Enterprise experiences in the culture of new sparids

Bodington P.

Recent advances in Mediterranean aquaculture finfish species diversification

Zaragoza : CIHEAM
Cahiers Options Méditerranéennes; n. 47

2000
pages 135-139

Enterprise experiences in the culture of new sparids

Ph. Bodington
Selonda Aquaculture S.A., Riopesca, Managouli, Fokidas, TK33056, Greece

SUMMARY – Demand is steadily increasing for hatchery production of alternative species to sea bass, *Dicentrarchus labrax*, and sea bream, *Sparus aurata*. Production of these "new" species is dependent on biological factors such as egg production efficiency, larval survival, fry growth rates, deformity levels, disease tolerance, handling tolerance, as well as non-biological factors like the certainty of fry demand and confidence in meeting production targets for the standard species. These factors vary with hatchery site and design as well as target market. This paper summarises experiences in hatchery production of *Puntazzo puntazzo*, *Diplodus sargus*, *Dentex dentex* and *Pagrus pagrus*.

Key words: *Puntazzo puntazzo*, *Diplodus sargus*, *Dentex dentex*, *Pagrus pagrus*, hatchery production.

***RESUME –** "Expériences des entreprises concernant l'élevage de nouveaux sparidés". La demande augmente régulièrement pour la production en écloseries d'espèces alternatives au Loup,* Dicentrarchus labrax*, et à la daurade,* Sparus aurata*. La production de ces "nouvelles" espèces est sous la dépendance de facteurs biologiques tels qu'efficacité de la production d'œufs, survie larvaire, taux de croissance des alevins, niveaux de déformité, tolérance aux maladies, tolérance à la manipulation, ainsi que de facteurs non biologiques tels que la certitude de la demande en alevins, et l'assurance de répondre aux objectifs de production pour les espèces standard. Ces facteurs varient selon le site et la conception de l'écloserie ainsi que le marché-cible. Cet article résume des expériences de production en écloseries pour* Puntazzo puntazzo*,* Diplodus sargus*,* Dentex dentex *et* Pagrus pagrus*.*

Mots-clés : Puntazzo puntazzo*,* Diplodus sargus*,* Dentex dentex*,* Pagrus pagrus*, production en écloseries.*

Introduction

With the expansion of the industry, the number of hatcheries has grown steadily. With increasing experience and the introduction of new products, the percentage of hatcheries producing successfully will continue to grow. To reduce the impact of this competition hatcheries have been trying to diversify. Taking into consideration the cage farmers demands, diversification has concentrated primarily on species similar to those currently produced.

The rate of development of new species is dependent on external factors, e.g., cage farm demand, level of competition for produced fry, as well as internal factors, e.g., broodstock, successful egg production, results of preliminary work.

This paper will examine the various factors influencing development of new species from the perspective of experiences to date from *Puntazzo puntazzo*, *Diplodus sargus*, *Dentex dentex* and *Pagrus pagrus*. Due to the differences in performance between hatcheries and the varying environmental conditions all data will be presented not in absolute terms but relative to a reference species, *Sparus aurata*.

External factors

Cage farm demand

There is a very great difference between perceived and actual demand. While the industry wants, and needs, to diversify, the predominant view is still dictated by short-medium term cash flow needs. Income is more guaranteed with current species, that are produced with known risk.

Uncertainty in cage performance, variable fry quality and unknown market potential all contribute to a reluctance to commit resources to the production of new species. This will, of course, change as experience is gained and the potential income from sea bream and sea bass reduces.

Production of new species is still limited. *Puntazzo puntazzo* and *Diplodus sargus* are preferred, not because of any actual advantages in cage performance but because of fry availability and increasing familiarity with these species.

Hatchery competition

Every year more hatcheries, both large and small, are commissioned. The introduction of procedures and products enabling more reliable rotifer and algae production has removed a large element of variability that previously limited hatchery production.

These two factors contribute to increasing the competition for fry sales. This results in pressure on the hatcheries to support sales, by offering alternative species.

Internal factors

Broodstock success

The successful production of eggs is a pre-requisite for any realistic development of new species. The relative ease with which eggs are obtained will inevitably bias the choice of species pursued and influence the rate at which development takes place. Egg production reliability, and the quantities of eggs produced determine the suitability of a species for hatchery production.

There is a considerable difference in spawning reliability between species (see Table 1). Some like *Dentex* can yield good results in one hatchery, but not at all in others. *Puntazzo* are extremely sensitive to temperature, environmental factors and the genetic origin of the stocks. *Pagrus* present few problems, while *Diplodus sargus* performs reasonably, but with lower egg production per kg.

Table 1. Broodstock performance relative to results from *Sparus aurata*

	Eggs (kg)/kg broodstock	Successful stocks (%)	Relative performance
Sparus aurata	0.7-2.0	100	100
Puntazzo puntazzo	0-0.25	50	5
Pagrus pagrus	0.3-0.4	100	35
Dentex dentex	0-0.3	40	6
Diplodus sargus	0-0.35	50	9

It is clear that the investment in effort to obtain reliable egg production is considerably more than that required to routinely spawn *Sparus aurata*.

Hatchery performance

Once eggs are obtained the time taken to reach a reasonable production is dependent on the amount of tank facilities made available. This is very dependent on confidence, and hatchery size.

Guaranteed production from tanks of standard species allows others tanks to be utilised for new species that might, or might not produce a reasonable quantity of fry.

Early problems reduce this confidence, and therefore bias decisions.

No two hatcheries are identical and even with procedures in common, very different results are obtained. The causes of variability are examined below and the performance of the various species summarised in Table 2.

Table 2. Larval performance of new species, relative to *Sparus aurata*, for a range of factors influencing hatchery success

	S. aurata	*P. pagrus*	*P. puntazzo*	*D. dentex*	*D. sargus*
Egg sensitivity	0	–30	–50	–50	–30
First feed success	100	70	100	90	70
Larval sensitivity	0	–50	–50	–40	–70
Density tolerance	100	70	70	100	70
Handling tolerance	100	90	80	85	90
Weaning success	100	100	100	30	100
Larval survival	100	50	130	70	30
Larval growth rate	100	220	135	220	180
Relative performance	100	17	25	11	5

Egg sensitivity

Closely linked with egg size, egg sensitivity correlates with the percentage of duff eggs as well as early larval survival. It also strongly relates to the potential for deformity inducement.

Changes in egg collection and handling can alleviate many of the problems, but the risk of poor performance due to sub-optimal conditions remains high.

First feeding success

Traditionally, problems in this area have been attributed to prey size. Despite the variations in mouth size, we have found little difference in first feeding success. All the species considered in this paper feed well on the strains of rotifers currently used in marine hatcheries.

Failure to first feed can usually be linked to poor egg quality, and not to any factor concerning food size.

Larval density

This factor is of limited relevance except when the larvae approach weaning. Increasing biomass and tank feed rates can lead to disease problems as a result of sub-optimal conditions. The figures presented in Table 2 refer to the optimum densities that should be used to avoid problems.

Handling tolerance

Most hatcheries practice a policy of moving larvae prior to, or during, weaning. There is a considerable variation in tolerance, with significant mortalities resulting if care is not taken.

Weaning success

With the exception of *Dentex* there is not a problem in weaning. The poor showing with *Dentex* is a clear example of the influence of external factors. Poor cage farm demand results in little effort being made on solving this problem despite some early success indicating possible solutions.

Larval survival

The factors affecting larval survival have not been found to be any different from those relevant for

Sparus aurata. The figures given in the Table 2 are not absolute, but are the average survivals relative to those obtained for *Sparus aurata* under the same conditions.

Larval growth rate

Many of the disadvantages of new species already considered above, can be partly offset by the higher larval growth rates recorded for these new species. *Diplodus sargus*, *Dentex dentex* and *Pagrus pagrus* all exhibit significantly higher growth rates than *Sparus aurata*. The growth of *Puntazzo puntazzo* is marginally faster.

Tank usage for all these species is therefore more efficient, with more batches of fry being produced per tank for a given time period.

Larval sensitivity

The major influencing factor in determining commercial production success is larval sensitivity.

The higher the larval sensitivity the greater the variation between batches and between hatcheries.

It is possible to routinely achieve 40% survival for *Puntazzo puntazzo* in one hatchery, but despite procedures in common, in another hatchery with different water and tank parameters, a 3% survival is standard. A similar picture is apparent for *Diplodus sargus*, where there is a high inter-hatchery variation in performance. *Dentex dentex* and *Pagrus pagrus* are more difficult to quantify, as far fewer batches of larvae have been produced.

Nursery performance

Once the larvae are weaned the variation in performance is much less. The relative performances of the different species in the nursery are summarised in Table 3.

Table 3. Summary of factors affecting nursery performance

	S. aurata	*P. puntazzo*	*D. sargus*	*P. pagrus*	*D. dentex*
Non specific disease tolerance	100	80	100	100	100
Specific disease tolerance	50	70	90	50	50
Uniformity of growth	100	100	70	70	30
Growth rate	100	130	150	150	150
Density tolerance	100	70	70	70	60
Handling tolerance	100	50	80	50	80
Current demand	100	70	30	20	10
Relative performance	100	88	88	78	73

Disease tolerance

Data is still being built up of the disease tolerances of the various species, but it is clear that certain advantages and disadvantages are apparent. *Puntazzo puntazzo* is prone to non-specific myxo-bacterial and myxo-sporidean infections, but not sensitive to Pasteurella. *Pagrus pagrus* is similar to *Sparus aurata*, while *Diplodus sargus* is appears very tolerant to most problems. No problems have been noted for *Dentex* but data is limited.

Uniformity of growth

Fry acceptability to the cage farms is influenced by the uniformity of size. A large size range necessitates extra handling. Both *P. pagrus* and *D. dentex* have a great divergence in size. *D. sargus* and *P. puntazzo* are similar to *S. aurata*.

Growth rate

Despite some slowing down of growth after weaning all the new species have a growth advantage over *S. aurata* (see Table 3).

Density and handling tolerance

S. aurata is a very tolerant fish, and none of the examined species can be handled in the same way, without incurring problems of mortality or subsequent disease outbreaks. This results in higher production costs through increased handling times (labour cost), and reduced transport densities (higher transport costs).

Conclusion

New species offer certain advantages over *S. aurata*, though low demand for fry is restricting the pace of development.

At the industry level, extreme variability in performance between hatcheries suggests that a general allocation of facilities to the production of these new species now, will incur a significant cost through lost production.

Considering individual hatcheries, results to date indicate that provided conditions are appropriate, these species can be produced, as economically, or more so, than *Sparus aurata*.