



Considerations about dissemination of improved fish strains for aquaculture

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overview

Current status and general approach to genetic improvement

Effective dissemination of genetic gains

Technical considerations

Institutional arrangements and partnerships

Concluding remarks

A few remarks about cultured aquatic animals



- Most production from aquatic animals is based on unimproved stock, or has undergone only limited genetic improvement (this is particularly so in developing countries)
- So, in the rare instances that we have an improved strain, we have to make sure it reaches the farmers
- Multiplication and dissemination of improved stock are a challenge because:
 - We have little experience (few improved strains)
 - They entail influencing people

Design and implementation of a genetic improvement program

- Describe the production system(s)
- Choose the species, strains and breeding system
- Formulate the breeding objective
- Develop selection criteria
- Design system of genetic evaluation
- Select animals and mating system
- Monitor and compare alternative programs
- Design system for expansion



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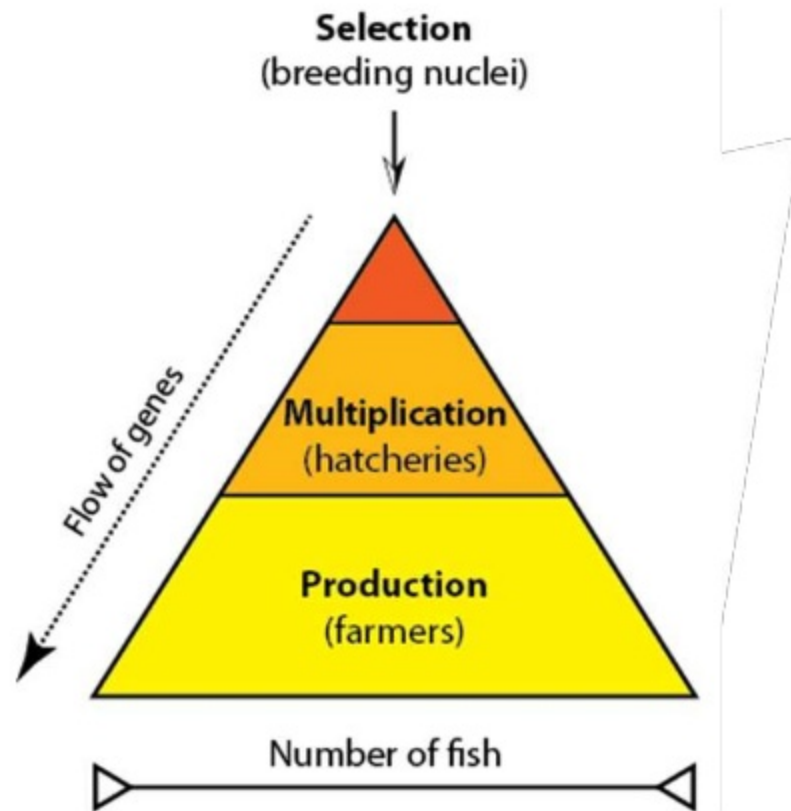
Effective
dissemination



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dissemination

Genetic improvement takes place in a very small fraction of the overall population

effective multiplication of genetic gains is critical

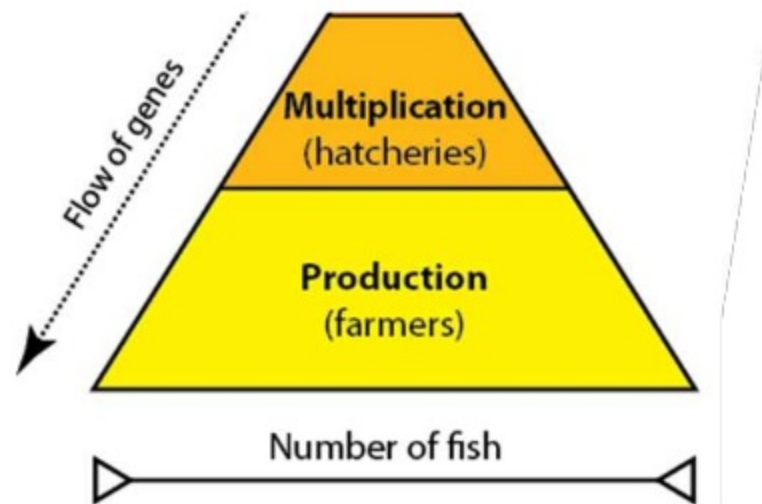


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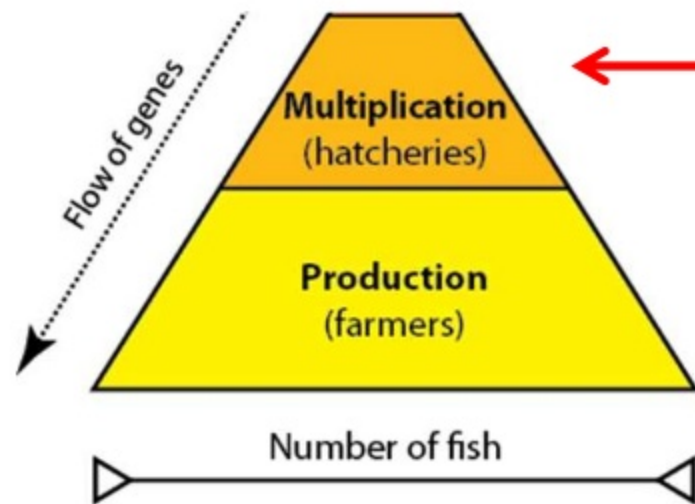


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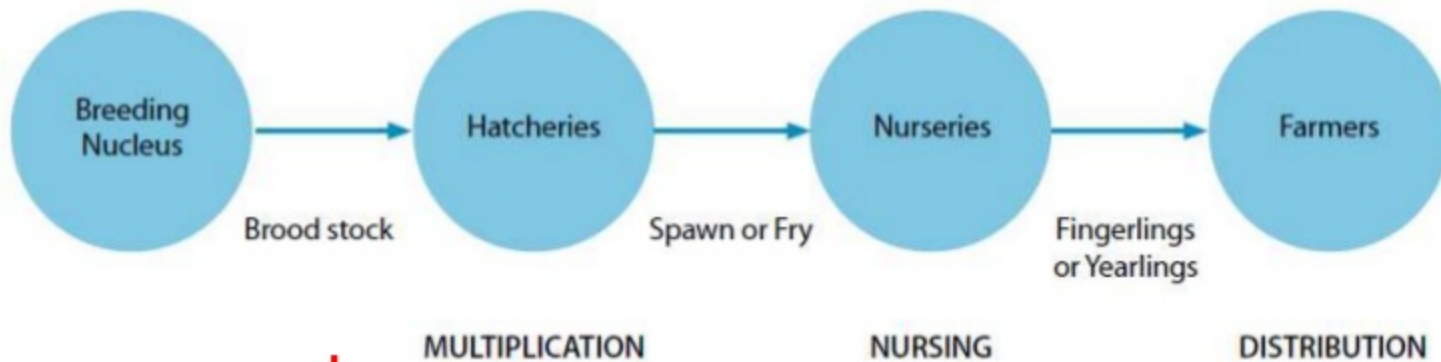


hatcheries attempt their own breeding

often leads to problems

inbred, genetically vulnerable stocks

basic elements in multiplication and dissemination



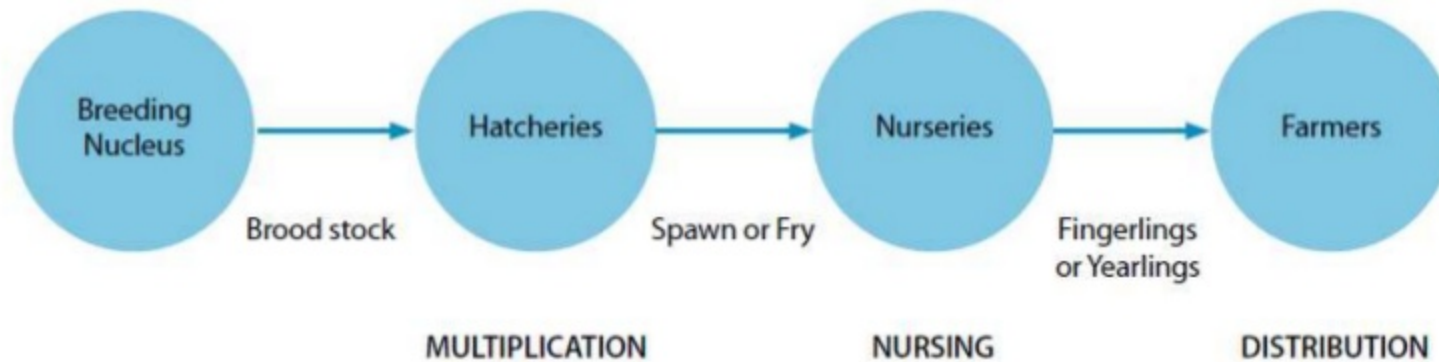
brood stock replaced
periodically (2-3 years)



producing brood stock
not required

specialized facilities
not needed

basic elements in multiplication and dissemination

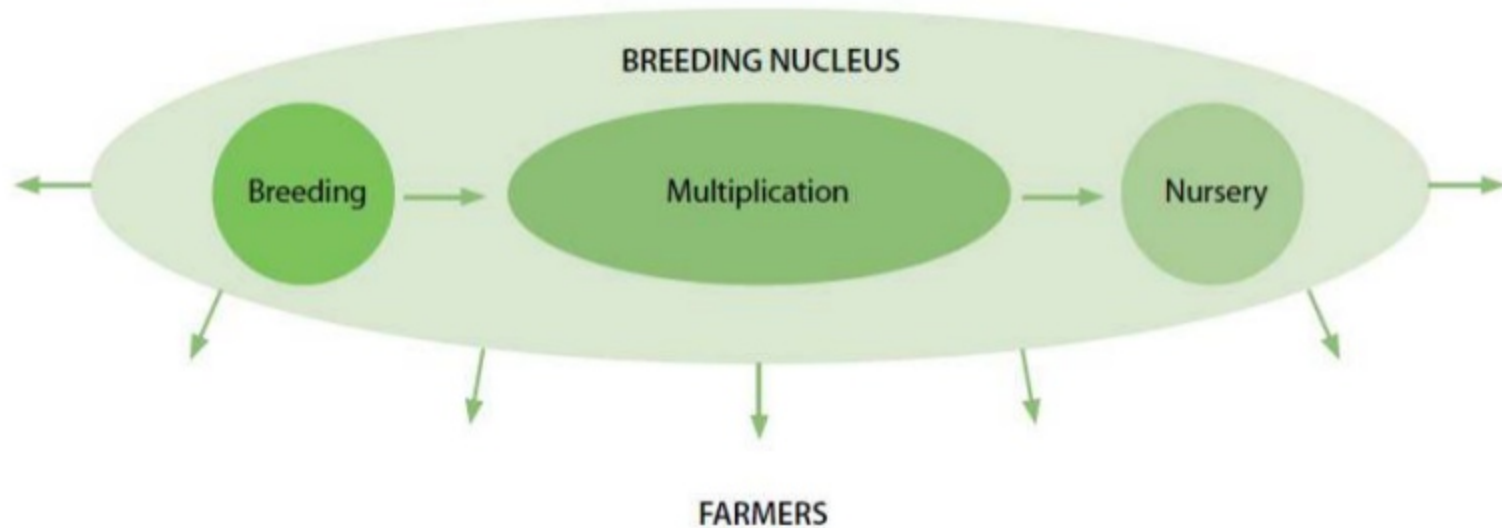


general aspects to be addressed

1. total demand for seed and its geographical distribution
2. presence or absence of private and govt. hatcheries
3. skill level and access to resources of hatcheries
4. farmers' need for additional training, education and technical support



centralized model



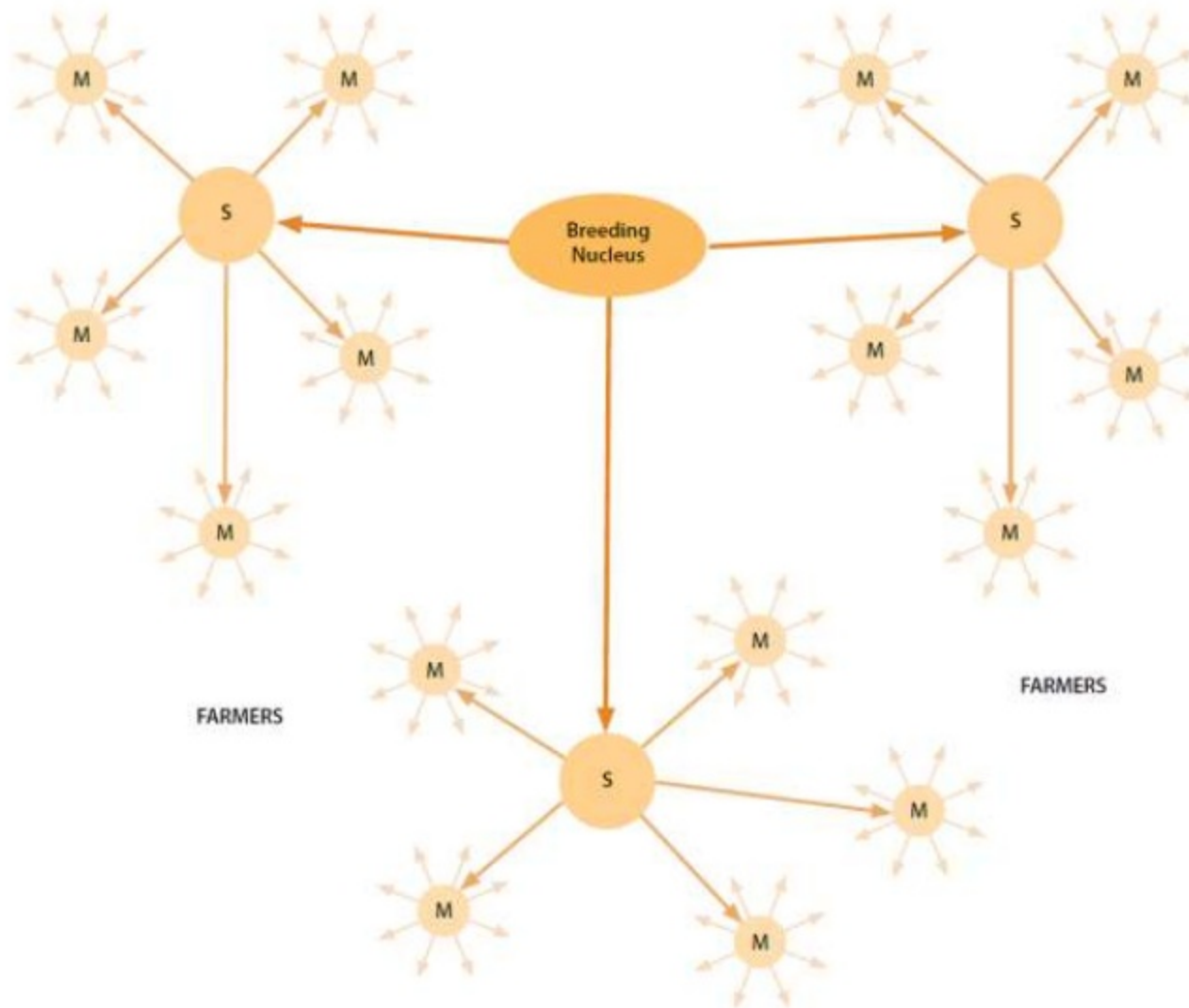
single operation conducts
breeding and multiplication

deals directly
with farmers

'centralized' in terms of geographic
location or control over germplasm

may require significant
resources for infrastructure

decentralized model



generally easier to
implement but will
forego some control

investment risk is
shared

better geographical
coverage, accessible to
more farmers

technical
considerations

problem in aquaculture is...

difficult to maintain pedigree

high reproductive rate
(a good thing too!)



large populations from
a few breeders

rapid inbreeding, poor productivity

low effective population size (N_e)

how to manage industry-wide?

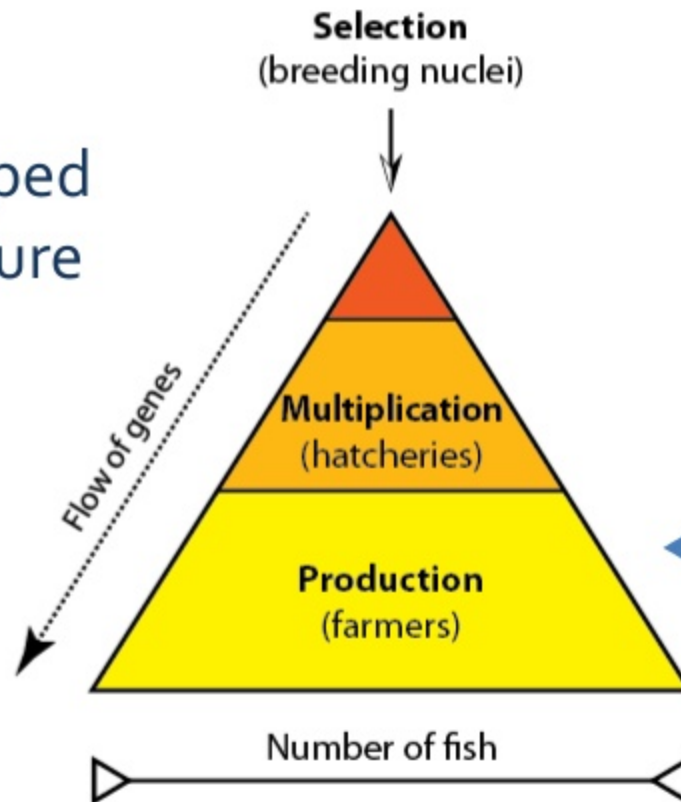


technical
considerations

inbreeding can be managed
through proper hatchery
practices and training

...and a developed
industry structure

generally not
present



production level
diversity not critical
if maintained in
nucleus

technical considerations

inbreeding can be managed
through proper hatchery
practices and training

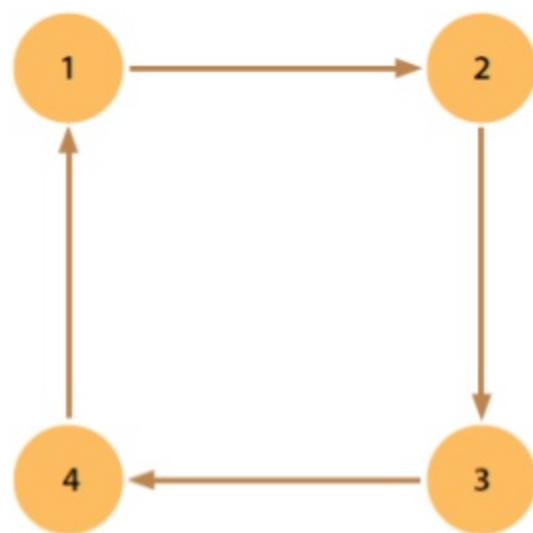
rotational mating schemes
to avoid inbreeding



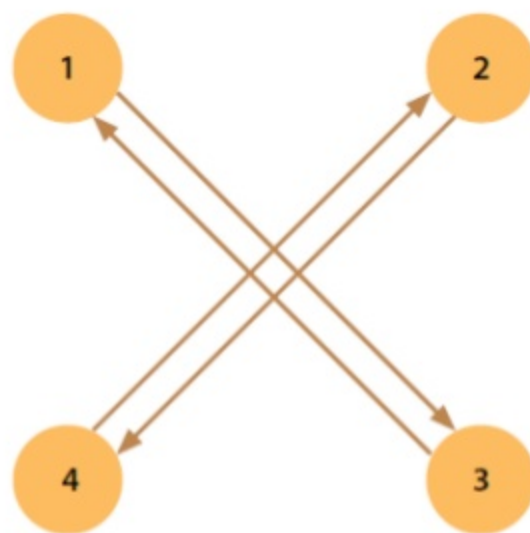
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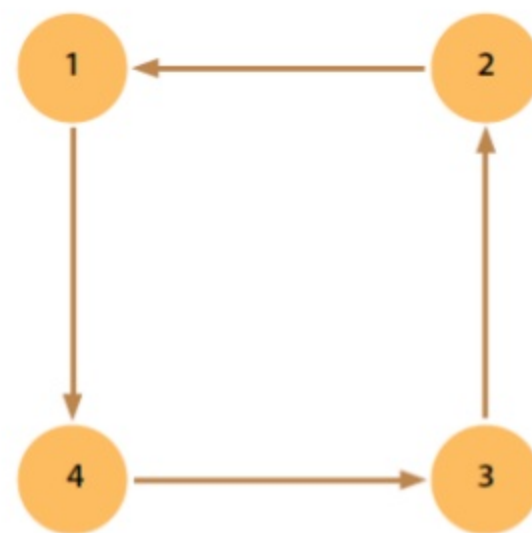
rotational mating schemes to avoid inbreeding



Generations: 1, 4, 7,



2, 5, 8,



3, 6, 9,

technical considerations

inbreeding can be managed through proper hatchery practices and training

rotational mating schemes to avoid inbreeding

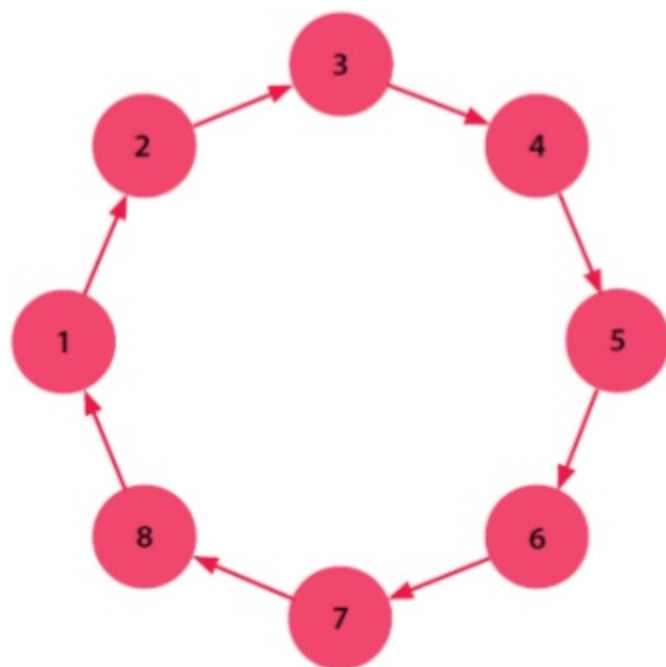


Diagram 1: Rotation of males for generations 1, 3, 5 and so on

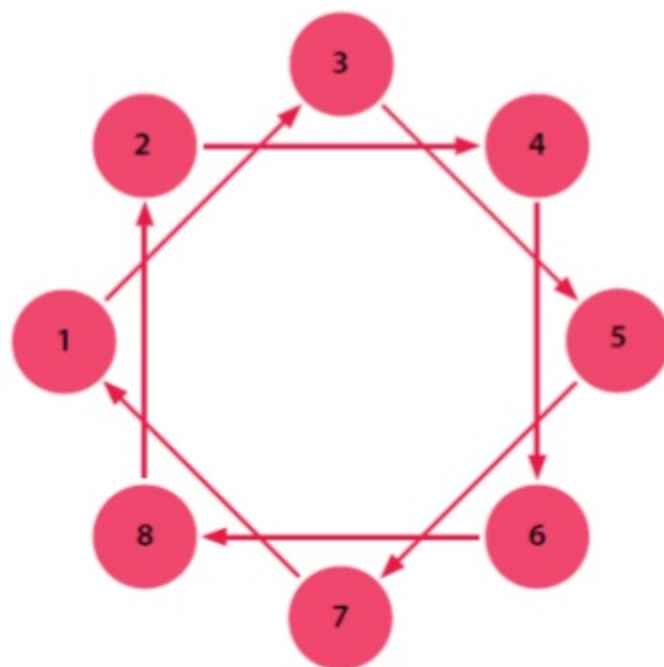


Diagram 2: Rotation of males for generations 2, 4, 6 and so on

Convincing hatcheries that they need not produce brood stock replacements not easy, requires **change in perception**

Doing so can benefit the industry as a whole, through **better access** to genetic gains made in nucleus

Problem is sociological and economic, much more than genetic



Institutional
arrangements
and partnerships