A pure delight. Healthy fish for higher profits.

Fish welfare

Animal and fish welfare is gaining importance with the community. Adequate oxygen levels guarantee optimum growth of fish and strengthen their immune system. Resistance against diseases increases significantly. As a consequence, a reduced mortality rate, faster growth and a larger size can be achieved. Under optimum growth conditions, the oxygen concentration should be controlled permanently.

In aquaculture, especially in hatcheries and for rearing delicate species, ozone is used to further prevent the occurrence of pathogenic microorganisms. Ozone is preferably produced from pure oxygen as this allows the use of smaller ozone generators.

Boosting profitability

Pure oxygen brings the following economic advantages:

- Higher stock densities
- Optimum growth rates
- Further increased production capacity due to reduced cycle times
- Feed cost savings due to improved feed utilization
- Minimum fish mortality
- Pumping cost savings due to reduced water recirculation
- Higher sales price due to average weight gain and higher quality of fish

RELATIVE GROWTH SPEED/MORTALITY (%)

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<thead>
<tr>
<th>Oxygen Saturation (%)</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
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<td>Growth speed</td>
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Oxygen for fish transport

Fish need oxygen at any time, at any place. In many cases, however, they have to be transported: from hatcheries to grow out facilities and from there to the processing units. To maintain optimal conditions, the injected oxygen into the transport containers is of value. For this purpose, BOC supplies oxygen in cylinders or liquid oxygen in superinsulated tanks.

BOC not only delivers gases it also delivers solutions and services that support farmers and breeders. With a full range of supply options, BOC delivers gas in the most cost-effective way for each individual farming operation.

At BOC, we have the knowledge, expertise and processes needed to successfully work in the aquaculture industry. With over 100 years of experience in developing solutions for business, BOC is committed to supplying solutions to the aquaculture industry. Whether you’re talking about oxygen for improving hatchery performance or for accelerating growth in sea cages, we’re there.

More than delivering gas. BOC delivers solutions.

Let them grow with pure oxygen.
A perfect atmosphere for effective aquaculture.
Aquaculture is the future. With pure oxygen.

High demand
Fish is an important component of a balanced diet and its production is enjoyed all over the world. According to estimates, fish consumption will rise by nearly 40 percent to 180 million tonnes by the year 2030. In order to meet this increasing demand, space and more fish have to be created in fish farms. In fact, aquaculture turns out to be the fastest growing sector in food production. Aquaculture is the future because it protects the oceans from further overfishing and produces healthy food with an extremely high feed conversion.

Dissolved oxygen is the most important factor in achieving good results in fish farming. The amount of oxygen needed for optimal fish growth depends on the species, its size, feeding rate, activity level, temperature and the demand of other species. In the water basin, Poor aeration capacities in the air and the oxygen concentration in the water basin are limited by the transfer rate of oxygen. If an aeration system is applied, the oxygen concentration in the basin is increased. Good oxygenation systems allow the oxygen saturation in the water to be maintained at a high level, thus ensuring an optimal water quality in the water basin.

Advantages of pure oxygen
Pure oxygen is indispensable for an eco-friendly aquaculture. In recirculation plants, where 90 to 95% of the water is recirculated, oxygen enrichment is necessary for two purposes: it provides suffi cient oxygen for the fish as well as for aerobic bacteria, which perform the biological nutrient removal. Moreover, with pure oxygen, much higher oxygen concentrations can be obtained, thus allowing the use of less powerful aeration solutions, which require less pumping energy. The risk of supersaturation can be safely avoided due to the fact that no other gas – like nitrogen in aeration – is dissolved.

Terrestrial oxygen concentration
The use of pure oxygen, on the other hand, provides considerable advantages. The fact that air contains only 21 % of oxygen implicates that in an atmosphere consisting of pure oxygen, the oxygen saturation is about five times higher than in air. According to the principle of diffusion, the transfer rate of oxygen is proportional to the difference between the oxygen concentration in the air and the actual concentration in the water. This is why oxygenation systems are much more effi cient. For example, a mere 3 % of oxygen saturation of 80 % in a fresh water basin at 15 °C, a system using pure oxygen at ambient pressure is about 20 times more effi cient than an aeration system. Moreover, with pure oxygen, 20 times more effi cient. For example, a mere 3 % of oxygen saturation of 80 % in a fresh water basin at 15 °C, a system using pure oxygen at ambient pressure is about 20 times more effi cient than an aeration system. Moreover, with pure oxygen, much higher oxygen concentrations can be obtained, thus allowing the use of less powerful aeration solutions, which require less pumping energy. Therefore, the risk of supersaturation can be safely avoided due to the fact that no other gas – like nitrogen in aeration – is dissolved.

All these considerations clearly demonstrate that the use of pure oxygen is technically as well as economically superior to the operation with air. Its advantages more than compensate for the extra cost.

Reliable production
Aquaculture faces many challenges. Oxygenation has proven to solve a number of the problems that can occur in breeding fish. It is a great remedy in critical situations, such as...

Increased water temperature
With increasing temperatures, less oxygen can be dissolved in water. At the same time, the oxygen demand of the fish increases as well. To maintain an oxygen saturation of 80 % in the incoming water, a recirculation system has to be installed. If the water temperature increases, the oxygen demand increases much more quickly than the oxygen concentration in the basin does. Thus, the production capacity of a fish farm will be reduced considerably if no oxygenation system is installed.

Emergencies
In emergency situations, e. g. when the water flow is suddenly interrupted, the installation of a reliable oxygenation system, which works even without power supply, can be a great remedy. Moreover, if the oxygen concentration falls drastically, the whole crop, thus avoiding economic disaster.

Eco-friendly aquaculture
Stricter environmental regulations hinder the proliferation of aquaculture. However, environmental concerns and economic interests can go hand in hand. Advanced technologies combine highly effective rearing methods with outstanding environmental friendliness: so-called recirculation plants require a minimum of valuable water and pollution can be eliminated almost completely.

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Reduction of oxygen concentration
The amount of water in rivers often varies greatly throughout the year. In this situation, pure oxygen is of great help. It can be injected directly into the basins or used for the saturation of recirculated water.

Reduced water availability
When the power supply is cut off, can save the whole crop, thus avoiding economic disaster.

With pure oxygen. Without pure oxygen.