

# Delta\*, a database developed for indoor shrimp farms

Supported by real-time monitoring,  
comprehensive data overview and evaluation  
→ for a secure and sustainable shrimp production

## DBU-funded Project: “Developing solutions for a sustainable, Nitrogen-efficient indoor shrimp production in compliance with animal welfare and based on Biofloc technology”

### Background

The complexity of indoor aquaculture is more efficiently controlled by using online data monitoring tools, offering rapid assessment and (remote) control of critical water quality parameters.

One of the project aims was to develop an online database covering all critical parameters and their evaluation to provide optimal support to the operator and to substantially reduce the risks associated with aquaculture operation.

### Approach

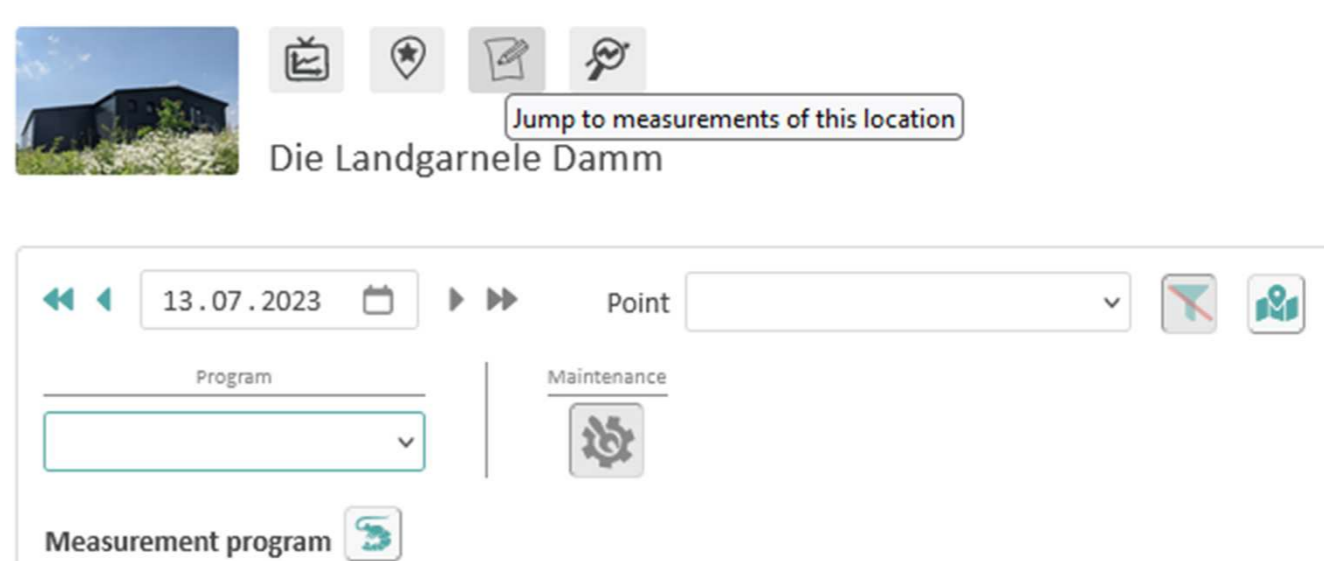
Basis for the new aquaculture tool was the earlier developed database for natural swimming pools: “DANA 2.0” (as well funded by the DBU).

### Results

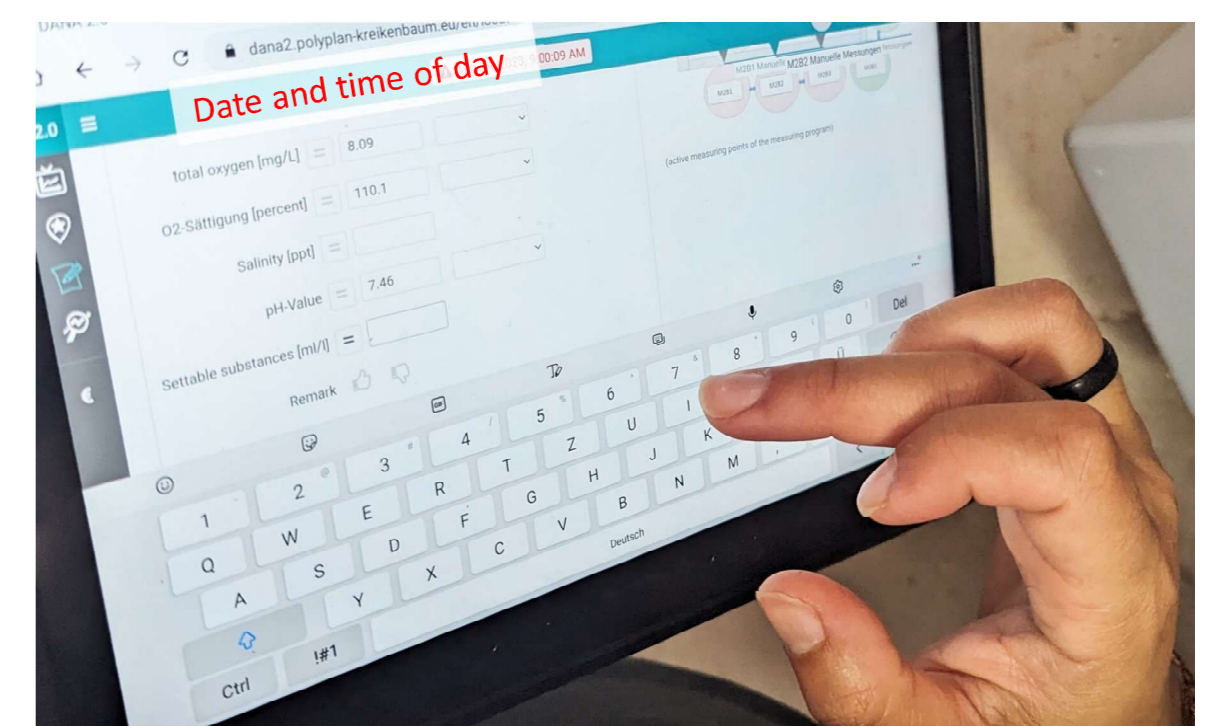
- Online sensors are connected and all monitoring data are entered into defined sets of protocols
- The elaborated feed management tool is in function and can easily be updated
- Data visualization can be individually formatted, graphs can be saved as templates and shown on the dashboard
- Any data from several batches of shrimp can be plotted in a single graph for comparison
- Alarms are managed by PLC-data displayed in Delta
- Sensor data can be transferred via LORAWAN\*\* independent from WIFI/Ethernet
- In conclusion, the database offers an easy and up-to-date access to any available data, supporting a deeper understanding of the complex processes and a more efficient control of all critical parameters



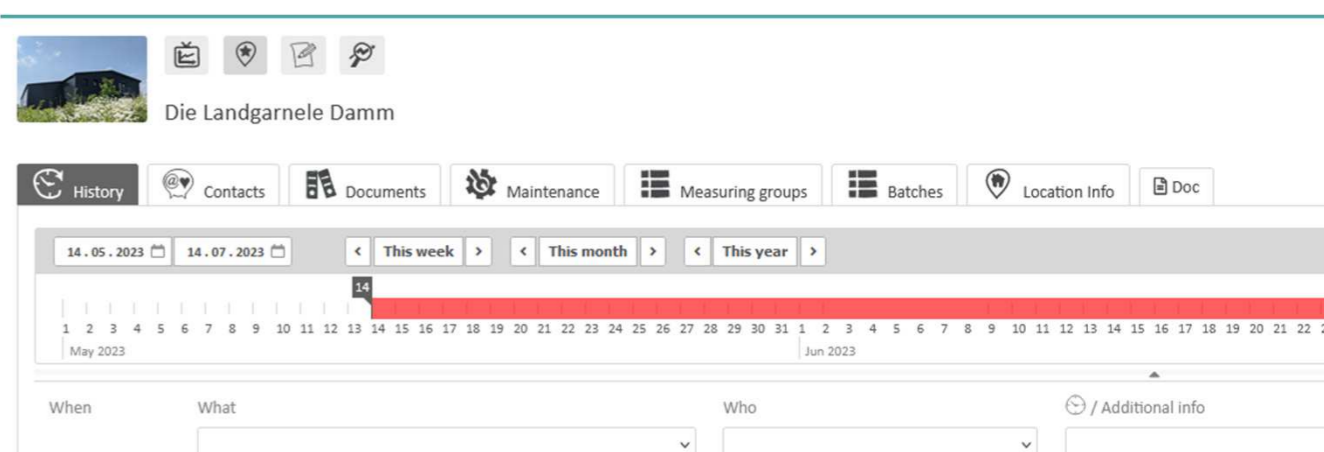
Main functions in DeltaA:  
dashboard – settings – data entry & ~evaluation



Data entry for different programs defined in DeltaA by selecting protocols for: daily monitoring, feed management, zootechnical or laboratory data



Data entry into DeltaA, here: data of the daily monitoring program (water quality parameters by multi probe and Imhoff cone)



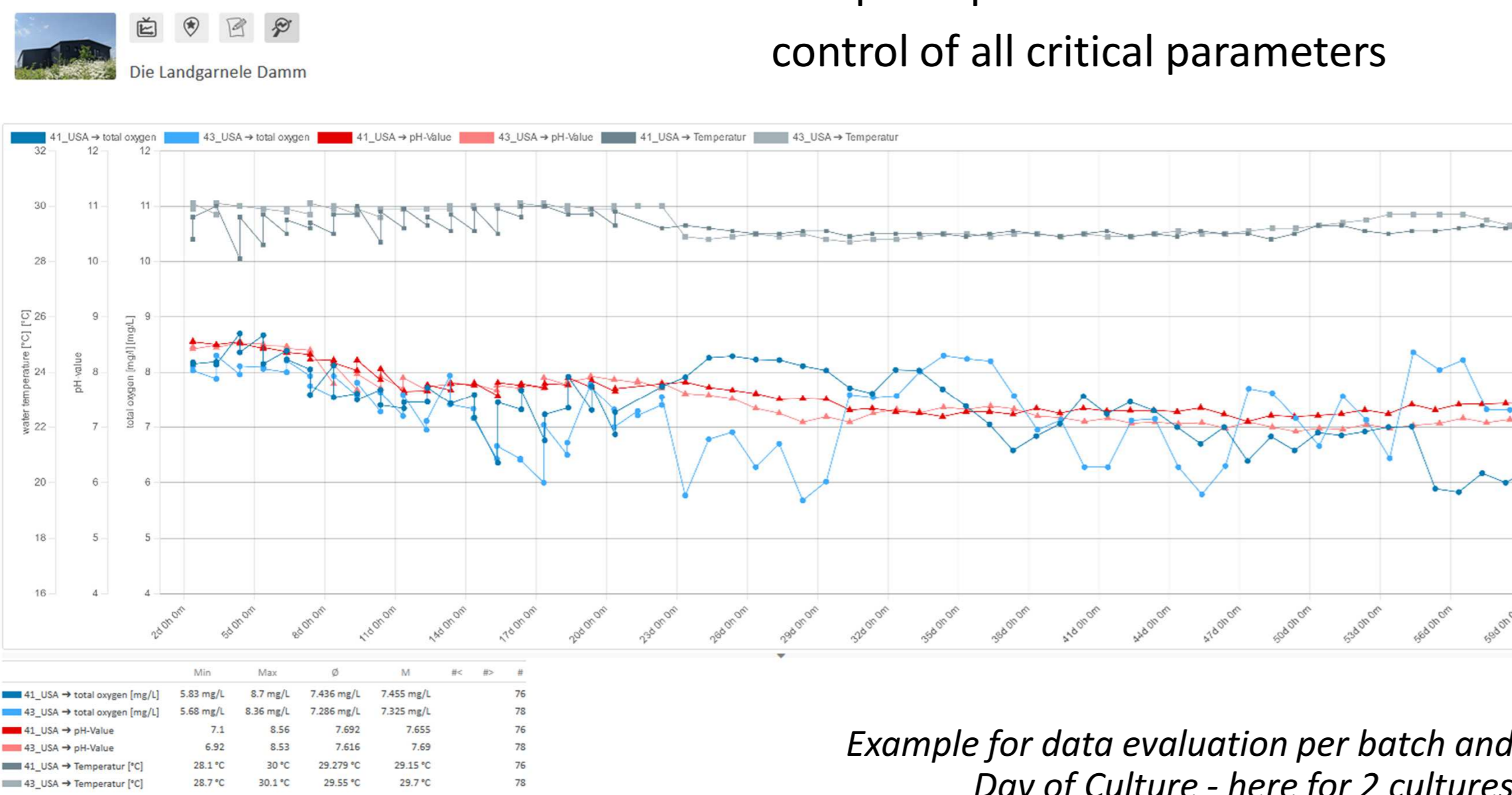
Main settings at location “Damm”, calendar and filter options for viewing data entry report



Example for data evaluation per tank & date (here, dates are faded out)



Shrimp raised at Damm Aquakultur:  
[www.die-landgarnele.de](http://www.die-landgarnele.de) (the inland shrimp)



Example for data evaluation per batch and Day of Culture - here for 2 cultures

Applying the database to aquaculture operations required major adaptations, such as the new central unit “culture batch”, to be recorded throughout the culture cycle in any tank. Further, the new and complex function “feed management” needed to be integrated in a feasible and concise way, for more than one type of feed. Protocols, alarm settings and dashboards were defined in close cooperation with the operator. The programming work was subcontracted to an experienced German software company.

### Outlook

We are constantly improving DeltaA, and are aiming at implementing new functions to support a safe operation of indoor farms. We are working on assessing zootechnical data on growth more easily.

Development and implementation of a higher degree of automatisations, also supported by AI, are further objectives for the near future. Basically DeltaA is adaptable to the culture of any aquaculture organism, thereby opening a broad field of applications.

\*DeltaA: Database for European land- and technique-based Aquaculture  
\*\*Longe Range Wide Area Network