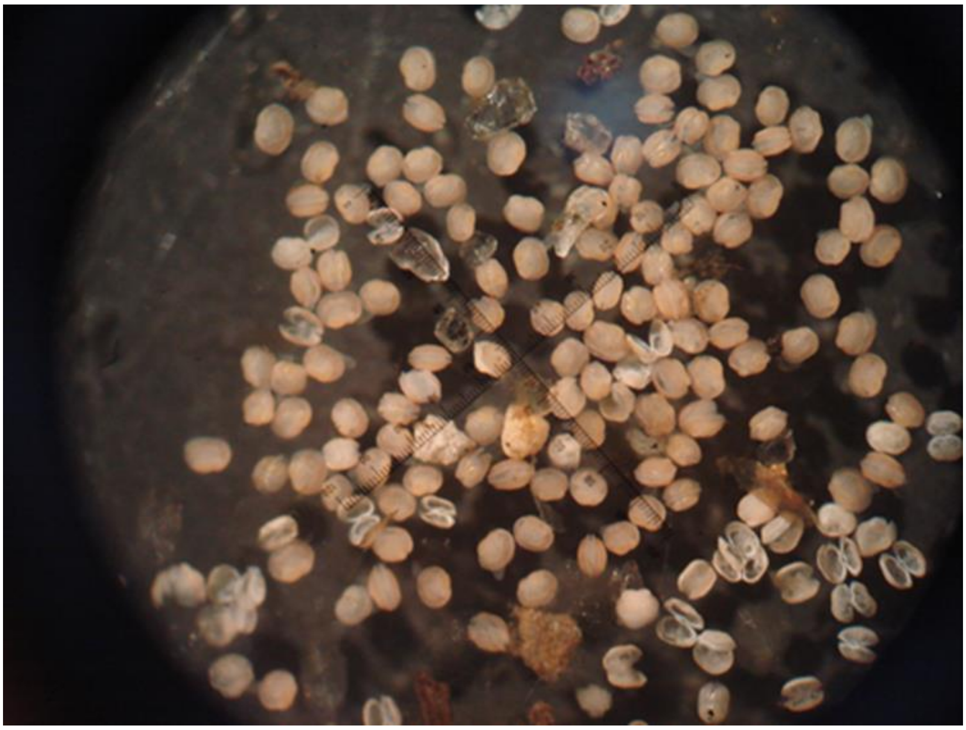
Finding the way to food

Patch quality evaluation performed by young of the year freshwater pearl mussels (*Margaritifera margaritifera*)



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Cover illustration: Per Johan Jakobsen

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Tusen takk!

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Jeanette Gramstad

Abstract:

The freshwater pearl mussel *Margaritifera margaritifera* is considered a key species in aquatic environments. The juvenile stage is considered to be the most volnarable stage for the young mussels due to pollution challenges and declines in suitable host fish populations.

Growth rates using different treatments with different food components were investigated in the freshwater pearl mussel, *Margaritifera margaritifera*. The Linear mixed effects model revealed that growth was higher when food components were present, unchanged by the absence of detritus. Young of the year mussels show positive growth when fed additional algae and when reared without detritus when the treatment is changed frequently, this categories detritus as a poor nutrition source.

According to the optimal foraging theory (OFT) mussels should be expected to choose the substratum that provides the highest growth gain. However, when presented with the option mussels select the patches containing detritus regardless of its additional contents.

Comparing patches differing in nutrition quality resulted in a considerable amount (90%) of the mussels chose the detritus patches with detritus when compared to patches containing only food. When allowed to choose between detritus with food components and only detritus a 50/50 division was revealed, indicating that mussels selected patches based exclusively on the presence of detritus.

Detritus as natural habitats are linked with food and low velocity water; hence the mussels are attracted to the detritus.

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1 Introduction

1.1 Population declines

Several freshwater species suffer from rapid population decline and in some cases even increased extinction risk. Especially the bivalve biodiversity is at risk (Bauer and Walcher, 2001). Studies reveal that the most diminishing specie is the long-lived freshwater Pearl Mussel *Margaritifera margaritifera* (Bauer, 1988), which is considered a key species in river ecosystems (Geist, 2010). The juvenile stage is considered to be the most vulnerable stage for the young mussels due to pollution challenges and the declines in suitable host fish populations. Only 100 years ago *M. margaritifera* were commonly found in rivers, occurring high densities, often in many layers on the riverbeds (Israel, 1913). Today only some healthy populations remain (i.e in river Os, Norway).

The promise of fortune has long been associated with the pearl mussels due to their ability of pearl production. During the 1600- and 1700 century the royal family monopolized pearl fishing in Norway (Larsen 2005). In the name of the queen, all pearls found where collected by government employees, who travelled around the country to collect them. The right to collect pearls was given back to land owners in 1845 (Larsen, 2005). The pearl fishing might have caused the initial population declines, because in order to find one high-quality pearl, one would have to open around 10.000 shells.

Water pollution, eutrophication, acidification, habitat destruction, river exploitation and lack of suitable hosts are considered the main ongoing contributors to the decline of freshwater mussels (Geist and Kuhen, 2005). Given the large biomass of this species in healthy populations (hundreds of mussels per square meter), adult *M. margaritifera* have an important role in particle processing, release of nutrients and sediment mixing in the ecosystem it inhabits (Vaughn C., C. Hakenkamp, 2001). Freshwater mollusks including mussels are thus an important component in aquatic ecosystems and their presence is an indicator of the health of the freshwater habitat (Brim box et al., 2006). Despite the importance of *M. margaritifera* in aquatic ecosystems, the lack of knowledge around their complex biology prohibits us in cracking the code on how to stop the ongoing processes leading to their rapid decline (Geist, 2011). Studies on juvenile mussels ecological and metabolical requirement, the most vulnerable stage, deserve particular attention (Bauer and Wächtler, 2000).

As other Unionids, the *M. Margaritifera* has a complex and vulnerable life cycle (appendix B) (Larsen et al., 2000). It requires a stable habitat with flowing water, low in lime and nutrients (Geist and Kuhen, 2005) The *M. margarifera* normally have separate sexes, however when population densities are low, mussels possess the ability of hermaphroditism (Grande et. al., 2000). Their life cycle contains a larval (glochidia) stage, which are released from the female brood pouch or gills. For the following 8 to 12 months they have an obligate parasitic phase encysted on a suitable salmonid host, before they detach in order to find suitable substrate and nutrition as a bottom dweller (Geist and Kuhen, 2005). To compensate for the risk of being transported away from suitable hosts, a very large amount (millions) of small larvae (glochidia) is produced. The long life expectancy also serves as an advantage for reproduction challenges (Bauer and Wächtler, 2000), seeing as survival of young mussels may vary between years. Its long life span is perhaps an adaptation to nutrient-poor habitats (Bauer, 1991).

The young of the year and juvenile *M. margaritifera* are sensitive to low oxygen and pH levels (Buddensiek et al., 1993), sediments clogging interstitial spaces in the stream substrates contribute in lowering the oxygen available (Wood and Armitage, 1997).

Initial growth and survival has been found to be most critical at the stage of freshly decysted mussels (Buddensiek, 1995). Young mussels live buried within, the preferably well-aired stream substratum, for a period of at least 5 years (Skinner et al 2003). Young of the year mussels are not capable of filter feeding due to immature digestive, circulatory organs and gills (Yeager et al., 1994). Young og the year mussel have to utilize pedal sweeping and pedal feeding until the development of filtration organs occur and are believed to survive on naturally occurring biofilm in the wild. The young mussels develop the filter apparatus when they reach 2mm in length (Schartum pers. comm., 2014).

Young of the year mussels can desyst from host fish in both favorable and unfavorable locations on the riverbed; hence the ability of relocating is essential. The mussels use their elongated foot for movement (Wachtler 1986; Yeager et al., 1994). Compared to adult mussels, young of the year mussels are noticeable mobile (pers. obs 2014). The foot appears in the bivalve larvae when reaching 200µm in shell length but does not become functional for locomotion and attachment before the mussel reaches 260µm in shell length (Gosling, 2003).

Studies suggest that the mantel cells provide storage of granules that accumulate during the parasitic stage on the host fish, where food is absorbed through the dense area on the larval mantle cells of the microvillus (Bauer and Wächtler, 2000). When detaching from the host fish it`s feeding mechanism changes into using the foot for food gathering (Bauer and Wächtler, 2000). The ability of storing metabolic reserves in the digestive gland plays an important role in survival, it can be used as an additional energy source when facing physiological stress or when food is scarce e.g. after detachment from the fish host (Bayne et al., 1976).
Mussels use their nerve system to control the foot. The simple nerve system in bivalves is bilaterally symmetrical and contains three pairs of ganglia and several pair of nerves (Gosling, 2003). The middle fold in the mantle holds the most of the sensory receptors (Gosling, 2003). The mantle is considered a thick fold that carries a large number of pallial tentacles, their amount and length is found to vary with the species (Gosling, 2003). The tentacles are covered in sensitive epithetical sensory cells. Touch produce a reflex function causing the mussel to contract the mantle (Gosling, 2003). The chemoreceptor cells are believed to be present on these tentacles (Gosling, 2003).
In addition to using the foot, the second mechanism behind the active post parasitic stage for feeding is driven by additional cilia that create a water flow at several sites around the shell together with the gill papillae, and contribute to a stream of water transporting particles to the mussel (Bauer and Wächtler, 2000). The importance of the foot in early nutrient uptake was described in Yeager (1994), who investigated the early feeding stages in *Villosa iris*. They

showed that there is a clear distinction between pedal-sweep and pedal locomotory feeding behavior, which the juvenile mussels can switch between, depending on the density of the particles surrounding them (Bauer and Wächtler, 2000). The role of mucus in bivalve feeding has been the topic of discussion for decades, it is uncertain if the mucus is used for feeding or just for cleaning of feeding surfaces, i.e. the production of pseudofaeces (Gosling, 2003).

1.2 Optimal foraging

The first life stage of the mussels is considered to be the most limiting stage for juvenile recruitment as it's when the young mussels are most vulnerable (Young and Williams 1983; Buddensiek et al 1993; Geist, 1999 a, b). With less than eight days of food reserve after decystment, the need to locate food and a suitable habitat immediately after detaching from the host fish is urgent (Ebye et al, 2012). Fast growth during their first year is according to Lange and Selheim (2011) important. Early growth to a minimum total shell length of about 1 mm can be considered a threshold size for survival during the first winter. A possible benefit of a high growth rate is that mussels may outgrow some predator size preference, decreasing risk of predation (Werner and Hall, 1988).

Effective food gatherers are expected to be favored from natural selection and optimal foraging theory (OFT) is based on simple predictions (Graham, 1984). Choosing prey that maximize energy intake are among the predictions from (OFT). In nature, however, the right solution for an adapted behavior is often based on complex situations and lack of knowledge of the environment. Animals simplify the surrounding environment in order to locate the food needed for growth and survival and sometimes sacrifice their optimal feeding opportunities. An animal's assessment of food can be done by examining the food item's size, shape, color, smell or any other criteria (Emlen, 1968). In cases where this assumption is valid, food preferences would have evolved in such a way that food items with high nutrition value and the prize for the effort made, will be favored and selected (Emlen, 1968). On the other hand, conditions with extreme abundance of food can lead to food specialization, not necessarily the best option of food (Emlen, 1968).

Little is known about young of the year mussels natural food preference and foraging mechanisms. In order to restore rivers where mussels are near extinction, knowledge on this fragile life stage is urgently needed. The habitat the young of the year mussels inhabit the initial part of their life is unidentified, and only a few observations have been done of young of the year mussels in the wild (Larsen pers. med., 2013). Recently, however, young of the year mussels have been made available through ongoing mussel cultivation projects and can now be studied.

Phytoplankton is considered the principal food source for marine bivalves (Ukeles 1971, Webb and Chu, 1983). Previous studies show that algae in combination with detritus are a suitable nutrition source for juvenile freshwater mussels (Ebye et al., 2012). The relative importance of bacteria, organic detritus and protozoans as food, in addition to the possibility that environmental bacteria are required for digestion, is still uncertain (Urban and Langdon 1984, Crosby et al. 1989, 1990, Baldwin and Newell, 1991).

The aim of this study is to gain more information on the young of the year mussles cultivation diet needs. Patch quality was evaluated first, based on the individual growth gained in the different composed treatments. It was expected to determine the components which contribute to mussel growth.

The second part allowed mussels to choose between patches offering different nutrition value. The patches were selected from the fisrt part of the study. This can reveale the young of the year mussels ability to asess and select between different food patches. Simple OFT model dictates that the mussels would chose the patch that would result in the highest growth rate.

2 Materials and methods

2.1 Parental generation and infection

To obtain freshly encysted mussels for the experiment salmon (*Salmo salar*) which were naturally infected with *M. margaritifera* glochidia, were collected from river Os (60°11'41. 84"N, 5°28'21. 78"E) (figure 1) using electro fishing the 5th of June 2012 by John Magerøy. The decysted mussels were harvested in the mussel-breeding farm between 10th and 22th of June. These young of the year mussels were used in the “distribution experiment 2012” (appendix C) and “growth experiment” (section 2.4) conducted during the summer of 2012. In order to evaluate how young of the year mussels chose between food patches in the distribution experiment 2013 (section 2, 5), glochidia larvae from gravid mussels inhabiting river Slørdal (figure 1) were used to artificially infect salmon the summer of 2012. The decysted mussels were harvested at the mussel breeding station at Austevoll in mid-June 2013. All mussels used are specialized as parasites on Atlantic salmon (*Salmo salar*).

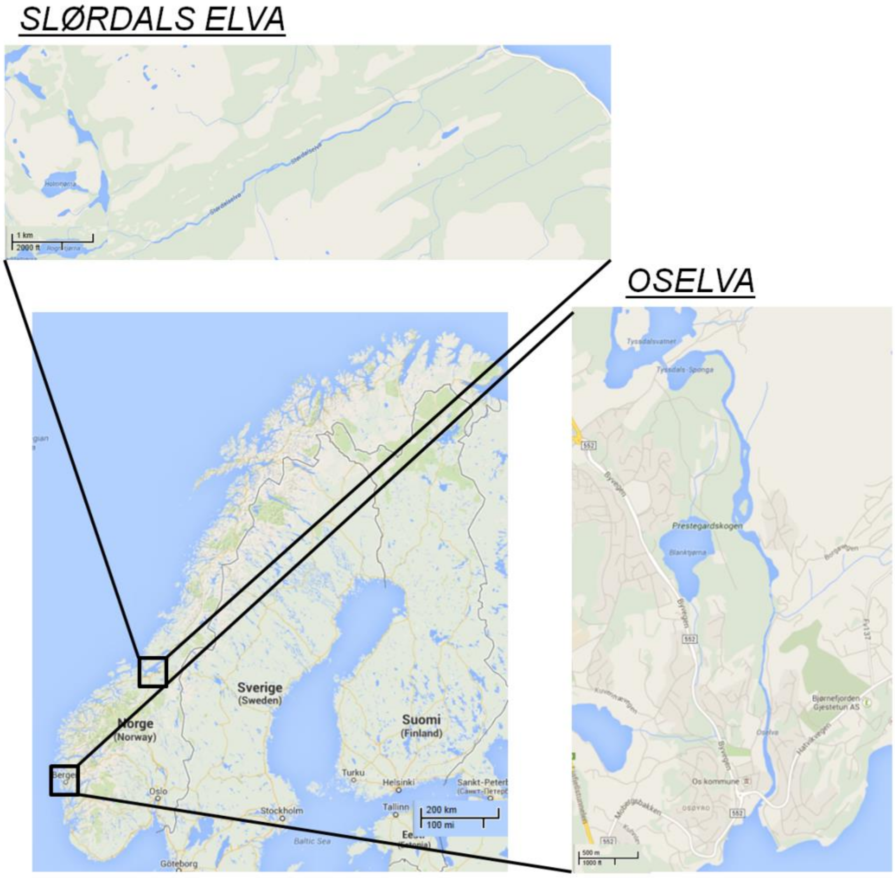


Figure 1 Map over Norway (Google maps 2014) showing the originating rivers for the Young of the year mussels used in the experiments. Mussels from river Os (Oselva) where used in the growth experiment and distribution experiment 2012 while mussels from river Slørdal (Slørdals elva) where used in the distribution experiment 2013.

2.2 Harvest and treatment of mussels prior to the experiment

Each sieving from the containers (figure 2) were given an individual identification number before the mussels were cleaned and transferred into 0.8 liter boxes, with a 7cm water column. Mussels were fed every 48 hours with a standardized food mixture (appendix A) for 21 days in order to exclude weak mussels from the experiment. The mussels were stored at constant temperature of 17ºC.

Figure 2 Host fish was kept containers with 90L of water during the harvest. The fish were kept in dark tanks to prevent the fish from eating the decysted young of the year mussels. When the glochidia matured and decysted from the fish, they were transported, using a pipe system, onto a sieve with a mesh size of 200µm placed below the containers (photo: Per Johan Jakobsen).

2.3 Components used in all experiments

The water source used in the experiments, Lake Kvernavatnet (60º 5'46. 03''N, 5º14'27. 62''E), was treated with UV- light and 3mg/L calcium was added. The water was filtered through a 30 µm mesh before use. The water used in all experiments originated from the standardized water used at the captive breeding station for the young of the year mussels.

The collected detritus was collected from a wet unfertilized meadow area nearby the breeding station at Austevoll. The meadow has a small brook running through it and was calcified for two years before use. The surrounding vegetation mostly consists of herbs, and hazel. The detritus was sieved trough a 30 µm net and oxygenated for three days. All detritus used in each of the experiments was from the same batch, and were used in all trials. Detritus was frozen down before use.

When preparing the food components (table 1) used in the recipe Spirulina powder and defrosted Nano algae were added to 50ml of water and mixed in a blender to avoid particle lumps. Liquid Shellfish diet was added directly to the treatment mix container. Chironomide larvae were defrosted and mixed in the blender for 60 seconds with 50ml of water to acquire small pieces. All food components were then sieved through a 30μm sieve. 0,4dl calcium powder was diluted in 1 L of water and the amounts used were extracted directly from the container.

Table 1 Overview over nutrition content in the food components tested.

Component	Content	Amount	Product information	Supplier
Water	Natural	Undefined		Nature
Detritus	Natural occurring	Undefined		Nature
***Spirulina* (per 3g)**	Proteins Ckal Carbohydrate Beta-carotene	2g 10 0,6g 6,5mg	Dry powder	Health stores
Nano 3600 (*Nanocloropsi ssp.*)	Protein Carbohydrate Lipid EPA (fatty acid)	58% 20% 14,3% 30,3%	Cell size 1-2 microns. Cell counts 68 billion per ml. 1L-3600 formula. Batch#12311 Deep frozen	www.instant-algae.com www.zooplankton.com
Shellfish diet 1800	*Isochrysis* *Tetraselmis* *Thalassiosiraweissflogii (TW)* *Nanocloropsis* *Pavlova*	25% 20% 30% 5% 20%	Liquid	www.instant-algae.com
Chironomide	Protein Fat Ash Carbohydrate	0,5% 1,0% 0,8% 0,9%	Art nr 165.0010 Deep frozen	Finafisken, Imaso AB
Calcium	Calcium		CaCo3	

2.4 Growth experiment

2.4.1 Setup

The growth experiment was conducted in the University of Bergen's lab facilities from July to September 2012.

The experiment was performed using mussels form river Os (figure 1), September 2012. A total of 168 *M. margariifera* were used to perform the 53 days long experiment. Water, detritus and food components (table 1) used in the experiments were retrieved from the cultivation station at Austevoll. To get comparable amount of sediment particles in the 1 cm water column as in the 7cm storage boxes, the components in the original recipe (appendix A) were recalculated (table 2) making it a seven time stronger concentration. The recipe was adjusted to 1L of water instead of 10L as in the original recipe.

Table 2 Recalculated components introduced to its assigned 1L mix.

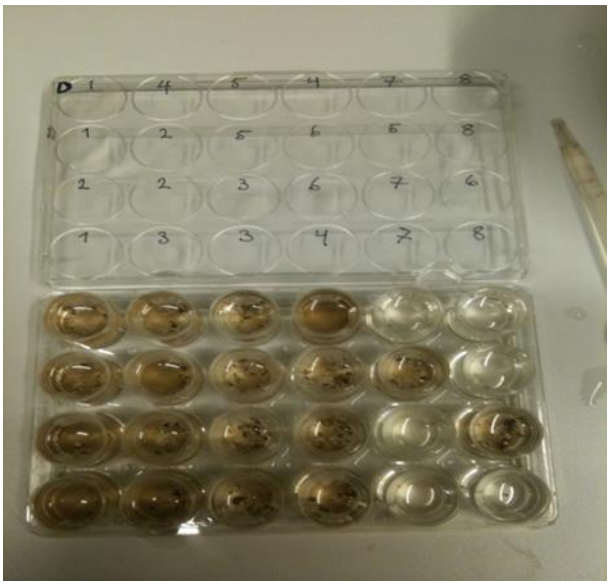
Component	Amount	Added to
CaCo3	0,97ml	Directly to 1L mix
Shellfish diet	0,243µm	Directly to 1L mix
***Chironomide* larvae**	4,5 individuals	Homogenized in 50ml water
Nano algae	0.97ml	Homogenized in 50ml water
Spirulina	1,9 pinch	Homogenized in 50ml water
Detritus	70ml	Directly to 1L mix

2.4.2 Performing the experiment

All food components were prepared separately in order to be able to discriminate components. Treatments 1 to 7 (table 3) were mixed in seven separate 3L containers. The following were added to the containers; 4, 5 red bloodworms (*chironomidae*) and 50ml water was mixed for 1 minute in the blender. Nano algae were defrosted and 0,97ml was added to 50ml of water, mixed in the blender and added to the container. Two small pinches of Spirulina powder were added to 50ml of water before being mixed in the blender. 0,243µm shellfish diet was added directly to the water in the 3L containers. All containers were filled with 0,97ml of calcium in order to stabilize pH. Equivalent amount of water added in preparing the food, was removed from the 1L of water in the 3L container using a 50ml syringe in order to avoid additional dilution. The treatments were made and changed every 72 hours in order to provide the young of the year mussels with fresh food and oxygenized water.

Marked Elisa-dish compartments (Figure 3) with a 1cm water column were filled with the assigned treatment (table 3). Detritus can naturally wary in color and content. All detritus used was from the same batch and were frozen down before use, in an attempt to control unknown components. The detritus was sieved through a mesh size of 30µm before added to the treatment mix. The wells in each Elisa- tray were numbered from one to eight in random combinations and filled with the assigned treatment (table 3).

One randomly selected mussel was placed in each of the 24 compartments of the seven Elisa dishes. A total of 168 individual mussels from different the sievings were used.



Figur 3 One of the seven Elisa dish trays filled with the different treatments, after three days.

In order to maintain a stable oxygen level and keep ammonium levels to a minimum, the mixtures and water were replaced every 72 hours. Only ¾ of the mixed water was removed in order to minimize the stress for the mussels. Frequent change of the treatment mixes contributed to keeping the food fresh. The currents made by the pipette while changing the liquid contributed to keeping the mussels shell clean and free from ecto-parasites.

Table 3 Overview over the treatments and its identification number tested in the growth experiment.

Treatment	Identification number
All components	1
Detritus only	2
No Nano algae	3
No shellfish diet	4
No Spirulina	5
No *chironomidae*	6
Food components only	7
Water	8

2.4.3 Monitoring mussels in the Elisa dishes

The young of the year mussels were examined in combination with changing the treatments (table 3) every 72 hours during the 53 days long experiment. Mussels with gaping open valves was removed and registered as dead.

2.4.4 Collecting the data

Each mussel was measured when the experiment started and when the experiment was terminated after 53 days. The mussels were measured in water with a microscope containing a measuring lens (WILD Heerbrugg Switzerland M5-93898) using x25 magnification.

2.5 Distribution experiment 2013

2.5.1 Background

Based on the results in the growth and distribution experiment in 2012 (section 4, 1 and appendix D) a second distribution experiment was performed the summer of 2013. Based on the results from the growth and distribution experiment from 2012 three patches were selected for further testing. The patch with no detritus (Treatment 7 in table 3) which contained only food components, the patch with only detritus (Treatment 2 in table 3) and the patch with detritus containing all food components (Treatment 1 in table 3). The treatments were tested against each other using the detritus as a control (Treatment 2 in table 3). The four day experiment ran three times. For the first run, the young of the year mussels (n=96) were introduced into the Petri dish and left to divide undisturbed in complete darkness, before collecting the data after 91 hours. For the 2nd and 3rd run, using the same amount of mussels, a continuing surveillance of the mussels movements were performed in order to document the mussels navigation in the 24 Petri dishes used per run.

2.5.2 Setup

The distribution experiments were conducted in a small un- isolated concrete house on Lerøy vest fish farm locality; HAV12 at Storebø - Austevoll Bergen Hordaland Norway (60° 5'47.82"N, 5°14'25.47"E) the summer of 2013. An oven with a thermostat was used in order to keep temperatures over 16 ºC during the night.

The recipe with the food components used in the mussel cultivation project (appendix A) were recalculated (table 1) to a water column of 1cm to ensure the same amount of particles would sediment when compared to the boxes used in the mussel cultivation project. A total of 24 plastic Petri dishes (diameter = 8cm, height =1cm) were marked and randomly placed out on the table (figure 4). Twelve Petri dishes where used for testing combination A (table 4). Dish A contained two out of four patches with only detritus (previously treatment 2 in table 3) and the remaining two patches of detritus containing all food components with detritus (previously treatment 1 table 3). A total of twelve Petri dishes were used for testing combination B (table 4). Dish B contained two out of four patches, containing only food components (previous treatment number7 in table 3) and two patches contained only detritus (previous treatment number 2 in table 3). In both A and B dishes the treatment patches were left to sediment with the purpose of placing two out of four patches next to each other (table 5) containing the same treatment. A randomized treatment map was placed under all Petri dishes assigning the treatment to each falcon tube, new maps were used every run. Petri dish orientation and sequence was randomized.

Figure 4 Treatments sedimented for 20 hours in the Falcon tubes.

A total of 96 Falcon tubes (50ml) with a diameter of 2,5cm were sawed off at the bottom in order to sediment the food components (treatment A1), detritus (Treatment A2 and B2) and detritus containing food components (treatment B3) in the Petri dish. The Falcon tubes were placed as close as possible to the sides of the introduction square in the center of the Petri dish (1.5cm x1, 5cm) to ensure the same distance from the introduction point to the sedimented patches. The tubes where weighed down using bent nails (figure 5), ensuring no liquid would leak in or out form the tubes while filling the tubes or dish. All Petri dishes used in the experiments ran with four young of the year mussels placed in the middle of the introduction square. The mussels used in the experiment were normally distributed between 0,5mm and 1mm in length (appendix E).

Table 4 Overview of the contents used in the patches tested in combination A (A1 vs. A2) and combination B (B2 vs. B3) in the distribution experiment 2013.

Identification	**Patches**
A1	Detritus with food components (Shellfish diet, Spirulina, Nano algae and Chironomide)
A2	Detritus
B2	Detritus
B3	Food components only (Shellfish diet, Spirulina, Nano algae and Chironomids)

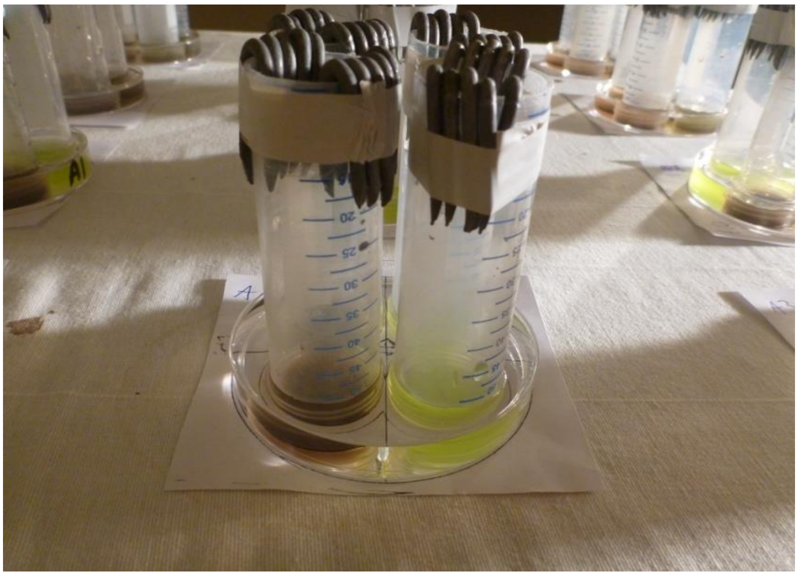


Figure 3 Combination B sedimenting while the Falcon tubes are weighed down using bent nails.

2.5.3 Performing the experiment

All three mixtures were prepared in separate 2L containers. In order to apply additional pressure on the tubes from the outside to help prevent leakage, the Petri dishes were filled with 50ml of water into the center, using a 50ml syringe. Each tube was filled with 20ml of its assigned treatment before left to sediment for 20 hours (Figure 4).

The Falcon tubes was carefully removed before four randomly selected young of the year mussels were introduced into the middle of the introduction square in the center of each Petri dish using a pipette (figure 6). The young of the year mussels were placed in the square with a maximum deviation of 2mm from the cross in the middle of the dish on the treatment map (figure 6).

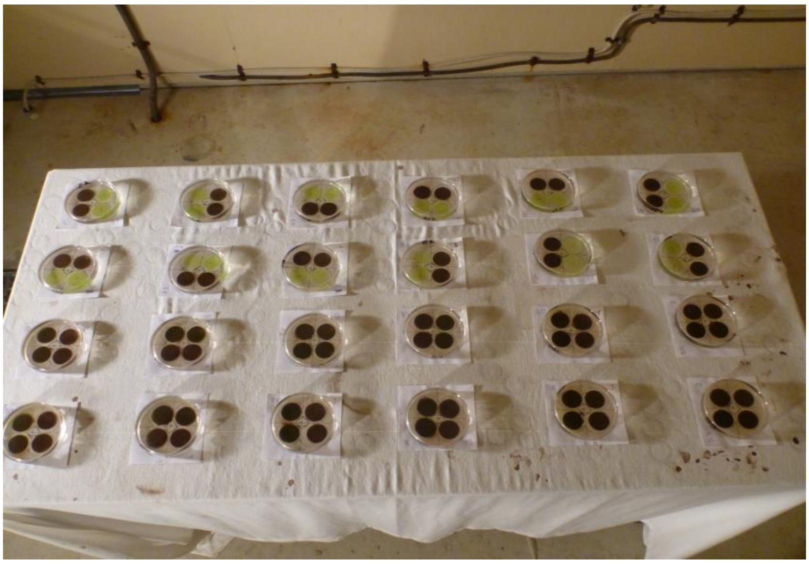


Figure 4 Patches sedimented for 20 hours before four mussels were introduced into the square in the middle. The two upper rows show combination B dishes, while the two lower rows show combination A dishes.

2.5.4 Monitoring mussel movement in the Petri dishes

Movement was not recognized as a choice before the young of the year mussel left the introduction square (1cm x1cm) in the middle of the dish (figure 6). The mussels in run 1 were left to distribute undisturbed for the 91 hours experiment. Run 2 and run 3 were monitored frequently during the 91 hours experiment. The first 12 hours of the experiment mussel movement was logged and photographed continuously every hour the first eight hours. The logging of position was reduced to every 6^{th} hours the 2^{nd} day. The last two days of the experiment movement was logged every 12th hours. Mussel's locations and detectible movements in the detritus patches and food patches were registered.

Temperature and light exposure was logged using a data logger (Onset HOBO Pendant 8K - UA-002-08). Log intervals were set to every 30 minutes.

Run 1 was undisturbed during the experiment only exposing mussels to light (figure 14 in appendix F) and movements when starting and ending the experiment. Temperature fluctuated between 25 ºC the first day when starting the experiment down to 16 ºC at night. During the other days the temperature was 18 ºC and at night the temperature reached no lower than 16 ºC due to the thermostat regulating the oven.

The mussels in run 2 distributed in temperatures up to 20 ºC the first day(figure 15 in appendix F) , before the temperature stabilized the second and third day at 18 ºC. The temperature was stable at 16 ºC during the night.

Run 3 were monitored during the experiment while temperatures and light were logged (figure 16 in appendix F). Temperatures were stable during the nights at 16.5 ºC and fluctuated between 17 ºC and 21 ºC during the 91 the experiments ran.

2.5.5 Collecting the data

Mussel locations were determined by observation throughout the experiment. The mussels were always allowed to spend more than 91 hours (with a maximum of 104 hours) in the experimental arena before final substrate preference was determined.

When ending the experiment the Petri dishes were photographed before the mussel location and tracks in the detritus were registered. Controls of the registered locations were obtained when removing the mussels carefully with a pipette. The mussels were measured and confirmed alive after the experiment.

2.6 Statistical analysis

All analysis was completed with the statistical software package R version 3.0.2 (R Development Core Team 2013, http://www.r-project.org).

To test for differences in growth between the 8 types of media, we used a Linear mixed effects model (LME), with the following R syntax:

lme(Growth~Treatment, random=~+1|Dish)

Where growth is the response variable representing change in length (mm) over the experimental time period, treatment is the predictor variable containing eight levels representing the eight different growth media tested.

random=~+1|Dish

specifies the dish as a random effect factor due to clustering of observations within Elisa dishes. When the LME revealed an effect of the different treatments, a posthoc (Tukey HSD) test was performed in order to test which of the growth media were different.

Analyzing the proportion of mussels that chose a substrate when the experiment ended was used to determine time it took for the mussels to settle on a substrate. Two of the three runs was monitored throughout the experiment (run 2 and 3) and used for the analysis. The data was analyzed using a generalized linear mixed effect model (GLMM) by using the glmmPQL function from the MASS library of R (Venables and Ripley 2002) and
with the following R syntax:

glmmPQL(choice~Time, random=~+1|Dish/ID, cor=corAR1(), family=binomial)

where choice represent the binary response variable and *Time* represent the repeated measurements of each individual.

random=~+1|Dish/ID, cor=corAR1(),

takes into account the repeated measurement of individuals within the given dish. *Family= binomial* specifies the binary distribution for the response-variable, where the value 0 was given for individuals not choosing any medium and 1 for mussels choosing a medium at a given time of observation.

To evaluate which of the 3 substrates were preferred by the mussels (food, food and detritus, or detritus), a generalized linear mixed effects model was performed. The syntax for the model was:

glmmPQL(Food ~treatment, random= ~+1| Dish, family=binomial)

Where *Food* represents the binary response variable with 1 for individuals found in patches containing food and 0 when the patches didn't (including the individuals who didn't end up in any patch). Treatment represent the two substrate combinations tested against each other (combination A versus B).

random= ~+1| Dish,

accounts for the clustering of individuals within the same dish, while

family=binomial

specifies the binary distribution for the response variable. The same model was used for testing proportion found in patches containing only detritus. The outcome in this model is not exactly the opposite of the outcome from the analysis above, e.g. a zero value in food could either mean that the individual was found in a patch not containing food or that it did not choose any substrate.

Full R - syntax can be found in appendix G

The significance level for all analyses was set to 0. 05.

3 Results

3.1 Growth experiment

The linear mixed effect model (LME) revealed a significant difference (Figure 7) within growth in young of the year *M. margaritifera* mussels reared on different compositions of diets in the Elisa dishes. The Tukey HSD post hoc test showed that mussels fed with treatments containing “only detritus” and “only water” (indicated with the letter B in figure 7) had a considerable lower growth rate than mussels fed with additional food components. Mussels fed with the treatment “all components”, “no Chironomids”, “no Nano algae”, “no shellfish diet” and “no Spiruina” (all indicated with the letter A in figure 7) contributed to a higher growth (when compared to the treatments "only detritus and "only water") where young of the year mussels where at the lowest 1cm longer than when treated with "only water" and “only detritus”. The treatment with “no detritus”, showed the highest growth of the treatments together with “no Chironomids” and “no shellfish diet” (indicated with the letter C in figure 7). Mussels treated with these three diet compositions had a growth rate increase of more than 3,0mm in length. There were no significant difference between "no detritus" and "all components" but the diet compositions where only differentiated with a trend (Table 5). The treatments with “no Chironomids”, “no detritus” and “no Nano algae” (indicated with C in figure 7) show the highest rates of growth in young of the year mussels, however "no Chironomids" and "no shellfish diet" don't differ from growth rates in "all componetnts", "no nano algae" and "no Spirulina".

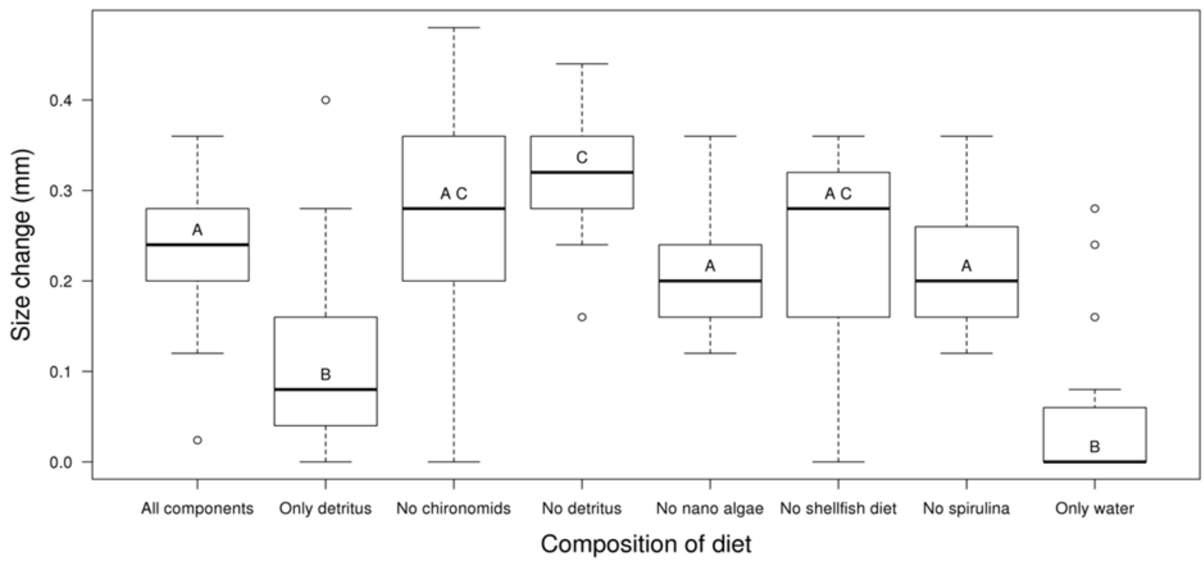


Figure 5 Size change in different diet composition tested. Treatments that are classified with the same letter A, B and C is not significant different from one another

Table 5 Significance in difference in growth when comparing the treatments tested in the growth experiment (Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 '' 1)

Treatment	Vs. Treatment	Estimate	Std. Error	z value	Pr(>|z|)	Significance
Mud	All	-0.117333	0.027526	-4.263	< 0.001	***
No.chironomide	All	0.035048	0.027526	1.273	0.90866	
No.mud	All	0.082245	0.027874	2.951	0.06249	.
No.nano	All	-0.020190	0.027526	-0.733	0.99599	
No.shellfish.diet	All	0.010245	0.027874	0.368	0.99996	
No.Spirulina	All	-0.029499	0.027874	-1.058	0.96506	
Water	All	-0.176820	0.030186	-5.858	< 0.001	***
No.chironomids	Mud	0.152381	0.027526	5.536	< 0.001	***
No.mud	Mud	0.199578	0.027874	7.160	< 0.001	***
No.nano	Mud	0.097143	0.027526	3.529	0.00976	**
No.shellfish.diet	Mud	0.127578	0.027874	4.577	< 0.001	***
No.Spirulina	Mud	0.087834	0.027874	3.151	0.03439	*
Water	Mud	-0.059487	0.030186	-1.971	0.50133	
No.mud	No.chironomids	0.047197	0.027874	1.693	0.69132	
No.nano	No.chironomids	-0.055238	0.027526	-2.007	0.47628	
No.shellfish.diet	No.chironomids	-0.024803	0.027874	-0.890	0.98700	
No.Spirulina	No.chironomids	-0.064547	0.027874	-2.316	0.28396	
Water	No.chironomids	-0.211868	0.030186	-7.019	< 0.001	***
No.nano	No.mud	-0.102435	0.027874	-3.675	0.00581	**
No.shellfish.diet	No.mud	-0.072000	0.028206	-2.553	0.17391	
No.Spirulina	No.mud	-0.111744	0.028220	-3.960	0.00190	**
Water	No.mud	-0.259065	0.030519	-8.489	< 0.001	***
No.shellfish.diet	No.nano	0.030435	0.027874	1.092	0.95859	
No.Spirulina	No.nano	-0.009309	0.027874	-0.334	0.99998	
Water	No.nano	-0.156630	0.030186	-5.189	< 0.001	***
No.Spirulina	No.shellfish.diet	-0.039744	0.028220	-1.408	0.85341	
Water	No.shellfish.diet	-0.187065	0.030519	-6.130	< 0.001	***
Water	No.Spirulina	-0.147321	0.030501	-4.830	< 0.001	***

3.2 Distribution experiment 2013

The generalized linear mixed effects model preformed on the data from the distribution experiment showed that when focusing on the proportion of mussels that were found in the patches containing food and detritus against patches only containing detritus, nearly 50% of the mussels were found in patches with food components in combination with detritus (proportion A in left panel, figure 8). When the mussels could choose between patches only containing food components against patches only containing detritus (GLMM; p<0,001, proportion B in the left panel, figure 8), the proportion of mussels found in patches containing food components were 10%.

When analyzing the results with focus on the proportion found in patches containing detritus, the proportion selecting the patch containing only detritus is close to 50% (Figure 8, proportion A in right panel). When mussels were left to choose between patches with only detritus and only food components (GLMM; p<0,001, figure 8, proportion B in right panel) 90% of the mussels were found in patches containing detritus. Both panels were included to illustrate the general distribution of mussels in the dish, either with focus on selection of food components, detritus alone or detritus in combination with food components.

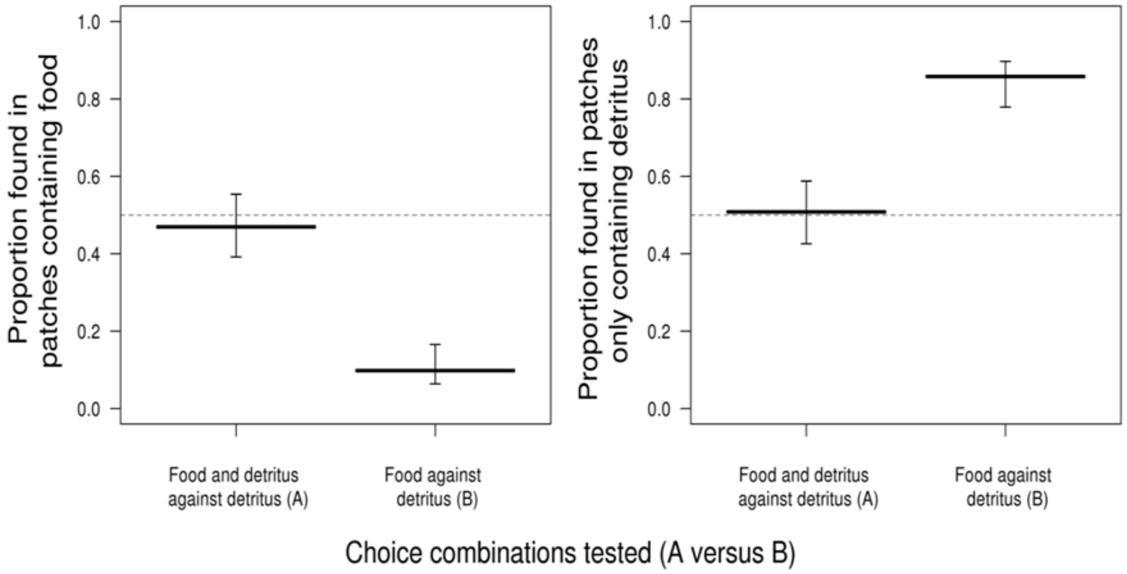


Figure 6 Patch combination A tested plotted against patch combination B with focus on the amount of mussels found in patches containing food components (left panel) and focus on patches only containing detritus (right panel).

3.2.1 Probability of selecting a substrate depending on time

The time each mussel spent, before selecting a substrate became apparent when performing a generalized linear mixed effect model (GLMM). The model was performed on growth experiment run 2 and run 3 which both tracked mussel movement over time for 91-104 hours. More than 50% of the 192 mussels distributed (figure 9) in the Petri dish within the first 30 minutes it took to finish the introduction of mussels into the 24 Petri dishes used in the experiments. Despite this, a high proportion of young mussels selected a substrate, resulting in a significant increase in proportion of mussels that selected a substrate over time (significant positive slope, $P<0.001$). Time spent before 90% of the mussels had selected a substrate was less than 91 hours.

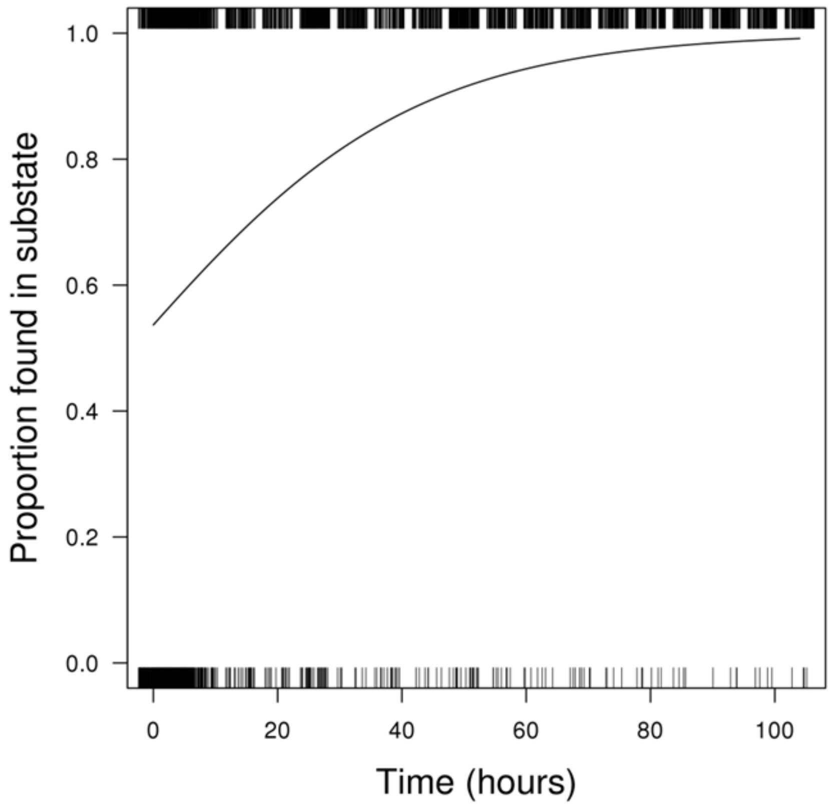


Figure 7 Proportion of mussels observed distributing in the substrates over a period of 4 days (91 hours).

4 Discussion

4.1 Evaluating patch quality using growth rates

Growth rate studies in patches differing in food and detritus components were used to evaluate patch quality. There was a significant difference in growth rate in mussels reared with different composition of treatment qualities used in the growth experiment. When choosing between patches of different qualities, mussels were expected to be found in the patch which contributed to the highest growth gain, however results show that the young of the year mussels was attracted to the patches containing detritus, regardless if it contained food components.
When allowed to choose, young of the year mussels did not choose feeding patches with the highest food quality based on growth gain. By improving the initial diet used in rearing young of the year mussels an optimal diet formula can be implemented in the cultivation projects, equipping mussels with an adequate amount of nutrition to grow and survive their first year as young mussels. Optimizing the diets by reducing in number of components used for feeding could result in a decreased cost and workload, while still generating the best growth or even increase growth in the young of the year mussels.

Many organisms inhabit unpredictable and changing environments, where failure can be fatal. All animals must be able to categorize and predict their sounding environment with a certain degree of rational in order to survive. As a small animal in a big world, the young of the year mussels needs to be able to locate patches with food with simple stimuli to secure their survival.

Locations with sedimentation of fine detritus, and areas with a low water velocity are in nature related with detritus and i.e nutritious algaes ability to sediment. Hence attraction to such areas indicates that they are less vulnerable to being washed away with the water current. Detritus could be associated with good feeding patches. Young of the year mussels ability to locate feeding grounds, using detritus as stimuli might be present at desystment. This is however not evidence for an innate trait. All mussels used in the experiments had been pre fed with detritus containing additional food components (appendix A) prior to the experiment and hence, they might have habituated to the conditions presented to them. Novel components may have left the mussels unable to have an adequate reaction to the food components presented to them in this experiment.

Positive results in growth were recorded in young of the year mussels in treatments where no detritus was added, mussels had the same level of growth as when detritus were present. This assumption is only valid when treatments are changed on a regular basis no less than eight days apart, based on findings in Ebye (2012).

Ebye (2012) measured fatal values of both ammonium and nitrite in the water without detritus after eight days, even when mussels were absent.

Results in the distribution experiment (section 3, 2) imply that mussels prefer the patches with detritus, regardless if food components are present.

4.2 Pedal feeding

When feeding, particles are lead with the ciliated foot and enter through the pedal gape or sometimes using the currents generated from the sweep of the foot (Gatenby et al., 1996). Mussels have been proved to survive and grow under circumstances with and without detritus in the growth experiment. Gatenby (et al. 1996) observed that juvenile freshwater mussels fed with algae and bacteria in substratum also ingested the algae. Mussels fed with no substratum only swept about 25% particles into the pedal gape, meanwhile the mussels fed on substratum swept about 75% into their gape. In this experiment the young of the year mussels showed a trend of increased growth in the treatment containing food components without detritus, compared to treatments containing only detritus. Results were not significantly different from the other treatments containing detritus, but observations made by Gatenby (et al., 1996) could indicate that mussels fed without detritus spend unnecessary energy on obtaining the same growth gain as mussels reared on detritus. These findings propose the importance of detritus is more than the bacteria found in the natural composition of sediments to young of the year mussels.

Detritus include different non-living organic matter and plant tissue as leaf litter, dead wood, aquatic macrophytes and algae. We find animal tissue, dead microbes, secreted products as feces and waste from resident organisms (Moore et al., 2004). The quality and quantity of detritus and relative requires in form and content of their origination, size and chemical composition is variable according to the ecosystem compositions (Callaway and Hastings, 2002). Detritus is not homogenous; its properties can be highly variable in form and distribution that can have an impact on individual organisms, food webs or entire ecosystems (Moore et al., 2004). The chemical composition also categorizes the detritus in order to control its origin, legacy and the biochemical composition of life forms. Nutrient availability is influenced by the initial input of detritus together with its decomposition products, but also the physical mixing performed by inhabiting organisms (Brussaard et al., 1997).

4.3 The importance of sediment

It has been suggested that young of the year freshwater mussels benefit from being reared with a substratum, silt, fine sediment or detrituss. This is due to resident bacteria in the biofilm could enhance enzymatic activities or act as aid in the digestion of algae (Urban and Langdon 1984, Crosby et al., 1990, Gatenby et al., 1996). Pedal feeding young of the year mussels that ingest fine sediments together with algae can acquire additional minerals and nutrients that contribute to improved growth and survival. Way (1989) and Gatenby (2000) suggest that detritus is the main dietary component for rearing young freshwater mussels. Urban and Langedon (1984) and Gatenby et al. (1996) found that growth in shell length and survival rates of juvenile freshwater mussels are higher when sediment is present. The gut of juvenile freshwater mussels (*V. iris*) was full of chlorophyll and colloidal particles, which might indicate that the mussels ingested algae associated with the sediment. Still no difference in growth or survival was found when adding bacteria similar to the bacteria found in the riverbed (Gatenby et al., 1996). Fine sediment particles might also serve as internal grinding substrate for digesting algae cells (Gatenby et al., 1996). Bacteria added to autoclaved-sterilized sediment did not enhanced growth in the mussels (Gatenby et al., 1996). However rod shaped bacteria were found in the algae diets and guts of juvenile mussels. Meanwhile it is not certain if the bacteria originate from, the diet, river sediment or is natural flora found in the mussel gut (Gatenby et al., 1996). Urban and Langdon (1984) concluded that kalotin aid as a grinding substratum for the crystalline style sac thereby increasing digestibility of those algae with tough cell walls. Other dietary studies have concluded in conflicting theories. Bricelj (1984) contradicted this hypothesis with his work with the hard clam (*Mercenaria mercenaria*). According to Lasee (1991) encysted *Unionid* glochidia lacks crystalline. He discovered that between 12 and 48 hours post metamorphosis juveniles developed a posterior style- sac stomach (characterized by a crystalline style and cilia) which would allow them to digest algae without any additional help. After 56 days the style sack is a separate structure from the stomach, this indicates that mussels may be fully capable of digesting algae. The hypothesis that fine sediment may serve as a grinding substrate to enhance digestion of algae in freshwater mussels remains untested.

Foe and Knight (1985) concluded that the Asiatic clams (*Corbicula flumina*) were independent of suspended sediment. In addition Lasee (1991) concluded that 50-100g/L sediment added to an aquarium did not improve growth or survival of juvenile pocketbook mussels (*Lampsilis venticosa*) after 56 days. On the other hand, Hudson and Isom (1984) experienced when adding sediment, a higher survival (91, 9%) and increased growth (610ym) for 30 days old *Utterbackia (anodonta) imbecilus*. Enough sediment was added to cover the chamber floor with a thin layer (less than 1cm) in one treatment; while in the other “cloudy silt suspension” was used. No significant growth difference was detected between the 1cm layer treatment and the “cloudy silt suspension” treatment after 30 days. They concluded in that sediment must provide nutrition in the form of organic detritus. However it is possible that some of the “suspended silt” did sediment to the bottom thereby providing a substrate for the pedal feeding mussels.

Growth data might differ from nature due to the natural environment that could provide additional required nutrients, vitamins or food abundance not present in the laboratory experiments. Howard (1922) concluded that juvenile freshwater mussels grown outdoors were larger than juveniles cultured in laboratory L. siliquoidea mussels of the same age placed in aquaria outside grew 1mm more in 37days compared to the same age mussels after 30days. The mussels who remained in the river grew an additional 7mm. (Gatenby et al., 1996).

Young of the year mussels showed that the favored habitats were patches containing detritus. The primary role of the detritus as sediment could just be to provide the mussels with a substratum, shelter or a place where pedal-feeding young of the year mussels can collect food particles. Detritus might not function only as a food source but as a biological active compound that reduces harmful ions such as ammonium and nitrite (Ebye et al., 2012). Properties of soil clays consist of adsorbing potassium, calcium and magnesium thereby functioning as a nutrient storage (Kelly, 1942). Soil possesses the property of absorbing amino acids and sugars (Ebye et al., 2012). Water properties are believed to have an effect on survival of young of the year mussels (Ebye et al., 2012). Young of the year mussels are not equip to tolerate high Nitrate (NO3), Nitrite (NO2-) and ammonium (NH4+) concentrations in addition to other pollutants (Jensen., 1996; Camargo and Alonso., 2006). Adult mussels have the ability to close their valves when exposed to high ammonia levels (Horne and Mcintosh., 1979), while the juvenile strategy when dealing with pollutaints is still unknown. Closing their valves could result in a fatal outcome due to starvation (Ebye et al., 2012). Simmons and Reed (1973) argued that freshwater mussels (unoidae) are one of the most sensitive groups to organic enrichment. Ammonium is considered a particular harmful substance (Wade, 1992; Augspurger et al 2003; Mummert et al., 2003).

Ammonium and nitrate levels were not investigated in this study but Ebye (2012) suggested that ammonium and nitrite levels rise significantly after eight days.

4.4 Light and temperature changes

Figure 14, 15 and 16 in appendix F present data on the young of the year mussel exposure to light and temperature changes during the distribution experiment in 2013. It can be argued that light and natural fluctuating temperatures have little or no influence on the mussel patch choice. Mussels in the first run of the experiment were not interrupted by light (figure 14 in appendix F), nevertheless the majority of mussels chose the same patches, containing detritus, as the mussels frequently interrupted by light in the second (figure 15 in appendix F) and third (figure 16 in appendix F) run of the distribution experiment in 2013 (appendix H section 7.7.3). When selecting a detritus patch, mussels did not wander in and out, while mussels initially choosing patches with only food components eventually chose a patch containing detritus. Based on observations and track records from the detritus patches, natural fluctuating temperatures between night and day did not appear to influence the mussel choice of patch, activity level or favored location in the dish.

4.5 Growth correlates with treatment

The health and growth rate of the young of the year *M. margaritifera* correlated strongly with the dietary treatment in this study. Results in the growth experiment (section 3,1) show that mussels make more use of additional food components, such as algae, for growth than only the detritus. This classifies detritus as a poor nutrition choice.

Based on results, survival and growth rates of artificially reared young of the year *M. margaritifera* where significantly higher among young of the year mussels kept on treatments containing food components compared with treatments containing no additional food. However, we cannot assume detritus is the component making the difference in mussel growth. Growth is suggested to be higher in the treatment containing only food components and no detritus. However, results conclude that this treatment is not significantly different

from the two treatments with "no Chironomids and "no shellfish diet" which both contain detritus. In addition a trend relationship was detected with the treatment containing “all components”.
However, it can be argued that the detritus used in these experiments were frozen down before use in order to remove additional unknown nutrients in the detritus, leaving it providing less nutrition than it might have provided in nature, a slightly higher growth is to be expected from unfrozen detritus. The findings show that young of the year mussels can survive and grow without detritus present as long as water is changed on a regular basis.
No significant growth differences were found when discriminating one by one of the food components used in the recipe (appendix A). When removing shellfish diet or Chironomids the growth of the mussels overlapped with the highest achieved growth gain found in mussels reared on only food components. Growth in these treatments was somewhat higher than mussels reared with the absence of algae. The dietary study performed by Ebye (2012) showed that growth rate in mussels fed with detritus and Chironomids the growth gain is lower than when fed with algae as the food components. These results concur with the findings in this study, where higher or same growth rates were achieved in the absence of Chironomids. Additional growth gain was achieved in treatments where Chironomids were absent; even if these results were not significant this could indicate that mussels make no use of the Chironomids when algae are present. Chironomids could be difficult and energy draining to ingest, thereby these components might be discriminated against when other food is available.

Different combinations of algae species have been used to culture Unioid mussels (Hudson and Isom., 1984). Findings in the growth study agree with Ebye (2012) findings. It was concluded that mussels reared without algae present, grew the least.
The impact on young of the year mussel growth when removing the different food components was tested in the growth experiment (section 2, 4). Results show no significant difference in mussel growth when discriminating one of the food components, however when not including any of the food components, using only detritus, growth rates were significantly lower. Even if no significant differences were detected between the removals of food components, deviations where still detectable in the figure 1. This calls for an investigation of the components tested.
The results show that "all components" have a trend relationship with "no detritus" (Table 5) leaving all treatments containing food components resulting in the same growth. The two treatments lacking Spirulina and nano algae give lower growth (figure 5). This could indicate that when removing the algae mussel growth is not as high as when it is present.
The shellfish Diet 1800 is a 100% natural mix of marine microalgae that have had success in providing a better nutritional profile and increasing both growth rates and survival for a variety of shellfish e.g. oysters, clams, mussels and scallops (Skimz, 2014). Results show that without Shellfish diet young of the year mussels have a small visible increase in growth compared to when it is present. Nano algae showed to be an important ingredient in the mussel growth. When removed from the treatment mussel growth was noticeable lower then when present. Nano3600 consists of one species *Nanocloropsis sp*. This specie is high in protein (58% from table 1) and provides the mussels with fatty acid (30% from table 1)

(Reedmariculture, 2014). The product showed to be beneficial for the mussel growth and is in addition an easy product to use in rearing juvenile mussels. Nano algae are estimated to last 12-14 weeks when defrosted while it can be held fresh for 3 years when frozen. Chironomide larvae were originally added to the diet to provide additional animal protein (Geist, 2010). Results suggested that Chironomids are not an important contributor to mussel growth. Ebye (2012) concluded that the larva is not needed in the diet in order to obtain positive growth. When Spirulina was removed from the detritus the growth in the young of the year mussels was detectable lower than when present. Spirulina is in addition used as a human health product, believed to cause positive health effects.

Mortality occured in treatmets with only water from Kvernavatnet, however mussels that survived had no significant difference in growth when compared to the mussels treated with pre frozen detritus, this indicate the low nutrition in frozen detritus and additional nutrients in the water. Ebye (2012) experienced an almost 100% mortality in mussels kept in river water with no additional food after 28 days. In the light of that study it should be expected that all mussels reared with only lake water from Kvernavatnet should die during the 53 days of the experiment. However lake water in general contains some additional food and the energetic state might have been high in water from Kvernavatnet. Results in the growth experiment contradict the findings in Ebye (2012) in relations to the water treatments, due to that most of the young of the year mussels were still alive after 53 days. These findings might suggest that the young of the year mussels could have had a small storage of energy due to the prior three weeks feeding in the mussel cultivation project. Adult mussels have been observed to survive up to 30 days on land, in up to 15 degrees (Ziuganov., et al 1994), therefore young of the year mussels might be able to endure short periods without food. Determining moribund young of the year mussels is hard when the valves are not gaping open and dead mussels might have been registers as alive. Ebye (2012) found that river water with added detritus showed constant nitrate levels and decreasing concentrations of ammonium and nitrite during the experiment period. Increased levels of nitrite and ammonium were found in treatments fed on algae (Ebye 2012). This classifies detritus an important factor for limiting the nitrite and ammonium levels in water (Ebye 2012). Sediment may provide some natural value to the mussels as it contains organic material with or without sterilization (Gatenby et al. 1996).

4.6 Developing the mussel diet

Developing the perfect juvenile freshwater mussel cultivation diet composition takes time and effort. This study contributes in determining the key food components needed when rearing young of the year mussels. In North America the scientific basis of freshwater mussel culturing has been developed over decades of research and put in motion by Richard Neves and co-workers at Virginia Teck (freshwater mollusk conservation center, FMCC). The continuance of developing methods for freshwater mussel rearing was done by the different universities (Geist, 2010). Today, numerous of new rearing methods are being further developed, (center of Mollusk Conservation in Frankfort, KY; Genoa National Fish Hatchery, WV) resulting in an increase of knowledge where protocols and propagation techniques for more than 40 endangered mussel species have been produced.

An estimated number of 80 000 individuals of fresh water pearl mussels have been reared in the Czeck Republic, Germany, The UK, Northern Ireland and Luxembourg of where an estimate of 35 000 mussels has been released into the wild (Gum et al., 2011). In North America juveniles are being bred in laboratories for instant release and repopulation causes, while in Europe Michael Lange from Saxony, Germany, adopted the Hruska method and implemented new theories (Geist, 2011). The methods used are wery similar to the ongoing cultivation project in Austevoll.
The Hruska method includes the maintenance of infected host fish in controlled environment conditions with a daily collection of freshly exysted young of the year mussels. Mussels are then laboratory pre cultured in small boxes without water flow, where feeding consists of organic suspended detritus. Juvenile mussels are transferred into cages or containers adapted to mussel size before being placed in natural rivers or semi natural flow channels (Hruska., 1999; Gum., 2011). The mussels are then tagged for monitoring purposes and kept for 1-2 years before being released into the wild, to the river they originated from. In a majority of the methods used, cultured algae, commercial shellfish diets or re-circulated pond water is used for feeding (Gum et al., 2011). Due to low quality detritus, animal protein (i.e. Chironomids) was added by Lange in order to produce a boost the initial growth rates (Geist, 2011). To test the young of the year mussels ability of patch evaluation the distribution experiment 2013 was performed.

4.7 Distant food discrimination

The result in section 3.2.1 confirms that young of the year mussels had enough time to distribute to the patches in the Petri dishes. Nearly 50% of the mobile young of the year mussels distributed onto the patches during the first 20 minutes. Mussels used in this experiment were fed in the mussel cultivation project after decysting from their host fish, with the same food and detritus concentration as in the distribution experiments. In theory, these food components were familiar to the mussels and should therefore trigger a response.
Distant discrimination between food patches may be quite common in freshwater pearl mussels *M.margaritifera* where the use of odors or cues instead of physical inspection of patches allows young mussels to locate feeding sites while saving their energy. It can be argued that the food component- patch tested in the distribution experiment (treatment B3 in table 4) could not have repelled the mussels due to equal distribution in patches containing food components with detritus (treatment A1 in table 4).

Freshly desysted mussels are likely to be transported by the current to low energy deposit sites where smaller particles sediment. The ability to locate and move towards these patches could prevent young of the year mussels form starving or being swept away and transported to unsuitable locations. Young of the year mussels have less than eight days of food reserve after decystment and need to locate food immediately after detaching from the host fish in preferably a favorable habitat (Ebye et al., 2012).
Mussels are believed to possess chemoreceptors (Gosling et al., 2003) that could be used for foraging. Young of the year mussels are unable to filer feed before reaching 1mm when they develop the filter apparatus (pers med. Shertung 2014). Pedal feeding is therefore necessary in order to obtain organic nutrients and inorganic minerals. Yeager at al., (1994) suggested that

young of the year mussels may have different feeding strategies even within the two first weeks after decystment having different strategies for obtaining nutrition requirements after metamorphosis.
According to the principles of Hjulströms diagram (Pinet, 2009) silt and mud areas is the safest place to be for the mussels. A high energy current is needed to swipe them away from areas with already existing fine sediment (Pinet, 2009). Mussels less than 0,5mm are unlikely to withstand the current in high velocity areas (Yeagar et al., 1994). It is known that young of the year Unioid mussels burrow, but exactly how deep they burry and what particles they eat are unknown (Yeagar et al., 1994). Juvenile mussels 0-3yrs have been found from 1mm down to 8mm in depth in the sediment layer (Yeagar et al., 1994 and Neves and Widlak 1987). Difference in reported depth of capture could be explained by different current velocity. Mussels could have avoided patches containing only food components because of exposure, danger of being swept away, digestion needs, particle catchment or not recognizing the food components. Detritus is considered to play an important role in providing shelter for small benthic organisms, this could indicate that patches without detritus could leave the mussel exposed to e.g. predators, and are thereby not chosen. Mussels could in addition search for the fine particle substratum to find shelter from high velocity streams given that a threat to be swept away is present. Detritus could play an important role in providing shelter for small benthic organisms; therefore patches not containing detritus could leave the mussel exposed to e.g. predators. Mussels could also search for fine particle substratum due to strong current flow.

The initial experiment in 2012 (appendix C) suggested that detritus could contain attractors or cues for the mussels. In both the experiments, distribution experiment 2012 (appendix C) and distribution experiment 2013 (section 2,5) the mussels detected and selected the patches containing detritus, meaning patches containing food particles was only selected when they were in combination with detritus. In the distribution experiment 2013, food particles were presented to the mussels in patches with detritus against patches with only detritus. The distribution experiment revealed that when left with the option of choice the mussel is attracted to the patches with detritus, regardless if it contained food particles. Mussels may therefore not have the ability to respond to the food components added artificially to the detritus patches, even if growth gain was higher. When mussels located a patch with detritus they did not go out from the patch, this was registered when observing the mussel movement and tracks in the detritus patch in the Petri dishes. When mussels located the patch containing only food components the young of the year mussels continued their search for more attractive patches (pers obs. and appendix H) until most ended up in the patches containing detritus.

The results indicate that the mussels are able to locate the detritus without difficulties. This might indicate that the mussels in fact are able to distinguish and navigate between poor and optimal feeding sites. Detritus might also in addition to a food reservoir, function as shelter from both predators and strong water currents. Despite the result that patches with additional food components in detritus provided the mussels with the best growth rate compared to patches with only detritus, distribution between these two food patches did not vary. The young of the year mussels particle -recognition repertoire might not be adapted to detect the industrialized produced food used in the experiment. This suggests that these types of food components are in general not found in the mussels natural habitat. This could indicate that young of the year mussels chemoreceptors have not yet been adapted to distinguish between different food qualities. Detritus might be the only attractor used when young of the year mussels choose feeding habitat. The natural response of seeking detritus becomes a negative trait due to river pollution. We argue that in the mussels natural habitat, detritus sediment in laminar areas together with other food. Hence attraction to detritus correlates with attraction to feeding sites.

5 Conclusions

This study provides new information in the field of preferred and optimal initial diet for young of the year *M. margaritifera*. This life stage has previously been given little attention, despite it being considered the most vulnerable. The results from this study can be summarized as follows:

1. The young of the year mussels grow best when food components are present. Detritus has shown to be a poor nutrition source. There were found no significant difference in growth in young of the year mussels reared with food components in detritus compared to those reared with only food components with no added detritus or substratum.

2. Mussels can grow with a sufficient rate when detritus is absent as long as the water is changed frequently.

3. When the mussels are given the option, the mussels choose to go to the patches containing detritus regardless if food components are present. The young of the year mussels are believed to use chemoreceptors for distant discrimination of patches without detritus.

4. The mussel goes more often, than expected by chance, to the patches containing detritus.

The results from this study contribute to the knowledge about young of the *year M. margaritifera* mussels by stressing the importance of additional algae in the initial diet for an increased growth. Detritus has been proved to be of some importance to the young of the year mussels in the initial search for food, therefore detritus is recommended as a substratum for rearing young of the year mussels in captivity. Detritus sediment in low velocity areas together with other food components, the young of the year mussels could use detritus as navigation cue.

Accordingly low velocity sites for deposition should be implemented in river conservation and reconstruction planning in order to secure the substratum attracting, and maybe securing, the survival of young of the year mussels in natural habitats. Further research is needed on the relative importance of natural occurring bacteria and different types of algae in the freshwater mussel diet. Additional understanding of young of the year *M. margaritifera* mussels biology, behavior and ecology is needed in order to better assess how current and future management decisions will affect *M. margaritifera* young of the year mussels.

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7 Appendices

7.1 Appendix A: Recipe used in mussel cultivation project

The mussels were kept in plastic boxes (appendix C), approved for food starage (polyprophylene, plastic ID code 5).

The components (table 6) are calculated to be added to 10L of water. Adjusted to the 7cm water column height in the storage boxes. This recipe were recalculated and concentrated 7 times to the Petri dish 1 cm water column height in order to sediment the same amount (7:1=7).

Table 6 Food components used in the cultivation project

Component	Amount	Details
Calcium	1ml	
Shellfish food	250ym	
Mix (homogenized in with 50ml of water in blender)	2ml	5 Chironomide larvae 1ml defrosted Nano algae 0,006g (3 pinches) Spirulina powder.
Detritus	100ml	

Instructions:

Defrost Nano algae and Chironomide larvae before use.

Add all food components to 50ml of water then blend the mix for 1 minute and then sieve through a 30ym sieve.

Fill the box with food to a 7cm height. Add 100 ml of sieved and oxygenized detritus.

7.2 Appendix B: Freshwater pearl mussel, *Margaritifea margaritifera,* life cycle

The complex life cycle of the river pearl mussel, *Margaritifera margaritifera*, consist of an initial obligat parasitic stage on salmonid fish gills. The glochidia is released from the female in a syncronized event, releasing up to 4 million glochidia during two mid-summer days (Taeubert et al., 2010). The glochidia remain encysted on the fish gills for a period of 8 to 12 months reaching a size of 0,4 to 0,5 mm in length (Taeubert et al., 2010; Young and williams, 1984). When detaching the young of the year mussels begin their up to five year juvenile stage as benhic organisms (taeubert et al., 2010; Young and Willems., 1984). The river pearl mussels mature when reaching ten to fifteen years old. Young mussels are yellowish but become darker brown while maturing. Scandinavian populations, in cooler areas, have an estimated life span of 190-200+ years (Geist., 2010 , Bauer 1992).

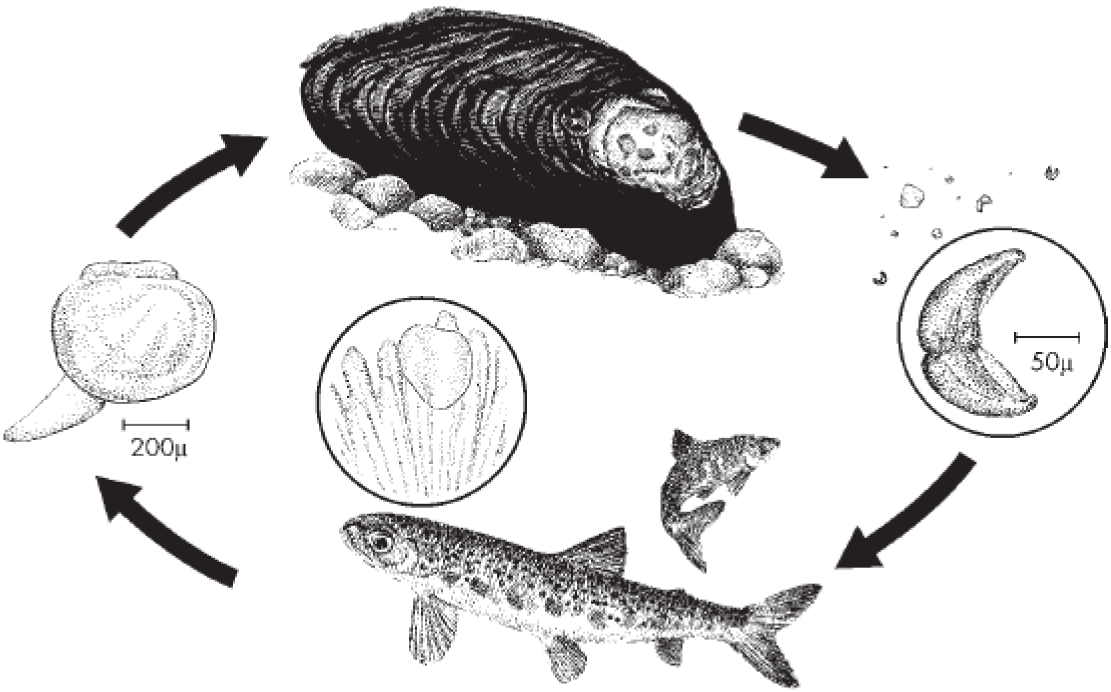


Figure 8 Schematic presentation of the life cycle of the freshwater pearl mussel *Margaritifera margaritifera* from Skinner (2003).

7.3 Appendix C: Equipment

Table 7 Equipment used in performing the three experiments (growth experiment, distribution experiment 2012 and distribution experiment 2013).

Equipment	Amount	Supplier
0,8L Plastic boxes for mussel storing and treatment mixing	1 per 200 mussels	ChlasOlsson/ Rema 1000 /IKEA
Blender	1	UIB
Petri dishes	120	UIB
Falcon tubes	96	UIB
Syringes (50ml and 1ml)	5	UIB
Thermostat	1	ChlasOlsson
Microscope M5-93898	1	WILD Heerbrugg Switzerland
Temperature logger Pendant 8K - UA-002-08	1	Onset HOBO
Pipettes	4	UIB
Elisa dishes	7	UIB

7.4 Appendix D: Distribution experiment 2012

7.4.1 Setup

The distribution experiment was conducted on Lerøy vest fish farm locality nr. HAV12 at Storebø- Austevoll Bergen Hordaland Norway (60° 5'47.82"N, 5°14'25.47"E) in the summer of 2012. The experiments were conducted in a temperature regulated room, with a constant temperature of 17ºC, together with the mussels in the cultivation project.

The food components used in the mussel cultivation project (appendix A, table 6) were used to test the patches. A total of 10 glass bowls, with a diameter of 19cm and a 7cm high water column (figure 11) were used. Unique randomized treatment maps were placed under the bowls assigning each treatment to the falcon tube.

A total of 70 Falcon tubes (50ml) with a diameter of 2,5cm were sawed off at the bottom in order to be used to sediment the food components, detritus and detritus containing food components in the glass bowl. The Falcon tubes were placed in a circle 3cm out from the introduction site in the center of the bowl, without overlapping. To avoid leakage, due to pressure differences, the food components where added in a concentrated form to minimize the input to the tubes. The experiment ran 11 times over four days with five mussels in each of the ten glass bowls. A total number of 550 young of the year mussels from river Os were used in the experiment, using 50 mussels per run.

Table 8 Overview over the content in the patches tested

Patch identification number	Treatment
1	All food components
2	Detritus only
3	No Nano
4	No Spirulina
5	No Chironomide
6	No shellfish diet
7	All food components no detritus

7.4.2 Performing the experiment

The treatments in the tubes were then left to sediment for 20 hours before carefully removing the falcon tubes. Five randomly selected mussels were measured and placed into the bowl with a pipette on the introduction square in the middle of the bowl (1x1cm). The young of the year mussels were left to distribute for 4 days (92 hours).

7.4.3 Data collection

After four days all bowls where photographed and the visible mussel tracks in the detritus were logged. The mussels where collected carefully with a pipette from the chosen patch or area in the bowl. The young of the year mussels were carefully transferred into marked Petri-dishes for registration of position and measurements.

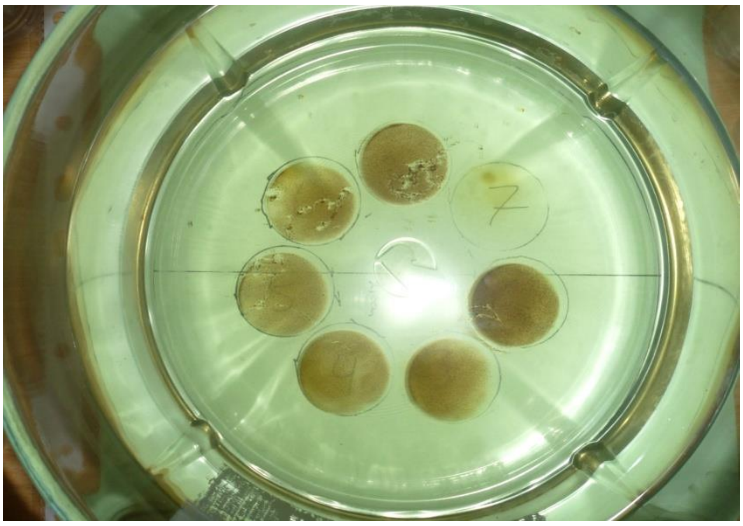


Figure 9 Glass bowl with sedimented treatment patches

7.4.4 Results and analysis

Out of the mussels tested in this experiment, 245 of the 550 individuals choose a patch while 295 mussels are found outside the patches (figure 12). Probability of selecting a given patch by chance (1/7) was tested performing a chisq test (appendix G, section 7.6.3) which detrmined that the distribution on the seven patches in the bowl where not a result (P=0,006) of chance.

Determining the differences in the selected (table 9) substrates was investigated by comparing the second least chosen pathc (No Spirulina) against the patch chosen a lesser amount of times (No detritus). When compared patches without detritus ("no detritus") were selected only 16 times (table9) compared to the patch with no spirulina which were selected 32 times (P=0.020), showing a noteworthy difference in patch selection.

When comparing the two most chosen patches against each other (all components vs. only detritus) we find no difference in the times selected (P=0,291).

Table 9 Sum of mussels choosing the different mediums in the bowl

All components	Only detritus	No spirulina	No nanoalgae	No shellfish diet	No chironomides	No detritus	No medium chosen
40	50	32	35	35	37	16	295

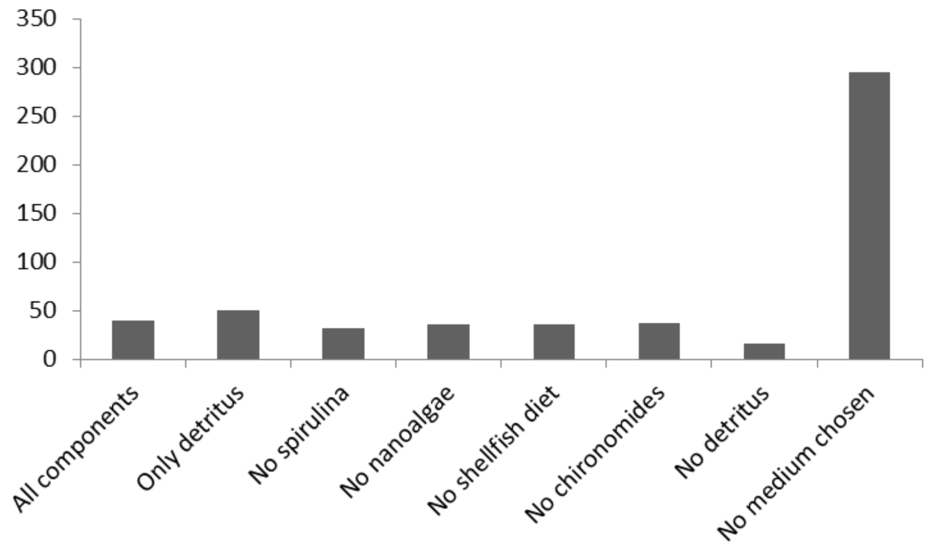


Figure 10 Graphic presentation of distribution on the different patches in the bowl

7.4.5 Discussion

The patch containing no detritus where significantly less chosen by the young of the year mussels than the patches containing detritus. Due to the high amount of mussels that did not choose a patch the experiment could not conclude with a specific preference in the young of the year mussels.

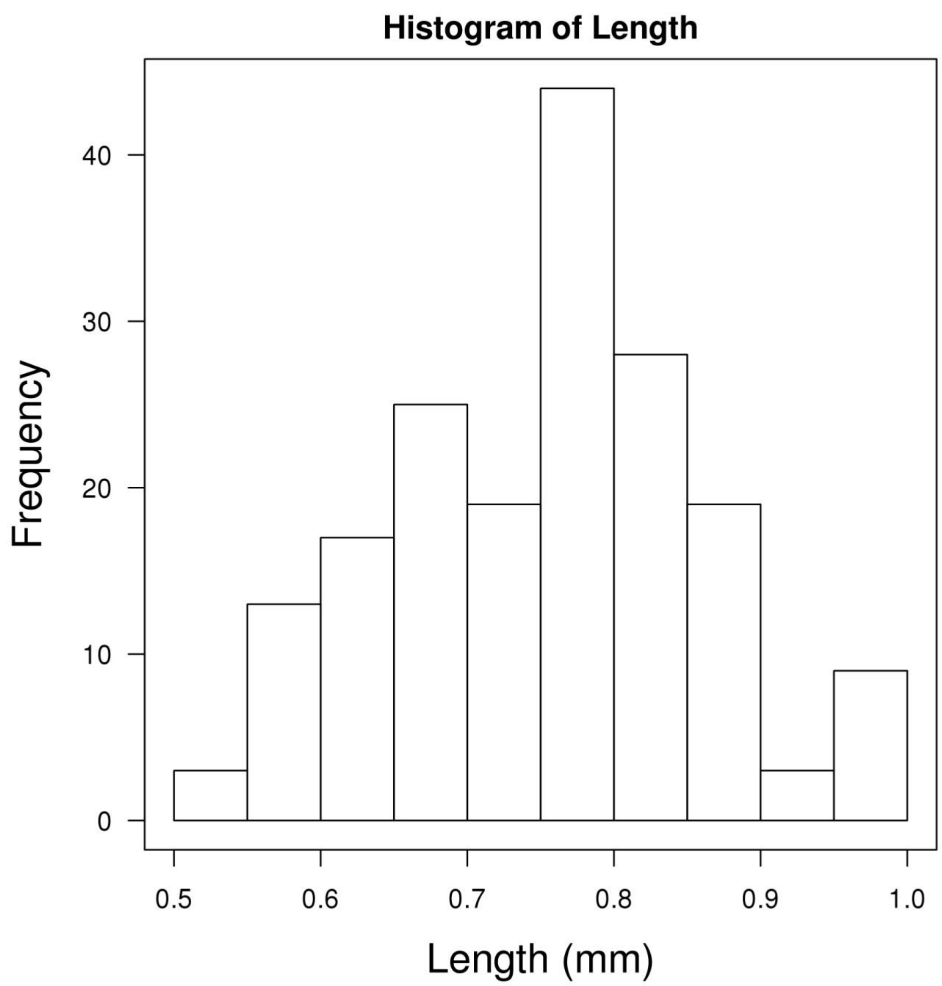
The mussels that did not choose a substratum, most where found in the introduction square in poor health. This could indicate that the mussels where to young, being only a week old, for being handled and transferred between boxes prior to the experiment.

Continues surveillance of the young of the year mussels during the four days were not performed in order to minimize disturbance when the mussels where distributing in the bowl. This eliminated the detection of mussels movement between or around the patches. Using survaillance could have contributed to data on mussel paths in the 19cm diameter bowls. Mussels used in the end of the experiment in July (fed in the cultivation project since encystment), where obviously more energetic (pers obs) and where more of than found outside the circle (figure 11) of food patches than the mussels used in the beginning (June). Due to the long experimental time (11* 4days) mussels reared in the cultivation project could have gained advantages and stored more energy compared to the mussels The findings in the experiment indicates that the mussels are not able to distinguish between the patch qualities based on food components and might navigate using only the detritus.

Mussels could have been stressed by the feeding schedule of the mussels in the cultivation project, stored in the same room. Light and vibrations in the shelf where the bowls were placed on could have made an impact on the young of the year mussels, resulting in them closing their valves, and not have time to distribute within the four days in the experimental arena.

In conclusion the glass bowl used where to big with too many choices in the experiment arena for the young of the year mussels with a to detailed patch compositions for the mussels to distinguish between them. Thereby providing no clear preference for food components tested.

7.5 Appendix E: Size distribution of mussels used in the distribution experiment 2013



Figur 11 Length distribution of mussels used in the experiment in 2013

7.6 Appendix F: Temperature and light log for Distribution experiment 2013

Figures were made using HOBOware Pro, version 3.4.1.

The data logger recorded data every 0,5 hour during the experiment.

7.6.1 Run 1

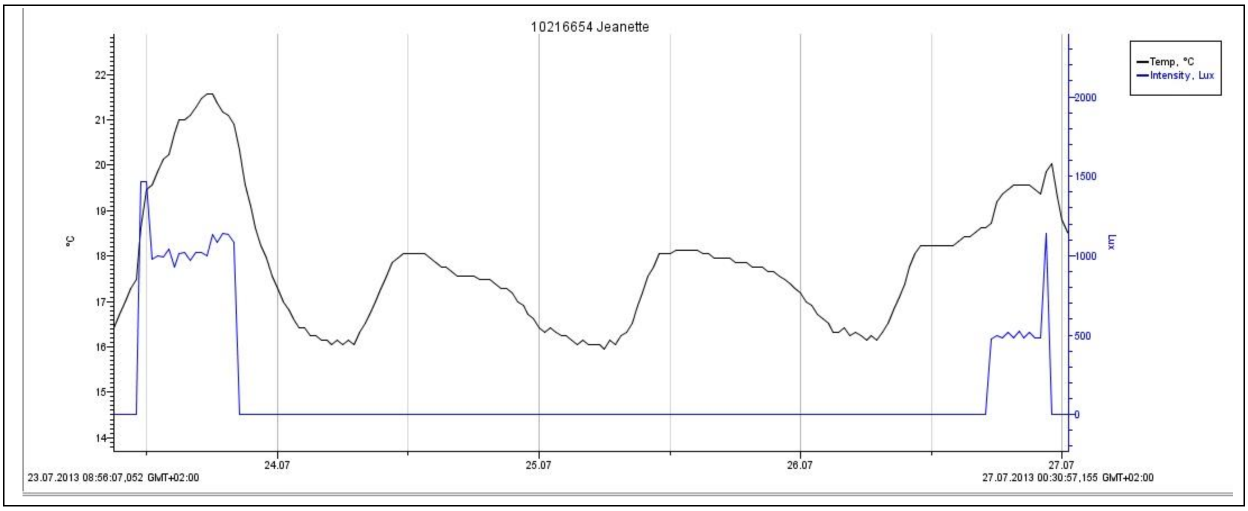


Figure 14 Light and temperature log for the first run in the experiment from 23/7 to 27/7 - 2013.

7.6.2 Run 2

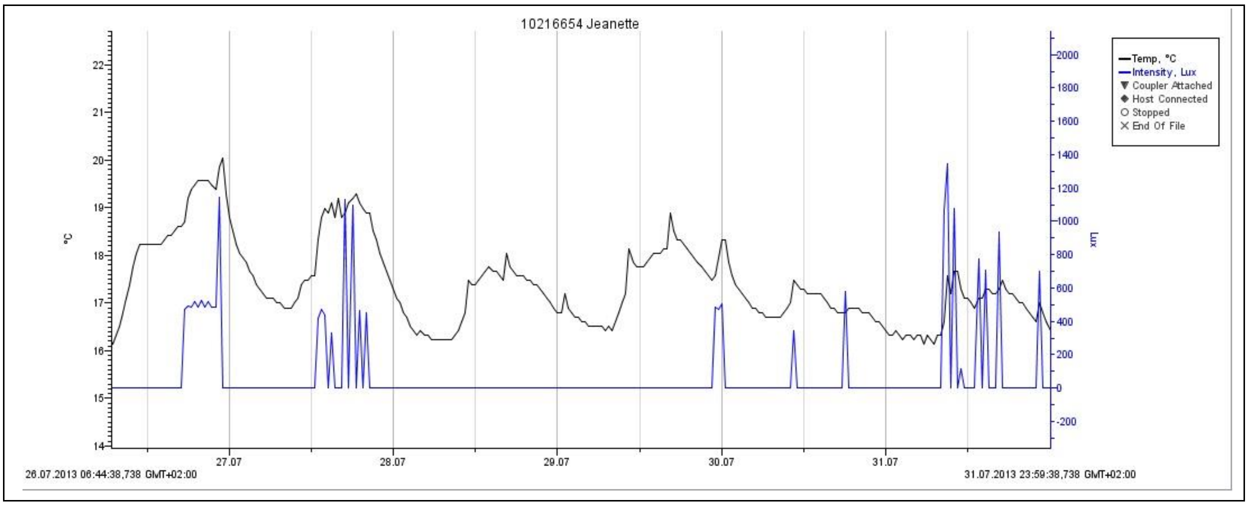


Figure 15 Light and temperature log for the second run in the experiment28/7 to 31/7 -2013. The data logger recorded data every thirty minutes, resulting in an incomplete light log.

7.6.3 Run 3

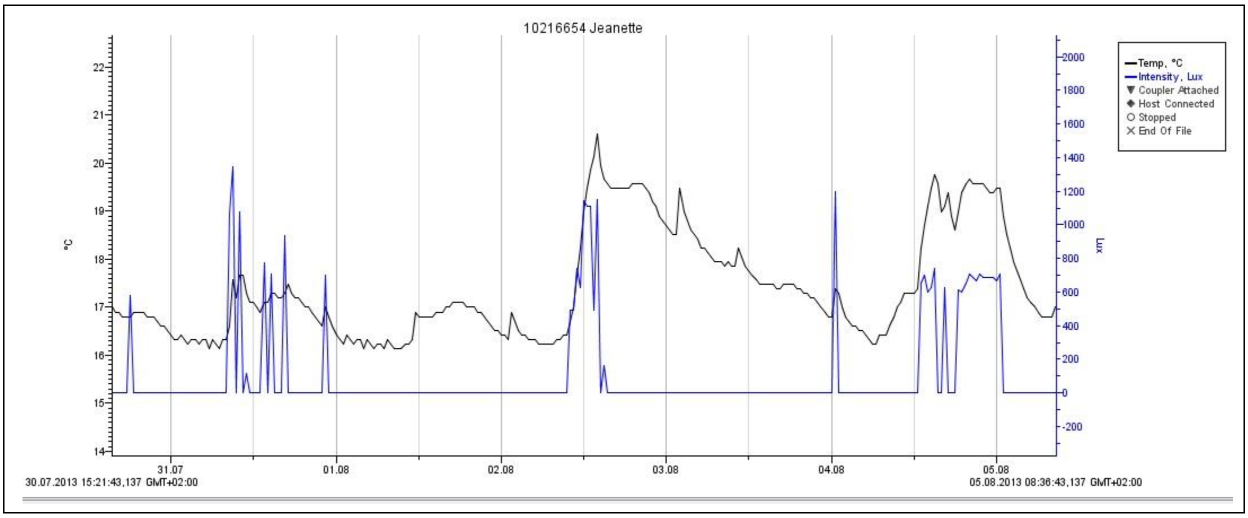


Figure 16 Light and temperature log for the third run in the experiment 1/8 to 5/8 -2013. . The data logger recorded data every thirty minutes, resulting in an incomplete light log.

7.7 Appendix G: R syntax

All analysis were completed with the statistical software package R version 3.0.2 (for windows) (R Core Team, 2013).

7.7.1 R syntax: Growth data

```
sizedist.df <- read.table('/home/sjannipc/dokumenter/masteroppgave/resultater/vekst/size.dist.txt', header=t)

attach(sizedist.df)

jpeg('/home/sjannipc/dokumenter/masteroppgave/resultater/vekst/size.dist.jpg', unit='mm', width=160, height=160, res=600)

par(mar=c(5,5,2,2), cex.lab=1.5, las=1)

hist(length, xlab='length (mm)')

box()

dev.off()

groeth:

vekstforsok.df <-
read.table('/home/sjannipc/dokumenter/masteroppgave/resultater/vekst/vekstforsok.txt', header=T)

attach(vekstforsok.df)

names(vekstforsok.df)

str(vekstforsok.df)

jpeg('/home/sjannipc/dokumenter/masteroppgave/resultater/vekst/vekstforsok.jpg', unit='mm', width=320, height=160, res=600)

par(mar=c(5,5,2,2), cex.lab=1.5, las=1)

plot(Growth~Treatment, axes=F, xlab='Composition of diet', ylab='Size change (mm)')

axis(1, at=c(1,2,3,4,5,6,7,8), labels=c('All components','Only detritus','No chironomids','No detritus','No nano algae','No shellfish diet','No spirulina','Only water'))

axis(2)

text(1,median(Growth[Treatment=='All'], na.rm=T), 'A', pos=3)

text(2,median(Growth[Treatment=='Mud'], na.rm=T), 'B', pos=3)

text(3,median(Growth[Treatment=='No.chironomide'], na.rm=T), 'A C', pos=3)
```

```
text(4,median(Growth[Treatment=='No.mud'], na.rm=T), 'C', pos=3)

text(5,median(Growth[Treatment=='No.nano'], na.rm=T), 'A', pos=3)

text(6,median(Growth[Treatment=='No.shellfish.diet'], na.rm=T), 'A C', pos=3)

text(7,median(Growth[Treatment=='No.spirulina'], na.rm=T), 'A', pos=3)

text(8,median(Growth[Treatment=='Water'], na.rm=T), 'B', pos=3)

box()

dev.off()

library(nlme)

fit.lme <- lme(Growth~Treatment, random=~+1|Dish, na.action='na.omit', data=vekstforsok.df)

anova(fit.lme)

library(multcomp)

Dunnet.test <- glht(fit.lme,linfct=mcp(Treatment='Dunnett'))

TukeyHSD.test <- glht(fit.lme,linfct=mcp(Treatment='Tukey'))

summary(TukeyHSD.test)
```

7.7.2 R syntax distribution experiment 2013

```
petri.df <- read.table('/home/ sjannipc/dokumenter/masteroppgave/resultater/distr/petriforsok.txt', header=T)

petri.df$choice <- ifelse((petri.df$Food+petri.df$Mud)>0, 1, 0)

petri.df$gjorvalg <- as.factor(ifelse((petri.df$Food+petri.df$Mud)>0, 'ja', 'nei'))

attach(petri.df)

names(petri.df)

str(petri.df)


petri23.df <- subset(petri.df, Petri.Exp!='run1')

petri23.df <- droplevels(petri23.df)

attach(petri23.df)

library(MASS)
```

```
fit1.glmm <- glmmPQL(choice~Time, random=~+1|Dish/ID, cor=corAR1(), family=binomial,
data=petri23.df)


jpeg('/home/ sjannipc/dokumenter/masteroppgave/resultater /prob_choosing_substrate.jpg',
unit='mm', width=160, height=160, res=600)

par(mar=c(5,5,2,2), cex.lab=1.5, las=1)

plot(choice~Time, type='n', xlab='Time (hours)', ylab='Proportion found in substate')

rug(jitter(Time[choice==0],40))

rug(jitter(Time[choice==1],40), side=3)

xvals <- seq(min(Time), max(Time), 0.1)

lines(xvals, predict(fit1.glmm, level=0, newdata=data.frame(Time=xvals), type='response'))

dev.off()
```

7.7.3 R syntax distribution 2012

```
names <- c('All components', 'Only detritus', 'No spirulina', 'No nano algae', 'No Shellfish diet', 'No
chironomids', 'No detritus', 'No medium chosen')

observed <- c(40, 50, 32, 35, 35, 37, 16)

expected <- c(1/7, 1/7, 1/7, 1/7, 1/7, 1/7, 1/7)

chisq.test(observed,p=expected)


observed2 <- c(32,16)

expected2 <- c(1/2, 1/2)

chisq.test(observed2,p=expected2)


observed3 <- c(40,50)

expected3 <- c(1/2, 1/2)

chisq.test(observed3,p=expected3)
```

7.8 Appendix H: Data set

7.8.1 Growth experiment

Start 17.08.2010 – 08.10.2012 (53 days)

Treatment	Time (month)	Dish	ID	Lenght	Notes	Meashurd in microscope /25
All	0	a	1	23		0,92
All	1,8	a	1	31		1,24
All	0	a	2	23		0,92
All	1,8	a	2	32		1,28
All	0	a	3	20		0,8
All	1,8	a	3	26		1,04
All	0	b	4	22		0,88
All	1,8	b	4	27		1,08
All	0	b	5	20		0,8
All	1,8	b	5	28		1,12
All	0	b	6	21		0,84
All	1,8	b	6	27		1,08
All	0	c	7	20		0,8
All	1,8	c	7	26		1,04
All	0	c	8	22		0,88
All	1,8	c	8	29		1,16
All	0	c	9	2,1		0,084
All	1,8	c	9	2,7		0,108
All	0	d	10	21		0,84
All	1,8	d	10	28		1,12
All	0	d	11	21		0,84
All	1,8	d	11	28		1,12
All	0	d	12	22		0,88
All	1,8	d	12	29		1,16
All	0	e	13	24		0,96
All	1,8	e	13	27		1,08
All	0	e	14	21		0,84
All	1,8	e	14	26		1,04
All	0	e	15	27		1,08
All	1,8	e	15	32		1,28

All	0	f	16	25		1
All	1,8	f	16	31		1,24
All	0	f	17	26		1,04
All	1,8	f	17	30		1,2
All	0	f	18	25		1
All	1,8	f	18	31		1,24
All	0	g	19	21		0,84
All	1,8	g	19	25		1
All	0	g	20	25		1
All	1,8	g	20	31		1,24
All	0	g	21	23		0,92
All	1,8	g	21	30		1,2
Mud	0	a	22	26		1,04
Mud	1,8	a	22	28		1,12
Mud	0	a	23	24		0,96
Mud	1,8	a	23	28		1,12
Mud	0	a	24	20		0,8
Mud	1,8	a	24	24		0,96
Mud	0	b	25	25		1
Mud	1,8	b	25	25		1
Mud	0	b	26	24		0,96
Mud	1,8	b	26	24		0,96
Mud	0	b	27	23		0,92
Mud	1,8	b	27	25		1
Mud	0	c	28	22		0,88
Mud	1,8	c	28	32		1,28
Mud	0	c	29	26		1,04
Mud	1,8	c	29	30		1,2
Mud	0	c	30	26		1,04
Mud	1,8	c	30	27		1,08
Mud	0	d	31	20		0,8
Mud	1,8	d	31	22		0,88
Mud	0	d	32	18		0,72
Mud	1,8	d	32	21		0,84
Mud	0	d	33	21		0,84
Mud	1,8	d	33	28		1,12
Mud	0	e	34	21		0,84
Mud	1,8	e	34	25		1

Mud	0	e	35	21		0,84
Mud	1,8	e	35	22		0,88
Mud	0	e	36	19		0,76
Mud	1,8	e	36	20		0,8
Mud	0	f	37	22		0,88
Mud	1,8	f	37	25		1
Mud	0	f	38	22		0,88
Mud	1,8	f	38	24		0,96
Mud	0	f	39	24		0,96
Mud	1,8	f	39	25		1
Mud	0	g	40	22		0,88
Mud	1,8	g	40	26		1,04
Mud	0	g	41	24		0,96
Mud	1,8	g	41	28		1,12
Mud	0	g	42	26		1,04
Mud	1,8	g	42	28		1,12
No shellfish diet	0	a	43	22		0,88
No shellfish diet	1,8	a	43	29		1,16
No shellfish diet	0	a	44	28		1,12
No shellfish diet	1,8	a	44	36		1,44
No shellfish diet	0	a	45	24		0,96
No shellfish diet	1,8	a	45	28		1,12
No shellfish diet	0	b	46	23		0,92
No shellfish diet	1,8	b	46	30		1,2
No shellfish diet	0	b	47	19		0,76
No shellfish diet	1,8	b	47	27		1,08
No shellfish diet	0	b	48	19		0,76
No shellfish diet	1,8	b	48	22		0,88
No shellfish diet	0	c	49	22		0,88
No shellfish diet	1,8	c	49	29		1,16
No shellfish diet	0	c	50	23		0,92
No shellfish diet	1,8	c	50	25		1
No shellfish diet	0	c	51	21		0,84
No shellfish diet	1,8	c	51	26		1,04
No shellfish diet	0	d	52	21		0,84
No shellfish diet	1,8	d	52	30		1,2
No shellfish diet	0	d	53	21		0,84
No shellfish diet	1,8	d	53	25		1

No shellfish diet	0	d	54	21		0,84
No shellfish diet	1,8	d	54	29		1,16
No shellfish diet	0	e	55	28		1,12
No shellfish diet	1,8	e	55	28		1,12
No shellfish diet	0	e	56	22		0,88
No shellfish diet	1,8	e	56	NA		NA
No shellfish diet	0	e	57	26		1,04
No shellfish diet	1,8	e	57	30		1,2
No shellfish diet	0	f	58	23		0,92
No shellfish diet	1,8	f	58	32		1,28
No shellfish diet	0	f	59	25		1
No shellfish diet	1,8	f	59	31		1,24
No shellfish diet	0	f	60	21		0,84
No shellfish diet	1,8	f	60	30		1,2
No shellfish diet	0	g	61	25		1
No shellfish diet	1,8	g	61	32		1,28
No shellfish diet	0	g	62	25		1
No shellfish diet	1,8	g	62	33		1,32
No shellfish diet	0	g	63	25		1
No shellfish diet	1,8	g	63	32		1,28
No nano	0	a	64	21		0,84
No nano	1,8	a	64	25		1
No nano	0	a	65	22		0,88
No nano	1,8	a	65	26		1,04
No nano	0	a	66	17		0,68
No nano	1,8	a	66	21		0,84
No nano	0	b	67	20		0,8
No nano	1,8	b	67	23		0,92
No nano	0	b	68	20		0,8
No nano	1,8	b	68	23		0,92
No nano	0	b	69	22		0,88
No nano	1,8	b	69	27		1,08
No nano	0	c	70	21		0,84
No nano	1,8	c	70	26		1,04
No nano	0	c	71	21		0,84
No nano	1,8	c	71	26		1,04
No nano	0	c	72	27		1,08
No nano	1,8	c	72	31		1,24

No nano	0	d	73	22		0,88
No nano	1,8	d	73	27		1,08
No nano	0	d	74	21		0,84
No nano	1,8	d	74	25		1
No nano	0	d	75	22		0,88
No nano	1,8	d	75	26		1,04
No nano	0	e	76	18		0,72
No nano	1,8	e	76	26		1,04
No nano	0	e	77	21		0,84
No nano	1,8	e	77	30		1,2
No nano	0	e	78	22		0,88
No nano	1,8	e	78	26		1,04
No nano	0	f	79	21		0,84
No nano	1,8	f	79	27		1,08
No nano	0	f	80	25		1
No nano	1,8	f	80	30		1,2
No nano	0	f	81	20		0,8
No nano	1,8	f	81	29		1,16
No nano	0	g	82	22		0,88
No nano	1,8	g	82	26		1,04
No nano	0	g	83	22		0,88
No nano	1,8	g	83	30		1,2
No nano	0	g	84	21		0,84
No nano	1,8	g	84	30		1,2
No spirulina	0	a	85	23		0,92
No spirulina	1,8	a	85	NA		NA
No spirulina	0	a	86	22		0,88
No spirulina	1,8	a	86	27		1,08
No spirulina	0	a	87	23		0,92
No spirulina	1,8	a	87	28		1,12
No spirulina	0	b	88	22		0,88
No spirulina	1,8	b	88	25		1
No spirulina	0	b	89	20		0,8
No spirulina	1,8	b	89	27		1,08
No spirulina	0	b	90	21		0,84
No spirulina	1,8	b	90	25		1
No spirulina	0	c	91	23		0,92
No spirulina	1,8	c	91	28		1,12

No spirulina	0	c	92	20		0,8
No spirulina	1,8	c	92	29		1,16
No spirulina	0	c	93	25		1
No spirulina	1,8	c	93	29		1,16
No spirulina	0	d	94	23		0,92
No spirulina	1,8	d	94	28		1,12
No spirulina	0	d	95	21		0,84
No spirulina	1,8	d	95	28		1,12
No spirulina	0	d	96	23		0,92
No spirulina	1,8	d	96	29		1,16
No spirulina	0	e	97	23		0,92
No spirulina	1,8	e	97	26		1,04
No spirulina	0	e	98	20		0,8
No spirulina	1,8	e	98	28		1,12
No spirulina	0	e	99	25		1
No spirulina	1,8	e	99	30		1,2
No spirulina	0	f	100	25		1
No spirulina	1,8	f	100	29		1,16
No spirulina	0	f	101	24		0,96
No spirulina	1,8	f	101	28		1,12
No spirulina	0	f	102	21		0,84
No spirulina	1,8	f	102	25		1
No spirulina	0	g	103	23		0,92
No spirulina	1,8	g	103	30		1,2
No spirulina	0	g	104	22		0,88
No spirulina	1,8	g	104	25		1
No spirulina	0	g	105	21		0,84
No spirulina	1,8	g	105	25		1
No chironomide	0	a	106	20		0,8
No chironomide	1,8	a	106	28		1,12
No chironomide	0	a	107	24		0,96
No chironomide	1,8	a	107	24		0,96
No chironomide	0	a	108	21		0,84
No chironomide	1,8	a	108	26		1,04
No chironomide	0	b	109	23		0,92
No chironomide	1,8	b	109	30		1,2
No chironomide	0	b	110	22		0,88
No chironomide	1,8	b	110	27		1,08

No chironomide	0	b	111	22		0,88
No chironomide	1,8	b	111	26		1,04
No chironomide	0	c	112	21		0,84
No chironomide	1,8	c	112	26		1,04
No chironomide	0	c	113	25		1
No chironomide	1,8	c	113	26		1,04
No chironomide	0	c	114	25		1
No chironomide	1,8	c	114	30		1,2
No chironomide	0	d	115	22		0,88
No chironomide	1,8	d	115	31		1,24
No chironomide	0	d	116	20		0,8
No chironomide	1,8	d	116	30		1,2
No chironomide	0	d	117	21		0,84
No chironomide	1,8	d	117	31		1,24
No chironomide	0	e	118	21		0,84
No chironomide	1,8	e	118	31		1,24
No chironomide	0	e	119	22		0,88
No chironomide	1,8	e	119	33		1,32
No chironomide	0	e	120	22		0,88
No chironomide	1,8	e	120	26		1,04
No chironomide	0	f	121	24		0,96
No chironomide	1,8	f	121	28		1,12
No chironomide	0	f	122	25		1
No chironomide	1,8	f	122	32		1,28
No chironomide	0	f	123	22		0,88
No chironomide	1,8	f	123	30		1,2
No chironomide	0	g	124	18		0,72
No chironomide	1,8	g	124	30		1,2
No chironomide	0	g	125	26		1,04
No chironomide	1,8	g	125	33		1,32
No chironomide	0	g	126	23		0,92
No chironomide	1,8	g	126	32		1,28
No mud	0	a	127	22		0,88
No mud	1,8	a	127	31		1,24
No mud	0	a	128	22		0,88
No mud	1,8	a	128	29		1,16
No mud	0	a	129	23		0,92
No mud	1,8	a	129	31		1,24

No mud	0	b	130	22		0,88
No mud	1,8	b	130	30		1,2
No mud	0	b	131	22		0,88
No mud	1,8	b	131	30		1,2
No mud	0	b	132	16		0,64
No mud	1,8	b	132	27		1,08
No mud	0	c	133	20		0,8
No mud	1,8	c	133	29		1,16
No mud	0	c	134	28		1,12
No mud	1,8	c	134	32		1,28
No mud	0	c	135	22		0,88
No mud	1,8	c	135	28		1,12
No mud	0	d	136	23		0,92
No mud	1,8	d	136	31		1,24
No mud	0	d	137	22		0,88
No mud	1,8	d	137	31		1,24
No mud	0	d	138	23		0,92
No mud	1,8	d	138	30		1,2
No mud	0	e	139	20		0,8
No mud	1,8	e	139	NA		NA
No mud	0	e	140	22		0,88
No mud	1,8	e	140	31		1,24
No mud	0	e	141	20		0,8
No mud	1,8	e	141	28		1,12
No mud	0	f	142	25		1
No mud	1,8	f	142	31		1,24
No mud	0	f	143	26		1,04
No mud	1,8	f	143	34		1,36
No mud	0	f	144	25		1
No mud	1,8	f	144	31		1,24
No mud	0	g	145	25		1
No mud	1,8	g	145	32		1,28
No mud	0	g	146	16		0,64
No mud	1,8	g	146	27		1,08
No mud	0	g	147	25		1
No mud	1,8	g	147	34		1,36
Water	0	a	148	24		0,96
Water	1,8	a	148	NA		NA

Water	0	a	149	21		0,84
Water	1,8	a	149	21		0,84
Water	0	a	150	21		0,84
Water	1,8	a	150	28		1,12
Water	0	b	151	21		0,84
Water	1,8	b	151	25		1
Water	0	b	152	22		0,88
Water	1,8	b	152	NA		NA
Water	0	b	153	23		0,92
Water	1,8	b	153	NA		NA
Water	0	c	154	24		0,96
Water	1,8	c	154	25		1
Water	0	c	155	21		0,84
Water	1,8	c	155	21		0,84
Water	0	c	156	24		0,96
Water	1,8	c	156	24		0,96
Water	0	d	157	22		0,88
Water	1,8	d	157	NA		NA
Water	0	d	158	21		0,84
Water	1,8	d	158	27		1,08
Water	0	d	159	23		0,92
Water	1,8	d	159	23		0,92
Water	0	e	160	23		0,92
Water	1,8	e	160	25		1
Water	0	e	161	23		0,92
Water	1,8	e	161	23		0,92
Water	0	e	162	25		1
Water	1,8	e	162	25		1
Water	0	f	163	20		0,8
Water	1,8	f	163	20		0,8
Water	0	f	164	25		1
Water	1,8	f	164	NA		NA
Water	0	f	165	20		0,8
Water	1,8	f	165	21		0,84
Water	0	g	166	18		0,72
Water	1,8	g	166	NA		NA
Water	0	g	167	24		0,96
Water	1,8	g	167	24		0,96

Water	0	g	168	23		0,92
Water	1,8	g	168	23		0,92

7.8.2 Distribution experiment 2012

0 = Mussel did not select a substratum

1= Mussel selected a substratum

				Treatment	Treatment	Treatment	Treatment	Treatment	Treatment	Treatment	Location	size in microscope
Date started	Run	Bowl	Ind	1- All	2-mud	3-spirulina	4-nano	5-shellfish	6- Chr	7-food only	bowl	NA
17.06.2012	1	A	1	0	0	0	0	0	0	0	1	NA
17.06.2012	1	A	2	0	1	0	0	0	0	0	0	NA
17.06.2012	1	A	3	0	0	0	0	0	0	0	1	NA
17.06.2012	1	A	4	0	0	0	0	0	0	0	1	NA
17.06.2012	1	A	5	0	0	0	0	0	0	0	1	NA
17.06.2012	1	B	1	0	0	0	0	0	0	0	1	NA
17.06.2012	1	B	2	0	1	0	0	0	0	0	0	NA
17.06.2012	1	B	3	0	0	0	0	0	1	0	0	NA
17.06.2012	1	B	4	0	0	0	0	0	0	0	1	NA
17.06.2012	1	B	5	0	0	0	0	0	0	0	1	NA
17.06.2012	1	C	1	1	0	0	0	0	0	0	0	NA
17.06.2012	1	C	2	0	0	1	0	0	0	0	1	NA
17.06.2012	1	C	3	0	0	0	0	0	0	0	0	NA
17.06.2012	1	C	4	0	0	0	0	0	0	0	1	NA
17.06.2012	1	C	5	0	0	0	0	0	0	0	1	NA
17.06.	1	D	1	0	0	0	0	1	0	0	0	NA

2012												
17.06. 2012	1	D	2	0	0	0	0	0	1	0	0	NA
17.06. 2012	1	D	3	0	0	0	0	1	0	0	0	NA
17.06. 2012	1	D	4	0	0	0	0	0	0	0	1	NA
17.06. 2012	1	D	5	0	0	0	0	0	0	0	1	NA
17.06. 2012	1	E	1	1	0	0	0	0	0	0	0	NA
17.06. 2012	1	E	2	0	0	1	0	0	0	0	0	NA
17.06. 2012	1	E	3	0	0	0	1	0	0	0	0	NA
17.06. 2012	1	E	4	0	0	0	0	0	1	0	0	NA
17.06. 2012	1	E	5	0	0	0	0	0	0	0	1	NA
17.06. 2012	1	F	1	1	0	0	0	0	0	0	0	NA
17.06. 2012	1	F	2	0	1	0	0	0	0	0	0	NA
17.06. 2012	1	F	3	0	0	0	1	0	0	0	0	NA
17.06. 2012	1	F	4	0	0	0	0	0	0	0	0	NA
17.06. 2012	1	F	5	0	0	0	0	0	0	0	na	NA
17.06. 2012	1	G	1	1	0	0	0	0	0	0	0	NA
17.06. 2012	1	G	2	0	0	0	0	0	0	0	na	NA
17.06. 2012	1	G	3	0	0	0	0	0	0	0	na	NA
17.06. 2012	1	G	4	0	0	0	0	0	0	0	na	NA
17.06. 2012	1	G	5	0	0	0	0	0	0	0	na	NA
17.06. 2012	1	H	1	0	0	1	0	0	0	0	0	NA
17.06. 2012	1	H	2	0	0	0	0	0	1	0	0	NA
17.06. 2012	1	H	3	0	0	0	0	0	0	0	1	NA
17.06. 2012	1	H	4	0	0	0	0	0	0	0	1	NA
17.06. 2012	1	H	5	0	0	0	0	0	0	0	1	NA
17.06. 2012	1	I	1	1	0	0	0	0	0	0	0	NA

17.06. 2012	1	I	2	0	1	0	0	0	0	0	0	NA
17.06. 2012	1	I	3	0	0	0	0	1	0	0	0	NA
17.06. 2012	1	I	4	0	0	0	0	0	0	0	1	NA
17.06. 2012	1	I	5	0	0	0	0	0	0	0	1	NA
17.06. 2012	1	J	1	0	0	1	0	0	0	0	0	NA
17.06. 2012	1	J	2	0	0	0	0	0	1	0	0	NA
17.06. 2012	1	J	3	0	0	1	0	0	0	0	0	NA
17.06. 2012	1	J	4	0	0	0	0	0	0	0	1	NA
17.06. 2012	1	J	5	0	0	0	0	0	0	0	1	NA
21.06. 2012	2	A	1	0	0	0	0	1	0	0	0	NA
21.06. 2012	2	A	2	0	0	0	0	0	0	0	1	NA
21.06. 2012	2	A	3	0	0	0	0	0	0	0	1	NA
21.06. 2012	2	A	4	0	0	0	0	0	0	0	1	NA
21.06. 2012	2	A	5	NA	NA	NA	NA	NA	NA	NA	NA	NA
21.06. 2012	2	B	1	0	1	0	0	0	0	0	0	NA
21.06. 2012	2	B	2	0	0	0	0	0	1	0	0	NA
21.06. 2012	2	B	3	0	0	0	0	0	1	0	0	NA
21.06. 2012	2	B	4	0	0	0	0	0	0	0	1	NA
21.06. 2012	2	B	5	0	0	0	0	0	0	0	1	NA
21.06. 2012	2	C	1	0	1	0	0	0	0	0	0	NA
21.06. 2012	2	C	2	0	0	0	0	1	0	0	0	NA
21.06. 2012	2	C	3	0	0	0	0	1	0	0	0	NA
21.06. 2012	2	C	4	0	0	0	0	0	0	0	1	NA
21.06. 2012	2	C	5	0	0	0	0	0	0	0	1	NA
21.06. 2012	2	D	1	1	0	0	0	0	0	0	0	NA
21.06.	2	D	2	1	0	0	0	0	0	0	0	NA

2012												
21.06.2012	2	D	3	1	0	0	0	0	0	0	0	NA
21.06.2012	2	D	4	0	0	0	1	0	0	0	0	NA
21.06.2012	2	D	5	0	0	0	0	0	0	0	1	NA
21.06.2012	2	E	1	1	0	0	0	0	0	0	0	NA
21.06.2012	2	E	2	NA	NA	NA	NA	NA	NA	NA	NA	NA
21.06.2012	2	E	3	0	0	1	0	0	0	0	0	NA
21.06.2012	2	E	4	0	0	0	1	0	0	0	0	NA
21.06.2012	2	E	5	0	0	0	0	0	0	0	1	NA
21.06.2012	2	F	1	0	0	0	0	1	0	0	0	NA
21.06.2012	2	F	2	0	0	0	0	1	0	0	0	NA
21.06.2012	2	F	3	0	0	0	0	0	0	0	1	NA
21.06.2012	2	F	4	0	0	0	0	0	0	0	1	NA
21.06.2012	2	F	5	NA	NA	NA	NA	NA	NA	NA	NA	NA
21.06.2012	2	G	1	0	0	1	0	0	0	0	0	NA
21.06.2012	2	G	2	0	0	0	1	0	0	0	0	NA
21.06.2012	2	G	3	0	0	0	0	1	0	0	0	NA
21.06.2012	2	G	4	0	0	0	0	0	0	0	1	NA
21.06.2012	2	G	5	0	0	0	0	0	0	0	1	
21.06.2012	2	H	1	0	0	1	0	0	0	0	0	NA
21.06.2012	2	H	2	0	0	0	1	0	0	0	0	NA
21.06.2012	2	H	3	0	0	0	0	1	0	0	0	NA
21.06.2012	2	H	4	0	0	0	0	1	0	0	0	NA
21.06.2012	2	H	5	0	0	0	0	0	1	0	0	NA
21.06.2012	2	I	1	1	0	0	0	0	0	0	0	NA
21.06.2012	2	I	2	0	1	0	0	0	0	0	0	NA

21.06. 2012	2	I	3	0	0	0	0	0	1	0	0	NA
21.06. 2012	2	I	4	0	0	0	0	0	1	0	0	NA
21.06. 2012	2	I	5	0	0	0	0	0	0	1	0	NA
21.06. 2012	2	J	1	0	0	0	1	0	0	0	0	NA
21.06. 2012	2	J	2	0	0	0	0	0	1	0	0	NA
21.06. 2012	2	J	3	0	0	0	0	0	0	0	1	NA
21.06. 2012	2	J	4	0	0	0	0	0	0	0	1	NA
21.06. 2012	2	J	5	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	A	1	1	0	0	0	0	0	0	0	NA
25.06. 2012	3	A	2	1	0	0	0	0	0	0	0	NA
25.06. 2012	3	A	3	0	1	0	0	0	0	0	0	NA
25.06. 2012	3	A	4	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	A	5	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	B	1	0	1	0	0	0	0	0	0	NA
25.06. 2012	3	B	2	0	1	0	0	0	0	0	0	NA
25.06. 2012	3	B	3	0	0	0	0	1	0	0	0	NA
25.06. 2012	3	B	4	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	B	5	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	C	1	0	1	0	0	0	0	0	0	NA
25.06. 2012	3	C	2	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	C	3	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	C	4	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	C	5	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	D	1	0	1	0	0	0	0	0	0	NA
25.06. 2012	3	D	2	0	0	0	1	0	0	0	0	NA
25.06.	3	D	3	0	0	0	0	0	1	0	0	NA

2012												
25.06. 2012	3	D	4	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	D	5	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	E	1	0	0	0	0	1	0	0	0	NA
25.06. 2012	3	E	2	0	0	0	0	1	0	0	0	NA
25.06. 2012	3	E	3	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	E	4	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	E	5	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	F	1	0	1	0	0	0	0	0	0	NA
25.06. 2012	3	F	2	0	0	0	0	0	0	1	0	NA
25.06. 2012	3	F	3	0	0	0	0	0	0	1	0	NA
25.06. 2012	3	F	4	0	0	0	0	0	0	1	0	NA
25.06. 2012	3	F	5	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	G	1	0	0	0	0	0	1	0	0	NA
25.06. 2012	3	G	2	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	G	3	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	G	4	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	G	5	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	H	1	1	0	0	0	0	0	0	0	NA
25.06. 2012	3	H	2	0	0	0	1	0	0	0	0	NA
25.06. 2012	3	H	3	0	0	0	0	0	1	0	0	NA
25.06. 2012	3	H	4	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	H	5	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	I	1	0	0	0	0	1	0	0	0	NA
25.06. 2012	3	I	2	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	I	3	0	0	0	0	0	0	0	1	NA

25.06. 2012	3	I	4	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	I	5	0	0	0	0	0	0	0	1	NA
25.06. 2012	3	J	1	0	1	0	0	0	0	0	0	NA
25.06. 2012	3	J	2	0	0	0	1	0	0	0	0	NA
25.06. 2012	3	J	3	0	0	0	1	0	0	0	0	NA
25.06. 2012	3	J	4	0	0	0	0	1	0	0	0	NA
25.06. 2012	3	J	5	0	0	0	0	0	1	0	0	NA
29.06. 2012	4	A	1	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	A	2	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	A	3	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	A	4	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	A	5	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	B	1	0	1	0	0	0	0	0	0	NA
29.06. 2012	4	B	2	0	0	1	0	0	0	0	0	NA
29.06. 2012	4	B	3	0	0	0	0	0	1	0	0	NA
29.06. 2012	4	B	4	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	B	5	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	C	1	1	0	0	0	0	0	0	0	NA
29.06. 2012	4	C	2	0	0	0	1	0	0	0	0	NA
29.06. 2012	4	C	3	0	0	0	1	0	0	0	0	NA
29.06. 2012	4	C	4	0	0	0	1	0	0	0	0	NA
29.06. 2012	4	C	5	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	D	1	0	0	1	0	0	0	0	0	NA
29.06. 2012	4	D	2	0	0	1	0	0	0	0	0	NA
29.06. 2012	4	D	3	0	0	0	1	0	0	0	0	NA
29.06.	4	D	4	0	0	0	1	0	0	0	0	NA

2012												
29.06. 2012	4	D	5	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	E	1	1	0	0	0	0	0	0	0	NA
29.06. 2012	4	E	2	0	1	0	0	0	0	0	0	NA
29.06. 2012	4	E	3	0	0	1	0	0	0	0	0	NA
29.06. 2012	4	E	4	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	E	5	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	F	1	0	1	0	0	0	0	0	0	NA
29.06. 2012	4	F	2	0	0	0	0	1	0	0	0	NA
29.06. 2012	4	F	3	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	F	4	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	F	5	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	G	1	0	0	1	0	0	0	0	0	NA
29.06. 2012	4	G	2	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	G	3	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	G	4	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	G	5	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	H	1	1	0	0	0	0	0	0	0	NA
29.06. 2012	4	H	2	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	H	3	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	H	4	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	H	5	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	I	1	1	0	0	0	0	0	0	0	NA
29.06. 2012	4	I	2	1	0	0	0	0	0	0	0	NA
29.06. 2012	4	I	3	0	1	0	0	0	0	0	0	NA
29.06. 2012	4	I	4	0	0	0	0	0	0	0	1	NA

29.06. 2012	4	I	5	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	J	1	0	1	0	0	0	0	0	0	NA
29.06. 2012	4	J	2	0	0	1	0	0	0	0	0	NA
29.06. 2012	4	J	3	0	0	0	0	1	0	0	0	NA
29.06. 2012	4	J	4	0	0	0	0	0	0	0	1	NA
29.06. 2012	4	J	5	0	0	0	0	0	0	0	1	NA
03.07. 2012	5	A	1	1	0	0	0	0	0	0	0	1,9
03.07. 2012	5	A	2	0	0	0	1	0	0	0	0	2
03.07. 2012	5	A	3	0	0	0	1	0	0	0	0	2,1
03.07. 2012	5	A	4	0	0	0	0	0	1	0	0	2
03.07. 2012	5	A	5	0	0	0	0	0	0	0	1	1,8
03.07. 2012	5	B	1	0	0	0	0	0	0	0	1	2
03.07. 2012	5	B	2	1	0	0	0	0	0	0	0	2,2
03.07. 2012	5	B	3	0	1	0	0	0	0	0	0	2
03.07. 2012	5	B	4	0	0	0	0	0	0	1	0	2,1
03.07. 2012	5	B	5	0	0	0	0	0	0	0	1	1,9
03.07. 2012	5	C	1	0	0	1	0	0	0	0	0	2
03.07. 2012	5	C	2	0	0	0	0	0	1	0	0	2
03.07. 2012	5	C	3	0	0	0	0	0	0	1	0	1,8
03.07. 2012	5	C	4	0	0	0	0	0	0	0	1	1,8
03.07. 2012	5	C	5	0	0	0	0	0	0	0	1	1,9
03.07. 2012	5	D	1	0	0	0	0	0	0	1	0	2,2
03.07. 2012	5	D	2	0	0	0	0	0	0	1	0	2
03.07. 2012	5	D	3	0	0	0	0	0	0	0	1	1,9
03.07. 2012	5	D	4	0	0	0	0	0	0	0	1	1,8
03.07.	5	D	5	0	0	0	0	0	0	0	1	1,9

2012												
03.07. 2012	5	E	1	0	0	0	0	1	0	0	0	1,9
03.07. 2012	5	E	2	0	0	0	0	1	0	0	0	1,6
03.07. 2012	5	E	3	0	0	0	0	1	0	0	0	1,9
03.07. 2012	5	E	4	0	0	0	0	0	0	0	1	1,9
03.07. 2012	5	E	5	0	0	0	0	0	0	0	1	1,9
03.07. 2012	5	F	1	0	1	0	0	0	0	0	0	2
03.07. 2012	5	F	2	0	1	0	0	0	0	0	0	2,1
03.07. 2012	5	F	3	0	1	0	0	0	0	0	0	2
03.07. 2012	5	F	4	0	0	0	1	0	0	0	0	1,9
03.07. 2012	5	F	5	0	0	0	0	0	0	0	1	2,2
03.07. 2012	5	G	1	0	1	0	0	0	0	0	0	1,7
03.07. 2012	5	G	2	0	0	1	0	0	0	0	0	2
03.07. 2012	5	G	3	0	0	0	0	0	0	0	1	2
03.07. 2012	5	G	4	0	0	0	0	0	0	0	1	2
03.07. 2012	5	G	5	0	0	0	0	0	0	0	1	2,1
03.07. 2012	5	H	1	0	1	0	0	0	0	0	0	1,9
03.07. 2012	5	H	2	0	0	0	0	0	1	0	0	1,8
03.07. 2012	5	H	3	0	0	0	0	0	0	1	0	1,8
03.07. 2012	5	H	4	0	0	0	0	0	0	0	1	1,9
03.07. 2012	5	H	5	0	0	0	0	0	0	0	1	2,2
03.07. 2012	5	I	1	0	0	0	0	0	0	0	1	2
03.07. 2012	5	I	2	0	0	0	0	0	0	0	1	1.9
03.07. 2012	5	I	3	0	0	0	0	0	0	0	1	1,8
03.07. 2012	5	I	4	0	0	0	0	0	0	0	1	1,6
03.07. 2012	5	I	5	0	0	0	0	0	0	0	1	1,9

03.07. 2012	5	J	1	0	1	0	0	0	0	0	0	2
03.07. 2012	5	J	2	0	1	0	0	0	0	0	0	2
03.07. 2012	5	J	3	0	0	0	0	0	1	0	0	2,1
03.07. 2012	5	J	4	0	0	0	0	0	1	0	0	2
03.07. 2012	5	J	5	0	0	0	0	0	0	0	1	2
03.07. 2012	6	A	1	0	0	0	1	0	0	0	0	2,2
03.07. 2012	6	A	2	0	0	1	0	0	0	0	0	2,1
03.07. 2012	6	A	3	0	0	0	0	0	0	0	1	2,1
03.07. 2012	6	A	4	0	0	0	0	0	0	0	1	2
03.07. 2012	6	A	5	0	0	0	0	0	0	0	1	1,9
03.07. 2012	6	B	1	0	0	0	0	0	1	0	0	2,2
03.07. 2012	6	B	2	0	0	0	0	0	0	0	1	2
03.07. 2012	6	B	3	0	0	0	0	0	0	0	1	2,2
03.07. 2012	6	B	4	0	0	0	0	0	0	0	1	2
03.07. 2012	6	B	5	0	0	0	0	0	0	0	1	1,8
03.07. 2012	6	C	1	1	0	0	0	0	0	0	0	2,1
03.07. 2012	6	C	2	0	0	1	0	0	0	0	0	2
03.07. 2012	6	C	3	0	0	0	0	0	0	0	1	2,1
03.07. 2012	6	C	4	0	0	0	0	0	0	0	1	1,7
03.07. 2012	6	C	5	0	0	0	0	0	0	0	1	1,9
03.07. 2012	6	D	1	1	0	0	0	0	0	0	0	0
03.07. 2012	6	D	2	0	0	1	0	0	0	0	0	1,8
03.07. 2012	6	D	3	0	0	1	0	0	0	0	0	2,1
03.07. 2012	6	D	4	0	0	0	0	0	0	0	1	2
03.07. 2012	6	D	5	0	0	0	0	0	0	0	1	2,1
03.07.	6	E	1	0	1	0	0	0	0	0	0	2

2012												
03.07. 2012	6	E	2	0	0	0	0	0	0	0	1	2,2
03.07. 2012	6	E	3	0	0	0	0	0	0	0	1	2,2
03.07. 2012	6	E	4	0	0	0	0	0	0	0	1	1,9
03.07. 2012	6	E	5	0	0	0	0	0	0	0	1	2
03.07. 2012	6	F	1	1	0	0	0	0	0	0	0	1,9
03.07. 2012	6	F	2	1	0	0	0	0	0	0	0	1,8
03.07. 2012	6	F	3	0	0	0	0	0	0	0	1	1,7
03.07. 2012	6	F	4	0	0	0	0	0	0	0	1	1,8
03.07. 2012	6	F	5	0	0	0	0	0	0	0	1	1,9
03.07. 2012	6	G	1	0	0	0	0	0	0	0	1	1,2
03.07. 2012	6	G	2	0	0	0	0	0	0	0	1	1,8
03.07. 2012	6	G	3	0	0	0	0	0	0	0	1	1,5
03.07. 2012	6	G	4	0	0	0	0	0	0	0	1	1,8
03.07. 2012	6	G	5	0	0	0	0	0	0	0	1	1,9
03.07. 2012	6	H	1	0	0	0	0	0	0	0	1	1,8
03.07. 2012	6	H	2	0	0	0	0	0	0	0	1	1,3
03.07. 2012	6	H	3	0	0	0	0	0	0	0	1	2
03.07. 2012	6	H	4	0	0	0	0	0	0	0	1	2
03.07. 2012	6	H	5	0	0	0	0	0	0	0	1	2
03.07. 2012	6	I	1	0	0	0	0	0	0	0	1	1,5
03.07. 2012	6	I	2	0	0	0	0	0	0	0	1	1,9
03.07. 2012	6	I	3	0	0	0	0	0	0	0	1	2
03.07. 2012	6	I	4	0	0	0	0	0	0	0	1	1,4
03.07. 2012	6	I	5	0	0	0	0	0	0	0	1	1,7
03.07. 2012	6	J	1	0	0	0	0	0	0	1	0	1,7

03.07. 2012	6	J	2	0	0	0	0	0	0	0	1	2,1
03.07. 2012	6	J	3	0	0	0	0	0	0	0	1	1,8
03.07. 2012	6	J	4	0	0	0	0	0	0	0	1	2,1
03.07. 2012	6	J	5	0	0	0	0	0	0	0	1	2
07.07. 2012	7	A	1	0	0	0	1	0	0	0	0	2,2
07.07. 2012	7	A	2	0	0	0	0	0	1	0	0	2,4
07.07. 2012	7	A	3	0	0	0	0	0	0	0	1	2,1
07.07. 2012	7	A	4	0	0	0	0	0	0	0	1	2,4
07.07. 2012	7	A	5	0	0	0	0	0	0	0	1	2,4
07.07. 2012	7	B	1	0	0	0	0	0	0	0	1	2,3
07.07. 2012	7	B	2	0	0	0	0	0	0	0	1	2,9
07.07. 2012	7	B	3	0	0	0	0	0	0	0	1	2
07.07. 2012	7	B	4	0	0	0	0	0	0	0	1	2,4
07.07. 2012	7	B	5	0	0	0	0	0	0	0	1	2,2
07.07. 2012	7	C	1	1	0	0	0	0	0	0	0	2
07.07. 2012	7	C	2	0	0	0	0	0	1	0	0	1,8
07.07. 2012	7	C	3	0	0	0	0	0	0	1	0	1,8
07.07. 2012	7	C	4	0	0	0	0	0	0	0	1	1,7
07.07. 2012	7	C	5	0	0	0	0	0	0	0	1	1,7
07.07. 2012	7	D	1	0	0	0	0	1	0	0	0	2,6
07.07. 2012	7	D	2	0	0	0	0	1	0	0	0	2,6
07.07. 2012	7	D	3	0	0	0	0	0	0	0	1	2,4
07.07. 2012	7	D	4	0	0	0	0	0	0	0	1	2,5
07.07. 2012	7	D	5	0	0	0	0	0	0	0	1	2,5
07.07. 2012	7	E	1	1	0	0	0	0	0	0	0	2,4
07.07.	7	E	2	0	1	0	0	0	0	0	0	2,4

2012												
07.07. 2012	7	E	3	0	0	0	0	0	0	0	1	2,3
07.07. 2012	7	E	4	0	0	0	0	0	0	0	1	2,5
07.07. 2012	7	E	5	0	0	0	0	0	0	0	1	2,3
07.07. 2012	7	F	1	0	0	0	0	0	0	0	1	2,4
07.07. 2012	7	F	2	0	0	0	0	0	0	0	1	2,4
07.07. 2012	7	F	3	0	0	0	0	0	0	0	1	2,5
07.07. 2012	7	F	4	0	0	0	0	0	0	0	1	2,3
07.07. 2012	7	F	5	0	0	0	0	0	0	0	1	2,3
07.07. 2012	7	G	1	0	0	0	0	0	1	0	0	2,1
07.07. 2012	7	G	2	0	0	0	0	0	1	0	0	2,2
07.07. 2012	7	G	3	0	0	0	0	0	0	0	1	2,2
07.07. 2012	7	G	4	0	0	0	0	0	0	0	1	2,5
07.07. 2012	7	G	5	0	0	0	0	0	0	0	1	2,3
07.07. 2012	7	H	1	0	1	0	0	0	0	0	0	2,6
07.07. 2012	7	H	2	0	0	0	0	0	0	1	0	2,3
07.07. 2012	7	H	3	0	0	0	0	0	0	0	1	2,4
07.07. 2012	7	H	4	0	0	0	0	0	0	0	1	2,3
07.07. 2012	7	H	5	0	0	0	0	0	0	0	1	2,5
07.07. 2012	7	I	1	0	0	0	0	0	0	0	1	2,5
07.07. 2012	7	I	2	0	0	0	0	0	0	0	1	1,9
07.07. 2012	7	I	3	0	0	0	0	0	0	0	1	2,5
07.07. 2012	7	I	4	0	0	0	0	0	0	0	1	2,6
07.07. 2012	7	I	5	0	0	0	0	0	0	0	1	2,1
07.07. 2012	7	J	1	0	1	0	0	0	0	0	0	2,5
07.07. 2012	7	J	2	0	0	0	0	0	0	0	1	2,4

07.07. 2012	7	J	3	0	0	0	0	0	0	0	1	1,8
07.07. 2012	7	J	4	0	0	0	0	0	0	0	1	2,4
07.07. 2012	7	J	5	0	0	0	0	0	0	0	1	2,3
11.07. 2012	8	A	1	0	0	0	0	1	0	0	0	2,2
11.07. 2012	8	A	2	0	0	0	0	0	0	1	0	2,4
11.07. 2012	8	A	3	0	0	0	0	0	0	0	1	2,2
11.07. 2012	8	A	4	0	0	0	0	0	0	0	1	2,1
11.07. 2012	8	A	5	0	0	0	0	0	0	0	1	2,1
11.07. 2012	8	B	1	0	0	0	1	0	0	0	0	2,4
11.07. 2012	8	B	2	0	0	0	0	1	0	0	0	2,2
11.07. 2012	8	B	3	0	0	0	0	0	0	0	1	2,2
11.07. 2012	8	B	4	0	0	0	0	0	0	0	1	2,3
11.07. 2012	8	B	5	0	0	0	0	0	0	0	1	2,4
11.07. 2012	8	C	1	0	0	0	0	0	0	1	0	2,1
11.07. 2012	8	C	2	0	0	0	0	0	0	0	1	2,5
11.07. 2012	8	C	3	0	0	0	0	0	0	0	1	1,7
11.07. 2012	8	C	4	0	0	0	0	0	0	0	1	2,4
11.07. 2012	8	C	5	0	0	0	0	0	0	0	1	2,2
11.07. 2012	8	D	1	0	1	0	0	0	0	0	0	2,4
11.07. 2012	8	D	2	0	0	1	0	0	0	0	0	2,1
11.07. 2012	8	D	3	0	0	0	0	0	0	0	1	2
11.07. 2012	8	D	4	0	0	0	0	0	0	0	1	2,3
11.07. 2012	8	D	5	0	0	0	0	0	0	0	1	2,4
11.07. 2012	8	E	1	0	0	0	1	0	0	0	0	1,8
11.07. 2012	8	E	2	0	0	0	1	0	0	0	0	2,1
11.07.	8	E	3	0	0	0	0	1	0	0	0	2,1

2012												
11.07. 2012	8	E	4	0	0	0	0	0	0	0	1	2
11.07. 2012	8	E	5	0	0	0	0	0	0	0	1	2,1
11.07. 2012	8	F	1	0	0	1	0	0	0	0	0	2,4
11.07. 2012	8	F	2	0	0	0	0	0	0	0	1	NA
11.07. 2012	8	F	3	0	0	0	0	0	0	0	1	NA
11.07. 2012	8	F	4	0	0	0	0	0	0	0	1	NA
11.07. 2012	8	F	5	0	0	0	0	0	0	0	1	NA
11.07. 2012	8	G	1	0	0	0	0	1	0	0	0	2,5
11.07. 2012	8	G	2	0	0	0	0	0	1	0	0	2,1
11.07. 2012	8	G	3	0	0	0	0	0	0	0	1	1,9
11.07. 2012	8	G	4	0	0	0	0	0	0	0	1	2,1
11.07. 2012	8	G	5	0	0	0	0	0	0	0	1	1,9
11.07. 2012	8	H	1	1	0	0	0	0	0	0	0	2,2
11.07. 2012	8	H	2	0	0	0	1	0	0	0	0	2,2
11.07. 2012	8	H	3	0	0	0	0	0	0	0	1	2
11.07. 2012	8	H	4	0	0	0	0	0	0	0	1	2,2
11.07. 2012	8	H	5	0	0	0	0	0	0	0	1	2,2
11.07. 2012	8	I	1	0	1	0	0	0	0	0	0	2,3
11.07. 2012	8	I	2	0	0	0	0	0	0	0	1	1,9
11.07. 2012	8	I	3	0	0	0	0	0	0	0	1	2,3
11.07. 2012	8	I	4	0	0	0	0	0	0	0	1	2,5
11.07. 2012	8	I	5	0	0	0	0	0	0	0	1	2
11.07. 2012	8	J	1	1	0	0	0	0	0	0	0	2,1
11.07. 2012	8	J	2	0	0	0	0	0	0	0	1	NA
11.07. 2012	8	J	3	0	0	0	0	0	0	0	1	NA

11.07. 2012	8	J	4	0	0	0	0	0	0	0	1	NA
11.07. 2012	8	J	5	0	0	0	0	0	0	0	1	NA
15.07. 2012	9	A	1	1	0	0	0	0	0	0	0	2,1
15.07. 2012	9	A	2	0	0	0	0	1	0	0	0	1,8
15.07. 2012	9	A	3	0	0	0	0	0	0	0	1	2,3
15.07. 2012	9	A	4	0	0	0	0	0	0	0	1	2,2
15.07. 2012	9	A	5	0	0	0	0	0	0	0	1	2,1
15.07. 2012	9	B	1	1	0	0	0	0	0	0	0	2,2
15.07. 2012	9	B	2	1	0	0	0	0	0	0	0	1,6
15.07. 2012	9	B	3	0	0	1	0	0	0	0	0	2,3
15.07. 2012	9	B	4	0	0	0	0	1	0	0	0	2,4
15.07. 2012	9	B	5	0	0	0	0	0	0	0	1	2,5
15.07. 2012	9	C	1	0	1	0	0	0	0	0	0	2,1
15.07. 2012	9	C	2	0	0	0	0	1	0	0	0	2,5
15.07. 2012	9	C	3	0	0	0	0	0	0	0	1	2,1
15.07. 2012	9	C	4	0	0	0	0	0	0	0	1	2,2
15.07. 2012	9	C	5	0	0	0	0	0	0	0	1	2,2
15.07. 2012	9	D	1	0	0	0	1	0	0	0	0	2,4
15.07. 2012	9	D	2	0	0	0	1	0	0	0	0	2,2
15.07. 2012	9	D	3	0	0	0	0	0	0	0	1	2,3
15.07. 2012	9	D	4	0	0	0	0	0	0	0	1	2,1
15.07. 2012	9	D	5	0	0	0	0	0	0	0	1	1,9
15.07. 2012	9	E	1	0	0	1	0	0	0	0	0	2,3
15.07. 2012	9	E	2	0	0	1	0	0	0	0	0	2,1
15.07. 2012	9	E	3	0	0	0	0	0	0	0	1	1,8
15.07.	9	E	4	0	0	0	0	0	0	0	1	2,1

2012												
15.07. 2012	9	E	5	0	0	0	0	0	0	0	1	1,8
15.07. 2012	9	F	1	0	1	0	0	0	0	0	0	2
15.07. 2012	9	F	2	0	0	1	0	0	0	0	0	2,1
15.07. 2012	9	F	3	0	0	0	0	0	1	0	0	2,2
15.07. 2012	9	F	4	0	0	0	0	0	1	0	0	2,6
15.07. 2012	9	F	5	0	0	0	0	0	0	0	1	2,4
15.07. 2012	9	G	1	0	0	0	1	0	0	0	0	1,9
15.07. 2012	9	G	2	0	0	0	0	0	1	0	0	1,8
15.07. 2012	9	G	3	0	0	0	0	0	0	0	1	1,6
15.07. 2012	9	G	4	0	0	0	0	0	0	0	1	2,4
15.07. 2012	9	G	5	0	0	0	0	0	0	0	1	2,2
15.07. 2012	9	H	1	0	1	0	0	0	0	0	0	2,4
15.07. 2012	9	H	2	0	0	0	1	0	0	0	0	1,8
15.07. 2012	9	H	3	0	0	0	0	0	0	0	1	2,3
15.07. 2012	9	H	4	0	0	0	0	0	0	0	1	2
15.07. 2012	9	H	5	NA	NA	NA	NA	NA	NA	NA	NA	NA
15.07. 2012	9	I	1	0	0	1	0	0	0	0	0	2,6
15.07. 2012	9	I	2	0	0	0	0	1	0	0	0	2,2
15.07. 2012	9	I	3	0	0	0	0	1	0	0	0	2,2
15.07. 2012	9	I	4	0	0	0	0	0	0	0	1	1,5
15.07. 2012	9	I	5	0	0	0	0	0	0	0	1	2,3
15.07. 2012	9	J	1	0	0	1	0	0	0	0	0	2,1
15.07. 2012	9	J	2	0	0	0	1	0	0	0	0	2,2
15.07. 2012	9	J	3	0	0	0	0	0	1	0	0	2,5
15.07. 2012	9	J	4	0	0	0	0	0	1	0	0	2,4

15.07. 2012	9	J	5	0	0	0	0	0	0	0	1	2,3
19.07. 2012	10	A	1	1	0	0	0	0	0	0	0	2,4
19.07. 2012	10	A	2	0	1	0	0	0	0	0	0	2,9
19.07. 2012	10	A	3	0	0	1	0	0	0	0	0	2,7
19.07. 2012	10	A	4	0	0	0	1	0	0	0	0	2,7
19.07. 2012	10	A	5	0	0	0	0	1	0	0	0	2,7
19.07. 2012	10	B	1	0	1	0	0	0	0	0	0	2,2
19.07. 2012	10	B	2	0	0	0	0	0	0	0	1	2,8
19.07. 2012	10	B	3	0	0	0	0	0	0	0	1	2,6
19.07. 2012	10	B	4	0	0	0	0	0	0	0	1	3
19.07. 2012	10	B	5	0	0	0	0	0	0	0	1	2,9
19.07. 2012	10	C	1	0	1	0	0	0	0	0	0	1,6
19.07. 2012	10	C	2	0	1	0	0	0	0	0	0	1,7
19.07. 2012	10	C	3	0	0	0	0	0	0	0	1	2,3
19.07. 2012	10	C	4	0	0	0	0	0	0	0	1	2
19.07. 2012	10	C	5	0	0	0	0	0	0	0	1	3
19.07. 2012	10	D	1	0	0	0	1	0	0	0	0	2,3
19.07. 2012	10	D	2	0	0	0	0	1	0	0	0	2,5
19.07. 2012	10	D	3	0	0	0	0	0	0	0	1	2,5
19.07. 2012	10	D	4	0	0	0	0	0	0	0	1	2,2
19.07. 2012	10	D	5	0	0	0	0	0	0	0	1	2,6
19.07. 2012	10	E	1	0	0	0	1	0	0	0	0	2,2
19.07. 2012	10	E	2	0	0	0	0	0	1	0	0	2,3
19.07. 2012	10	E	3	0	0	0	0	0	1	0	0	2,5
19.07. 2012	10	E	4	0	0	0	0	0	0	0	1	2
19.07.	1	E	5	0	0	0	0	0	0	0	1	2,1

2012	0											
19.07.2012	10	F	1	0	0	0	0	0	0	0	1	1,7
19.07.2012	10	F	2	0	0	0	0	0	0	0	1	2
19.07.2012	10	F	3	0	0	0	0	0	0	0	1	2,5
19.07.2012	10	F	4	0	0	0	0	0	0	0	1	2,2
19.07.2012	10	F	5	0	0	0	0	0	0	0	1	2,3
19.07.2012	10	G	1	0	1	0	0	0	0	0	0	2,1
19.07.2012	10	G	2	0	0	0	0	0	1	0	0	2,1
19.07.2012	10	G	3	0	0	0	0	0	0	0	1	2
19.07.2012	10	G	4	0	0	0	0	0	0	0	1	2,4
19.07.2012	10	G	5	0	0	0	0	0	0	0	1	2,2
19.07.2012	10	H	1	0	0	0	0	0	0	0	1	2,1
19.07.2012	10	H	2	0	0	0	0	0	0	0	1	2,1
19.07.2012	10	H	3	0	0	0	0	0	0	0	1	2,3
19.07.2012	10	H	4	0	0	0	0	0	0	0	1	2
19.07.2012	10	H	5	0	0	0	0	0	0	0	1	2,4
19.07.2012	10	I	1	1	0	0	0	0	0	0	0	2
19.07.2012	10	I	2	0	0	0	1	0	0	0	0	2
19.07.2012	10	I	3	0	0	0	0	0	0	0	1	2,3
19.07.2012	10	I	4	0	0	0	0	0	0	0	1	2,5
19.07.2012	10	I	5	0	0	0	0	0	0	0	1	2,1
19.07.2012	10	J	1	0	0	0	0	0	0	0	1	2
19.07.2012	10	J	2	0	0	0	0	0	0	0	1	2,4
19.07.2012	10	J	3	0	0	0	0	0	0	0	1	2,3
19.07.2012	10	J	4	0	0	0	0	0	0	0	1	2,5
19.07.2012	10	J	5	0	0	0	0	0	0	0	1	2,3

23.07.2012	11	A	1	1	0	0	0	0	0	0	0	2,5
23.07.2012	11	A	2	1	0	0	0	0	0	0	0	2,5
23.07.2012	11	A	3	1	0	0	0	0	0	0	0	2,3
23.07.2012	11	A	4	0	1	0	0	0	0	0	0	2,4
23.07.2012	11	A	5	0	1	0	0	0	0	0	0	2,3
23.07.2012	11	B	1	0	1	0	0	0	0	0	0	2,5
23.07.2012	11	B	2	0	0	0	0	0	0	0	1	2,5
23.07.2012	11	B	3	0	0	0	0	0	0	0	1	2,5
23.07.2012	11	B	4	0	0	0	0	0	0	0	1	2,3
23.07.2012	11	B	5	0	0	0	0	0	0	0	0	NA
23.07.2012	11	C	1	0	0	0	0	0	0	0	1	2,3
23.07.2012	11	C	2	0	0	0	0	0	0	0	1	2,2
23.07.2012	11	C	3	0	0	0	0	0	0	0	1	NA
23.07.2012	11	C	4	0	0	0	0	0	0	0	1	NA
23.07.2012	11	C	5	0	0	0	0	0	0	0	1	NA
23.07.2012	11	D	1	1	0	0	0	0	0	0	0	2,5
23.07.2012	11	D	2	1	0	0	0	0	0	0	0	2,7
23.07.2012	11	D	3	0	0	0	0	0	0	0	1	2
23.07.2012	11	D	4	0	0	0	0	0	0	0	1	2,2
23.07.2012	11	D	5	0	0	0	0	0	0	0	1	1,7
23.07.2012	11	E	1	0	0	1	0	0	0	0	0	2,4
23.07.2012	11	E	2	0	0	1	0	0	0	0	0	2
23.07.2012	11	E	3	0	0	0	0	0	0	0	1	2,5
23.07.2012	11	E	4	0	0	0	0	0	0	0	1	2,4
23.07.2012	11	E	5	0	0	0	0	0	0	0	1	2,6
23.07.	1	F	1	0	0	1	0	0	0	0	0	2,7

2012	1											
23.07. 2012	11	F	2	0	0	0	0	0	1	0	0	2,5
23.07. 2012	11	F	3	0	0	0	0	0	0	0	1	2,3
23.07. 2012	11	F	4	0	0	0	0	0	0	0	1	2,3
23.07. 2012	11	F	5	0	0	0	0	0	0	0	1	2,1
23.07. 2012	11	G	1	0	1	0	0	0	0	0	0	2,5
23.07. 2012	11	G	2	0	1	0	0	0	0	0	0	2,2
23.07. 2012	11	G	3	0	0	0	1	0	0	0	0	2,6
23.07. 2012	11	G	4	0	0	0	0	0	0	0	1	2,3
23.07. 2012	11	G	5	0	0	0	0	0	0	0	1	2,7
23.07. 2012	11	H	1	1	0	0	0	0	0	0	0	2,5
23.07. 2012	11	H	2	1	0	0	0	0	0	0	0	2,7
23.07. 2012	11	H	3	0	0	0	0	0	0	0	1	2,3
23.07. 2012	11	H	4	0	0	0	0	0	0	0	1	2,2
23.07. 2012	11	H	5	0	0	0	0	0	0	0	1	2,4
23.07. 2012	11	I	1	0	1	0	0	0	0	0	0	2,7
23.07. 2012	11	I	2	0	1	0	0	0	0	0	0	2,4
23.07. 2012	11	I	3	0	0	0	0	1	0	0	0	2,2
23.07. 2012	11	I	4	0	0	0	0	0	0	1	0	2,3
23.07. 2012	11	I	5	0	0	0	0	0	0	1	0	2,3
23.07. 2012	11	J	1	0	1	0	0	0	0	0	0	2,4
23.07. 2012	11	J	2	0	1	0	0	0	0	0	0	2,5
23.07. 2012	11	J	3	0	0	0	0	0	1	0	0	2,8
23.07. 2012	11	J	4	0	0	0	0	0	0	0	1	2,5
23.07. 2012	11	J	5	0	0	0	0	0	0	0	1	2,7

7.8.3 Distribution experiment 2013

7.8.3.1 Run 1

0 =did not choose 1 = chose

Plain = Detritus vs. food (treatment B Figure 5)

Complex = Dereitus with food vs. detritus (treatment A Figure 5)

Run 1: 23/6 to 27/6 2013

ID Dish Treatment Food Mud length

ID	Dish	Treatment	Food	Mud	Lenght in microscope X25
1A1	1A	plain	0	1	17
1A2	1A	plain	0	1	18
1A3	1A	plain	0	1	17
1A4	1A	plain	0	1	18
2A1	2A	plain	1	0	19
2A2	2A	plain	0	0	19
2A3	2A	plain	0	1	20
2A4	2A	plain	1	0	16
3A1	3A	plain	0	1	17
3A2	3A	plain	0	1	19
3A3	3A	plain	0	1	18
3A4	3A	plain	0	1	16
4A1	4A	plain	0	1	18
4A2	4A	plain	0	1	19
4A3	4A	plain	0	1	18
4A4	4A	plain	0	1	20
5A1	5A	plain	1	0	17
5A2	5A	plain	0	1	17
5A3	5A	plain	0	1	17
5A4	5A	plain	0	1	16
6A1	6A	plain	0	1	16
6A2	6A	plain	0	1	16
6A3	6A	plain	0	1	18
6A4	6A	plain	0	1	20
7A1	7A	plain	0	1	16
7A2	7A	plain	1	0	18
7A3	7A	plain	1	0	17
7A4	7A	plain	0	1	19
8A1	8A	plain	0	1	20
8A2	8A	plain	0	1	18
8A3	8A	plain	0	1	20
8A4	8A	plain	0	1	17
9A1	9A	plain	0	1	18
9A2	9A	plain	1	0	19
9A3	9A	plain	0	1	17

9A4	9A	plain	0	1	17
10A1	10A	plain	1	0	20
10A2	10A	plain	0	1	19
10A3	10A	plain	0	1	19
10A4	10A	plain	0	1	19
11A1	11A	plain	0	1	17
11A2	11A	plain	0	1	17
11A3	11A	plain	0	1	17
11A4	11A	plain	0	1	16
12A1	12A	plain	0	1	16
12A2	12A	plain	0	1	19
12A3	12A	plain	0	1	20
12A4	12A	plain	0	1	17
1B1	1B	complex	0	1	16
1B2	1B	complex	0	1	18
1B3	1B	complex	1	0	16
1B4	1B	complex	0	1	16
2B1	2B	complex	0	1	18
2B2	2B	complex	0	1	17
2B3	2B	complex	0	1	16
2B4	2B	complex	0	1	20
3B1	3B	complex	0	1	16
3B2	3B	complex	0	1	17
3B3	3B	complex	1	0	17
3B4	3B	complex	0	1	17
4B1	4B	complex	0	1	19
4B2	4B	complex	1	0	18
4B3	4B	complex	0	1	18
4B4	4B	complex	0	1	16
5B1	5B	complex	0	1	19
5B2	5B	complex	0	1	20
5B3	5B	complex	1	0	20
5B4	5B	complex	1	0	17
6B1	6B	complex	1	0	19
6B2	6B	complex	0	1	16
6B3	6B	complex	0	1	16
6B4	6B	complex	1	0	18
7B1	7B	complex	0	0	17
7B2	7B	complex	0	1	19
7B3	7B	complex	1	0	17
7B4	7B	complex	1	0	16
8B1	8B	complex	0	1	17
8B2	8B	complex	0	1	16
8B3	8B	complex	1	0	18
8B4	8B	complex	0	1	16
9B1	9B	complex	0	1	16
9B2	9B	complex	1	0	16
9B3	9B	complex	0	1	17
9B4	9B	complex	1	0	16
10B1	10B	complex	1	0	18

10B2	10B	complex	1	0	16
10B3	10B	complex	1	0	16
10B4	10B	complex	0	1	17
11B1	11B	complex	0	1	16
11B2	11B	complex	1	0	16
11B3	11B	complex	1	0	18
11B4	11B	complex	0	1	20
12B1	12B	complex	1	0	17
12B2	12B	complex	1	0	16
12B3	12B	complex	0	1	16
12B4	12B	complex	0	1	16

7.8.3.2 Run 2

Experiment ran from 27/7 to 31/7 - 2013

0 =did not choose 1 = chose

Plain = Detritus vs. food (treatment B Figure 5)

Complex = Dereitus with food vs. detritus (treatment A Figure 5)

		Date:	27.07.2013	27.07.2013	27.07.2013	27.07.2013	27.07.2013	27.07.2013	27.07.2013	27.07.2013
		Time:	14.00	14.00	14.40	14.40	15.40	15.40	16.40	16.40
ID	Dish	Treatment	food	mud	food	mud	food	mud	food	mud
1A1	1A	plain	1	0	1	0	1	0	1	0
1A2	1A	plain	0	0	0	0	0	0	0	0
1A3	1A	plain	0	0	0	0	1	0	0	0
1A4	1A	plain	1	0	1	0	1	0	1	0
2A1	2A	plain	0	0	0	1	0	1	0	1
2A2	2A	plain	0	0	0	0	0	0	0	0
2A3	2A	plain	0	1	0	1	0	1	0	1
2A4	2A	plain	1	0	0	0	0	0	0	0
3A1	3A	plain	0	1	0	1	0	1	0	1
3A2	3A	plain	0	0	0	0	0	0	0	1
3A3	3A	plain	0	0	0	1	0	1	0	1
3A4	3A	plain	0	1	0	1	0	1	0	1
4A1	4A	plain	0	1	0	1	0	1	0	1
4A2	4A	plain	0	0	0	0	0	0	1	0
4A3	4A	plain	0	0	0	0	0	0	0	0
4A4	4A	plain	0	0	0	1	0	1	0	1
5A1	5A	plain	0	0	0	0	0	0	0	0
5A2	5A	plain	0	1	0	1	0	1	0	1
5A3	5A	plain	0	1	0	1	0	1	0	1
5A4	5A	plain	0	1	0	1	0	1	0	1

6A1	6A	plain	0	1	0	1	0	1	0	1
6A2	6A	plain	0	0	0	1	0	1	0	1
6A3	6A	plain	0	0	0	0	0	1	0	1
6A4	6A	plain	0	1	0	1	0	1	0	1
7A1	7A	plain	1	0	0	0	0	0	1	0
7A2	7A	plain	0	0	0	0	0	0	0	0
7A3	7A	plain	0	0	0	0	0	0	0	0
7A4	7A	plain	0	0	0	0	0	0	0	0
8A1	8A	plain	0	0	0	0	0	0	0	0
8A2	8A	plain	0	0	1	0	1	0	1	0
8A3	8A	plain	0	1	0	1	0	1	0	1
8A4	8A	plain	NA	NA	NA	NA	0	1	0	1
9A1	9A	plain	0	1	0	1	0	1	0	1
9A2	9A	plain	0	0	1	0	1	0	1	0
9A3	9A	plain	0	0	0	0	0	0	0	0
9A4	9A	plain	0	1	0	1	0	1	0	1
10A1	10A	plain	0	0	0	0	0	0	0	0
10A2	10A	plain	0	1	0	1	0	1	0	1
10A3	10A	plain	0	1	0	1	0	1	0	1
10A4	10A	plain	NA	NA	NA	NA	0	1	0	1
11A1	11A	plain	0	0	0	0	0	1	0	1
11A2	11A	plain	0	0	0	0	0	0	0	0
11A3	11A	plain	0	0	0	0	0	0	0	0
11A4	11A	plain	0	0	0	0	0	0	0	0
12A1	12A	plain	1	0	0	1	1	0	1	0
12A2	12A	plain	0	0	0	0	0	0	0	0
12A3	12A	plain	0	0	0	0	0	0	0	0
12A4	12A	plain	0	0	0	1	0	1	0	1
1B1	1B	complex	0	0	1	0	1	0	1	0
1B2	1B	complex	0	1	0	1	0	0	0	1
1B3	1B	complex	0	0	0	1	0	1	0	1
1B4	1B	complex	1	0	1	0	1	0	1	0
2B1	2B	complex	0	1	0	1	0	1	0	1
2B2	2B	complex	0	1	0	1	0	1	0	1
2B3	2B	complex	1	0	0	1	0	1	0	1
2B4	2B	complex	0	1	0	1	0	1	0	1
3B1	3B	complex	0	1	0	1	0	1	0	1
3B2	3B	complex	0	1	0	1	0	1	0	1
3B3	3B	complex	1	0	1	0	1	0	1	0
3B4	3B	complex	1	0	1	0	1	0	1	0
4B1	4B	complex	1	0	1	0	1	0	1	0
4B2	4B	complex	1	0	1	0	1	0	1	0
4B3	4B	complex	0	1	0	1	0	1	0	1
4B4	4B	complex	0	1	0	1	0	1	0	1
5B1	5B	complex	0	0	0	0	0	0	0	0
5B2	5B	complex	0	0	0	0	0	0	0	0
5B3	5B	complex	0	0	0	0	0	0	0	0
5B4	5B	complex	0	0	0	0	0	0	0	0
6B1	6B	complex	1	0	1	0	1	0	1	0
6B2	6B	complex	1	0	1	0	1	0	1	0

6B3	6B	complex	0	0	0	0	0	0	0	0
6B4	6B	complex	0	0	0	0	0	0	0	0
7B1	7B	complex	0	0	0	0	0	0	0	0
7B2	7B	complex	0	0	0	0	**0**	0	1	0
7B3	7B	complex	0	0	0	0	0	0	0	0
7B4	7B	complex	0	0	0	0	0	0	0	0
8B1	8B	complex	1	0	1	0	1	0	1	0
8B2	8B	complex	0	1	0	1	0	1	0	1
8B3	8B	complex	0	0	0	0	0	1	0	1
8B4	8B	complex	0	0	0	0	0	0	1	0
9B1	9B	complex	0	0	0	0	0	0	0	0
9B2	9B	complex	0	0	0	0	0	0	0	0
9B3	9B	complex	0	0	0	0	0	0	0	0
9B4	9B	complex	0	0	0	0	0	0	0	0
10B1	10B	complex	0	0	0	1	0	1	0	1
10B2	10B	complex	0	0	0	0	0	0	0	0
10B3	10B	complex	0	0	0	0	0	0	0	0
10B4	10B	complex	0	0	0	0	0	0	0	0
11B1	11B	complex	0	1	0	1	0	1	0	1
11B2	11B	complex	0	0	0	0	0	1	0	1
11B3	11B	complex	1	0	1	0	1	0	1	0
11B4	11B	complex	1	0	1	0	1	0	1	0
12B1	12B	complex	0	1	0	1	0	1	0	1
12B2	12B	complex	1	0	1	0	1	0	1	0
12B3	12B	complex	0	0	0	1	1	0	1	0
12B4	12B	complex	1	0	1	0	1	0	1	0

	18,7C	18,7			19,4C	19,4C	16,8C	16,8C		
	27.07. 2013	27.07. 2013	27.07. 2013	27.07. 2013	27.07. 2013	27.07. 2013	28.07. 2013	28.08. 2013	28.07. 2013	28.07. 2013
	17.40	17.40	18.40	18.40	19.40	19:40: 00	10:00: 00	10:00: 00	16.00	16.00
ID	food	mud	food	mud	food	mud	food	mud	food	mud
1A1	1	0	1	0	1	0	0	1	0	1
1A2	0	0	0	0	1	0	0	1	0	1
1A3	1	0	1	0	1	0	0	1	0	1
1A4	1	0	1	0	1	0	0	1	0	1
2A1	0	1	0	1	0	1	0	1	0	1
2A2	0	0	0	0	0	0	0	0	0	1
2A3	0	1	0	1	0	1	0	1	0	1
2A4	0	0	0	0	0	0	0	1	0	1
3A1	0	1	0	1	0	1	0	1	0	1
3A2	0	1	0	1	0	1	0	1	0	1
3A3	0	1	0	1	0	1	0	1	0	1
3A4	0	1	0	1	0	1	0	1	0	1
4A1	0	1	1	0	1	0	0	1	0	1
4A2	0	0	0	0	0	0	0	1	0	1
4A3	0	1	0	1	0	1	0	1	0	1
4A4	0	1	0	1	0	1	0	1	0	1

5A1	0	0	0	0	0	0	0	1	0	1
5A2	0	1	0	1	0	1	0	1	0	1
5A3	0	1	0	1	0	1	0	1	0	1
5A4	0	1	0	1	0	1	0	1	0	1
6A1	0	1	0	1	0	1	0	1	0	1
6A2	0	1	0	1	0	1	0	1	0	1
6A3	0	1	0	1	0	1	0	1	0	1
6A4	0	1	0	1	0	1	0	1	0	1
7A1	1	0	1	0	1	0	1	0	1	0
7A2	0	0	0	0	0	0	0	0	0	0
7A3	0	0	0	0	0	0	0	0	0	0
7A4	0	0	0	0	0	0	0	0	0	0
8A1	1	0	0	0	0	0	0	1	0	1
8A2	1	0	1	0	1	0	1	0	1	0
8A3	0	1	0	1	0	1	0	1	0	1
8A4	0	1	0	1	0	1	0	1	1	0
9A1	0	1	0	1	0	1	0	1	0	1
9A2	1	0	1	0	1	0	1	0	0	1
9A3	0	1	0	1	0	1	0	1	0	1
9A4	0	1	0	1	0	1	0	1	0	1
10A1	0	0	0	0	0	0	1	0	1	0
10A2	0	1	0	1	0	1	0	1	0	1
10A3	0	1	0	1	0	1	0	1	0	1
10A4	0	1	0	1	0	1	0	1	0	1
11A1	0	1	0	1	0	1	0	1	0	1
11A2	0	0	0	1	0	1	0	1	0	1
11A3	0	0	0	0	0	0	0	0	0	0
11A4	0	0	0	0	1	0	1	0	0	1
12A1	1	0	1	0	1	0	0	1	0	1
12A2	0	0	0	0	0	0	0	1	0	1
12A3	1	0	1	0	1	0	0	0	0	0
12A4	0	1	0	1	0	1	0	1	0	1
1B1	1	0	1	0	1	0	1	0	1	0
1B2	0	1	0	0	1	0	1	0	1	0
1B3	0	1	0	1	0	1	0	1	0	1
1B4	1	0	1	0	1	0	1	0	1	0
2B1	0	1	0	1	0	1	0	1	0	1
2B2	0	1	0	1	0	1	0	1	NA	NA
2B3	0	1	0	1	0	1	0	1	0	1
2B4	0	1	0	1	0	1	0	1	NA	NA
3B1	0	1	0	1	0	1	0	1	0	1
3B2	0	1	0	1	0	1	0	1	0	1
3B3	1	0	1	0	1	0	1	0	1	0
3B4	1	0	1	0	1	0	1	0	1	0
4B1	1	0	1	0	1	0	1	0	1	0
4B2	1	0	1	0	1	0	1	0	1	0
4B3	0	1	0	1	0	1	0	1	0	1
4B4	0	1	0	1	0	1	0	1	0	1
5B1	0	0	0	0	0	0	0	0	0	0
5B2	0	0	1	0	0	0	0	0	0	0

5B3	0	0	0	0	0	0	0	0	0	0
5B4	0	0	0	0	0	0	1	0	1	0
6B1	1	0	1	0	1	0	1	0	1	0
6B2	1	0	1	0	1	0	1	0	1	0
6B3	0	0	0	0	0	0	1	0	1	0
6B4	0	0	0	0	0	0	0	1	0	1
7B1	0	0	0	0	0	0	0	0	0	0
7B2	1	0	1	0	1	0	1	0	1	0
7B3	0	0	0	0	0	0	0	0	1	0
7B4	0	0	0	0	0	0	0	0	0	1
8B1	1	0	1	0	1	0	1	0	1	0
8B2	0	1	0	1	0	1	0	1	0	1
8B3	0	1	0	1	0	1	0	1	0	1
8B4	0	1	1	0	1	0	0	1	0	1
9B1	NA	NA	NA	NA	NA	NA	0	1	0	1
9B2	NA	NA	NA	NA	NA	NA	0	1	0	1
9B3	NA	NA	NA	NA	NA	NA	0	1	0	1
9B4	NA	NA	NA	NA	NA	NA	0	1	0	1
10B1	0	1	0	1	0	1	0	1	0	1
10B2	0	0	0	0	0	0	0	0	0	1
10B3	0	0	0	0	0	0	0	1	0	1
10B4	0	0	0	0	0	0	0	0	0	0
11B1	0	1	0	1	0	1	0	1	0	1
11B2	0	1	0	1	0	1	0	1	0	1
11B3	1	0	1	0	1	0	1	0	1	0
11B4	1	0	1	0	1	0	1	0	1	0
12B1	0	1	0	1	0	1	0	1	0	1
12B2	1	0	1	0	1	0	1	0	1	0
12B3	1	0	1	0	1	0	1	0	1	0
12B4	1	0	1	0	1	0	1	0	1	0

	17,1C	17,1C	18,9C	18,9C			17,0C	17,0C	17,0C	17,0C
	28.07. 2013	28.07. 2013	29.07. 2013	29.07. 2013	29.07. 2013	29.07. 2013	29.07. 2013	29.07. 2013	30.07. 2013	30.07. 2013
	22.00	22.00	10.00	10.00	16.00	16.00	22.00	22.00	10:00: 00	10:00: 00
ID	food	mud	food	mud	food	mud	food	mud	food	mud
1A1	0	1	0	1	0	1	0	1	0	1
1A2	0	1	0	1	0	1	0	1	0	1
1A3	0	1	0	1	0	1	0	1	0	1
1A4	0	1	0	1	0	1	0	1	0	1
2A1	0	1	0	0	0	0	0	1	0	1
2A2	0	1	1	0	1	0	0	1	0	0
2A3	0	1	0	1	0	1	0	1	0	1
2A4	0	1	0	1	0	1	0	1	0	1
3A1	0	1	0	1	0	1	0	1	0	1
3A2	0	1	0	1	0	1	0	1	0	1
3A3	0	1	0	1	0	1	0	1	0	1
3A4	0	1	0	1	0	1	0	1	0	1

4A1	0	1	0	1	0	1	0	1	0	1
4A2	0	1	0	1	0	1	0	1	0	1
4A3	0	1	0	1	0	1	0	1	0	0
4A4	0	1	0	1	0	1	0	1	0	1
5A1	0	1	0	1	0	1	0	1	0	1
5A2	0	1	0	1	0	1	0	1	0	1
5A3	0	1	0	1	0	1	0	1	0	1
5A4	0	1	0	1	0	1	0	1	0	1
6A1	0	1	0	1	0	1	0	1	0	1
6A2	0	1	0	1	0	1	0	1	0	1
6A3	0	1	0	1	0	1	0	1	0	1
6A4	0	1	0	1	0	1	0	1	0	1
7A1	1	0	1	0	1	0	1	0	0	0
7A2	0	0	0	0	0	0	0	0	0	0
7A3	0	0	0	0	0	0	0	0	0	0
7A4	0	0	0	0	0	0	0	0	0	0
8A1	0	1	0	1	0	1	0	1	0	1
8A2	0	1	1	0	1	0	0	1	0	1
8A3	0	1	0	1	0	1	0	1	0	1
8A4	0	1	0	1	0	1	0	1	0	1
9A1	0	1	0	1	0	1	0	1	0	1
9A2	1	0	1	0	1	0	1	0	0	1
9A3	0	1	0	1	0	1	0	1	0	1
9A4	0	1	0	1	0	1	0	1	0	1
10A1	1	0	1	0	1	0	1	0	0	1
10A2	0	1	0	1	0	1	0	1	0	1
10A3	0	1	0	1	0	1	0	1	0	1
10A4	0	1	0	1	0	1	0	1	0	1
11A1	0	1	0	1	0	1	0	1	0	1
11A2	0	1	0	1	0	1	0	1	0	1
11A3	0	0	0	0	0	0	0	0	1	0
11A4	0	1	0	1	0	1	0	1	0	1
12A1	0	1	0	1	0	1	0	1	0	1
12A2	0	1	0	1	0	0	0	1	0	1
12A3	1	0	1	0	1	0	1	0	0	0
12A4	0	1	0	1	0	1	0	1	0	1
1B1	1	0	1	0	1	0	1	0	1	0
1B2	1	0	1	0	1	0	1	0	1	0
1B3	0	1	0	1	0	1	0	1	0	1
1B4	1	0	1	0	1	0	1	0	1	0
2B1	0	1	0	1	0	1	0	1	0	1
2B2	1	0	1	0	1	0	1	0	0	1
2B3	0	1	0	1	0	1	0	1	0	1
2B4	NA	NA	0	1	0	1	0	1	0	NA
3B1	0	1	0	1	0	1	0	1	0	1
3B2	0	1	0	1	0	1	0	1	0	1
3B3	1	0	1	0	1	0	1	0	1	0
3B4	1	0	1	0	1	0	1	0	1	0
4B1	1	0	1	0	1	0	1	0	1	0
4B2	1	0	1	0	1	0	1	0	1	0

4B3	0	1	0	1	0	1	0	1	0	1
4B4	0	1	0	1	0	1	0	1	0	1
5B1	0	1	0	1	0	1	0	1	0	1
5B2	0	0	0	0	0	0	0	0	0	0
5B3	0	0	0	0	0	0	0	0	0	0
5B4	1	0	0	1	0	1	0	1	0	1
6B1	1	0	1	0	1	0	1	0	1	0
6B2	1	0	1	0	1	0	1	0	1	0
6B3	1	0	1	0	1	0	1	0	1	0
6B4	0	1	0	1	0	1	0	1	0	1
7B1	0	0	1	0	1	0	1	0	1	0
7B2	1	0	1	0	1	0	1	0	1	0
7B3	1	0	1	0	1	0	1	0	1	0
7B4	0	1	0	1	0	1	0	1	0	1
8B1	1	0	1	0	1	0	1	0	1	0
8B2	0	1	0	1	0	1	0	1	0	1
8B3	0	1	0	1	0	1	0	1	0	1
8B4	0	1	0	1	0	1	0	1	0	1
9B1	0	1	0	1	0	1	0	1	0	1
9B2	0	1	0	1	0	1	0	1	0	1
9B3	0	1	0	1	0	1	0	1	0	1
9B4	0	1	0	1	0	1	0	1	0	1
10B1	0	1	0	1	0	1	0	1	0	1
10B2	0	1	0	1	0	1	0	1	0	1
10B3	0	1	0	1	0	0	0	0	0	1
10B4	0	0	0	0	0	0	0	0	1	0
11B1	0	1	0	1	0	1	0	1	0	1
11B2	0	1	0	1	0	1	0	1	0	0
11B3	1	0	1	0	1	0	1	0	1	0
11B4	1	0	1	0	1	0	1	0	1	0
12B1	0	1	0	1	0	1	0	1	0	1
12B2	1	0	1	0	1	0	1	0	1	0
12B3	1	0	1	0	1	0	1	0	1	0
12B4	1	0	1	0	1	0	1	0	1	0

	30.07.2013	30.07.2013	31.07.2013	31.07.2013	31.07.2013	31.07.2013	31.07.2013	31.07.2013		
	22:00:00	22:00:00	10:00:00	10:00:00	22:00:00	22:00:00	oppgjøring	oppgjøring		
ID	food	mud	food	mud	food	mud	food	mud	Lenght	lenght in mm
1A1	0	1	0	1	0	1	0	1	21	0,84
1A2	0	1	0	1	0	1	0	1	21	0,84
1A3	0	1	0	1	0	1	0	1	20	0,8
1A4	0	1	0	1	0	1	0	1	21	0,84
2A1	0	1	0	1	0	1	0	1	22	0,88
2A2	0	0	0	1	0	1	NA	NA	NA	NA

2A3	0	1	0	1	0	1	0	1	22	0,88
2A4	0	1	0	1	0	1	0	1	14	0,56
3A1	0	1	0	1	0	1	0	1	22	0,88
3A2	0	1	0	1	0	1	0	1	19	0,76
3A3	0	1	0	1	0	1	0	1	20	0,8
3A4	0	1	0	1	0	1	0	1	23	0,92
4A1	0	1	0	1	0	1	0	1	21	0,84
4A2	0	1	0	1	0	1	0	1	25	1
4A3	0	1	0	1	0	1	0	1	20	0,8
4A4	0	1	0	1	0	1	0	1	20	0,8
5A1	0	1	0	1	0	1	0	1	21	0,84
5A2	0	1	0	1	0	1	0	1	21	0,84
5A3	0	1	0	1	0	1	0	1	24	0,96
5A4	0	1	0	1	0	1	0	1	21	0,84
6A1	0	1	0	1	0	1	0	1	22	0,88
6A2	0	1	0	1	0	1	0	1	22	0,88
6A3	0	1	0	1	0	1	0	1	21	0,84
6A4	0	1	0	1	0	1	0	1	23	0,92
7A1	0	1	0	1	0	1	0	1	22	0,88
7A2	0	0	0	0	0	0	0	0	21	0,84
7A3	1	0	1	0	1	0	1	0	20	0,8
7A4	0	0	0	0	0	0	0	0	20	0,8
8A1	1	0	1	0	0	1	1	0	21	0,84
8A2	0	1	0	1	0	1	0	1	24	0,96
8A3	0	1	0	1	0	1	0	1	25	1
8A4	0	1	0	1	0	1	0	1	21	0,84
9A1	0	1	0	1	0	1	0	1	21	0,84
9A2	0	1	1	0	0	1	0	1	19	0,76
9A3	0	1	0	1	0	1	0	1	18	0,72
9A4	0	1	0	1	0	1	0	1	21	0,84
10A1	0	1	0	1	0	1	0	1	20	0,8
10A2	0	1	0	1	0	1	0	1	21	0,84
10A3	0	1	0	1	0	1	0	1	21	0,84
10A4	0	1	0	1	0	1	0	1	24	0,96
11A1	0	1	0	1	0	1	0	1	21	0,84
11A2	0	1	0	1	0	1	0	1	19	0,76
11A3	1	0	1	0	1	0	0	1	21	0,84
11A4	0	1	0	1	0	1	0	1	23	0,92
12A1	0	1	0	1	0	1	0	1	16	0,64
12A2	0	1	0	1	0	1	1	0	18	0,72
12A3	0	0	0	0	0	0	0	1	21	0,84
12A4	0	1	0	1	0	1	0	1	20	0,8
1B1	1	0	1	0	1	0	1	0	20	0,8
1B2	1	0	1	0	1	0	1	0	24	0,96
1B3	0	1	0	1	0	1	0	1	20	0,8
1B4	1	0	1	0	1	0	0	1	21	0,84
2B1	0	1	0	1	0	1	0	1	21	0,84
2B2	0	1	0	1	0	1	0	1	19	0,76
2B3	0	1	0	1	0	1	0	1	22	0,88
2B4	1	0	0	1	0	1	0	1	20	0,8

3B1	0	1	0	1	0	1	0	1	24	0,96
3B2	0	1	0	1	0	1	0	1	22	0,88
3B3	1	0	1	0	1	0	1	0	22	0,88
3B4	1	0	1	0	1	0	1	0	20	0,8
4B1	1	0	1	0	1	0	1	0	24	0,96
4B2	1	0	1	0	1	0	1	0	22	0,88
4B3	0	1	0	1	0	1	0	1	18	0,72
4B4	0	1	0	1	0	1	0	1	21	0,84
5B1	0	1	0	1	0	1	0	1	NA	NA
5B2	0	0	0	0	0	0	0	0	21	0,84
5B3	0	0	0	1	0	1	0	1	22	0,88
5B4	0	1	0	1	0	1	0	1	21	0,84
6B1	1	0	1	0	1	0	1	0	18	0,72
6B2	1	0	1	0	1	0	1	0	22	0,88
6B3	1	0	1	0	1	0	1	0	20	0,8
6B4	0	1	0	1	0	1	0	1	22	0,88
7B1	1	0	1	0	1	0	1	0	24	0,96
7B2	1	0	1	0	1	0	1	0	22	0,88
7B3	1	0	1	0	1	0	0	1	22	0,88
7B4	0	1	0	1	0	1	0	1	18	0,72
8B1	1	0	1	0	1	0	1	0	22	0,88
8B2	0	1	0	1	0	1	0	1	21	0,84
8B3	0	1	0	1	0	1	0	1	22	0,88
8B4	0	1	0	1	0	1	0	1	18	0,72
9B1	0	1	0	1	0	1	0	1	22	0,88
9B2	0	1	0	1	0	1	0	1	18	0,72
9B3	0	1	0	1	0	1	0	1	20	0,8
9B4	0	1	0	1	0	1	0	1	NA	NA
10B1	0	1	0	1	0	1	0	1	20	0,8
10B2	0	1	0	1	0	1	0	1	19	0,76
10B3	0	1	0	1	0	1	1	0	20	0,8
10B4	0	1	0	1	0	1	1	0	21	0,84
11B1	0	1	1	0	1	0	1	0	20	0,8
11B2	0	1	0	1	0	1	0	1	18	0,72
11B3	1	0	1	0	1	0	1	0	21	0,84
11B4	1	0	1	0	1	0	1	0	21	0,84
12B1	0	1	0	1	0	1	0	1	21	0,84
12B2	1	0	1	0	1	0	1	0	17	0,68
12B3	1	0	1	0	1	0	1	0	20	0,8
12B4	1	0	1	0	1	0	1	0	22	0,88

7.8.3.3 Run 3

Experiment ran from 31/7 to 4/8 - 2013

0 =did not choose 1 = chose

Plain = Detritus vs. food (treatment B Figure 5)

Complex = Dereitus with food vs. detritus (treatment A Figure 5)

Run 3			31.07.2013	31.07.2013	31.07.2013	31.07.2013	31.07.2013	31.07.2013		
			08:00:00	08:00:00	10:00:00	10:00:00	11:00:00	11:00:00	12:00:00	12:00:00
ID	Dish	Treatment	food	detritus	food	detritus	food	detritus	food	detritus
1A1	1A	plain	0	0	0	0	0	0	0	0
1A2	1A	plain	0	0	0	0	0	0	0	1
1A3	1A	plain	0	0	0	0	0	0	0	0
1A4	1A	plain	0	0	0	0	0	0	0	0
2A1	2A	plain	0	0	0	0	0	0	0	0
2A2	2A	plain	0	0	0	0	0	0	0	0
2A3	2A	plain	0	0	0	1	0	1	0	1
2A4	2A	plain	0	0	0	0	0	1	0	1
3A1	3A	plain	0	0	0	0	0	0	0	0
3A2	3A	plain	0	0	0	0	0	0	0	0
3A3	3A	plain	0	0	0	0	0	0	0	0
3A4	3A	plain	0	0	0	0	1	0	0	0
4A1	4A	plain	0	0	0	0	0	0	0	0
4A2	4A	plain	0	1	0	0	0	1	0	1
4A3	4A	plain	0	0	0	0	0	0	0	0
4A4	4A	plain	0	0	0	0	0	0	0	0
5A1	5A	plain	0	0	0	1	0	1	0	1

5A 2	5A	plain	0	1	0	1	0	1	0	1
5A 3	5A	plain	0	0	0	1	0	1	0	1
5A 4	5A	plain	0	0	0	0	0	0	0	0
6A 1	6A	plain	0	0	0	0	0	0	0	0
6A 2	6A	plain	0	0	0	0	0	0	0	0
6A 3	6A	plain	0	0	1	0	1	0	1	0
6A 4	6A	plain	0	1	0	1	0	1	0	1
7A 1	7A	plain	0	0	1	0	1	0	1	0
7A 2	7A	plain	0	0	0	0	0	0	0	0
7A 3	7A	plain	0	0	0	0	0	0	0	0
7A 4	7A	plain	0	0	0	0	0	0	0	0
8A 1	8A	plain	0	1	0	1	0	1	0	1
8A 2	8A	plain	1	0	1	0	1	0	1	0
8A 3	8A	plain	0	0	0	1	0	1	0	1
8A 4	8A	plain	0	0	0	0	0	0	0	0
9A 1	9A	plain	0	0	1	0	1	0	1	0
9A 2	9A	plain	0	1	0	1	0	1	0	1
9A 3	9A	plain	0	0	0	0	0	0	0	0
9A 4	9A	plain	0	0	1	0	1	0	1	0
10 A1	10 A	plain	0	0	0	0	0	0	0	0
10 A2	10 A	plain	0	0	0	0	0	0	0	0
10 A3	10 A	plain	0	0	0	0	0	0	0	0
10 A4	10 A	plain	0	0	0	1	0	1	0	1
11 A1	11 A	plain	0	0	0	0	0	0	0	0
11 A2	11 A	plain	0	1	0	1	0	1	0	1
11	11	plain	0	0	0	0	0	0	0	0

A3	A									
11 A4	11 A	plain	0	1	0	1	0	1	0	1
12 A1	12 A	plain	0	0	1	0	1	0	1	0
12 A2	12 A	plain	0	0	1	0	1	0	1	0
12 A3	12 A	plain	0	0	1	0	1	0	1	0
12 A4	12 A	plain	0	1	0	1	0	1	0	1
1B 1	1B	comple x	1	0	1	0	1	0	1	0
1B 2	1B	comple x	0	0	0	0	0	0	0	0
1B 3	1B	comple x	0	0	0	1	0	1	0	1
1B 4	1B	comple x	0	0	1	0	1	0	1	0
2B 1	2B	comple x	0	0	1	0	1	0	1	0
2B 2	2B	comple x	0	1	0	1	0	1	0	1
2B 3	2B	comple x	0	0	0	0	0	0	0	0
2B 4	2B	comple x	0	0	1	0	1	0	1	0
3B 1	3B	comple x	0	1	0	1	0	1	0	1
3B 2	3B	comple x	0	0	1	0	1	0	1	0
3B 3	3B	comple x	0	0	1	0	1	0	1	0
3B 4	3B	comple x	0	1	0	1	0	1	0	1
4B 1	4B	comple x	1	0	1	0	1	0	1	0
4B 2	4B	comple x	1	0	1	0	1	0	1	0
4B 3	4B	comple x	0	0	0	1	0	1	0	1
4B 4	4B	comple x	0	0	0	1	0	1	0	1
5B 1	5B	comple x	0	1	0	1	0	1	0	1
5B 2	5B	comple x	0	1	0	1	0	1	0	1
5B 3	5B	comple x	0	1	0	1	0	1	0	1
5B 4	5B	comple x	0	0	0	1	0	1	0	1

6B1	6B	complex	0	0	0	1	0	1	0	1
6B2	6B	complex	0	0	1	0	1	0	1	0
6B3	6B	complex	1	0	1	0	1	0	1	0
6B4	6B	complex	1	0	1	0	1	0	1	0
7B1	7B	complex	0	0	1	0	1	0	1	0
7B2	7B	complex	0	0	0	0	0	0	0	0
7B3	7B	complex	0	0	0	0	0	0	0	0
7B4	7B	complex	0	0	0	0	1	0	1	0
8B1	8B	complex	0	0	0	0	0	0	0	0
8B2	8B	complex	0	0	0	0	0	0	0	0
8B3	8B	complex	0	0	0	1	0	1	0	1
8B4	8B	complex	0	0	0	1	0	1	0	1
9B1	9B	complex	0	0	0	0	0	0	0	0
9B2	9B	complex	0	0	0	0	0	0	0	0
9B3	9B	complex	0	0	0	1	0	1	0	1
9B4	9B	complex	0	0	1	0	1	0	1	0
10B1	10B	complex	0	0	0	0	0	0	0	0
10B2	10B	complex	0	0	0	0	0	0	0	0
10B3	10B	complex	0	0	0	0	1	0	1	0
10B4	10B	complex	0	0	0	0	1	0	1	0
11B1	11B	complex	0	0	1	0	1	0	1	0
11B2	11B	complex	0	0	1	0	1	0	1	0
11B3	11B	complex	0	0	0	0	0	0	0	0
11B4	11B	complex	0	0	0	0	0	0	0	0
12B1	12B	complex	0	0	1	0	1	0	1	0
12	12	comple	0	0	0	1	0	1	0	1

B2	B	x								
12 B3	12 B	complex	0	0	1	0	1	0	1	0
12 B4	12 B	complex	1	0	1	0	1	0	1	0

	31.07.2013	31.07.2013	31.07.2013	31.07.2013	31.07.2013	31.07.2013	31.07.2013	31.07.2013	01.08.2013	01.08.2013
	13:00:00	13:00:00	14:00:00	14:00:00	16:00:00	16:00:00	22:00:00	22:00:00	10:00:00	10:00:00
	food	detritus	food	detritus	food	detritus	food	detritus	food	detritus
1A1	0	0	0	0	0	0	0	0	0	1
1A2	0	1	0	1	0	1	0	1	0	1
1A3	0	0	0	0	0	0	0	0	0	0
1A4	0	0	0	0	0	0	0	0	0	1
2A1	0	0	0	0	0	0	0	0	1	0
2A2	0	1	0	1	0	1	0	1	0	1
2A3	0	1	0	1	0	1	0	1	0	1
2A4	0	1	0	1	0	1	0	1	0	1
3A1	0	0	0	0	0	0	0	0	0	0
3A2	0	0	0	0	0	0	0	0	0	0
3A3	0	0	0	0	1	0	1	0	1	0
3A4	0	0	0	0	0	0	0	1	0	1
4A1	0	0	0	0	0	0	0	0	0	1
4A2	0	1	0	1	0	1	0	1	0	1
4A3	0	0	0	0	0	0	0	0	0	0
4A4	0	0	1	0	1	0	1	0	1	0
5A1	0	1	0	1	0	1	0	1	0	0
5A2	0	1	0	1	0	1	0	1	0	1
5A3	0	1	0	1	0	1	0	1	0	1
5A4	0	0	0	0	0	0	0	0	0	1
6A1	0	0	0	0	0	0	0	0	0	0
6A2	0	0	0	0	0	0	0	0	0	0
6A3	1	0	1	0	1	0	1	0	0	1
6A4	0	1	0	1	0	1	0	1	0	1
7A1	1	0	1	0	1	0	0	1	0	1
7A2	0	0	0	0	0	0	0	0	0	1
7A3	0	0	0	0	0	0	0	0	0	0
7A4	0	0	0	0	0	0	0	0	0	0
8A1	0	1	0	1	0	1	0	1	0	1
8A2	1	0	1	0	1	0	1	0	0	1
8A3	0	1	0	1	0	1	0	1	0	1
8A4	0	0	0	0	0	0	0	0	0	1
9A1	1	0	1	0	1	0	1	0	1	0
9A2	0	1	0	1	0	1	0	1	0	1
9A3	0	0	0	0	0	0	0	0	0	1
9A4	1	0	1	0	1	0	1	0	0	0
10A1	0	0	0	0	0	0	0	0	0	0

10A2	0	0	0	0	0	0	0	0	0	0
10A3	0	0	0	0	0	0	1	0	1	0
10A4	0	1	0	1	0	1	0	1	0	1
11A1	0	0	0	0	0	0	0	0	1	0
11A2	0	1	0	1	0	1	0	1	0	1
11A3	0	0	0	0	0	0	0	0	1	0
11A4	0	1	0	1	0	1	0	1	0	1
12A1	1	0	1	0	1	0	1	0	1	0
12A2	1	0	1	0	1	0	1	0	1	0
12A3	1	0	1	0	1	0	1	0	0	0
12A4	0	1	0	1	0	1	0	1	0	1
1B1	1	0	1	0	1	0	1	0	1	0
1B2	0	0	0	0	0	0	0	0	0	0
1B3	0	1	0	1	0	1	0	1	0	1
1B4	1	0	1	0	1	0	1	0	1	0
2B1	0	0	0	1	0	1	0	1	0	1
2B2	1	0	1	0	1	0	1	0	1	0
2B3	0	0	1	0	1	0	1	0	1	0
2B4	0	1	0	1	1	0	1	0	1	0
3B1	1	0	1	0	1	0	0	1	0	1
3B2	1	0	1	0	1	0	1	0	1	0
3B3	1	0	1	0	1	0	1	0	1	0
3B4	0	1	0	1	0	1	0	1	0	1
4B1	1	0	1	0	1	0	1	0	1	0
4B2	1	0	1	0	1	0	1	0	1	0
4B3	0	1	0	1	0	1	0	1	0	1
4B4	0	1	0	1	0	1	0	1	0	1
5B1	0	1	0	1	0	1	0	1	0	1
5B2	1	0	1	0	1	0	1	0	1	0
5B3	0	1	0	1	0	1	0	1	0	1
5B4	0	1	0	1	0	1	0	1	0	1
6B1	0	1	0	1	0	1	0	1	1	0
6B2	1	0	1	0	1	0	1	0	1	0
6B3	1	0	1	0	1	0	1	0	1	0
6B4	1	0	1	0	1	0	1	0	1	0
7B1	1	0	1	0	1	0	1	0	1	0
7B2	0	0	0	0	0	0	0	0	0	0
7B3	0	0	1	0	1	0	1	0	1	0
7B4	1	0	1	0	1	0	1	0	1	0
8B1	0	0	0	1	0	1	0	1	0	1
8B2	0	0	0	0	0	0	0	1	0	1
8B3	0	1	0	1	0	1	0	1	0	1
8B4	0	1	0	1	0	1	0	1	0	1
9B1	1	0	1	0	1	0	1	0	1	0
9B2	0	0	0	1	0	1	0	1	0	1
9B3	0	1	0	1	0	1	0	1	0	1
9B4	1	0	1	0	1	0	1	0	1	0
10B1	0	0	0	0	0	0	0	0	0	0
10B2	0	0	0	1	0	1	0	1	0	1
10B3	1	0	1	0	1	0	1	0	1	0

10B4	1	0	1	0	1	0	1	0	1	0
11B1	1	0	1	0	1	0	1	0	1	0
11B2	1	0	1	0	1	0	1	0	1	0
11B3	0	0	0	0	0	0	0	0	0	0
11B4	0	0	0	0	0	0	0	0	0	0
12B1	1	0	1	0	1	0	1	0	1	0
12B2	0	1	0	1	0	1	0	1	0	1
12B3	1	0	1	0	1	0	1	0	1	0
12B4	1	0	1	0	1	0	1	0	1	0

	01.08.2013	01.08.2013	02.08.2013	02.08.2013	02.08.2013	02.08.2013	03.08.2013	03.08.2013	03.08.2013	03.08.2013
	22:00:00	22:00:00	10:00:00	10:00:00	22:00:00	22:00:00	10:00:00	10:00:00	22:00:00	22:00:00
	food	detritus	food	detritus	food	detritus	food	detritus	food	detritus
1A1	0	1	0	1	0	1	0	1	0	1
1A2	0	1	0	1	0	1	0	1	0	1
1A3	0	1	0	1	0	1	0	1	0	1
1A4	0	1	0	1	0	1	0	1	0	1
2A1	1	0	1	0	1	0	1	0	1	0
2A2	0	1	0	1	0	1	0	1	0	1
2A3	0	1	0	1	0	1	0	1	0	1
2A4	0	1	0	1	0	1	0	1	0	1
3A1	0	1	0	1	0	1	0	1	0	1
3A2	0	0	0	1	0	1	0	1	0	1
3A3	1	0	0	1	0	1	0	1	0	1
3A4	0	1	0	1	0	1	0	1	0	1
4A1	0	1	0	1	0	1	0	1	0	1
4A2	0	1	0	1	0	1	0	1	0	1
4A3	1	0	0	1	0	1	0	1	0	1
4A4	1	0	1	0	1	0	1	0	1	0
5A1	0	0	0	0	0	0	0	0	0	0
5A2	0	1	0	1	0	1	0	1	0	1
5A3	0	1	0	1	0	1	0	1	0	1
5A4	0	1	0	1	0	1	0	1	0	1
6A1	0	0	0	0	0	0	0	0	0	0
6A2	0	1	0	1	0	1	0	1	0	1
6A3	1	0	0	0	0	0	1	0	1	0
6A4	0	1	0	1	0	1	0	1	0	1
7A1	0	1	0	1	0	1	0	1	0	1
7A2	0	1	0	1	0	1	0	1	0	1
7A3	1	0	1	0	1	0	1	0	1	0
7A4	0	0	0	1	0	1	0	1	0	1
8A1	0	1	0	1	0	1	0	1	0	1
8A2	0	1	0	1	0	1	0	1	0	1
8A3	0	1	0	1	0	1	0	1	0	1
8A4	0	1	0	1	0	1	0	1	0	1
9A1	1	0	1	0	1	0	1	0	1	0

9A2	0	1	0	1	0	1	0	1	0	1
9A3	0	1	0	1	0	1	0	1	0	1
9A4	0	0	0	1	0	1	0	1	0	1
10A1	0	0	0	1	0	1	0	1	0	1
10A2	0	0	0	1	0	1	0	1	0	1
10A3	1	0	1	0	1	0	1	0	1	0
10A4	0	1	0	1	0	1	0	1	0	1
11A1	0	0	1	0	1	0	1	0	1	0
11A2	0	1	0	1	0	1	0	1	0	1
11A3	1	0	1	0	1	0	0	1	1	0
11A4	0	1	0	1	0	1	0	1	0	1
12A1	1	0	1	0	1	0	1	0	1	0
12A2	1	0	0	1	0	1	0	1	0	1
12A3	0	0	1	0	1	0	1	0	1	0
12A4	0	1	0	1	0	1	0	1	0	1
1B1	1	0	1	0	1	0	1	0	1	0
1B2	0	0	0	1	0	1	0	1	0	1
1B3	0	1	0	1	0	1	0	1	0	1
1B4	1	0	1	0	1	0	1	0	1	0
2B1	0	1	0	1	0	1	0	1	0	1
2B2	1	0	1	0	1	0	1	0	1	0
2B3	1	0	1	0	1	0	1	0	1	0
2B4	1	0	1	0	1	0	1	0	1	0
3B1	0	1	0	1	0	1	0	1	0	1
3B2	1	0	1	0	1	0	1	0	1	0
3B3	1	0	1	0	1	0	1	0	1	0
3B4	0	1	0	1	0	1	0	1	0	1
4B1	1	0	1	0	1	0	1	0	1	0
4B2	1	0	1	0	1	0	1	0	1	0
4B3	0	1	0	1	0	1	0	1	0	1
4B4	0	1	0	1	0	1	0	1	0	1
5B1	0	1	0	1	0	1	0	1	0	1
5B2	1	0	1	0	1	0	1	0	1	0
5B3	0	1	0	1	0	1	0	1	0	1
5B4	0	1	0	1	0	1	0	1	0	1
6B1	1	0	1	0	1	0	1	0	1	0
6B2	1	0	1	0	1	0	1	0	1	0
6B3	1	0	1	0	1	0	1	0	1	0

6B4	1	0	1	0	1	0	1	0	1	0
7B1	1	0	1	0	1	0	1	0	1	0
7B2	0	0	0	0	0	0	0	0	0	0
7B3	1	0	1	0	1	0	1	0	1	0
7B4	1	0	1	0	1	0	1	0	1	0
8B1	0	1	0	1	0	1	0	1	0	1
8B2	0	1	0	1	0	1	0	1	0	1
8B3	0	1	0	1	0	1	0	1	0	1
8B4	0	1	0	1	0	1	0	1	0	1
9B1	1	0	1	0	1	0	1	0	1	0
9B2	0	1	0	1	0	1	0	1	0	1
9B3	0	1	0	1	0	1	0	1	0	1
9B4	1	0	1	0	1	0	1	0	1	0
10B1	0	0	0	0	0	0	0	1	0	1
10B2	0	1	0	1	0	1	0	1	0	1
10B3	1	0	1	0	1	0	1	0	1	0
10B4	1	0	1	0	1	0	1	0	1	0
11B1	1	0	1	0	1	0	1	0	1	0
11B2	1	0	1	0	1	0	1	0	1	0
11B3	0	0	0	0	0	0	0	0	0	0
11B4	0	0	0	0	0	0	1	0	1	0
12B1	1	0	1	0	1	0	1	0	1	0
12B2	0	1	0	1	0	1	0	1	0	1
12B3	1	0	1	0	1	0	1	0	1	0
12B4	1	0	1	0	1	0	1	0	1	0

Final location:

	04.08.2013	04.08.2013
	10:00	10:00
Dish and ID nr	Food	Detritus
1A1	0	1
1A2	0	1
1A3	0	1
1A4	0	1
2A1	1	0
2A2	0	1
2A3	0	1
2A4	0	1
3A1	0	1
3A2	0	1
3A3	0	1
3A4	0	1
4A1	0	1
4A2	0	1
4A3	0	1
4A4	1	0
5A1	0	0
5A2	0	1
5A3	0	1
5A4	0	1
6A1	0	0
6A2	0	1
6A3	0	1
6A4	0	1
7A1	0	1
7A2	0	1
7A3	0	0
7A4	0	1
8A1	0	1
8A2	0	1
8A3	0	1
8A4	0	1
9A1	1	0
9A2	0	1
9A3	0	1
9A4	0	1
10A1	0	1
10A2	0	1
10A3	0	1
10A4	0	1
11A1	0	1
11A2	0	1
11A3	1	0
11A4	0	1
12A1	1	0

12A2	0	1
12A3	1	0
12A4	0	1
1B1	1	0
1B2	0	1
1B3	0	1
1B4	1	0
2B1	0	1
2B2	1	0
2B3	1	0
2B4	1	0
3B1	0	1
3B2	1	0
3B3	1	0
3B4	0	1
4B1	1	0
4B2	1	0
4B3	0	1
4B4	0	1
5B1	0	1
5B2	1	0
5B3	0	1
5B4	0	1
6B1	1	0
6B2	1	0
6B3	1	0
6B4	1	0
7B1	1	0
7B2	1	0
7B3	1	0
7B4	1	0
8B1	0	1
8B2	0	1
8B3	0	1
8B4	0	1
9B1	1	0
9B2	1	0
9B3	0	1
9B4	1	0
10B1	0	1
10B2	0	1
10B3	1	0
10B4	1	0
11B1	1	0
11B2	1	0
11B3	0	0
11B4	1	0
12B1	1	0
12B2	0	1
12B3	1	0

12B4	1	0