Aquaculture
genetics & breeding technology

The 2010 ABC Hatchery Season

Background

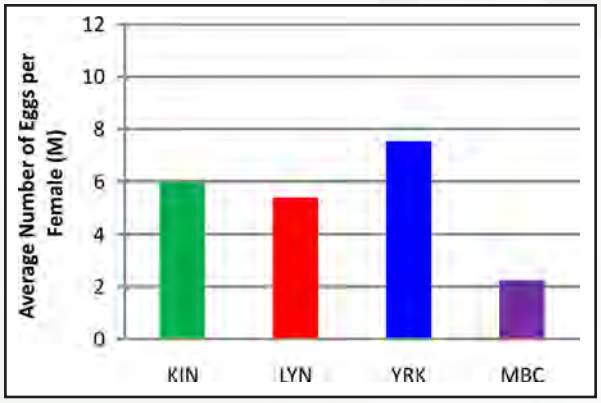
This document highlights and outlines the hatchery performance of the Superlines in the ABC Gloucester Point hatchery in our 2010 season. Our spawning season began in February with the selection of the best 1500 animals from each of our nine Superlines. DEBY ('D'), Louisiana ('L') and CROSBreed ('X') oysters were spawned from each of our three sites, Kinsale (KIN), Lynnhaven (LYN) and York River (YRK), making nine lines total. When spawned, these animals were approximately 20 months old and had been through two winters. They were allowed to condition naturally in our site at Sarah's Creek on the York River. Spawning began on the 18th of May and lasted for 5 weeks. The data presented below is what we consider to be important to commercial hatcheries (female fecundity, sperm utility, hatching rate, larval survival, harvest of eyed larvae, and setting rate) and was collected from spawns involving 1428 females and 1421 males. KIN oysters were spawned first in the 2010 season, followed by LYN and then YRK oyster populations. On the graphs below, they are ordered in this way. Three spawns of wild oysters from Mobjack Bay (MBC) were done to serve as controls for the three sites.

Fecundity

For spawning, we strip spawn males and females. Eggs from each female are counted individually. The sperm from each male is also rated individually.

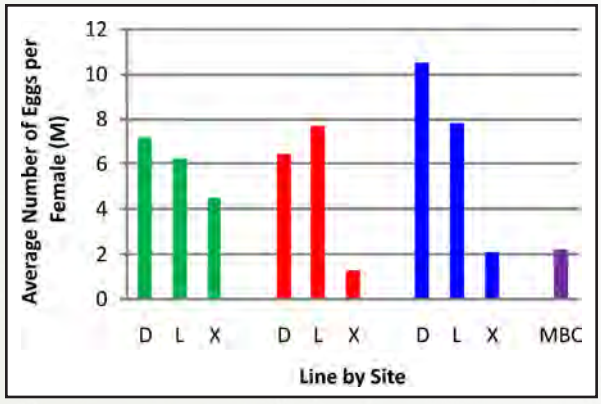
Fecundity: by site

Fecundity of all lines from each site shows that the YRK animals had the highest fecundity, an aberration from 2009 when fecundity was problematic. YRK animals were the last to be spawned, and the marked increase in fecundity might reflect the fact that they had longer to mature.



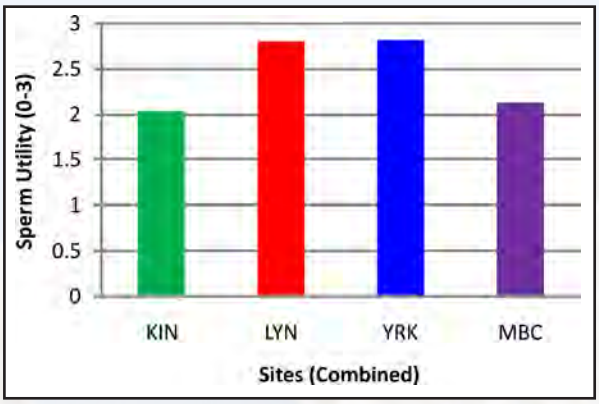
Fecundity: line x site

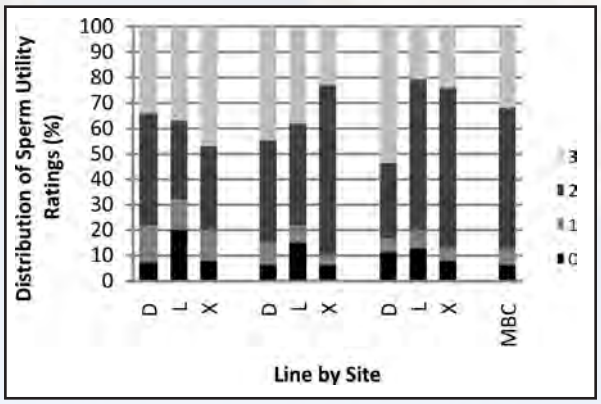
KIN LYN YRK MBC – Overall the fecundity of ABC lines was higher than wild Mobjack oysters. This could be a result of sampling various quality wild oysters. Within each site CROSBreed (X) oysters gave the lowest fecundity.



Sperm Utility

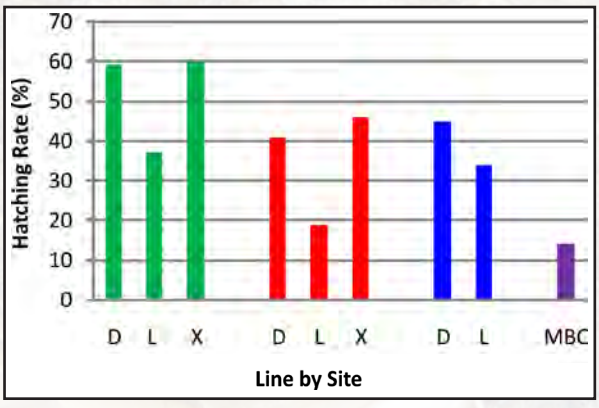
All stripped sperm is graded on a 0-3 scale that integrates both density and motility. Zero is no motility, 1 is low motility x density, 2 is moderate and 3 is high density x excellent motility. Sperm grades of 2 and above are preferred, however, grade 1 is still usable, at least for our smaller crosses. In general, sperm motility and density were adequate, averaging over 2 for animals at each site (top). We also show the percentage of males from each rated category: 0-3 (bottom). Overall 10% of males were useless and another 8% only somewhat useful, rated 1. Most males (46%) were rated 2. YRK DEBYs had the highest percentage of the males ranked 3.

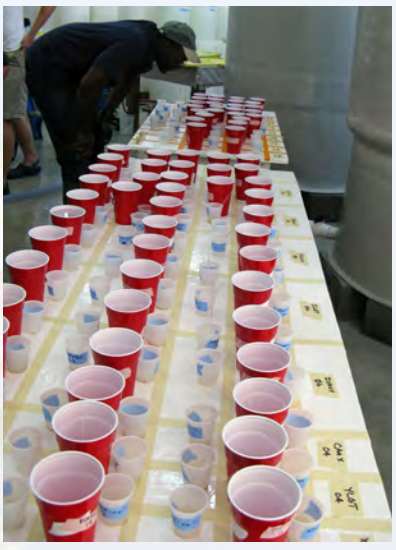




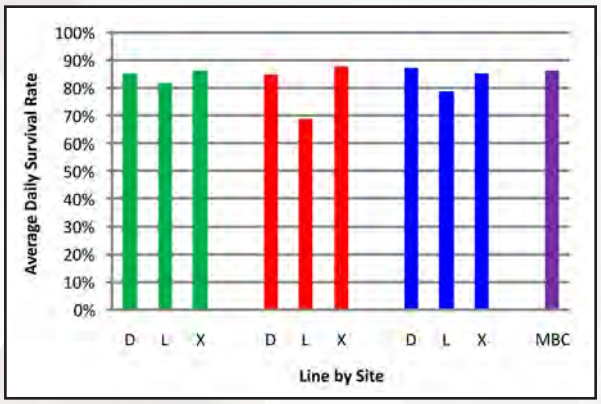
Hatching Rate

KIN LYN YRK MBC – We define hatching rate as the number of larvae that catch on a 20μm screen on the 1st drop day of the culture divided by the number of eggs incubated. For each line we incubate ~60M eggs and divide them evenly in four 200L tanks. Mean hatching rate across all lines was 37%. KIN brood stock had the highest mean hatching rates over all lines (52%). Although CROSBreed (X) animals had the lowest fecundity this was not reflected in the hatching rate. Hatching rate actually went down as the season progressed but it is impossible to attribute this to site or time of year.





Larval Survival



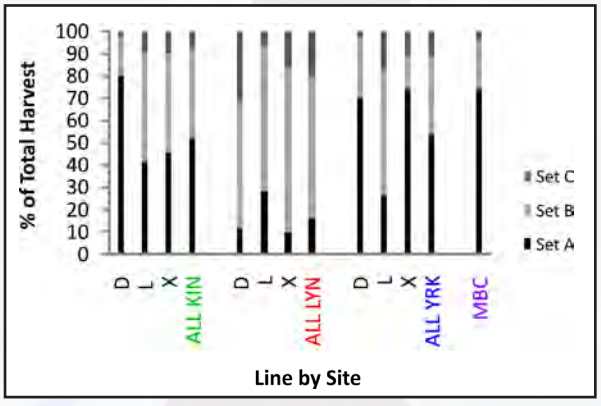
KIN LYN YRK MBC – We calculated daily survival rate by dividing the number of larvae at the start of a drop period by the number at the subsequent drop, divided by the number of days in that period. For the average rate, the mean of these values over the course of larvae culture was determined, until eyed larvae appeared. The survival rate for LYN (L) is lower because its data is comprised of two spawns, one of which was unsuccessful and did not make it to setting.

Harvest of Eyed Larvae

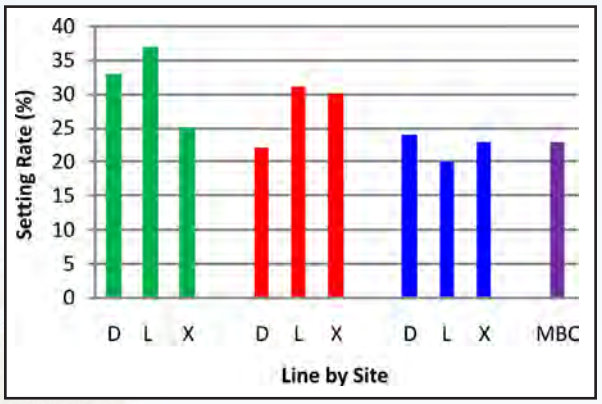
We harvest larvae when they are large enough to be retained on a 225μm screen in the first two harvests and a 212μm screen thereafter. This ensures that larvae are competent and have a well developed eye spot. We repeat the process for six harvests. The first two combined harvests we call "set A," the third and fourth combined "set B," and the fifth and sixth "set C." We do this because we suspect that there is a genetic effect on the timing of competence, and taking our breeding stock from only one batch of the harvest window could compromise the genetic variability within our lines.

Harvest Breakdown by Set A,B,C:

Larvae from any particular line may reach competence earlier or later during the larval period due to genetic effects, environmental effects, or a combination of both. KIN lines tended to have larger portions of eyed larvae harvested during set A, whereas eyed larvae of LYN lines were harvested primarily during set B. Across all lines and sites the third harvest (set C) produced the least number of larvae, generally less than 20%, averaging 12% across all lines. The lines from LYN were the most consistent. Harvest of larvae from Louisiana lines (L) were highest in set B while set A comprised the largest portion in DEBY (D) and CROSBreed (X). The wild control line, MBC, showed a tight harvest window predominated by set A.



Setting Rate



Setting rate is estimated as a ratio of the number of spat to the number of eyed larvae put in the setting system. We count spat when 90% or more catch on a 500μm screen off the downweller. Three sub-samples from each batch of spat are towel dried, weighed, and counted by hand, then averaged and used to estimate the total number. We stopped using epinephrine sets. The average setting rate for this season was 27%. KIN had the highest setting rate of 31% followed by LYN at 27% and YRK at 22%. Therefore, even though we harvested the most eyed larvae from the YRK animals we got the lowest setting rate. KIN overall and KIN(L) specifically had the highest setting rate.

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