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MANAGING RISK in aquaculture

- Why choose feathermeal?
- Electromagnetic frequency technology
- Fundamentals of drying aquafeeds
- Why technology transfer is key
- Water chillers in aquaculture



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Meet the future ELECTROMAGNETIC FREQUENCY TECHNOLOGY

by Caroline Decaux, MSc, agr., R&D Manager at
Ceresco Nutrition, Canada

Good health status in aquaculture is the result of a subtle balance between water, microorganisms, plants and fish. Natural homeostasis can be easily disturbed by external elements such as stress, anti-nutritional ingredients, toxic products or toxins emitted by certain micro-organisms, as well as weather and other factors that increase the risk of disease and mortality while also decreasing performance.

In order to eliminate these problems, antibiotics, pesticides and fertilisers have been used for decades. While benefiting from immediate results, there were long-term negative side effects on the environment and the global health status of the fish. Indeed, treating the symptoms remains sometimes crucial but a more deep understanding is needed of why certain diseases appear and how to eliminate their cause if we want to regenerate the natural homeostasis of the system.

In fact, diseases appear when the balance within the organism is broken, reflecting a lack or an excess of something. For example, the use of a large quantity of antibiotics or chlorine in water, while reducing the pathogen bacteria, will contribute to oxidize and acidify the environment providing the perfect conditions for the proliferation of mycosis and viral infection.

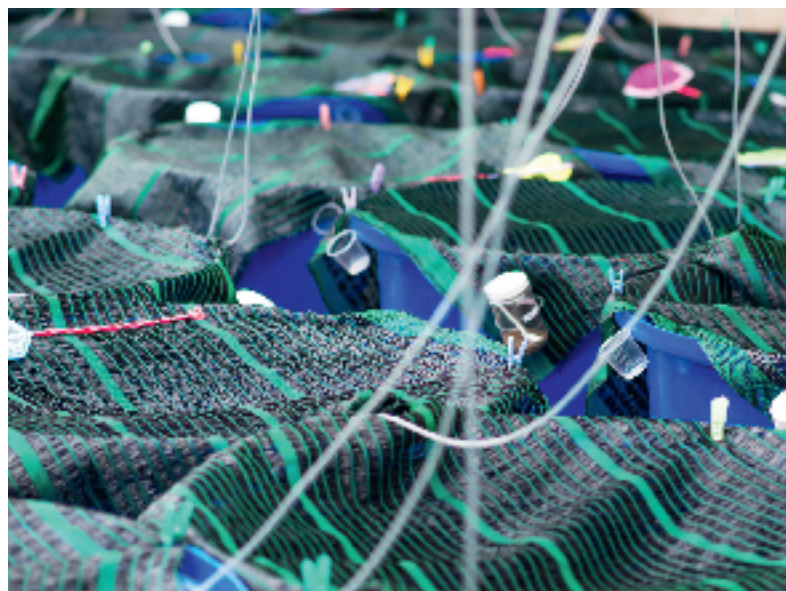
On the other hand, when we take into account the interaction between water, microorganisms, animal and human action, we can create harmony between all these elements. This is called synergy effect. Synergy occurs when combined elements or forces have greater impact than the sum of their individual parts; in other words: $1+1=3$. In animal nutrition, synergy effect can no longer be ignored and is becoming one of the main goals for the nutritionists and producers in restoring the health of aquaculture.

Water's key role in restoring the balance

For aquatic life, water is fundamental for survival but it also plays a key role in all biochemical reactions responsible for

homeostasis both inside the body and in the outside environment. Indeed, water is the main mediator regulating respiratory, blood, nervous and digestive systems. Water is the main constituent of blood and so it contributes to the transport of nutrients to the cell. It also increases the volume of blood, which affects blood pressure and heart rate. Water has the capacity to dissolve gases and allow for efficient exchange and transport of oxygen and carbon dioxide. By enabling better hydrolysis reactions, water participates in the biochemical breakdown of proteins, lipids and carbohydrates. Water can be excreted, so it carries toxins that have been made water-soluble, out of the body. Furthermore, it helps to regulate body temperature and guaranty stability of the nervous system.

Hence water is able to touch upon the very essence of all the living processes to allow for the homeostasis of the system. The essential role of water to guarantee life is likely found in its polar properties and quazi-crystalline structure, which makes water an excellent resonator of electromagnetic frequencies.





Electromagnetic frequency and water

During the 20th century, scientists such as Luc Montagnier (Nobel prize) have demonstrated that water can be affected by electromagnetic fields (EMF) and is able to transfer electromagnetic signals. Not many know that scientists from various disciplines strived for over 100 years to understand the effect of electromagnetic frequencies on living systems.

The famous electricity pioneer Nikola Tesla, following his invention of the Tesla coil, carried out several experiments demonstrating the harmlessness of alternate currents on the human body. George Lakhovsky further documented the effect of electromagnetic fields on plants, animals and human cells. Additional significant research continued by Moore et al. (1979), and F.-A. Popp (1981) discovered that the growth of all microorganisms can be altered by magnetic fields and that the DNA and any biological system for that matter emitted electromagnetic signals.

Finally, in 2014 Luc Montagnier demonstrated that DNA of bacteria emitted electromagnetic fields when exposed to ambient

electromagnetic background and that water, being a highly conductive substance, reacted to the signals emitted by living organisms.

These studies and many others show us that electromagnetic fields can influence biological systems through aqueous solutions. By using electromagnetic signals with specific frequencies, it is possible today to act on regulating functions, which is essential to guarantee homeostasis of the system and synergy between all the elements.

Recently, studies done in various world research centers* show that electromagnetic frequencies carried by a crystalline silicon dioxide contribute to improve animal health and performance by transferring specific vibratory information to water molecules. Only a small quantity of 200ppm of the activated silicon dioxide is enough to transfer the electromagnetic frequency to an aqueous solution of the gut.

Activated silicon dioxide and health of aqua species

According to peer-reviewed publications that have appeared in recent years, applying the activated silicon dioxide (Silica+, Ceresco Nutrition) to animal feed has several beneficial effects on health and aquatic system balance. When added to the water, the emission of EMF by the silica mineral activates aerobic reactions making the system more efficient and contributing to increase dissolved oxygen in water up to 40 percent in periods of high stress. In a study conducted by Nonglam University and led by Professor Loc, it was established that the addition of activated silicon dioxide increases survival rate of Pacific White Shrimp by up to 18 percent.

Explanations can be found in the action of the supplement on the oxidative stress level, which was demonstrated in the Prince of Songkla University study supervised by Dr. Wutiporn Phromkunthong. The study has revealed that this particular mineral allows a significantly higher Super Oxidative dismutase activity by +12.8 percent and phenol oxidase activity by +80.6 percent (Figure 1) compared to control. These two enzymes are involved in the neutralisation of free radicals.

Synergy effect to improve performance

In the same study (Prince of Songkla University), data revealed that, in two different diets with 7.5 percent and 15 percent fishmeal, a significant difference was observed between the experiment and control groups in terms of average daily weight gain (12.5% and 14.3% respectively), final body weight (+5.8% and +7.4%





Figure 1: The effect of Silica+ on Super Oxidase Dismutase and Phenol Oxidase activity in shrimp with 15% and 7.5% of fish meal (FM) in the diet.

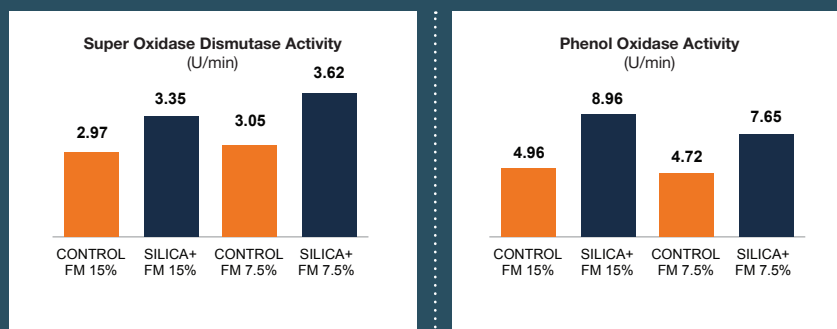


Figure 2: The effect of Silica+ on overall shrimp performance with different levels of fish meal (FM). Percentage of difference between control and Silica+ groups.

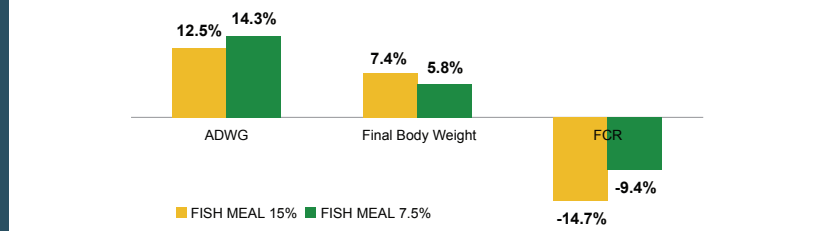
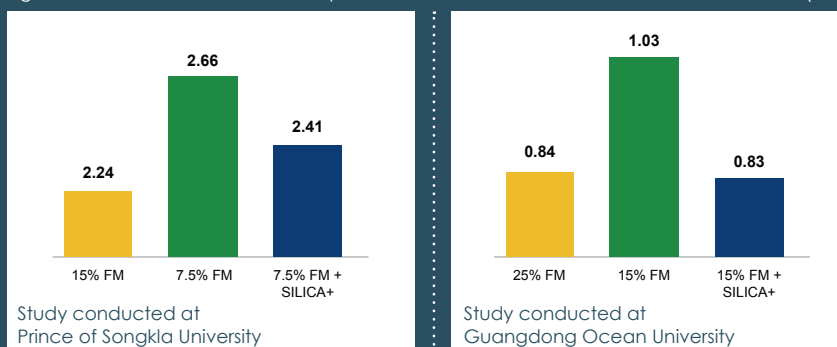


Figure 3: The effect of Silica+ on shrimp feed conversion rate with different levels of fish meal (FM)



respectively), and feed conversion ratio (-9.4% and -14.7% respectively) (Figure 2). Positive effect was also obtained with tilapia, where the addition of the activated mineral allows a higher gain of weight by 6.5 percent with a better feed conversion (1.06 vs 1.13).

Furthermore, this activated mineral (at an inclusion rate as low as 200 ppm) can help reduce fishmeal from 15 percent to 7.5 percent in a shrimp diet without significant difference in terms of growth performance (*Litopenaeus Vannamei*, Figure 3). The elevation of the protein utilisation ratio and the protease activity in the gut of the shrimp on diets supplemented with this mineral suggest that this product enhances protein digestion,” explained Dr Phromkunthong. “So adding this mineral to feed will contribute to better growth performance and feed utilisation”.

Another study conducted at the Guangdong Ocean University research facility in Guangdong Province (China) confirms that the activated mineral helps to reduce the quantity of fishmeal in shrimp diet, from 25 to 15 percent, while maintaining the same growth rate (Figure 3). On a 15 percent fishmeal diet, the mineral significantly improved the specific growth rate of shrimp, compared with groups receiving the treatment without the mineral. It also allowed a better feed conversion rate by 20 pts. Similar positive effect was also obtained on fish production, with tilapia and catfish. In a cost reduction strategy,

“A balanced system where all the elements work in synergy allows healthier fishes and thus higher performance, which can be translated in direct economic benefit”

research has shown that using Silica+ (Ceresco Nutrition) producers are able to replace 40 percent of fishmeal without a decrease in performance.

Conclusion

It is safe to say that EMF technology is the future of the aquaculture industry. Due to its synergy effect, activated silicon dioxide provides a healthier pond and increased growth performance of shrimp and fishes. Silica+ is a 100 percent natural product that will be essential in finding sustainable solutions in the aquaculture industry. Ceresco Nutrition President Luigi Pomponi comments, "We can no longer just say the word ‘sustainability’ because it sounds right; as decision makers we must be wholly and unconditionally committed to finding durable long-term solutions to the aquaculture industry.”

References

* Prince of Songkla University (Thailand), Nong Lam University (Vietnam), University of Guelph (Ontario, Canada), Centre de Recherche en Sciences Animales de Deschambault, CRSAD (Quebec, Canada), Schothorst Feed Research (Netherlands), Massey University (New Zealand), University of Beijing (China).