only been a limited success, more investigation is relevant. The exiting farm has a partly system in Albania which guarantes an average production of 300 kg/ha. The objective of the study was to reach at least 800 kg/ha in a semi-intensive system.

The analysis of semi-intensive and intensive shrimp production systems have indicated that greatest econimic efficiency is achieved by improving revenue-determining factors, e.g. by increasing shrimp density, growth rate, survival and market value, rather than by cutting costs, e.g. by spending less on feed, constructions, labour or the production of Postlarvae.

The second step was to demonstrate that the weather in Albania produces shrimp more cheaply than in Greece, Italy, or Spain by virtue of cheaper prices and cheaper ponds construction ponds.

Third step was to stimulate commercial interest in shrimp farming for prospective local investitors. As soon as seawater supply will demonstrate to be sufficient and reliable, new experiments with fish grow out are suggested.

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