



Spawning Yellow Perch Throughout the Year

Yellow perch (*Perca flavescens*) is an esteemed food fish, especially along the U.S. Great Lakes, where it is renowned for its sweetness. The supply of yellow perch from the Great Lakes has dwindled over the past 30 years, yet demand for this food fish remains high. In an effort to meet this demand, perch farmers are starting to employ indoor recirculation technology to avoid the seasonal limitations of pond production. Using recirculating technology, farmers are looking to produce a continuous supply of fingerlings throughout the year.

Wild yellow perch are annual spawners and require autumn and winter-like conditions to stimulate gonadal development. This period (termed recrudescence) can be simulated artificially by exposing captive yellow perch to gradually decreasing temperatures and photoperiod. Temperatures and daily light are reduced from optimum growing conditions (22°C and 13.5hrs light) to “winter” conditions (<10°C and 9hrs light) and then brought to spawning conditions (15°C and 14hrs light) (Fig. 1). This photothermal conditioning period lasts for 6 months, after which the yellow perch are sexually mature and almost ready to spawn.



Farm-raised Yellow Perch (*Perca flavescens*).

Mature female yellow perch can then be injected with a reproductive hormone to synchronize ovulation among individuals. In this study, a combination of LHRHa (lutening hormone, releasing hormone analog *a*) and pimozide was used, followed 48 hours later by a second LHRHa injection. The effectiveness of different hormones and dosage levels will be discussed more fully in an upcoming CFAST Fact Sheet.

Once a female ovulates, her egg mass can be stripped with gentle abdominal pressure and fertilized by the dry method (which tends to yield higher fertilization rates compared to the wet method) with milt stripped from a male perch. These egg masses

are called ribbons because they form a hollow, cohesive strand that can be stretched out after the eggs have water-hardened.

Knowing when ovulation takes place is critical to successful spawning of conditioned perch. Fertilization rates have been shown to be significantly higher when the fish are strip-spawned

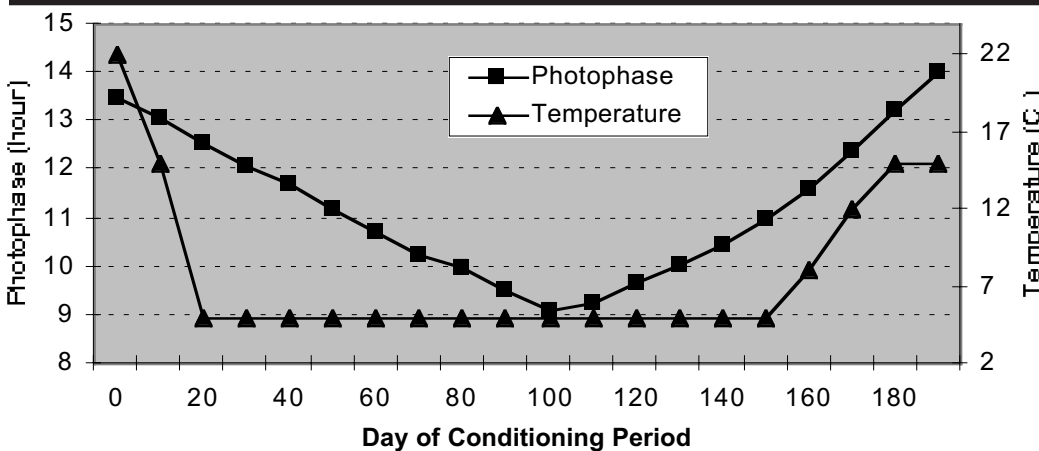
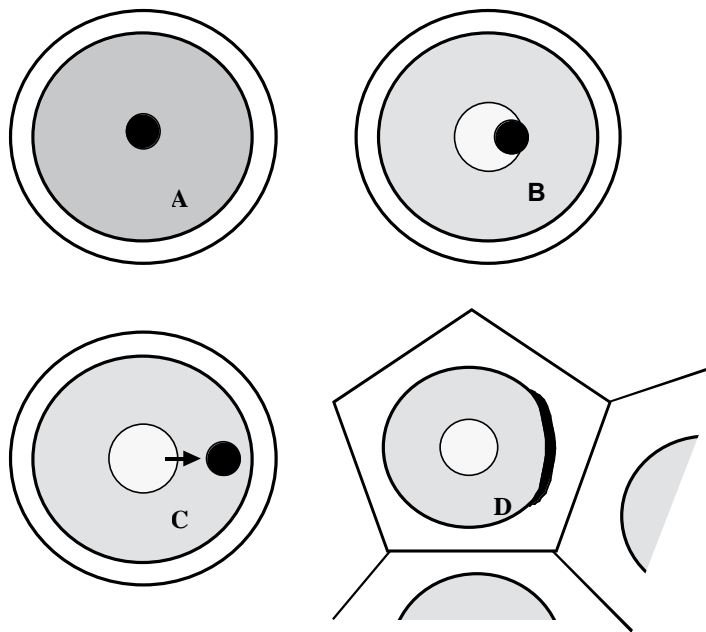


Figure 1. Control of light and temperature variables to induce spawning in cultured yellow perch

Figure 2. Egg Maturation Prior to Spawning

A - Central Germinal Vessicle (GV) before oil coalescence; **B** - Oil dropule formation with GV attached to surface; **C** - GV migration to periphery of egg; **D** - Ovulation stage, with GV breakdown and swelling of chorion



rather than allowed to spawn in tanks. When the fish are nearing ovulation (near day 180 of the conditioning period), the aquaculturist can carefully extract eggs from mature females with a micropipette and examine them with a dissecting microscope. As the fish approach ovulation, they should be checked more frequently (every 1 to 3 hours), to determine precisely when stripping and fertilization should occur.

Immature eggs have a centrally positioned germinal vessicle (GV) without an oil dropule present (Figure 2-A). As the eggs mature, oils coalesce to form a central dropule and the GV is offset, yet still in the center of the egg (Figure 2-B). Gradually the GV migrates to the periphery of the egg and becomes the “animal pole” where fertilization takes place (Figure 2-C). During ovulation the space between the chorion and the egg swells and takes on a pentagonal shape as it becomes part of the matrix which holds the eggs together (Figure 2-D). Yellow perch are poikilothermous, and the precise times for the egg maturation are highly dependent on water temperatures. The average time of progression from stage (a) to stage (d) was approximately 109 hours at 14°C (See Figure 2).

Eggs should be stripped within 30 minutes of ovulation and hydration of the chorion (shown in Figure 2-D). After stripping, eggs should be fertilized immediately. The fertilized eggs hatch within 10 days if water temperatures are slowly raised from spawning temperature (15°C) to 20°C in increments of 1°C per day. One can employ these techniques to obtain fertilized yellow perch eggs at various times of

the year simply by shifting the start of the conditioning period. Perch which have never been exposed to a natural, annual photothermal cycle (e.g.- reared in recirculating systems) should be chosen as broodstock, because internal rhythms are set once a fish undergoes maturity and spawning. Choosing farm-raised broodstock will make subsequent breeding cycles more predictable.

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