Rearing of Juvenile Wrasse

This leaflet brings together the available information, arising from the ECOFISH project, on the rearing and husbandry of juvenile Ballan wrasse from the post-weaning phase until they are of sufficient size to be transferred to sea cages. Juvenile rearing is the final phase of the commercialisation process of Ballan wrasse farming. To date, this is the least studied phase as few juvenile cohorts have been successfullly produced and brought through the life cycle to a viable size for use on salmon farms for lice control.

PROJECT SUMMARY

EcoFish is a three-year transnational project financed by the European Regional Development Fund/Northern Periphery Program and national private and governmental grants. The project focuses on developing methods for culture and use of Ballan wrasse as cleaner fish.

EcoFish has produced this series of summary technical leaflets on all the relevant practices covering the entire life cycle for the rearing and the production of Ballan wrasse. Readers can access and download more detailed, full-text, pdf versions of these technical leaflets at www.eco-fish.org

Rearing Unit Design and Type of Tanks

Tank size and volume

A variety of standard aquaculture holding tanks have been employed to rear the juvenile stage of Ballan wrasse generally, the tank units tend to be from 2m diam. circular or 2 x 2m square with rounded corners for the smaller juveniles up to 1g and extending up to 4m diam. x 2m deep for larger older individuals. Following standard farming procedures, it is usual to increase the tank size (diameter and depth) as the fish grow and thus maintain graded/sorted size groups together for a longer period of time.

Water input and outlet

Standard tank inflow pipework has been employed although the water delivery is usually sub-surface to minimize turbulence and angled to create a gentle circular current. Current flows for Ballan wrasse are from 2–3 tank volume turnovers per hour. For smaller sized fish, a fine mesh is fitted over the standpipe to contain the small juveniles and this is replaced with standpipes having increasingly larger holes/slots as the fish grow in size. With larger fish, bottom draining standpipes are routinely used.

Tank furniture

As with adults, it was found very advantageous to create refuges and provide adequate cover for these juveniles. Suitable materials include; on or near the surface, imitation floating weed and, on the bottom, a range of plastic pipes, shapes and hides. All tank furniture should be removed and cleaned at regular intervals (min. once per week) to prevent build-up of organic wastes and the development of biofilms.

Loading of transport tank with juvenile wrasse

Environmental Conditions for Juvenile Rearing

Temperature

The rearing of juvenile Ballan wrasse has been successfully conducted at a wide range of ambient water temperatures between 8–18°C. While there is, as yet, no empirical evidence for a temperature optimum or ontogenetic shifts *in preferenda* with fish size, it has been observed that fish activity, feeding behaviour and growth are all improved at higher temperatures in the above range (14–18°C). Some units make use of RAS (Recirculating Aquaculture System) to provide warmer water for the overwinter period or to increase the overall water temperature profile.

Light Photoperiod

A continuous light photoperiod is normally used during the larval rearing phase and, in some units, this regime is continued for up to 12 months (to the second summer). Alternatively, several units revert to a fixed photoperiod regime of 18L: 6D for rearing of juveniles.

Salinity

This should be maintained in the range 33–34ppt.

Oxygen Levels & Aeration

Oxygen levels need to be monitored and maintained in the range 7 to 9mg /L in the outfall pipe. A gentle, supplementary, aeration should be supplied with the water input to improve oxygenation and to enhance circulating currents for food distribution and the elimination of wastes in the discharge.

Juvenile Rearing Practices

In general, all trials undertaken with juvenile fish from 1g up to c. 100g were conducted on relatively smaller numbers (2,000–5,000 fish) due to the limited availability of rearing juveniles.

Stocking Tanks and Densities

When juveniles over 1g have completed weaning to dry feeds, they can be moved from the larval rearing facilities to larger, nursery, onrearing tanks. This can be undertaken using a soft hand net and if desired a preliminary hand sort, into two or more grades, can be undertaken at this stage: small groups of fish are moved to a shallow white tray and smaller or larger fish removed before the remaining are transferred to a rearing tank.

In most cases, juvenile Ballan wrasse have been maintained at relatively lower stocking densities than gadoids or most marine species with typical values in the range of only 5–10kg^{m-3}. Attention should be paid to mortality levels and intra-species aggression due to increasing size variation. Grading and lowering of stock densities should be achieved routinely.

Information on feeds, feeding methods and feed sizes for juvenile fish

Typically Ballan wrasse of 2–3g will accept up to 1mm pellet size and, thereafter, a 1.5mm pellet will be appropriate for fish from 3–15g, with a further progression in pellet size from 2mm for fish of 15–50g and then a 3mm pellet for fish over 50g.

A variety of commercially produced prototype diets are now available but it has been found that juveniles will readily accept and can be weaned to various gadoid/marine species diets and will also freely feed on 'home-made' moist diets and even natural prey materials such as cooked mussel meats and fish proteins. Commercial diets follow a stepwise size increase to match fish size to achieve maximal growth and recommended rations should be followed.

Using a fine mesh hand net to load juvenile wrasse

Generally, smaller fish are fed "to excess" using clockwork or plate feeders supplemented with hand feeds to monitor behaviour and ensure that stocks are feeding normally. Feeding frequency can be reduced as the fish grow in size with a tendency for the larger stocks to 'gorge' at feeding time. In general, most rearing units will still administer at least two feeds per day (AM & PM) to ensure satiation is reached and that fish are displaying normal behaviour.

Size Grading

Grading is typically carried out using a standard grading box with grading bars. These consist of GRP boxes, which are half immersed in the rearing tank, with vertical bars making up the bottom of the box. The bars come with differing inter-bar distances (e.g. 3mm upwards) allowing small fish to pass through whilst retaining larger ones. Figure 1. shows the mean sizes of Ballan wrasse juveniles retained by various mesh sizes in a specific trial in this study: there were no recorded mortalities at three days post-grading. While automatic graders are also available, there are no available data for the performance of fish in such equipment.

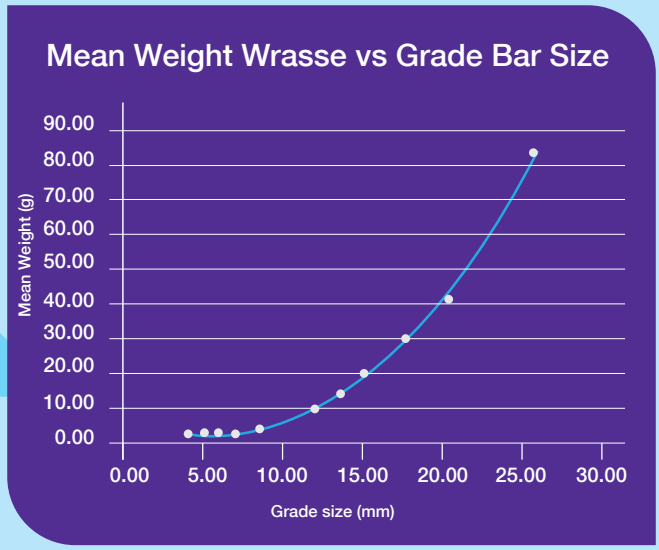

Figure 1. Size grading of juvenile Ballan wrasse

Stock monitoring and assessment of growth performance

As there are scant data on the optimal rearing conditions and practices, it is recommended that the performance of stocks is monitored on an ongoing basis to provide robust data on the survival and growth of stocks of different sizes in response to different feeds, stocking levels and ambient conditions.

Graphs are available of potential growth rate of juvenile wrasse. The growth rates of farmed Ballan wrasse have been improved using diets with high content in crustacean meal. Growth rates can also be improved by using heated water over the winter in the range 14–18°C.

ECOFISH BALLAN WRASSE PROJECT

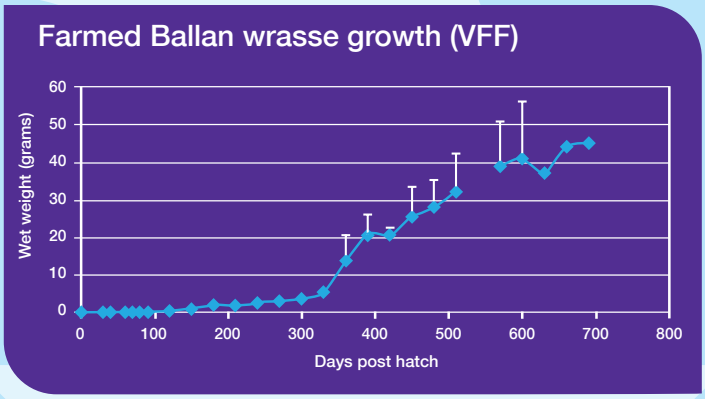

Figure 2. Growth of a cohort of Ballan wrasse from hatch to 22 months

Figure 2 shows the growth of Ballan wrasse over a two year period: though the fish were only 45g mean weight after 22 months of cultivation, this example is from one of the earliest reared batches and the duration of weaning to dry feed was slower than in more recent farmed fish cohorts.

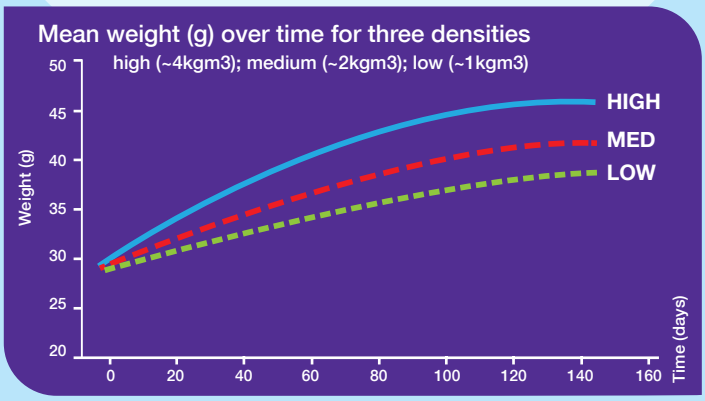

Figure 3. Growth of juvenile Ballan wrasse at different stocking densities

Figure 3 shows the impact of differing stocking densities (1, 2 and 4kg^{m-3}, arbitrarily termed 'low', 'medium' and 'high', respectively) on the growth performance of c. 30g juvenile Ballan wrasse in a feeding trial conducted using rearing tanks in the west of Ireland over ten weeks.

The objectives of the EcoFish partnership project are:-

- To establish wrasse hatcheries with captive broodstocks in Ireland, Scotland and Norway
- To develop techniques for rearing wrasse at all life stages
- To produce eggs and larval wrasse
- To develop methods for culture and use of Ballan wrasse as cleaner fish

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