

Manual- vs automated data collection

On many fish farms, several water quality parameters (including toxic free CO₂) are only measured manually at fixed times or in selected tanks. The water quality is fluctuating daily and are often following rhythmic patterns. With this method, you will often miss the peaks and therefore create a misleading result of a satisfying, stable CO₂-level.

This white paper compares and analyzes two identical data sets presented in two different ways.

Figure 1 presents actual data from a fish farm measured with Blue Unit's Lab Station. Here, the CO₂-concentrations are measured six times a day in each tank and provides a realistic and reliable picture of the current water quality.

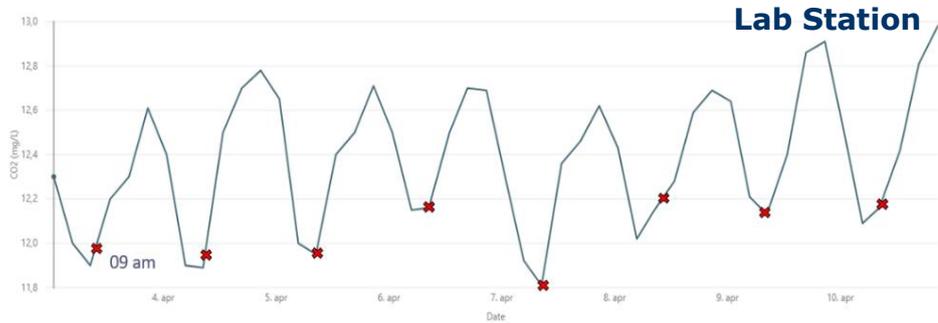


Figure 1 CO₂-concentrations from a fish farm measured with Blue Unit's Lab Station, presented in Power BI. The red crosses are marking every morning (9 AM), following a 24-hour interval. For simplicity, this figure only presents one parameter and one tank, even though the Lab Station measures 10 parameters in up to 12 different places.

Figure 2 presents the same data, but only with daily measurements (marked as red crosses on Figure 1). This simulates an example of a fish farm performing manual measurements every morning.

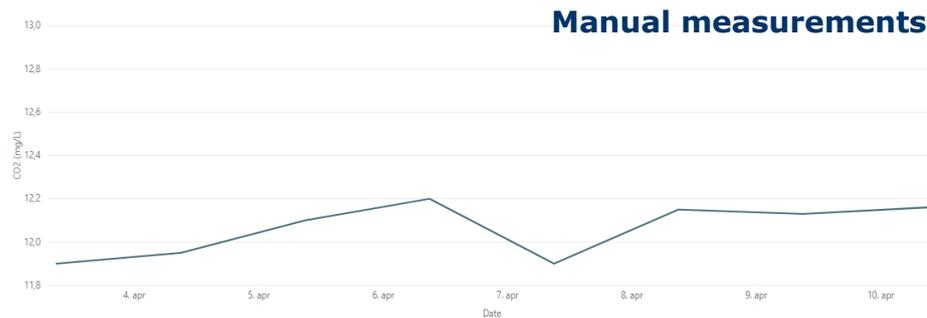


Figure 2 Simulation of manually measured data every morning. Data represents the same fish farm as Figure 1, but with fewer measurements.

The comparison

At first eye sight, Figure 2 seems to represent a tank with a stable water quality and a reasonable CO₂-level. But the measurements are only done once every morning, where the CO₂-concentrations are low, and thereby creating a misleading picture. Oppositely, Figure 1 displays fluctuations with daily peaks and shows how the CO₂-concentrations often exceeds preferable levels. This instability is not captured by the manual measurements. Additionally, the automatic measurements save you the effort of having to manually note down and keep track of the values.

The importance of frequent measurements

This comparison reveals why it is important to measure and monitor the water quality closely during the day. High and fluctuating CO₂-levels reduces the fish's growth and conversion rate¹. But these patterns are hard to identify with few, manual measurements, and this will cause decisions to be made based on inadequate information. The Lab Station identifies the problem, and can, together with Blue Unit's services, work towards a solution. In a situation like this it would probably be beneficial to steal a bit of flow from another more stable tank and direct it to this specific tank.

CO₂-levels are typically increasing during the day due to high production, and thereby inhibiting the growth. But without enough data, the farm manager will not be able to identify and solve the problem, which can lead to too low pH and uncontrolled levels of free CO₂.

¹ J.R. Khan, D. Johansen, P.V. Skov, 2018, The effects of acute and long-term exposure to CO₂ on the respiratory physiology and production performance of Atlantic salmon (*Salmo salar*) in freshwater, *Aquaculture*