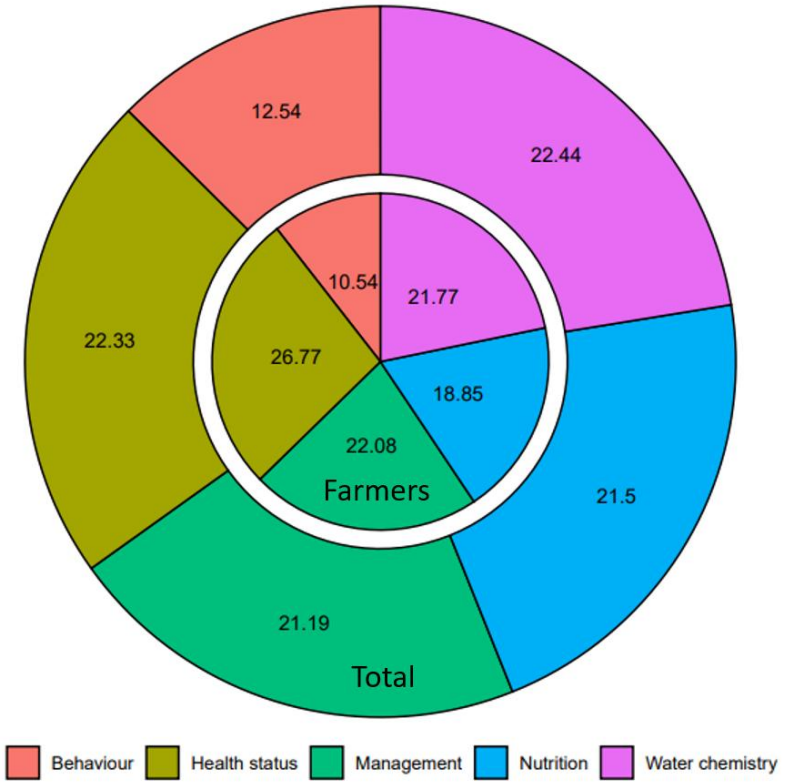
Workshop Results CrustWohl AQUA2024 Copenhagen

We sincerely thank you for your active participation in the Euroshrimp session at AQUA 2024 in Copenhagen. Your contributions, especially during the workshop, provided valuable insights and constructive feedback.

The first part of the workshop aimed to assess the relative importance of various macro-areas related to shrimp welfare. Participants assigned a percentage value (ranging from 0% to 100%) to each macro-area, reflecting their perceived significance. A total of 52 participants participated in the workshop: 13 farmers, 28 scientists, 2 consultants, 3 students and 6 from other professions.

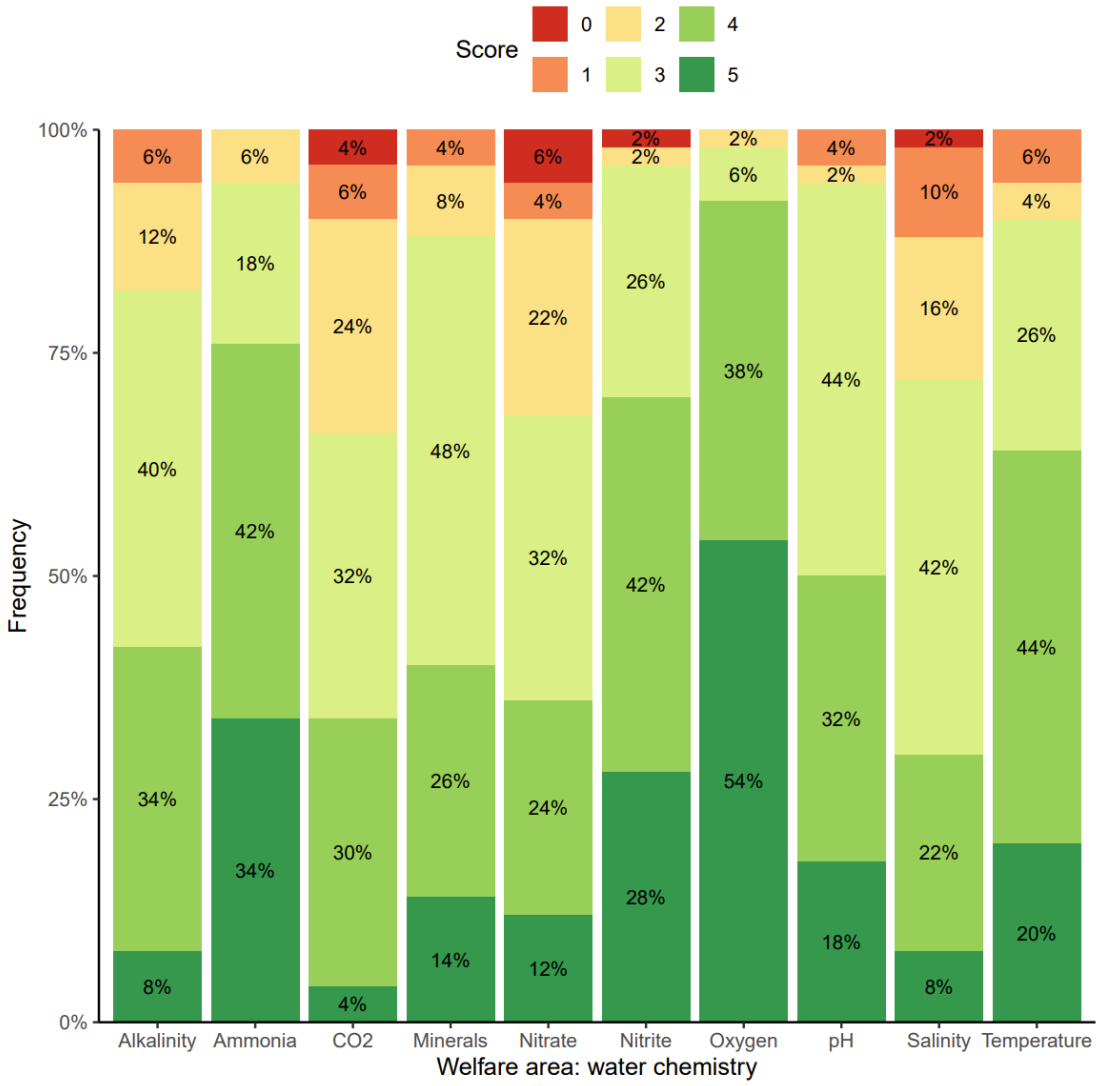


In the figures, we present the overall results (outer pie chart) alongside the isolated farmers' category (inner pie chart). Interestingly, **farmers** opinion did not differ dramatically compared to all the votes. Farmers put a bit more emphasis on health status and a bit less to nutrition, in respect to the total votes. Analyzing the individual welfare macro-areas, **water chemistry**, **feeding**, **management**, and **health status** received similar importance scores. However, it was noted that management may not be a primary factor for inclusion in a shrimp welfare index; therefore, detailed results for this category are not presented.

Behaviour was rated with approximately half the importance compared to the other macro-areas. Unfortunately, observing *P. vannamei* behavior in an objective and scientifically rigorous manner remains challenging. Additionally, certain production systems, such as biofloc, can obscure behavioral observations due to low water clarity.

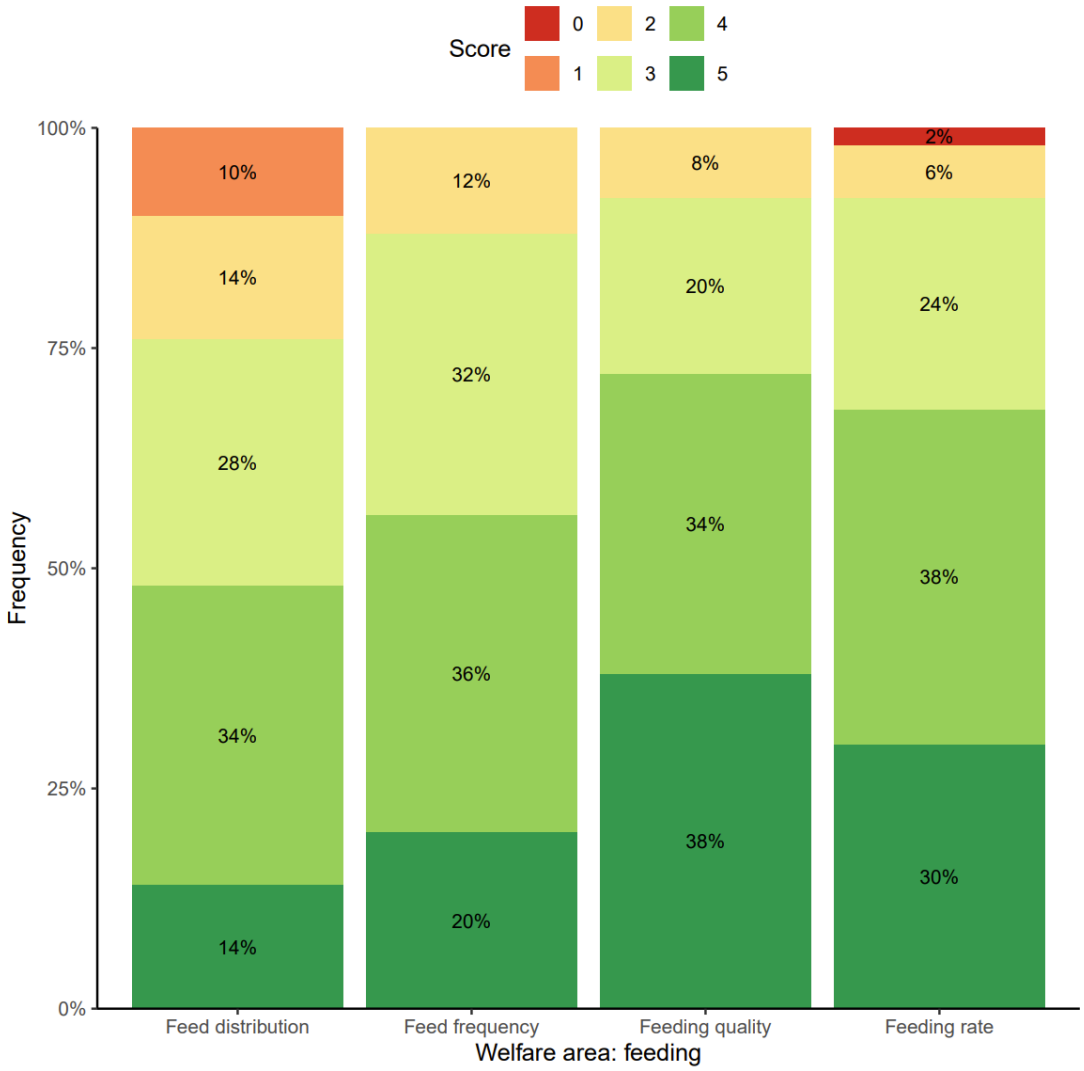
The second part of the workshop involved 50 participants. In this part, key welfare areas were organized into distinct categories. Participants were asked to rate the importance of each category on a scale from 0 (not important at all) to 5 (extremely important).

This chart illustrates the importance of various water chemistry parameters for shrimp welfare, as rated by the 50 participants, on a scale from 0 (not important) to 5 (extremely important).



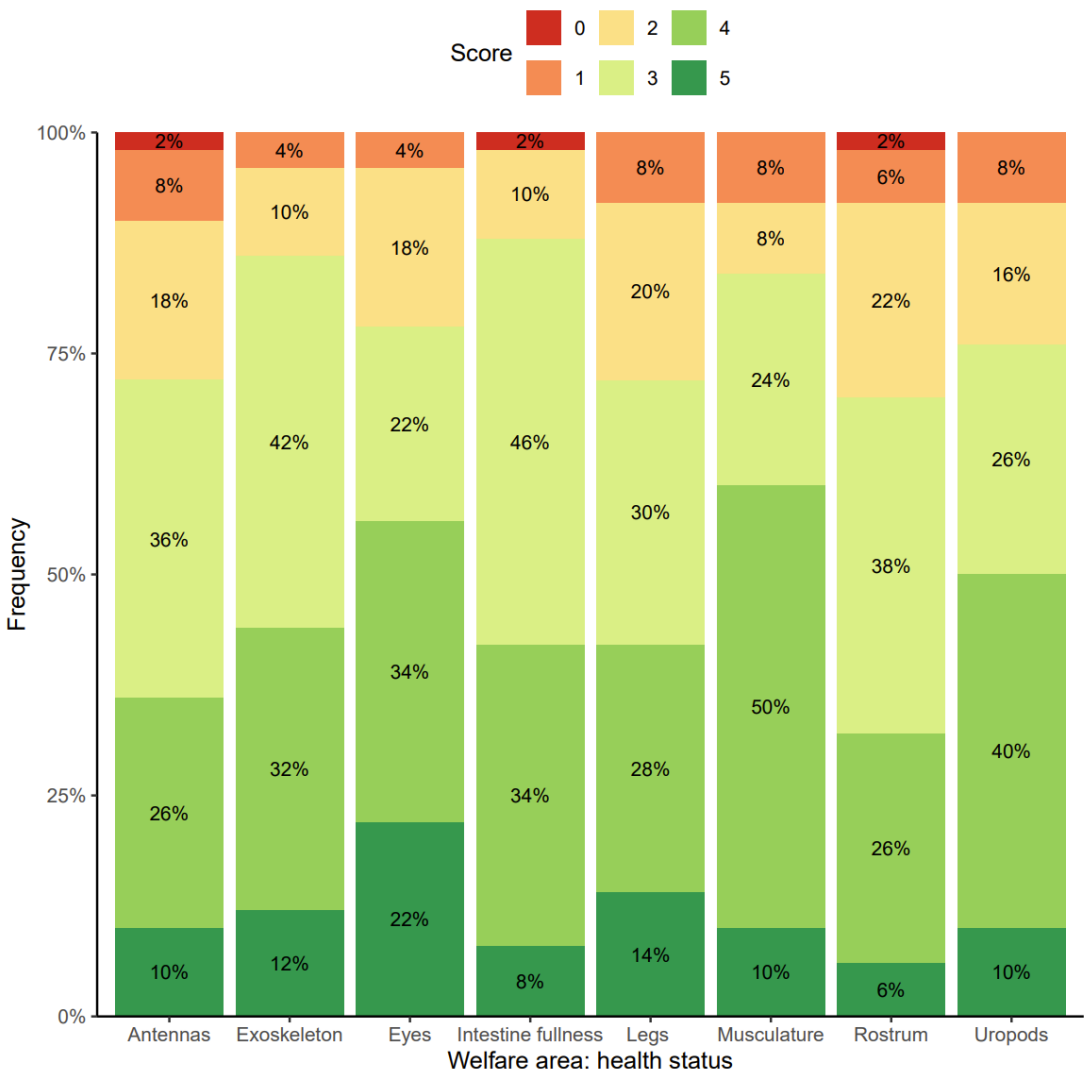
Among the water chemistry parameters, **dissolved oxygen** received the highest importance rating from participants, followed by **ammonia**, **nitrite**, **pH**, and **temperature**. In contrast, **nitrate**, **CO_2**, and **salinity** received lower scores. The average importance scores ranged from **4.44** for oxygen to **2.9** for CO_2. Notably, there was minimal variation between the ratings provided by farmers and those from the overall group.

Displayed here are the survey results on the perceived importance of different concepts related to feeding. The scale ranges from 0 (not important at all) to 5 (extremely important), with responses from 50 participants.



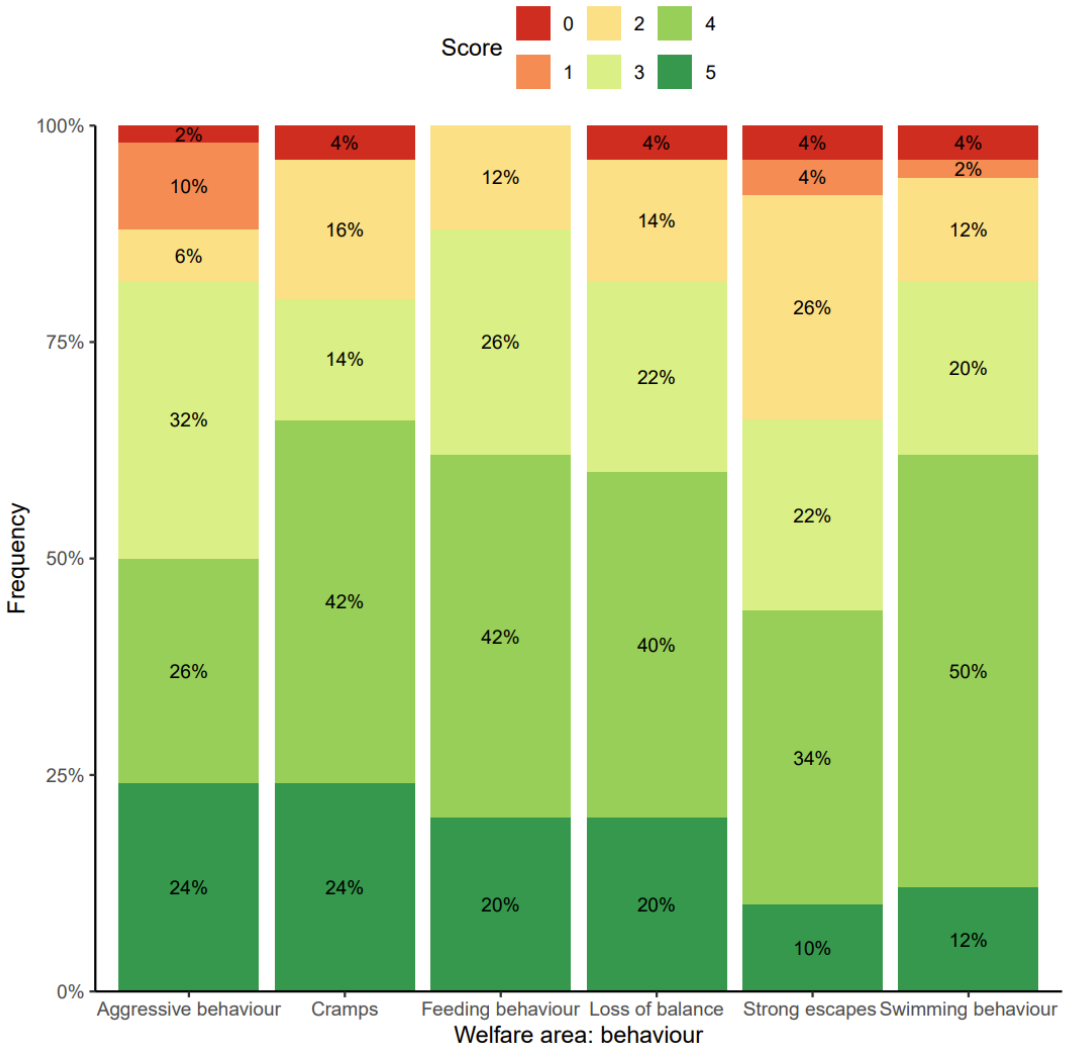
In the feeding area, **feed quality** and **feeding rate** were identified as the most important parameters, with feeding rate being a bit more emphasized by farmers group. Overall, the importance ratings within these categories showed relatively minor differences. The scores ranged from **4.02** for feed quality to **3.28** for feed distribution, suggesting a relatively flat hierarchy in terms of perceived importance.

This diagram represents the survey findings on how crucial health status of each body part is for shrimp welfare. Ratings range from 0 (not important at all) to 5 (extremely important), based on responses from 50 participants.



Among the evaluated body parts, **eyes**, **musculature**, and **uropods** received the highest scores. **Antennae** and **rostrum** were deemed the least important by the community. Interestingly, participants highlighted the importance of two additional organs: **gills** and **hepatopancreas**. These organs are considered critical for shrimp health and would likely receive higher scores than the evaluated body parts if included in the assessment. However, compared to other welfare categories, the overall average scores for this group were slightly lower. The average scores ranged from **3.52** for eyes and **3.46** for musculature to **2.98** for rostrum. Notably, farmers' inputs were consistent with the overall group data, indicating broad consensus across participant categories.

The chart shows survey responses on the analysis importance of each different behaviour for shrimp welfare. Participants rated its importance on a scale of 0 (not important at all) to 5 (extremely important), with 50 individuals taking part.



A relatively flat hierarchy was observed across most behavioral categories, with the exception of **strong escape behavior**, which stood out as a lower priority. Other behaviors displayed moderate variation in their importance ratings, ranging from **3.7** for feeding behavior to **3.42** for aggressive behavior. Interestingly, farmers placed slightly more emphasis on **swimming** and **feeding behaviors**, reflecting their practical relevance in day-to-day farm operations.

These data will contribute to developing a **welfare index** that farmers and researchers can use to monitor shrimp conditions on their farms/sites. The goal is **not to impose rules or restrictions** but to provide a tool that helps identify key challenges, focus on critical issues, and improve overall shrimp welfare and product quality.

If you would like to learn more about the research project CrustaWohl or have any further questions please visit our Website or get in contact with Paolo.Gamberoni@awi.de.