



# FISHBOOST

The next level of aquaculture breeding

## ***How often do you eat fish products? And do you know where the fish on your plate comes from?***

***Chances are that the fish on your plate is reared in one of Europe's many fish farms. European fish farmers want to produce healthy fish to bring you high quality fish products. Selective breeding is a way to improve the quality, health and welfare of the animals. This brochure will tell you about selective breeding in finfish aquaculture in Europe.***

### **Background of aquaculture production in Europe**

Global human population is increasing every year, and so is the consumption of animal protein. Fish is one of the main sources of protein for many people. The amount of fish that is captured by fisheries remains stable (FAO, 2012), which means that aquaculture production becomes more and more important. Aquaculture products from fish farming offer a healthy source of animal protein (and fat) and thus gain popularity. These trends result in the continuous growth of the aquaculture production sector, globally and in Europe.


### **Facts & Figures**

#### ***Did you know...***

- ...that aquaculture is the fastest growing animal production sector in the world?
- ...that in the very near future aquaculture will surpass global wild fisheries as the number one source of seafood?

*(European Union, 2015)<sup>1</sup>*

The European aquaculture is very diverse and consists of extensive and intensive farming, both in salt (sea)water and fresh water. European aquaculture is also leading in research and development of new technologies, techniques and products.



<sup>1</sup> <http://ec.europa.eu/fisheries/inseparable/en/farmed-eu>

## What is aquaculture?

The EU definition of aquaculture is: *“the rearing or cultivation of aquatic organisms using techniques designed to increase the production of the organisms in question beyond the natural capacity of the environment (...)”*.

This definition implies human intervention in the natural rearing process to control and improve production. One of the methods to do this is the use of selective breeding. In short, selective breeding means that the best males and females are selected from a group of animals to be the parents of the next generation.

Selective breeding is a way to further reduce the environmental impact of aquaculture, to improve the health and welfare of the animals and last but not least, improve the economic profitability of the sector.

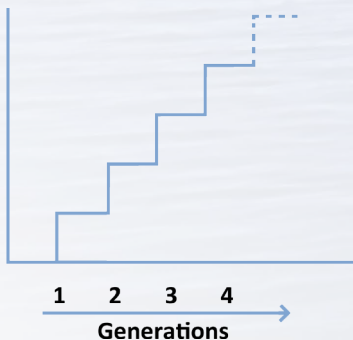
## What is selective breeding?

Breeding is a very old method used in almost all plant and animal production sectors. The breeder (or producer) chooses the best animal or plants for reproduction. Where in the beginning breeding allowed for selection on one single trait (for example body weight) at a time, current selective breeding uses techniques to select on multiple traits at the same time.

### Facts & Figures

#### Did you know...

- ...that there is a huge potential for improvement by selective breeding programmes in aquaculture?
- ...that one male and one female can produce an enormous amount of offspring?
- ...that this high fecundity is one of the reasons for the success of aquaculture breeding programmes?
- ... that at the same time the largest amount of siblings calls for extra attention to avoid inbreeding?



The key benefit of selective breeding is that the improvements are cumulative and permanent: a new generation builds on the improvement of the previous one as you can see in the figure on the left.

For example, the growth rate for Atlantic salmon has been doubled in six or seven generations (Gjedrem and Baranski, 2009)! In practice this means that the fish will be ready for sale a lot sooner, they need less feed and use their energy much more efficient.

## How does selective breeding work?

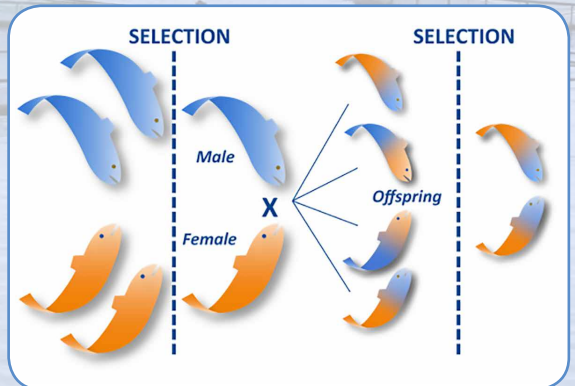
In most animal production sectors, selective breeding has been used for a considerable amount of time.

The eggs of the best females are fertilised with the sperm of the best males (either by natural mating or artificial fertilisation) to produce offspring that inherit the desired traits from their parents. When selective breeding is done over a longer period of time with a certain goal in mind, we speak of a breeding programme. There are breeding organisations who are specialised in the breeding process and sell eggs or larvae to producers, but there are also producers who select the best parents themselves.

However, the aquaculture sector is relatively young and selective breeding programmes have not yet made their way to all aquaculture production companies. Advanced methods and techniques are being developed for selecting the best fish on different traits (disease resistance, efficient use of feed, growth).

Setting up breeding programmes will have a huge positive impact on the European aquaculture, but there are some challenges. Choosing the best traits to select, getting the right information to estimate the possible value of the animal for selection and avoiding inbreeding are the most important ones.

In the EU funded project FISHBOOST researchers, producers and breeding organisations are working together to overcome these challenges and to boost the aquaculture breeding in Europe to the next level for Atlantic salmon, common carp, European seabass, gilthead seabream, rainbow trout and turbot.



Visit us at [www.fishboost.eu](http://www.fishboost.eu) to learn more about our project!



### Facts & Figures

European annual production of the six species targeted in FISHBOOST and the main producing countries (2013, in tons)

Species	Annual production (2013)	Top producer countries (2013)
Atlantic salmon	1.440.868	Norway, United Kingdom, Faroe Islands, Ireland, Iceland
Rainbow trout		
• ≥1,2 kg	126.144	Norway, Finland, France, Sweden, Denmark
• <1,2 kg	245.635	Turkey, Italy, Denmark, France, Poland
Sea bream	151.787	Greece, Turkey, Spain, Italy, Cyprus
Sea bass	128.105	Turkey, Greece, Spain, Italy, Croatia
Common carp	57.254	Poland, Czech Republic, Hungary, Germany, France
Turbot	7.795	Spain, Portugal, France

Source: FEAP (2014), European Aquaculture Production Report 2004-2013



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