

Ploidy induction in fish

Why?

Sterility: (for environmental reasons): triploid fish are sterile (e.g. grass carp)

Higher growth rate: through saving the energy which could be spent in gonad development and spawning (triploidy)

Indirect means to produce triploidy (when tetraploidy mates with diploidy)

How?

Shock application

Heat shock: water bath

Cold shock: chiller, refrigerator

Pressure: pressure chamber

Chemicals: (e.g. cytochalasin B)

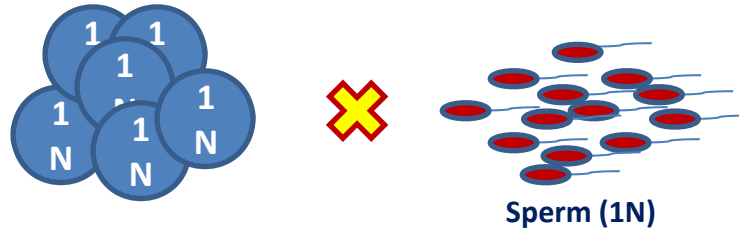
Ploidy determination

Flow cytometry

karyotyping

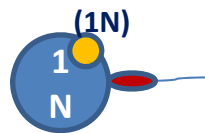
Triploidy induction in fish

Preparing for fertilization between haploid gametes (1N) each



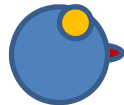
Fertilization

Second polar body (1N)



Apply the shock soon after fertilization

Resulted cell has 3 chromosomes from: ova, 2nd polar body (**retained**) and sperm



3-N fish



Without shock, second polar body is extruded and fallen and embryos with 2 chromosomes result

How soon the time of shocking depends on species and water temperature

Shocks could be heat shock, cold shock, pressure or use of specific chemicals; levels and durations of treatments vary

Tetraploidy induction in fish

Summary of the process:

No shock is applied after fertilization and so 2nd polar body is extruded and fallen (as normal) and embryos with 2 chromosomes result

Enough time should be allowed till cell chromosomes duplicate forming 4N

Shock is applied to inhibit the first mitotic division resulting in a 4N cells that divides normally afterwards producing tetraploid fish

Shock could be heat shock, cold shock, pressure or use of specific chemicals; timings, levels and durations of treatments vary

