Abstract for Lobster Farming

This abstract reflects general technical and market aspects of lobster farming/processing

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INTRODUCTION OF LOBSTER FARMING

Aquaculture, the farming of aquatic organisms, is the fastest growing type of food production in the world (Tidwell, 2001). Nearly 50 % of the fish consumed by humans is farmed (Kourous, 2006). Globally the wild fish stocks are declining whilst the demand for fish is constantly increasing, making the prospect of aquaculture increasingly attractive (Peters, 2007). Additionally, the necessity of aquacultures is getting more important due to the fact that already in 2010 two thirds of all stocks of known status under Regional Fisheries Management Organizations (RFMOs) were depleted or being overfished. For example, stocks of tunas and their relatives have declined on average by 60% during the last half century and the majority of these stocks are either fully or overexploited (Sumaila, 2015).

Hatching and farming as a combination in one project can result in a couple of synergies like the production of an own brood-stock, which lowers the external risk for the procurement of eggs from suppliers. Furthermore gives an own hatchery the possibility to develop species, which are best suitable for the cage farms` specific environment this lowers the risk of disproportionate mortality rates.

POPULAR SPECIES OF LOBSTER

No matter which body of water they hail from, all lobsters belong to the marine class of invertebrates known as crustaceans, as do shrimp and crabs. Lobsters are all bottom-feeding omnivores who dine primarily on mollusks. They all have poor vision, a keen sense of smell and 10 legs. There are a few differences between warm and cold-water lobsters, including geographical range, social habit and notable differences in appearance. American and European lobsters are cold-water specimens and found throughout the northern Atlantic Ocean.

Tropical spiny lobster (*Panulirus homarus*):

The tropical spiny lobster is considered to be one of the most exclusive seafood products in the world. There is an increasing global demand of this high value seafood product. To satisfy demand commonly wild caught lobster is offered. But there is now the possibility to successfully farm Lobster with a land-based RAS (Recirculating Aquaculture System) overcoming the many technical challenges related to adopting the tropical spiny lobster to high-tech profitable production technologies while still providing optimum rearing conditions. This land-based technology is based on re-circulation of seawater and a special cage technology.

Cold water lobster

The more exclusive cold-water lobsters are typically longer and heavier in size than the warm-water spiny lobsters. The most

POPULAR SPECIES OF LOBSTER

apparent difference between warm and cold-water lobsters is the presence or absence of large claws on the front-most pair legs. Cold-water lobsters are equipped with a pair of claws that are each designed for a different purpose. The larger claw has wide, thick teeth for crushing mollusk shells. The other claw is slightly smaller, with sharper teeth for tearing flesh. More often in areas where the warm water lobster is not available, they are sold as frozen tails. Cold water lobster is available fresh in many regions, even if they are not caught there. Because they are caught primarily in the northeastern and northwestern Atlantic, they can be shipped overnight and sold fresh. Cold water lobsters have whiter meat than warm water lobsters. The meat is sweeter and easier to work with than warm water lobster meat because it is firmer. Cold water lobsters have meat in their claws and their tails, but the only edible meat you'll find in a warm water lobster is in the tail.

Lobster aquaculture can be performed in the following three forms:

- **Resource enhancement**

Hatching eggs and releasing larvaes in the stages I or IV into the wild (Nicosia & Lavalli, 1999)

- **Product enhancement**

Lobsters are held and fed until their quality and prices increase (Aiken & Waddy, 1995)

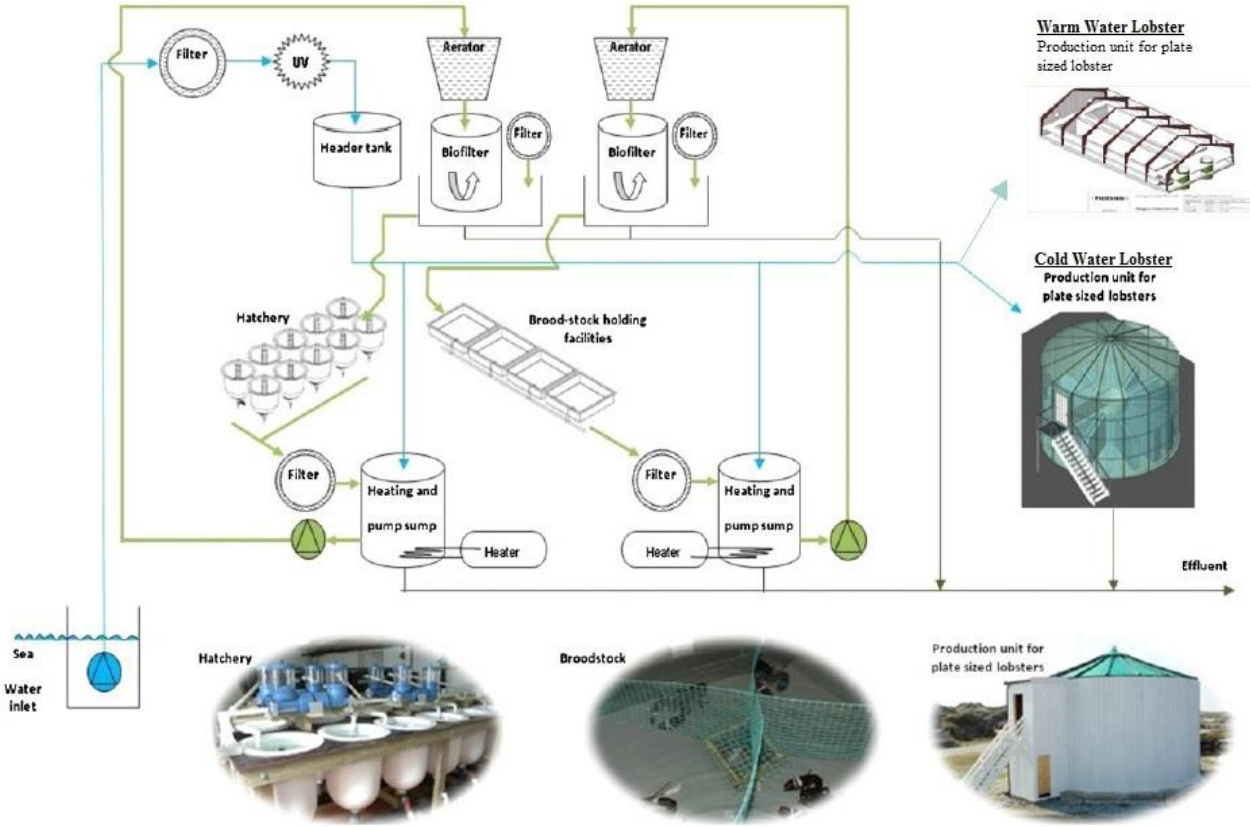
- **Full grow out**

Lobsters are reared from egg phase until they have reached the desired quality for the target market.

FROM HATCHERY/FARMING TO PROCESSING

The eggs for the lobster brood-stock can be provided by the supplier first. After the first production cycle, some of the own farmed mature fishes can be put into the brood-stock. There is also the possibility to purchase eggs from established farm.

The farm will be equipped with sea water pumps, mechanical water filtration units, UV filters, recirculation systems with biofilters, heaters, titanium heat exchangers, header tanks, rearing tanks, larval incubators and accessories. Juveniles between stages I and III will be transported back into the incubator to their other siblings and juveniles in stage IV will be transported to the cages for on growing.



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FROM HATCHERY/FARMING TO PROCESSING

In the modern state of art advanced production/on-growing facility, the single cages rotated similar to conventional conveyer belts, and the lobsters were fed when the cages were in an up-right vertical position. This procedure is a current method for cold water lobster. For warm water lobster the juveniles stay together throughout the stages I to IV where they will be bred, as they have smaller claws which therefore the risk of cannibalism is limited.

The maintenance of the cages is important to secure the survival of the brood stock. Hence, it is possible to farm cannibalistic European lobster or Tropical Spiny lobster. The only difference in farming the two lobster species is the on-growing facility. For the tropical spiny Lobster a separation of the on-growing Lobster is not necessary due to the fact that this lobster species has very small claws and is less aggressive (less cannibalistic). Therefore lobster are growing and fattening altogether in one tank. In contrast, the on-growing facility for European lobster consist of separate cages for each lobster. The breeding and on-growing of tropical spiny lobster is cheaper than the one for European cold water lobster.

The harvested lobster from the farm can be distributed alive (fresh) to the local market.

The main processing parts are:

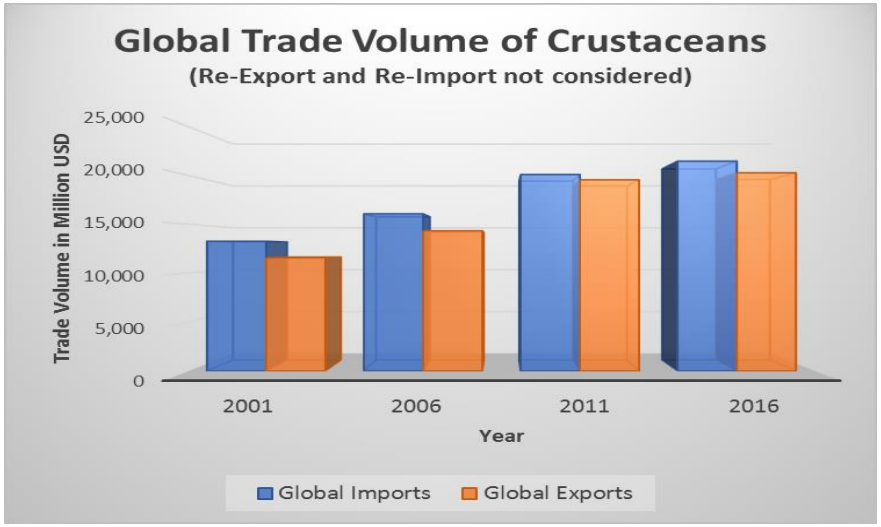
- The receiving area
- Weight grading lobster alive (fresh)
- Manual packing scales with label printers for barcodes

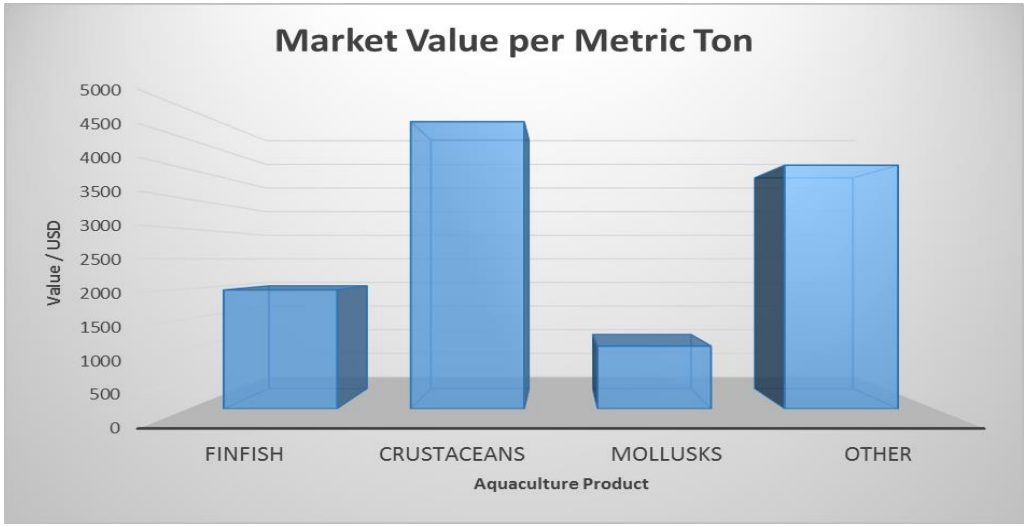
MARKET

Global fish production has grown steadily in the last five decades, with food fish supply increasing at an average annual rate of 3.2 percent, outpacing world population growth at 1.6 percent. There is an increasing demand for high quality seafood products and an increasing awareness of consumers for the nutritional value of seafood products (Feidi, 2009).

This global average fish consumption per capita produced in aquaculture has risen significantly from 9kg per year in 2011 to 9.8kg per year in 2013. In comparison the consumption of captured fish fluctuates around the amount of 9.85kg.

Crustaceans like lobster represents a high value seafood product as shown in the figure below. The captive amount of





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MARKET

lobster and other sea food products are limited. In the future the trade in fish commodities will increase as well as especially the developing countries will consume a much greater share of the world's fish in the future. This fish consumption is increasing by 57 percent, from 62.7 million tons in 1997 to 98.6 million tons in 2020. This demand development is driven by population growth, growing affluence and urbanization. This high demand will not be meet by capture fisheries alone due to overcatching and decreasing wild stocks. It will be only feasible if aquaculture production will increase significantly. In the past couple of decades, however, aquaculture has boomed significantly (Tidwell, 2001).

The production of sufficient food for the population has many advantages in the short, medium and long term including purposes of food security, creation of employment, preservation of resources, and savings on foreign currency reserves. On whether aquaculture can close the fish demand gap, it may be said that while it would not be able to close the gap completely, it certainly can substantially narrow it. Several issues have to be considered: human population growth trends, enhanced production from capture fisheries, availability of more natural resources for aquaculture, greater demand for fish proteins, government policies and legislations, domestication and genetic improvement of cultured species and environmentally sustainable culture technology.

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For further inquiries and quotes, please contact:

ensymm UG & Co.KG
Life Science Center Dusseldorf
Merowingerplatz 1
40225 Dusseldorf
Germany

Tel: 0049 2113367527
Project_assistant@ensymm.com
www.ensymm.com