



Chrisal study in the aquarium specialist ‘De Siervis’

Study format:

During several months, it was followed the effects of the product **Aqua Clear** in the different aquariums of the specialized aquarium business “De Siervis”

In the start phase a shock treatment was performed, where 50 ml of the product were applied per 100 L water for the first week. Afterwards, the weekly treatment comprehended 10-15 ml product per 100 L water, depending of the level of pressure.

It was mainly observed at:

- Bacterial composition of the water, more specifically the definition of:
 - o Total count as an indicator of organic pressure
 - o Entero/coliforms as an indicator of hygiene
 - o *Aeromonas hydrophila* (cause of fin rot) as an indicator of pathogens levels
- Pollution level of the filters (slime and algae, visual control)
- pH and common water parameters such as hardness, ammonia
- Behavior of the fish; possibly recovery of fish already damaged.

Results:

Microbial analyses:

For the interpretation of the results we worked with the following scoring system:

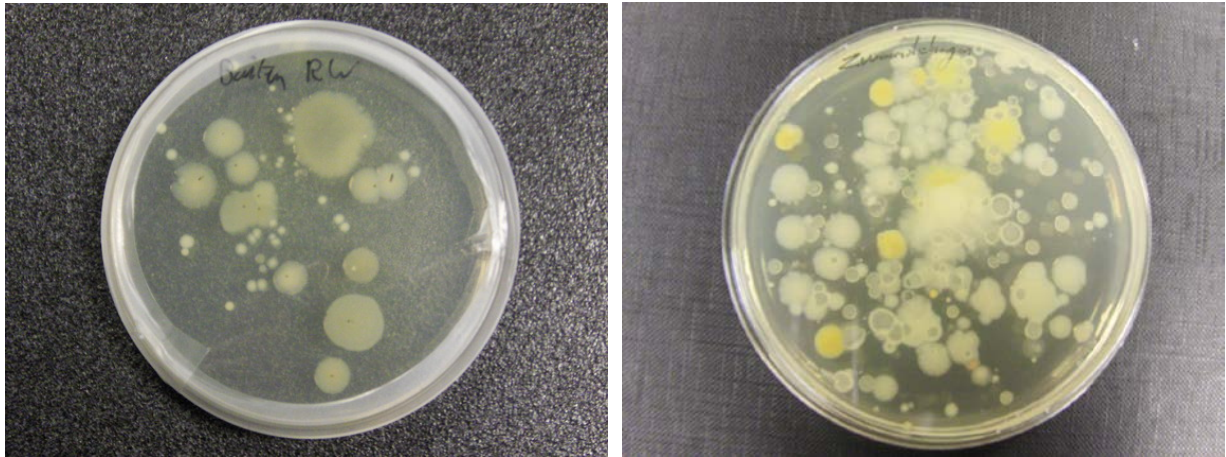
Score	Interpretation	Risk	Extra measure
0	Not found	None	None
1	Low amount	Very little	None
2	Moderate amount	Little	Water treatment advised
3	Large amount	Significant	Water treatment required
4	Exceptional amount	High	Urgent intervention

Initial Situation:

The first analyses of the water were performed in the 9th of May, 2008, just before the first doses of **Aqua Clear**, in three aquariums (show tank, green swordtails and turtles) The table shows the quality of the water at the start of the study:

<u>Sample</u>	<u>Total plate count</u>	<u>Coliforms</u>	<u>Aeromonas</u>	<u>TOTAL QUALITY</u>
Fish tank	4	3	3	BAD
Green Swordtails	4	3	3	BAD
Turtles	4	3	3	BAD

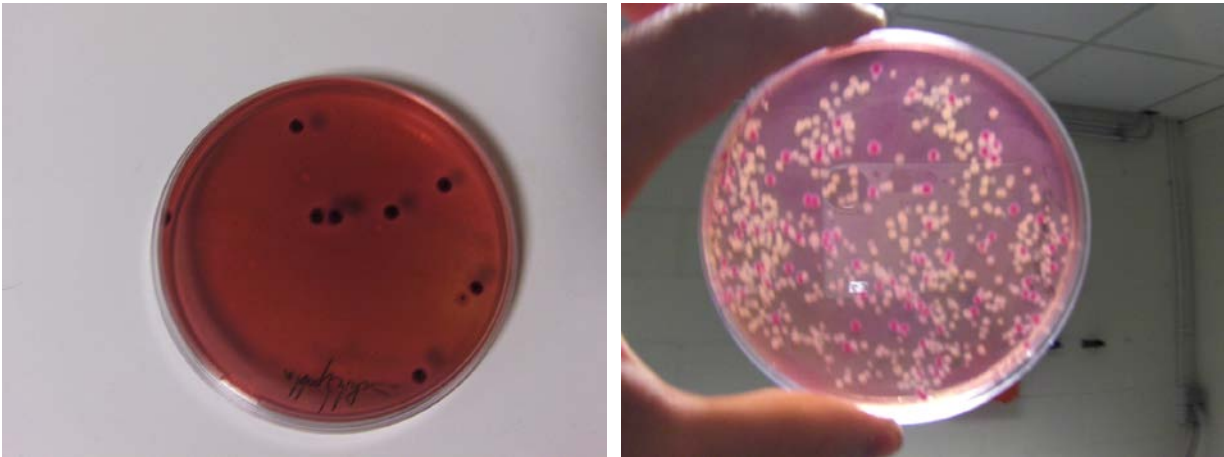
The above table clearly shows that all microbial parameters are suboptimal. All the aquariums have an issue with the unhealthy and unstable microbial quality of the water. For example, below a photo of a normal bacterial growth in the water (left) and the strong bacterial growth as in the tested aquariums (right):



It is also noticeable that all water basins had a fairly high number of *Aeromonas* bacteria. This is clearly visible due to the special growth soil that were used for that purpose; completely blue indicates absence of *Aeromonas*, more yellow shows more *Aeromonas*. The following pictures show a good water sample (left) and a bad water sample from the aquarium (right):



Also the coliforms were present in large amounts. This is also clearly visible on the special growth soils. The larger number of dots indicates more presence of coliforms. The following pictures show a good water sample (left) and a bad water sample (right):



Quality of the water:

In order to have an idea of the clarity and the amount of organic material (BOD, COD) in the water, there were made photometric measurements of the water samples. For all aquariums the water can be regarded as very bright. The optical density values (OD values) indicate all aquariums with a BOD and COD content of less than 50 mg/ml. This value corresponds to clear water, which is also visually observable.

The pH of the aquariums was also determined, and the following values were obtained:

Sample	pH
Show tank	7,18
Swordtails	7,55
Turtles	7,58

Report Initial Situation:

The analyses of the initial situation, show that the water from the different aquariums suffer from poor microbial quality of water, despite the clarity of the water. Due to an intensive pressure of the fish, a great amount of organic matter comes to the water which strongly increases the bacterial growth and creates an unstable environment. This brings a real risk with the presence of bad germs that creates an imminent danger for the fish.

The objective of the **Aqua Clear** is to introduce a healthy and stable microbial community.

Final Situation:

After the first dose of **Aqua Clear** in the 9th of May, frequent water analyses were performed until 12th of June. After 5 weeks, the study was completed with the following results:

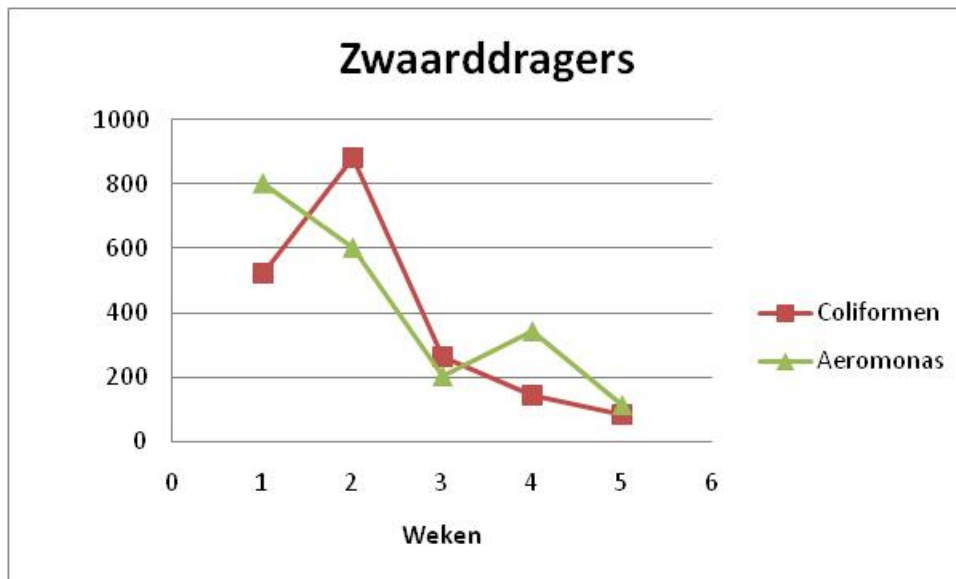
The following table show the scores of the water in the field of microbiology after 5 weeks of the **Aqua Clear** dosing.

<u>Sample</u>	<u>Total count plate</u>	<u>Coliforms</u>	<u>Aeromonas</u>	<u>TOTAL</u>
QUALITY				
Show tank	1	1	1	VERY GOOD
Swordtails	1	2	2	GOOD
Turtles	1	1	1	VERY GOOD

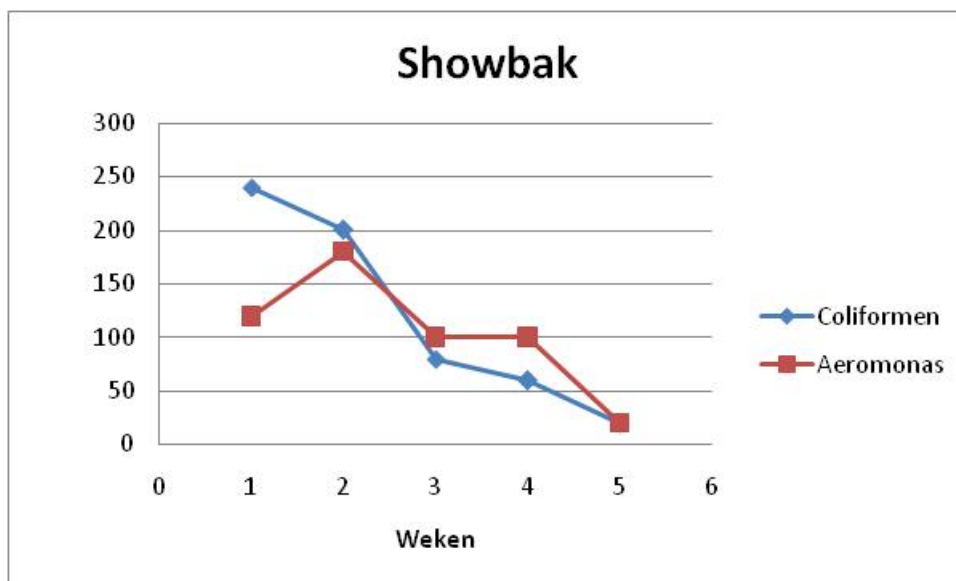
It is clear that the **Aqua Clear** brings a very positive change in the water of the different tanks. The probiotic bacteria have ensured a stable and healthy environment for the fish. The risk on the presence of coliforms and *Aeromonas* has sharply been reduced, which also leads to a reduced risk of infections. It is never possible to get an absolute level of no pathogens detected, but a few of them are desirable to maintain the natural resistance of the fish.

The graphs below show the risk reduction for germs that causes diseases. Very often we measure no coliforms anymore, but since the detection limit of the adopted method was 20 CFU / ml, we propose this as a minimum value that always could be present.

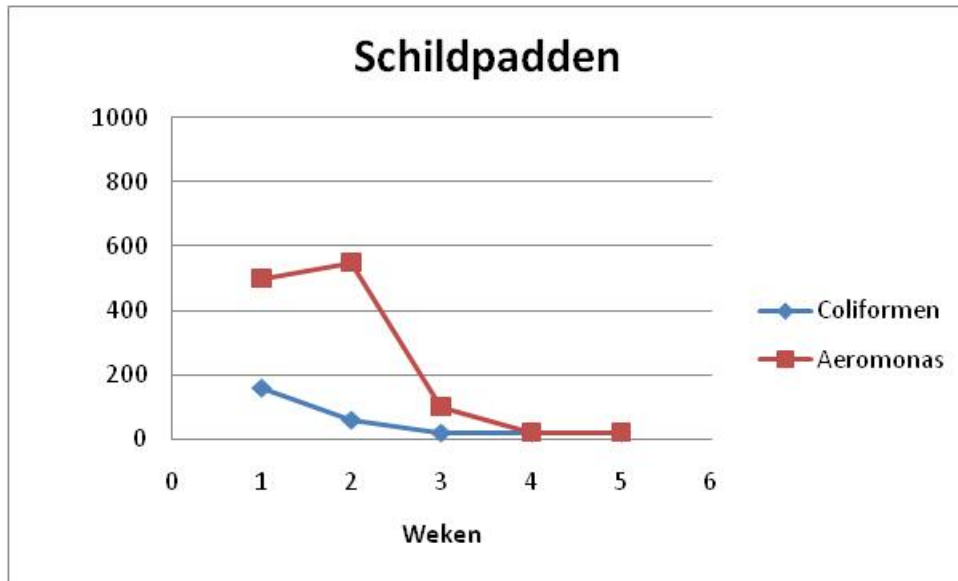
SWORDTAILS



SHOW TANK



TURTLES



Quality of the Water:

The clarity and the pH of the water remained virtually unchanged. Nevertheless, it might have happened that during the first two weeks of the **Aquaclear's** application, a turbidity is caused by the organic dirt that is weakened and removed by the PIP bacteria.

Final conclusion:

Based in the achieved results the effect of the Aqua Clear in the aquarium is clear:

The water got a stable and healthy microbial community, therefore the fish will have less stress and will be able to focus on their development (growth) instead of fighting against the bad germs.