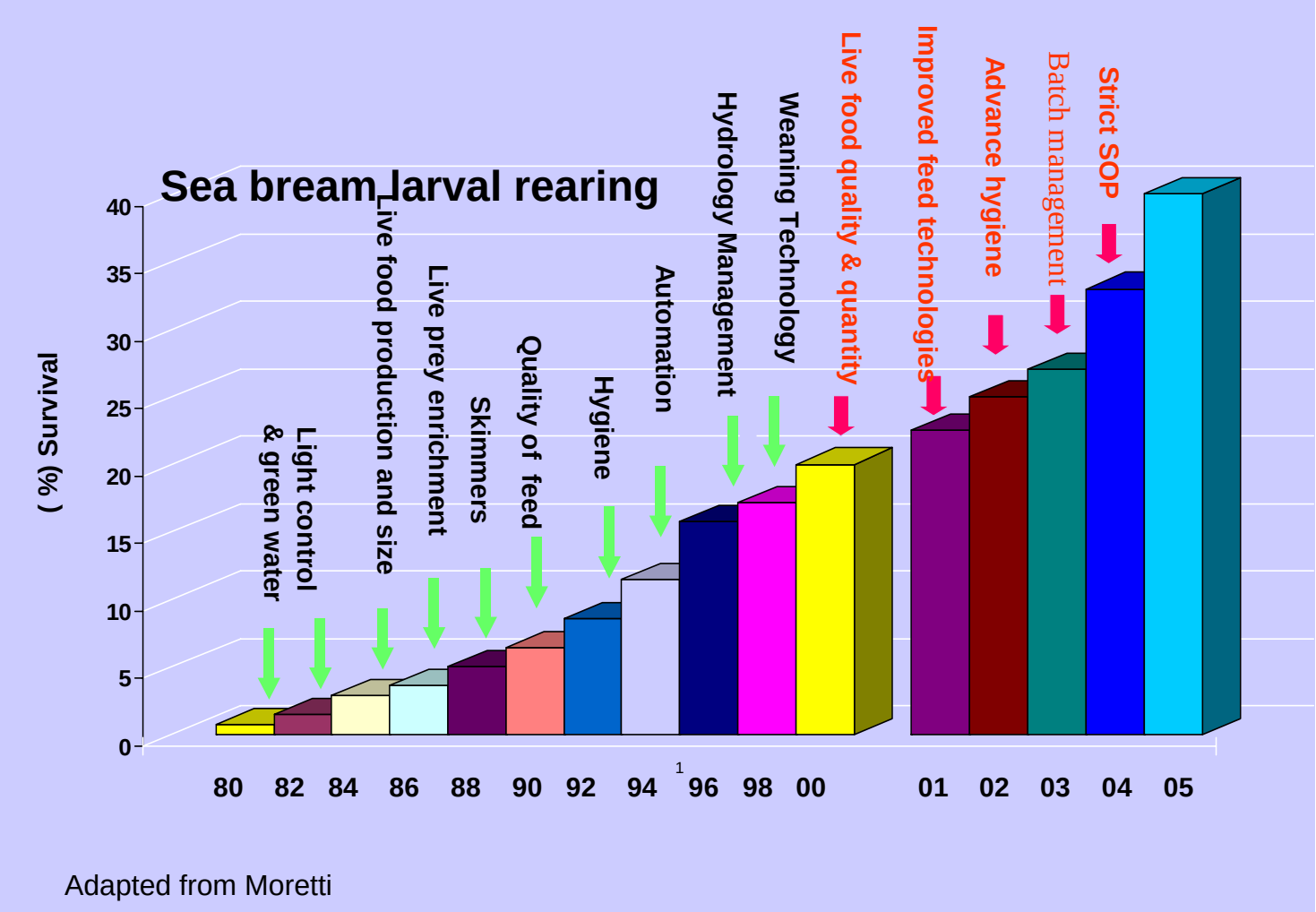
Starter feed and egg quality

Quality Improvement

Better practices combined with improved hygiene and management further improve survival, optimize quality and reduce costs



Adapted from Moretti

Effect of poor quality and deformity

- Deformed fish
- Poor food conversion rate
- Grow slower
- Lower market price
- Can cause severe financial losses

Photo: AKVAFORSK Malformed jaw Atlantic Salmon

Deformity – reasons and types

Factors affecting quality and deformity

- Broodstock nutrition
- Egg incubation systems and temperature
- Larval rearing systems
- Water quality
- Tank hydrology
- Live feed quality
- Larval nutrition
- Husbandry methods

Broodstock nutrition affects egg and larval quality

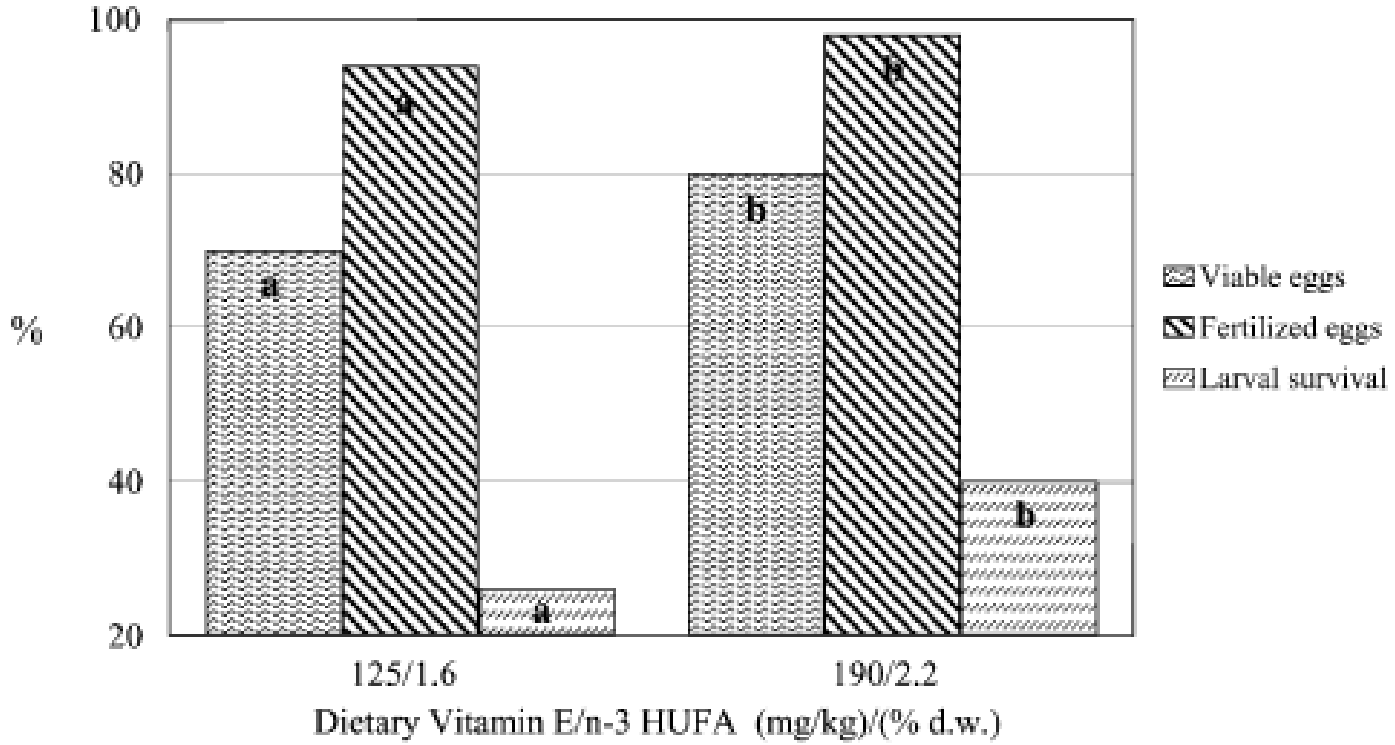


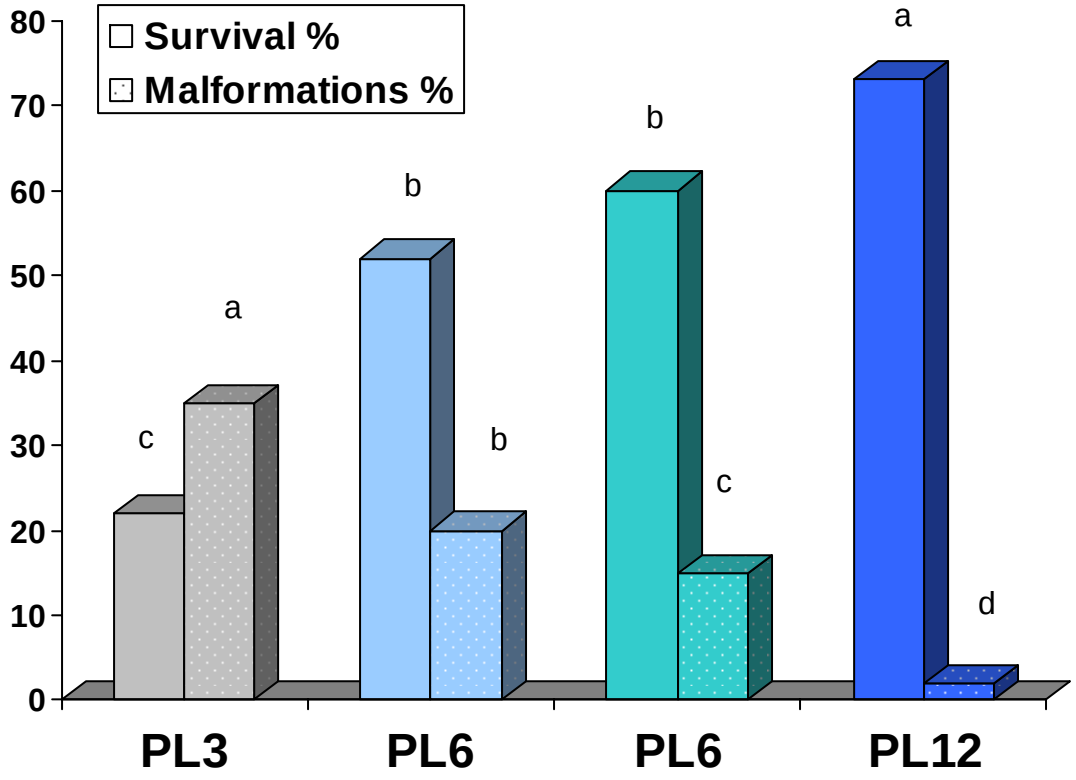
Fig. 3. Combined effect of dietary $n-3$ HUFA and vitamin E levels on egg viability, fertilization and larval survival of gilthead seabream.

Izquierdo et al 2001

Feed quality

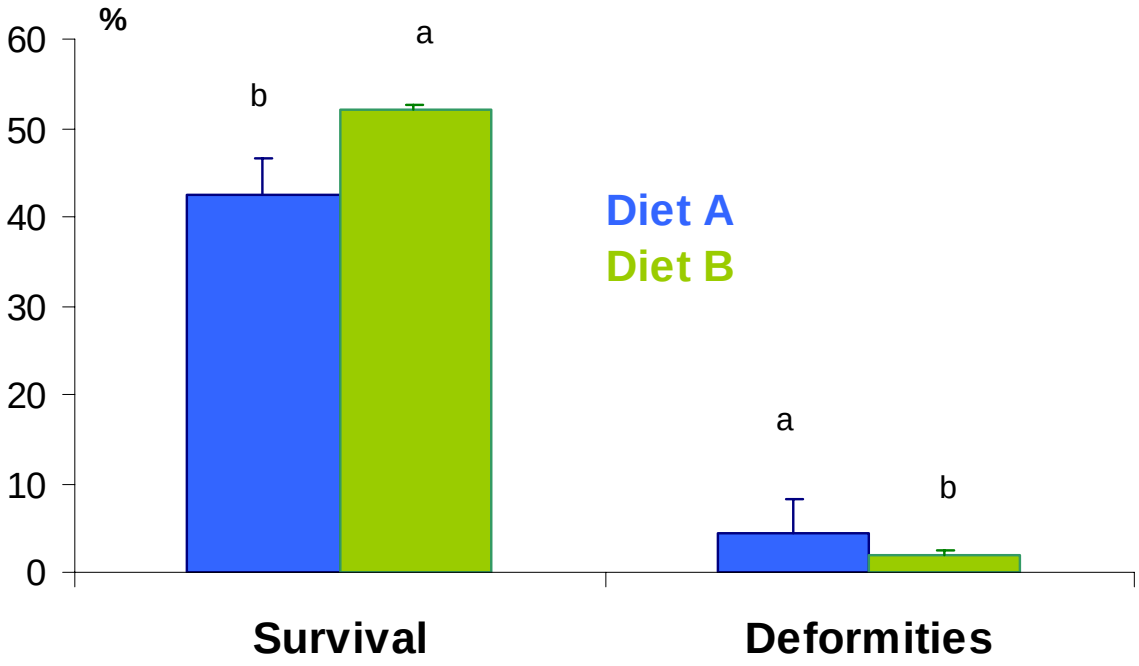
- Species specific formulation
- Bio-availability of macro and micro components
- Natural solutions promoting health and performance

Optimal phospholipid level in larval diets (Cahu *et al.* , in press)



Highest levels of phospholipids, p-choline and p-inositol gave the best survival and lowest malformations

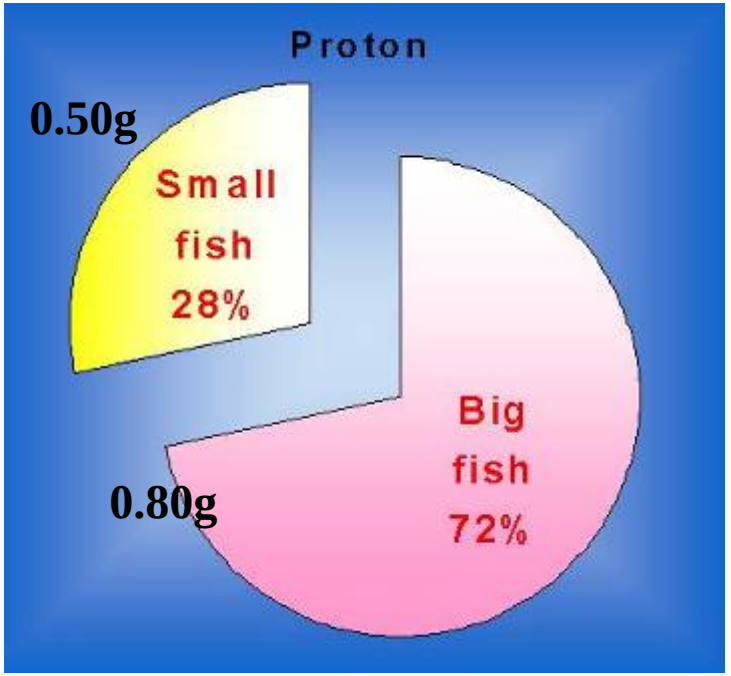
Survival and deformities rates of sea bass larvae fed Gemma Micro

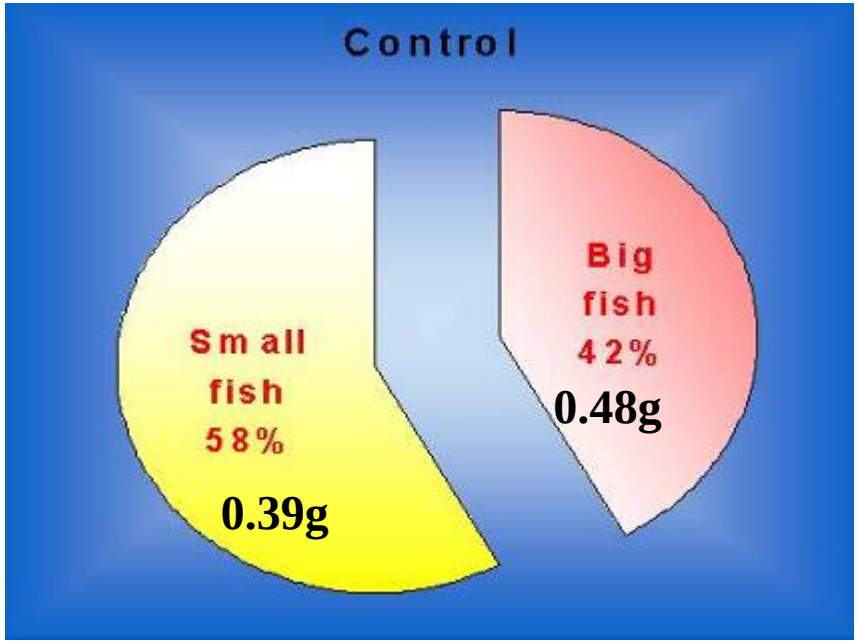


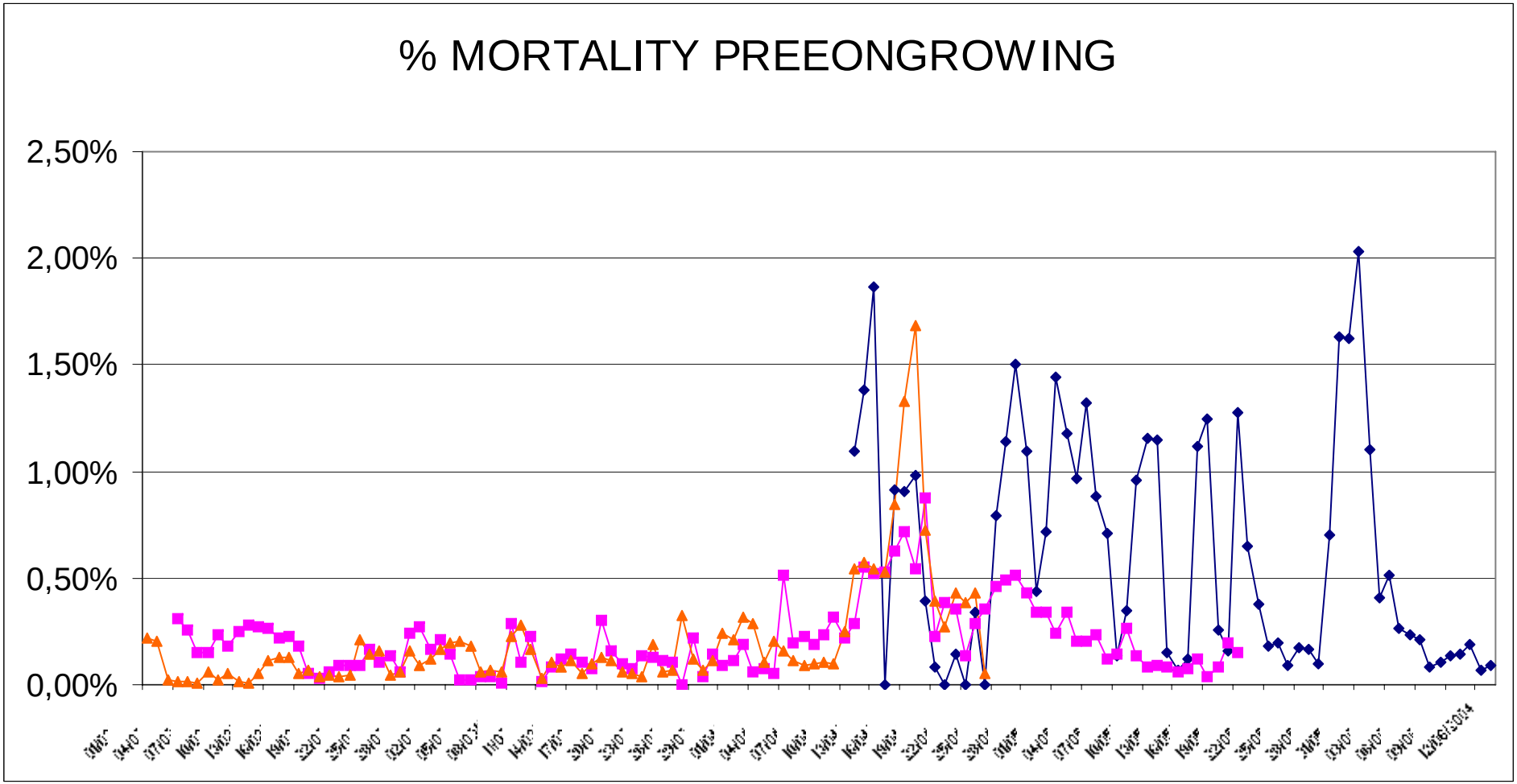
The presence of 60% of protein and 12% of phospholipids (diet B) compared to 58 and 9% (diet A) respectively, have an benefit impact on survival and deformities rates.

Size dispersion, cannibalism and mortality

Size distribution of sea bass at day 62 in an industrial scale NW Mediterranean hatchery



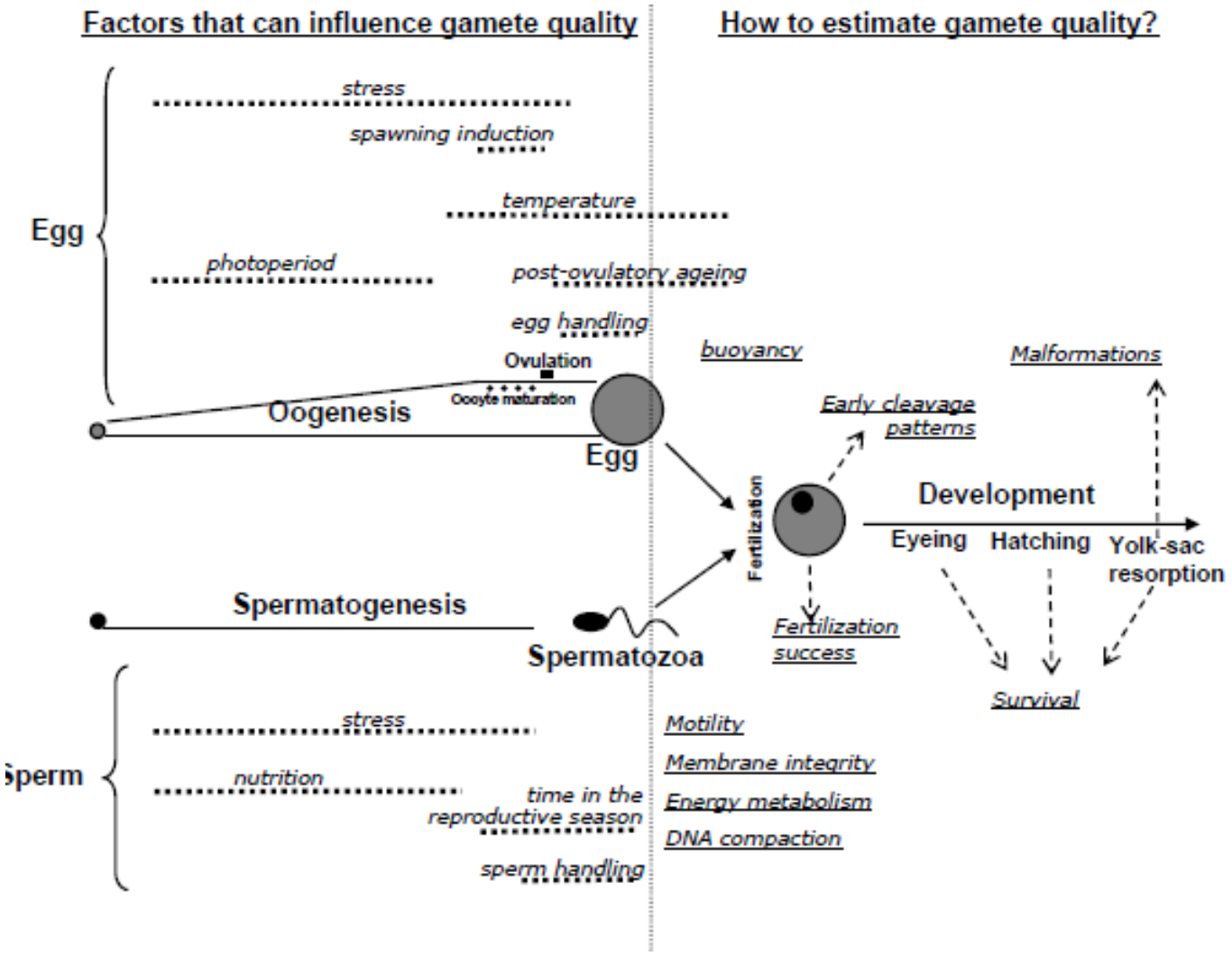




- As we move through the production season mortality is increasing even though more effort was made on husbandry (grading) and water quality, that fact points towards the importance of a good dry out period.

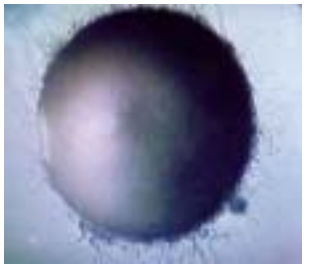
Egg quality

Overview of processes affecting egg quality



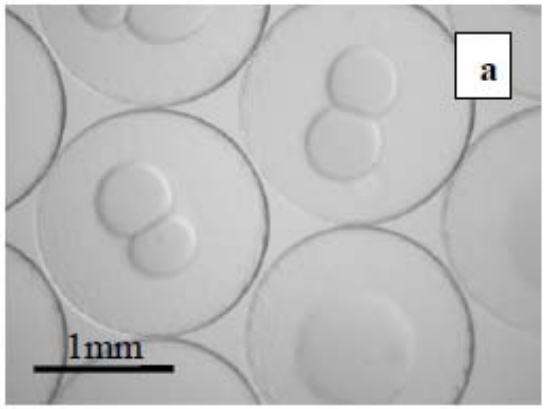
Methods of assessing egg quality

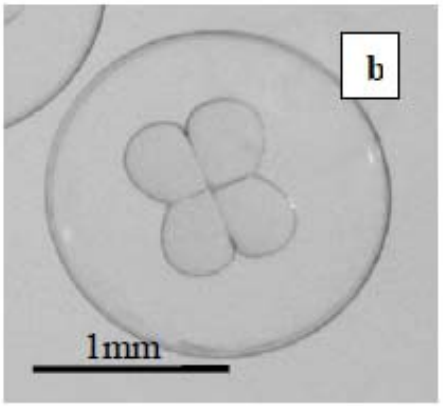
- Egg developmental success
  - Developmental stage and rate – comparison with well defined standard developmental stages for a particular species
  - Survival – daily screening for dead eggs
  - Yolk utilisation rate
  - Incubation period – time from fertilisation to hatching (day degrees)
- Egg Quality
  - Bacterial infection of shell

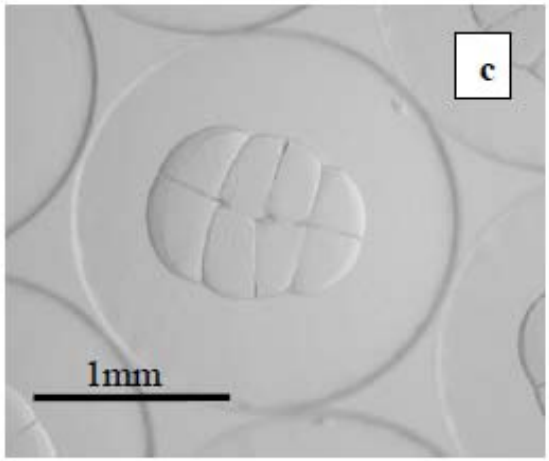


Egg quality – early cleavage pattern

Early stages of egg development showing normal blastomere arrangements at the a) 2 cell b) 4 cell and c) 8 cell stage of development

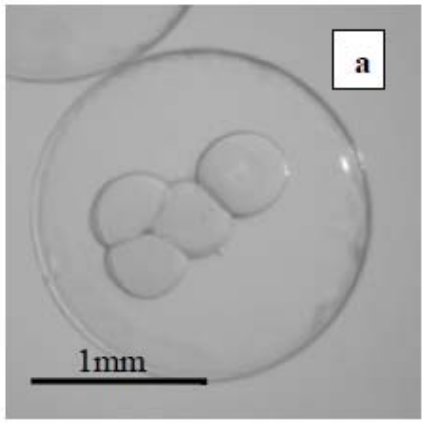


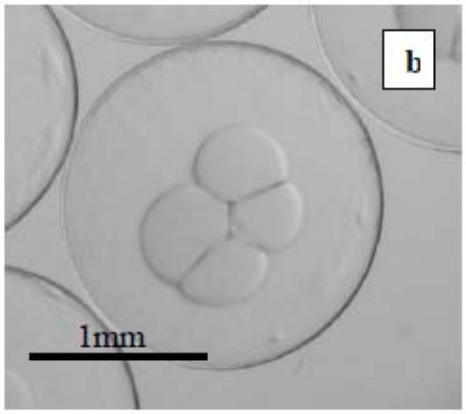


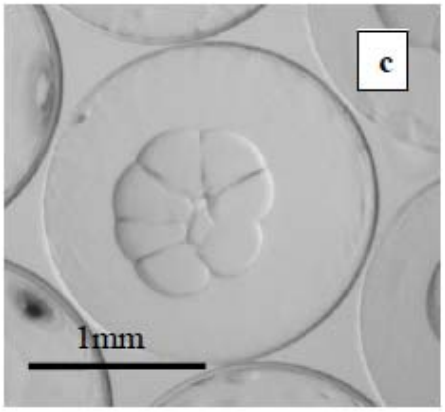


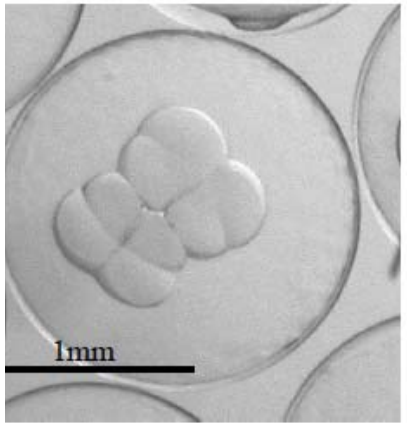
Egg quality – abnormal cleavage pattern

Types of cleavage abnormalities in cod embryos at the 4-8 blastomere stage of development. a) asymmetry b) unequal blastomere size c) asymmetry and unequal blastomere size.









lete separation of blastomeres. Horizontal bar: 1 m

Testing disinfection products on Rainbow trout eggs

Marie Forraz of Viviers de France (VdF) set up this field trial within the FineFish project. The goal of the work was to test several disinfection products at different doses in order to determine the potential effect of egg disinfection procedures on malformations, within a test on efficacy against Flavobacterium psychrophilum

The disinfectants of interest were:

- already used for egg disinfection in aquaculture and especially in VdF fishfarms, such as iodine and glutaraldehyde;
- environment-friendly, as hydrogen peroxide or peracetic acid;
- known as effective disinfectants namely against Flavobacterium.

The disinfectants were tested at different dosage levels, using normal aquaculture application levels as well as a range of different concentrations.

In order to measure the effect and the efficiency of the different disinfectants and their dosage, the efficiency against Flavobacterium was tested, as well as the hatching rate of the eggs, the survival rate of hatched fingerlings and the malformation rate and type of the hatched fingerlings.

The best disinfectant seems to be peracetic acid (less malformations) but it is not efficient against Flavobacterium. Incimaxx is interesting (best against Flavobacterium) but seems to induce more malformations on eggs than glutaraldehyde when compared to the control. Glutaraldehyde 25% 250 ppm or H202 35% 1000 ppm appear as the best compromises while Ammonium 10 ppm causes the death of eggs.

The results of these field experiments have given some very interesting first results, although the work has not yet been treated by statistical analysis. The trial needs to be repeated so as to draw absolute conclusions.

Company Viviers de France

Viviers de France (VdF) was founded in 1997 and operates 7 trout farms in the South West of France and North of Spain, becoming one of the largest trout producers in France. They also have a processing factory at Castets (Landes), which is the operational centre.

While trout is the focus of most of its products, the company also processes some salmon and other marine fish. VdF operates a selection programme for its trout broodstock, this being made within a dedicated fish farm at Sarrance. Hatching and juvenile growing are assured at 3 other sites in the area.

VdF has 2 subsidiary companies – Bell-Ile is a wholesale fish merchant while the Ferme Marine de Noirmoutiers produces turbot. Marie Forraz who is responsible for R&D acts for VdF within FineFish.

Egg disinfection methods can affect egg deformity rates and can cause death of eggs