THE EFFECT OF SALINITY IN THE EXTENSIVE REARING OF AUSTRALIAN BASS *MACQUARIA NOVEMACULEATA*

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The Australian bass is a euryhaline catadromous fish requiring salinities of at least 14gl^{-1} for successful spawning (Llewellyn and Macdonald 1980; van de Wal 1985). Adult fish undertake a downstream migration in early winter with adults and juveniles returning upstream in winter and early summer. Langdon(1987) postulated that juvenile bass need to remain in estuarine waters until they develop the ability to osmoregulate in fresh water because energy losses due to osmoregulation are minimised within the confines of the estuarine habitat where isosmotic conditions are most likely to be found. Thus the timing of this ability to osmoregulate is critical in the transfer to fresh water of artificially reared juvenile bass.

Commercial production of Australian bass in Queensland (Qld) commenced in 1988, almost ten years later than in New South Wales (NSW), where some excellent research had been conducted into the larval biology of these animals by a number of workers. However, two commercial hatcheries in Qld claimed significant larval survival when transferred to fresh water within a few days of hatching. This was in direct contrast to the findings of Battaglene *et al.* (1989), who found that larvae could not survive in fresh water before the age of three weeks. Subsequently, a research programme was initiated to compare NSW and Qld stocks reared under identical conditions in a cooperative effort between the Brackish Water Fish Culture Research Station at Port Stephens and the Department of Primary Industries, Fisheries Branch, hatchery at Deception Bay.

Larvae from NSW and Qld were held in two different acclimation salinities, 15 gl^{-1} and 28 gl^{-1}, at a temperature of 20±1°C. For each trial, survival over 48 h of three replicates of thirty larvae was tested against salinities of 0, 2, 5, 15 and 28 gl^{-1} at the ages of 4, 7, 11, 14, 17, 21 and 28 days. The results were analysed using two 4-way ANOVA comparing two blocks of results. Block 1 compared all ages of larvae for two salinities (2 and 5 gl^{-1}) against acclimation and stocks. Block 2 compared larval ages 14, 17, 21 and 28 days for three salinities (0, 2 and 5 gl^{-1}) against the same acclimations, salinity and stocks.

Survival at 0 gl^{-1} was significantly reduced for all larvae irrespective of source or treatment up to the age of 21 days. However, by 28 days, all larvae had developed the ability to cope with fresh water. It should also be noted that at least 80% of the larvae survived 2 gl^{-1} by the age of 7 days or over. The effect of acclimation salinity was very evident on Day 4 when fry acclimated at 15 gl^{-1} showed significantly better survival at 2gl^{-1} than those fry acclimated at 28 gl^{-1}. Beyond that age, the effect of acclimation was not significant.

Although the early survival claims have not been able to be repeated at one of the two Qld hatcheries, the other hatchery continues to claim success. One possible explanation of this

situation is suggested by the laboratory results which show a vast improvement in early larval survival with a low salinity of 2 gl^{-1} as well as a positive effect of acclimation on survival. The hatchery claiming these early larval survivals draws water from Stockyard Creek which is known to have a high mineral content with a measured salinity level of 1.4 gl^{-1} in mid-winter (a normally dry period in South East Qld). By way of contrast, the other Qld hatchery draws water from Ringtail Creek which has a low mineral content.

Thus it is possible that yolk-sac fry reared in 15 gl^{-1} salinity for one week and transferred to well prepared ponds with a residual salinity in the vicinity of 2 gl^{-1}, may survive, depending on their ability to find suitable food sources and to avoid possible predators. This may well be the basis for the apparently anomalous results in the Qld hatcheries.

References

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