



CODE EFABAR
the commitment to responsible breeding

Species Specific Template
Code EFABAR
AQUACULTURE



Code EFABAR 2017

Company: _____



AQUACULTURE

1. Impact and structure of breeding in EU aquaculture industry

Breeding of aquaculture species is a relatively recent activity in Europe when compared with other livestock production. Several stages of development of breeding programmes are underway depending on species, volume of production, country and the know-how acquired in reproduction and zootechnical procedures. The genetic improvement of farmed fish has developed rapidly since the mid-1980s, and nowadays, over 70% of EU fish production (especially salmon, rainbow trout, turbot and in a less extent halibut, sea bass and sea bream) is from selected stocks using methods of selection validated by the scientific community based on optimized mass selection, family based selection and genomic selection.

Investments since the mid-1980s led to the initiation of the domestication and selection of Atlantic salmon, rainbow trout, charr, sea bass, sea bream, turbot and halibut. Trials on other aquatic species, e.g. sturgeon, sole, common carp, sparid, tench, cod, perch, sander, European catfish, red porgy, and drum are underway. Similarly, genetic selection of cupped oyster and Manilla clam were initiated mostly to produce more resistant seeds to diseases. Where the main farmed species are concerned, European breeders are world leaders. They provide fertilised egg, fry and seeds to countries outside the EU, all around the Mediterranean basin (trout, bass and bream, oyster, Manilla clam), Middle East (bass, bream, trout), Southern America (salmon and trout) and China (turbot, sturgeon).

Aquaculture species, from the breeder's perspective, produce large - number of eggs at a single spawning (from several thousands to millions). They are, or can be, reproduced through artificial fertilisation for the most important species, except for some new farmed species, in domestication. Thus, for the species produced industrially (e.g. salmon, turbot, trout, bass and bream) the breeding sector tends to be evolving towards a small number of breeding companies per species that use up-to-date methods of evaluation with external investors specialized in animal breeding or from private funds. Some of these companies also invest in the breeding of tropical species (shrimp, tilapia) for tropical markets. Salmon breeding is now using genomic selection mostly to fight against diseases such as sea lice. Trout is following the same path. For sea bass, sea bream and turbot, the priority is to develop SNP-arrays and sequence the genome of some species (e.g. sea bream) before future applications of genomic selection. For species with more limited market size, (charr, carp, catfish, oyster, clam, etc.) more simple mass selection is applied associated increasingly with assisted DNA-based parentage assignment to manage inbreeding. Breeding programs are mostly developed by specialised breeding companies which are also involved more in the production of juveniles. Other breeding programs are part of integrated companies that are involved in growing, slaughtering and/or processing.

After improvement of growth, and in a less extend processing yields, the major new challenges are to improve disease resistances to several diseases as most of the production are developed in open water systems and to initiate efficiently the improvement of feed efficiency.

2. Introduction

Give a brief description of the governance policy of the breeding company regarding the societal challenges as mentioned in the Code EFABAR General Document. Besides the 6 pillars of the Code EFABAR, take also Food Security into consideration.

3. Sustainability and Technologies

PART 1 SUSTAINABILITY

A. Food Safety and Public Health

Breeding Element	Has the BC implemented this element in its breeding program, directly or indirectly? Yes/No	If yes, how has the BC implemented this element in its breeding program? If no, does the BC plan to address this element in its breeding program in the next 3 years? If no, why?
Reduction of use of antibiotics and anti-parasites when selecting for more resistant stocks	<i>To be filled by the company</i>	<i>To be filled in by the company</i>
Meat quality (related to food safety and public health) (for instance by minimizing the spreading of zoonotic diseases)		
Suppression antifungals treatments (in producing all-female salmonids)		

Management element	Yes/No	If yes, give a short explanation If no, explain why not
Has the Breeding Company a biosecurity policy on its own premises (to avoid spreading zoonoses) and is it implemented?		
Has the Breeding Company an antimicrobial policy on its own premises and is it implemented?		



B. Product Quality

Breeding Element	Has the BC implemented this element in its breeding program, directly or indirectly? Yes/No	If yes, how has the BC implemented this element in its breeding program? If no, does the BC plan to address this element in its breeding program in the next 3 years? If no, why?
Improvement of body or shell conformation and morphology		
Improvement of skin or shell colour		
Improvement of flesh quality, lipid content or composition of the fillet or the edible part		
Improvement of and colour of the fillet or the edible part		
Proposal of new product by the domestication of new species		
Prevention of external and/or internal malformation (appearance)		

C. Genetic diversity

Breeding Element	Has the BC implemented this element in its breeding program, directly or indirectly? Yes/No	If yes, how has the BC implemented this element in its breeding program? If no, does the BC plan to address this element in its breeding program in the next 3 years? If no, why?
Initiation of domestication or genetic selection of new species with an initial large genetic variation		
Management of genetic variability in selected lines to limit inbreeding		
<i>In-situ</i> conservation of genetic resources		
Mid-term live backup		
Long-term cryo-banking of genetic resources (sperm or larvae)		

Management Element	Yes/No	If yes, give a short explanation If no, explain why not
Does the BC have or contribute to a gene bank for commercial breeds?		
Does the BC contribute to the conservation of genes of rare and threatened breeds?		

D. Resource Efficiency

Breeding Element	Has the BC implemented this element in its breeding program, directly or indirectly? Yes/No	If yes, how has the BC implemented this element in its breeding program? If no, does the BC plan to address this element in its breeding program in the next 3 years? If no, why?
Growth rate		
Feed efficiency		
Ability to use feed substitutes with vegetal ingredients or alternative sources		
Survival rate to limit loss of feed and energy		
Improve yields at processing (gutting, filleting, trimming) or yield of edible part (shellfish)		

Management element	Yes/No	If yes, give a short explanation If no, explain why not
Has the Breeding Company a resource efficiency policy on its own premises?		

E. Environment

Breeding Element	Has the BC implemented this element in its breeding program, directly or indirectly? Yes/No	If yes, how has the BC implemented this element in its breeding program? If no, does the BC plan to address this element in its breeding program in the next 3 years? If no, why?
Feed efficiency (decrease of water pollution)		
Production of sterile fish or shellfish (to prevent potential negative effect of escapees and improve feed efficiency)		
Genetic resistance to diseases (to limit the release of drugs and the contamination of wild populations)		

Management element	Yes/No	If yes, give a short explanation If no, explain why not
Has the Breeding Company an environment policy on its own premises and is it implemented?		

F. Animal Health and Welfare

Breeding Element	Has the BC implemented this element in its breeding	If yes, how has the BC implemented this element in its breeding



	program, indirectly? Yes/No	directly or	program? If no, is the BC aware of the importance of this element and will it address this element in its breeding program in the next 3 years? If no, why?
Disease resistance and survival			
Fish and shellfish robustness			
Animal integrity improvement and maintain functional traits			
Improve ability to cope with farming practices (different environment and climate change)			
Preventing external and/or internal malformation			
Prevention of sexual maturation			
Multi-traits and balanced breeding goal			

Management element	Yes/No	If yes, give a short explanation If no, explain why not
Has the Breeding Company a biosecurity policy on its own premises (to avoid diseases and the spreading of diseases to other premises) and is it implemented?		
Has the Breeding Company a welfare policy on its own premises and is it implemented?		

PART II TECHNOLOGIES

A. Breeding technologies

Element	Is the BC using these breeding technologies in its breeding practices? Yes/no; why, why not?
Pedigree tracing	
Sib/progeny testing to improve disease resistance	
Transgenesis	
Gene editing	

B. Reproduction Technologies

Element	Is the BC using these (reproduction) technologies in its reproduction practices? Yes/no; why, why not?
Collection of semen (attention for welfare)	
Artificial fertilisation	
Synchronization of ovulation and sperm production by hormones	
All-female monosexing	
Sterilization by triploidization	
Inter-specific hybridization	
Production of tetraploid parents to produce triploids progenies	

4. Certification

We herewith declare that the content of this template expresses the breeding and reproduction policy of the company

Place:

Date:

Name and signature:

European Forum of Farm Animal Breeders (EFFAB)

We herewith state that this template complies with the CODE EFABAR Version 2017

Place: Brussels

Period of validity:

J. (Jan) G.B. Venneman, EFFAB, Director