Health & Welfare

Portuguese research studies meagre production in earthen ponds

2 May 2013

By L. Ribeiro , F. Soares , H. Quental-Ferreira , A. Gonçalves and P. Pousão-Ferreira

Customized feeds will lead to greater performance

Captured meagre broodstock were adapted to captivity in a process that tends to take longer than for other farmed marine fish.

The meagre (*Argyrosomus regius*) is a fast-growing fish species with good feed conversion rates that is a candidate for expanded aquaculture in the Mediterranean. Meagre production started in the late 1990s in France and Italy, but since then has spread to Spain, Egypt, Greece, Turkey, Malta and

Portugal. Overall meagre production is still very limited, probably around 5,000 metric tons (MT) total annually, but it is expected to increase.

Meagre production at IPIMAR

Studies to advance meagre production have been undertaken at the Instituto de Investigação das Pescas e do Mar (IPMA) Aquaculture Research Station, a 7-ha marine facility located in Olhão, southern Portugal, for research and technological development of species with potential value for the national aquaculture industry.

Meagre broodstock were initially captured in 2007 and adapted to captivity. The adaption took longer than for other farmed marine fish like sea bream and sea bass. The meagre did not eat for more than three weeks upon capture, and afterwards ate only live mackerel, delaying the introduction of a frozen diet of sardines and squid. From 2009 onwards, five more breeders were captured, but their adaption to captivity was faster.

Meagre broodstock were also more susceptible to external Monogena parasites than other fish species. Altered behavior, such as fish holding their heads above the water surface, and skin darkening were often observed when parasitosis occurred.

Since 2009, the meagre spawn regularly during April and May, 48 hours after hormonal induction at the IPMA facilities. The fish spawn for only one to three days, with the egg volume higher on the first day. When the juvenile stage is attained, the fish are stocked in earthen ponds to evaluate their growth potential.

Pond production

A shorter production cycle and lower investments, as well as a decrease in risk, are expected when farming a fast-growing species. Gilthead sea bream and sea bass normally attain marketable sizes of about 400 g within 12 to 14 months, respectively, when farmed in earthen ponds from 20 grams.

At the IPMA facilities, two farming protocols were used to evaluate meagre growth potential in 3,500-m3 earthen ponds, monoculture and polyculture with *S. aurata* and *Diplodus vulgaris*. Fish had a consistent initial weight of 15 g when stocked, but in the monoculture treatment, meagre were pre-fattened in 18-m3 outdoor fiber tanks before being transferred to earthen ponds at 300 g. In the polyculture farming, meagre were directly stocked in the earthen ponds.

The meagre attained 563 ± 170 g (0.5 kg/m3) within 15 months when farmed in monoculture and grew to above 1 kg five months later. When meagre were farmed with sea bream, it took 20 months to attain 300 g (Fig. 1). The differences in fish weight at stocking, as well as the higher levels of water quality, cleaning and access to food in the tanks accounted for the observed differences in growth.

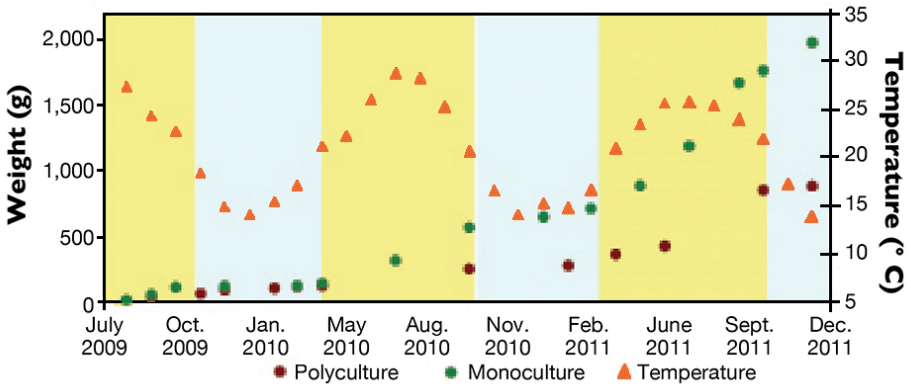

Fig. 1: Influence of temperature on meagre grown in earthen ponds in monoculture or polyculture with gilthead and common two-banded sea bream.

However, meagre feeding behavior and/or the initial stocking size, which was four times smaller than the size of the sea bream in the polyculture ponds, might have contributed to the magnitude of the grow-out weight difference. Sea bream have a more aggressive feeding behavior than meagre, which could have limited access to food for the meagre, especially during the first months.

Further studies with other species and different initial stocking densities are needed to confirm these observations, as well as improvements in feed distribution for greater growth. Increasing the number of meals and/or the number of automatic feeders could be a helpful strategy for the polyculture of meagre with sea bream.

Meagre produced under monoculture reached 1 kg in earthen ponds at IPMA in Portugal. Fish raised in polyculture with sea bream were considerably smaller.

Trial results

Meagre farmed in polyculture and monoculture achieved different average weights after 29 months of grow-out: 879 ± 262.2 grams and 1,968 ± 411.5 grams (Fig. 1), respectively. Differences in growth rates were mainly observed during the first 16 months, after which similar growth rates were observed for both production systems. At IPMA, meagre attained sizes above 1 kg faster than gilthead sea bream and sea bass, which took 45 and 40 months, respectively, to reach 1 kg.

Meagre performance can still be improved, since the fish were fed commercial feeds for sea bream. During the pre-fattening period, feed-conversion ratios of 1.1 were obtained for meagre, suggesting that growth can be enhanced if adequate feed formulations are used. Water temperature greatly affected meagre growth, especially during the winter season.

As expected, the highest specific growth rates – 1.5-2.3 percent/day – were observed during the first 12 months of grow-out. It was also during this period that lower water temperatures had a higher impact on growth (Fig. 1). Two periods of growth could be roughly identified: faster growth during May and October, and slower growth between November and April.

Growth seemed to slow down when water temperatures fell below 22 degrees-C, but meagre feeding behavior was clearly depressed at temperatures below 17 degrees-C. Eating almost stopped below 15 degrees-C, whereas gilthead sea bream feed normally down to 13 degrees-C. Although southern Portugal has a mild winter on the coast, temperatures below 15 degrees-C are registered December through February.

During growout, meagre were more resistant to common diseases affecting other marine fish. At IPMA, the parasites *Amyloodinium ocellatum* and different *Lamelodiscus* and *Diplectanum* species were identified in meagre reared in polyculture, but mortalities were only observed where *A. ocellatum* was present. The meagre farmed under monoculture were not affected by *A. ocellatum*, suggesting the sea bream might have been a disease vector.

Although cultured meagre seem less susceptible to diseases than sea bream, sea bass and sole, the intensification of production and/or polyculture with other species may result in disease outbreaks. It is important to follow the basic rules of hygiene and protect fish welfare by controlling density and water quality to prevent such outbreaks.

Market acceptance

Although wild meagre that weigh 8 to 10 kg are common in the markets of southern European countries, where they are typically sold as portions, the taste and nutritional value of this species are unknown to consumers in other countries.

Farmed meagre in 600- to 800-g portion sizes priced below 4€/kg (U.S. $5.33/kg) were not well accepted by consumers due to the darker skin, larger bones and less flesh than those found in meagre above 1 kg. However, studies on portion-size farmed meagre found good overall acceptance by a sensory panel of 20 people.

About 70 percent of the panel moderately liked or very much liked cooked meagre fillets. In relation to sensory attributes, 72 percent of the panel liked slightly to moderately the taste of meagre, while its texture was a less-appreciated attribute. In fact, the fillets were considered somewhat soft – a perception confirmed by instrumental measurements. Nutritionally, the fish were found to have a low fat content in the range of 0.9 to 1.6 percent, but a balanced ratio of omega-3:omega-6 fatty acids.

(Editor's Note: This article was originally published in the May/June 2013 print edition of the Global Aquaculture Advocate*.)*

Authors

L. RIBEIRO

Instituto Portugues do Mar e Atmosfera
Av. 5 de Outubro s/n
8700-305 Olhão, Portugal

lribeiro@ipma.pt (mailto:lribeiro@ipma.pt)

F. SOARES

Instituto Portugues do Mar e Atmosfera
Av. 5 de Outubro s/n
8700-305 Olhão, Portugal

H. QUENTAL-FERREIRA

Instituto Portugues do Mar e Atmosfera
Av. 5 de Outubro s/n
8700-305 Olhão, Portugal

A. GONÇALVES

Instituto Portugues do Mar e Atmosfera
Av. 5 de Outubro s/n
8700-305 Olhão, Portugal

P. POUSÃO-FERREIRA

Instituto Portugues do Mar e Atmosfera
Av. 5 de Outubro s/n
8700-305 Olhão, Portugal