Larvae first feeding

Materials and planning for the first feeding

- First feeding trays and raceways must be prepared in advance (cleaning, checking water quality, monitoring)
- Waterflow should be maintained at 160-200 L/hour
- The trays need to be placed as described in protocol# 4 compared to the conventional use in the raceway (Figure 1). This approach will ensure the flow of water from the side of the tray and out through the bottom and avoid the larvae getting stuck to the sidewall outlet.
- The water level in the trays should be adjusted to about 6-7 cm so that later when the larvae become more mobile and strong the water level can be raised further (>10 cm).
- Disinfect all equipment before, in between, and after every step of the operations .

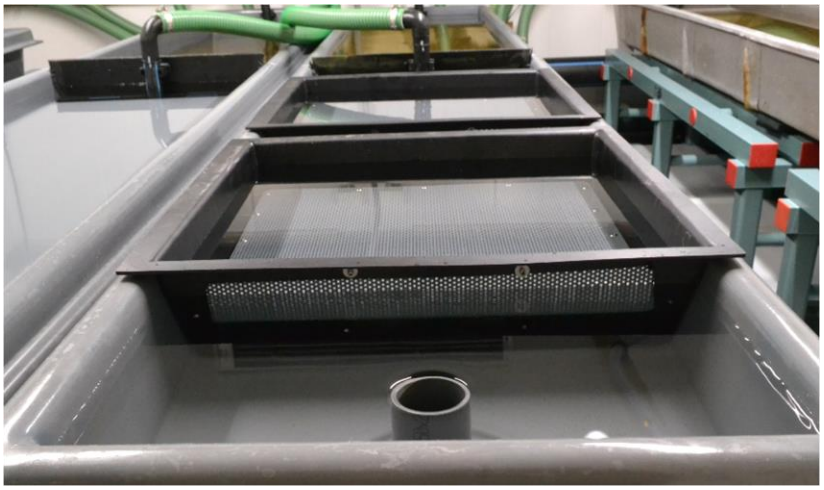

Figure 1: Regular mounted hatching trays in a standard raceway. Water inlet at the back (green tube) and outlet in the front. Reverse-mounted trays are recommended, to prevent larvae getting stuck to the outlet on the sidewall.

General guidelines for first feeding

- In a tray there should not be more than 1000 larvae
- As the larvae grow, the average feed size should be adjusted by mixing different sizes of feeds
- An aquarium net should be used to transfer larvae from one tray to another and only a few larvae should be transferred at a time

Although for the first few days, the larvae will lie on their side on the bottom of the tray, as days pass, they will become very active, especially when being fed.

Feeding

When the larvae hatch, they can eat dry feed straight away. They do not seem to feed off the bottom but will move to the surface to feed. We observed feeding from the bottom only at a much later stage, and never in the first-feeding trays.

In our first attempt of first-feeding in 2019 we used feed particles of 580 µm for the first weeks. Our concern was that they could not ingest larger feed particles, though it has been reported that they can accept feed of ~1000 µm directly after hatching. Using smaller particles than necessary is not recommended as it can negatively affect the rearing conditions of the larvae due to left over feeds that can potentially contaminate the water in the trays and raceway.

Table 1 presents our first-feeding strategy in 2019 where we employed the Otohime Larval Fish Diet. The information in the table can be adopted for routine feeding of wolfish larvae

Table 1: Feed particle size (diameter) for first-feeding of spotted wolffish larvae using commercially available Otohime Larval Fish Diet in the 2019 trials.

2019					
Feed type	Feed size (µm)	Week 1	Week 2	Week 3	Week 4
C1	580-840	30 %	20 %	10 %	0 %
C2	840-1400	70 %	80 %	85 %	90 %
S2	920-1800	0 %	0 %	5 %	10 %

Recommendation					
Feed type	Feed size	Week 1	Week 2	Week 3	Week 4
C2	840-1400	100 %	80 %	75 %	75 %
S2	920-1800	0 %	20 %	25 %	25 %

The larvae were fed 5-6 times a day (08:00, 12:00, 15:30, 20:00, 23:00). The larvae should be fed every four hours both day and night. We were not able to follow this protocol for the 2019 trial.

At feeding time, a thin layer of feed was distributed on the entire surface of each tray to maximize the availability of feed for all larvae.

Cleaning the trays

The trays were cleaned daily using both a dish brush and siphon. Due to the small feed particles and low waterflow, the feed got stuck to surfaces of the tray and had to be removed daily. It will be difficult to clean the trays if the larvae density is high. The cleaning brush must be moved very gently, and siphoning must be very gentle to avoid damaging the larvae. Note that this is a time-consuming procedure.

Once a week (usually Mondays) we switched the old trays with a new clean one. The larvae were collected using nets and they were gently transferred from the old tray to the new clean tray. It is important not to net too many larvae at once to avoid harming them and to keep their time out of water to a minimum. It is difficult to clean the trays with the larvae. Therefore, we suggest periodic replacement of trays to maintain hygienic conditions.

Cleaning the raceway

The raceways were cleaned every day. The trays were gently moved back and forth in the raceway, to allow for cleaning of the raceway. The raceway was cleaned in the same way as the trays, but care was taken to minimise the impact on the water quality in the trays. Hence, mostly a siphon was used to remove the dirt out of the system.

Ending of first feeding period

At the end of the first feeding period (week 4) the larvae were gently collected with a net and placed in a 5 L bucket for transport to the on-growth tanks. The larvae were gently poured into the new tank with minimal height difference between the bucket and the water level in the new tank to minimise disturbance.

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Nord University
Faculty of Biosciences and Aquaculture
8049 Bodø
NORWAY