REPRODUCTIVE PHYSIOLOGY OF FISH

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PREPARATION AND EVALUATION OF GnRHa-LOADED, POLYMERIC DELIVERY SYSTEMS FOR THE INDUCTION OF OVULATION AND SPERMATION IN CULTURED FISH.

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We have developed a variety of polymer-based delivery systems containing gonadotropin-releasing hormone (GnRHa) for inducing final gonadal maturation in fish. Delivery systems are prepared in the form of biodegradable, injectable microspheres or solid-matrix, implantable disks. Sustained elevations in circulating GnRHa levels are achieved for periods of 2 to 10 weeks. The effectiveness of these delivery systems has been evaluated in a variety of commercially important fishes, both in laboratory and field conditions. They have been shown to be effective both in species that spawn once during their reproductive season (Salmon, trout, striped bass, white bass), as well as in multiple spawners (American shad, plaice and yellowtail flounder). Treatment of females with these delivery systems induced 100% ovulation with good egg quality characteristics. Similar treatment of males induces a prolonged elevation of spermatiation, and large amounts of expressible milt can be collected frequently for up to three weeks after treatment. Use of sustained-administration, delivery systems obviates the need for multiple GnRHa injections, thus limiting the handling of sensitive and valuable broodstock to a single time. Moreover, the GnRHa treatment does not have to be precisely timed according to the fish's stage of maturity. Since the delivery systems can maintain elevated GnRHa plasma levels for long periods, they proved to be effective in fish at various stages of gonadal development.

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EFFECT OF THE LIPID COMPOSITION OF THE DIET ON THE HORMONAL LEVELS AND SPAWNING PERFORMANCE OF SEA BASS (DICECTRARCHUS LABRAX).


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The influence of dietary lipids on the reproductive cycle of sea bass was studied in fish that were fed for one year with diets containing different compositions of lipids: 7%, 15% (7% pelleted diet enriched with 8% of PUFA, mainly 22:6 n-3) and 28% of lipids in the diet. The control group was fed with sliced fish (Boops boops). Animals were fed in these conditions for one year before the beginning of the sampling. During the spawning period, eggs were collected daily to determine egg quality parameters. The control group showed improved egg quality (=50% egg viability) and higher hatching rate (=30%) than all the experimental groups (3-13% viability and 1-4% hatching rate). The egg quality for groups 15% and 30% was similar, and slightly higher than group 7%. Blood samples were collected monthly to determine the annual cycles of GtH II, estradiol-17B (E2) and vitellogenin (VTG) in plasma. Similar profiles of E2 and VTG were observed in all groups but interestingly, a marked bimodal profile of VTG (peaks before and after the spawning period) was observed in the groups with the lowest egg quality (7% and 15%). The annual profile of GtH II levels in plasma has been determined for the first time in this species, using a newly developed ELISA. In controls, a single peak of GtH II (=4 ng/ml) was observed at pre-spawning stages, followed by a continuous decrease, until basal levels (0.5-1 ng/ml) were reached after the spawning period. In the experimental groups, the quantity and profile of GtH II levels was not affected by the different diets.