Recirculating aquaculture system-based salmon farming

Thomas Hofmann
The Swiss Alpine Fish indoor salmon farm uses a recirculating aquaculture system that combines optimal resource management, respect for the environment and a high-quality product for the end customer. In the village of Lostallo in the Swiss Alps, the salmon are grown in a controlled environment, using no antibiotics or chemicals, in full compliance with sanitary standards. This sustainable and economically viable farming model could be used in urban settings where there is suitable infrastructure and access to good quality water, making this an encouraging prospect for private investors and consumers alike.

Thomas Hofmann has been working in aquaculture for 15 years. He progressed from technician to researcher then project manager in Australia, Denmark and Spain, and has now joined Veolia as the aquaculture process manager in the Water Technology Aquaculture Business Unit. Since 2015, he has been providing assistance to Swiss Alpine Fish, a salmon farming site based on a recirculating aquaculture system in Lostallo in the Swiss Alps.
1. The Swiss Alpine Fish salmon farm is mainly based on a recirculating aquaculture system. What are the advantages of this technology in both environmental and sanitary terms?

Thomas Hofmann: The alpine farm consists of an indoor installation in which the salmon are grown in tanks of clean mountain water, using no antibiotics or chemicals. This technology has three main advantages: (1) optimal resource and waste management, (2) a short-circuit system with a low carbon footprint and (3) production of very high-quality salmon for the end customer.

From the viewpoint of resource management, the recirculating aquaculture system (RAS) recycles 98% of the water needed for fish growing. The potable spring water is extracted at a depth of 25 meters and is continually recirculated in tanks after mechanical and biological filtration that removes ammonia, nitrites and nitrates. Only 1% of the water leaves the circuit and is returned to the river after treatment. Management of the farm’s organic waste is also sustainable because the fish excrements and any uneaten food are concentrated in containers and used locally to produce biogas.

As for the distribution circuit, conventional fish growing involves phenomenally high transportation costs: fish that is harvested in Norway or Scotland is often processed in Poland before being sent back to Norway for distribution throughout Europe. Under this system, it takes seven to eight days for the fish to reach consumers. At Swiss Alpine Fish, all these processes take place on site and the salmon can be on the market, with no freezing needed, in just a few hours. So the products have a smaller carbon footprint, especially as the electricity we use in Lostallo comes from a hydropower plant. Also, the continuous harvesting of the fish means we have many different sizes, so we can meet demand from customers flexibly while also ensuring full traceability.

Lastly, the salmon grow in a controlled environment where they are protected from disease and parasites such as sea lice, so they can be grown without using antibiotics or chemicals. The water quality and temperature settings, as well as the techniques for transferring them between the different tanks, also avoid stressing the fish. Their food, which is fish meal made in Norway from...
3. The farm is expected to make a profit this year. What are the factors that explain this result?

T.H.: I see three main factors for our success: an advanced technology, and an attractive business model that pays well and also meets strong demand for high-quality, local products.

First, the RAS, with its filtration and water treatment systems, is the key to the farm's success, because it lets us create a very high-quality product that respects the environment. Next, the Swiss market, which is the farm's main market, has high purchasing power and is also very drawn to “Made in Switzerland.” The water in the tanks where the Lostallo salmon grow is salted with Swiss salt! For a top-quality product—and, in the case of salmon, one that is seen as being for special occasions or even as a luxury product—the Swiss are very willing to pay even more for a Swiss product. In terms of price, a whole gutted fish sells for €14 a kilo and smoked salmon for as much as €90 a kilo. Consumers increasingly want to know what they’re eating, and conventional Norwegian and Scottish salmon farms have badly damaged the image of the product and its environmental impact. A responsible approach to producing salmon is one that appeals to the consumer.

Lastly, salmon farming with RAS offers investment possibilities with high returns, good growth curves and low financial risk. The business model has attracted investment from major companies in the retail sector and from private investors who want to put their money into a sustainable project.