FEEDING TRIALS AND ENVIRONMENTAL EFFECT ON THE METABOLIC RATE OF THE EUROPEAN LOBSTER (*Homarus gammarus*)

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Introduction

The European lobster (*Homarus gammarus*) is one of the many crustacean species with a history of aquaculture. The first known effort to farm a *Homarus* species dates back to the mid 1800's when the American lobster (*Homarus americanus*) was farmed in France. The interest in the European lobster, however, peaked over a hundred years later. During that time considerable effort and governmental funding from the US and Canada was applied to research in this field. After a brief golden age all contributions were cut back and the industry fell dormant (Factor, 1995). What makes the European lobster challenging in aquaculture is its aggressive behaviour. To avoid cannibalism within the livestock the animals have to be separated from each other using individual cages. This requirement complicates the design of equipment and each farming unit can easily become expensive and difficult to maintain. With modern advancement in technology, as well as Norwegian Lobster farm's latest system design, a large scale farming of the European lobster turns out to be an idea worth revisiting (Drengstig & Bergheim, 2013). Previous literature provides variety of information on the lobsters' requirement when held in captivity for farming purposes. There are non the less several knowledge gaps yet to be filled before we possess the necessary information essential for extensive farming.

In the presented work the aim is to shed further light on the species dietary needs with regards to dry feed as well as documenting specific aspects of the lobsters' metabolic responses. The metabolism is measured through respiration during exposure to temperature fluctuations and after different photoperiod treatments. The groups subjected to photoperiod treatments will have their growth monitored after measurements of respiration and food consumption to evaluate a possible relationship between metabolism and amount of weight gained between groups.

Materials and methods

Lobsters were fed with shelf bought feed made for Arctic char (0.074 g/pellet) and a custom made lobster feed made by National lobster hatchery in Padstow, UK (0.064g/pellet). Feeding was performed once a day, five days of the week, and lobsters were given one pellet in each feeding. Difference in gained weight was then compared between the treatment groups. In a concurrent experiment a group of lobsters was fed with the same type of char feed as previously mentioned, following the same feeding patterns. A part of the group was then fed twice a week with minor shrimp supplement along with regular feeding. Growth between those two treatment groups was then compared.

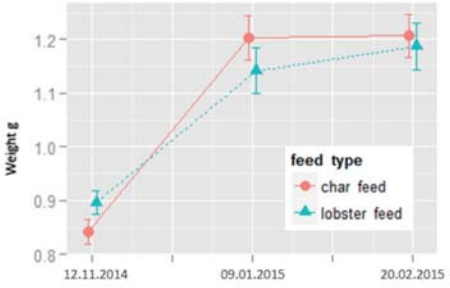

Figure 1: Weight of lobsters fed with two different types of dry feed (mean ±SE).

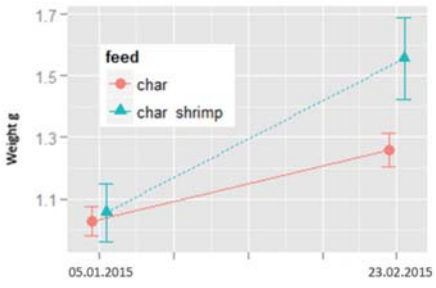

Figure 2: Lobsters feed with char feed exclusively and lobsters fed with char feed and shrimp supplements (mean ±SE).

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Respiration tests are performed with a Straht kelvin meter. Firstly, groups of two photoperiod treatments are compared with regards to metabolic rates. One group is exposed to longer periods of light than the other, resulting in increased stress, and therefore a rise in metabolism. Difference in growth between these two groups is compared to the difference in metabolism to see how predictive it is for growth at different farming circumstances.

The effect of temperature fluctuations is measured where lobsters are subjected to a rise in temperature in two different volumes. One group experiences a rise of 4°C and the other a rise of 8°C. Respiration is measured when the lobsters enter warmer water than they are accustomed to.

Results

The results from the feeding experiments show that there is not much difference in growth between the group fed with custom made lobster feed and the other group fed with shelf bought char feed (fig. 1). However, the lobsters fed with shrimp supplements along with regular char feed grew significantly more than their control group (fig. 2).

The respiration tests are still in progress during spring / early summer 2015 and results will be discussed further when all tests have been conducted. The results will demonstrate how temperature fluctuations affect lobsters as well as how photoperiod may influence metabolism. Additional tothose observations the possible growth difference between the two photoperiod groups might suggest a predictive value between metabolism and growth, depending on farming conditions.

Discussion and conclusion

The results from the feeding trial indicates that the char feed can be used with similar results as the custom made lobster feed. This is economically beneficial since there are considerable savings involved with being able to buy feed straight from the shelf. However, the vast difference in growth between the group fed with char feed and the one fed with additional shrimp supplement indicates that there are still unanswered questions regarding the complete dietary need of the European lobster. The dry feed available is still not equipped to fully utilize the lobsters' growth capacity.

Respiration testing is still in progress but results will be useful for further instructions regarding treatment of the European lobster in farming. The aim is to demonstrate how much stress is involved with temperature alterations and how the animal is affected by different photoperiods. If the difference in metabolism reflects the difference in weight gained between the photoperiod groups the respiration test might have a predictive value regarding growth in different environments, thus making further growth experiments and estimates faster and more efficient.

References

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Drengstig, A., Bergheim, A., 2013, Commercial land based farming of European lobster (*Homarus gammarus* L.) in recirculating aquaculture system (RAS) using a single cage approach. Aquaculture Engineering, 53:14-18.