

Current status of selective breeding in European aquaculture

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FISHBOOST
The next level of aquaculture breeding

Fishboost

WP 6: Economic evaluation of breeding programs

First step: Review of selective breeding programs and their market share

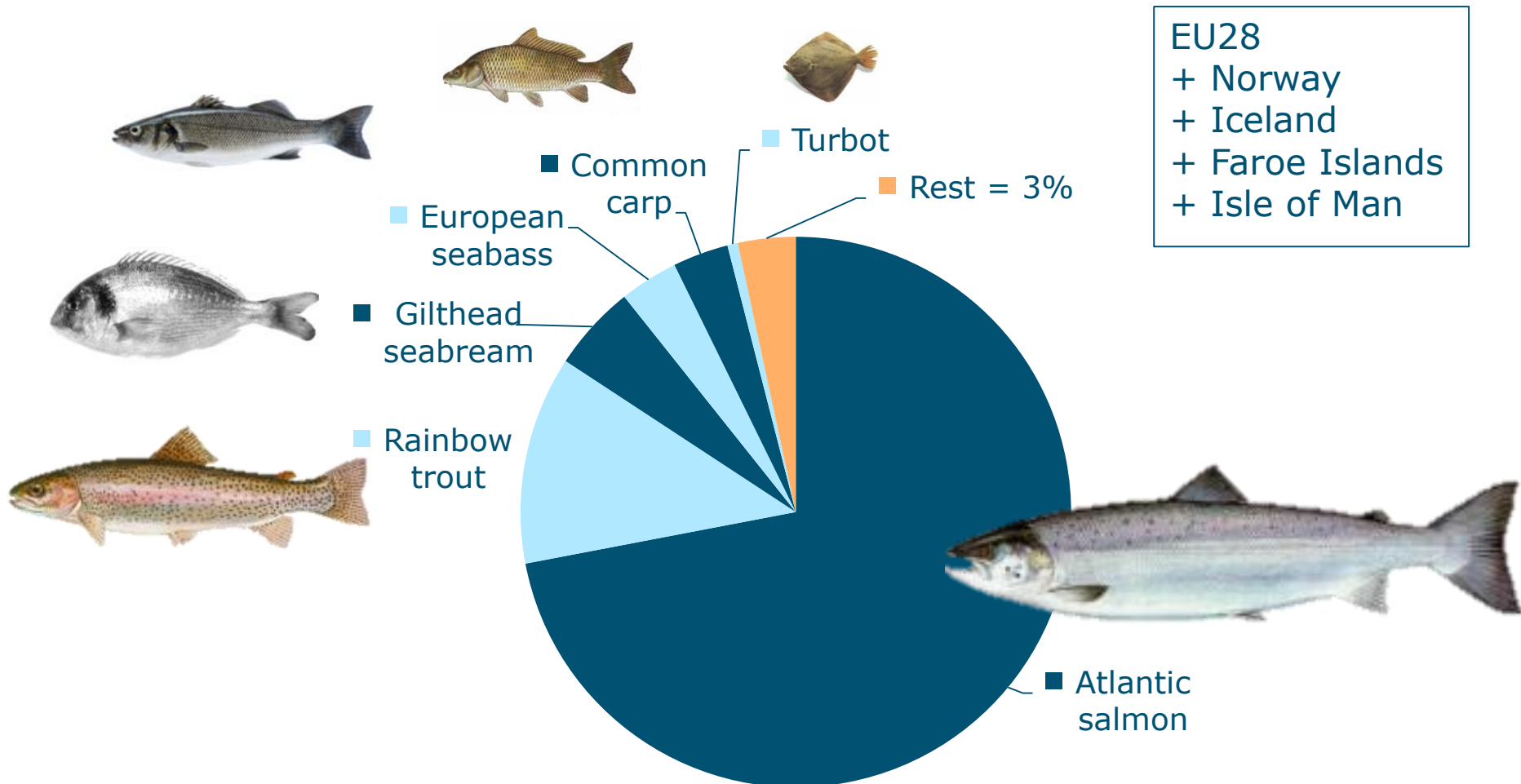


Objectives

1. Characteristics of breeding companies
2. Market share of selective breeding in European production



Six species account for >95% of European aquaculture production



(FAO, 2015)

Approach

- Survey among breeding companies
 - Family or mass selection
 - Traits
 - Selected generations
 - Egg/juvenile production

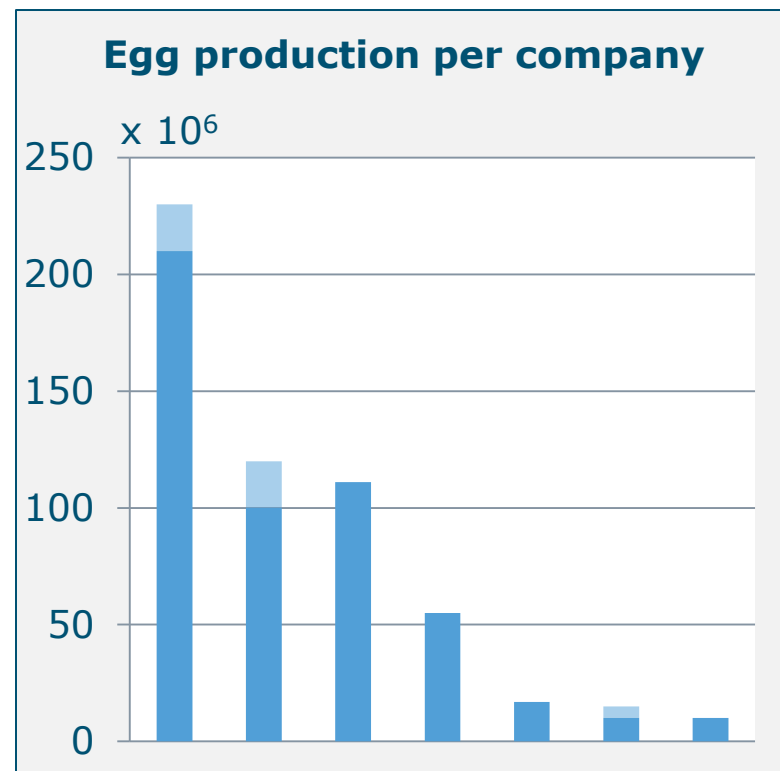


- Market share = $\frac{\text{Production by breeding companies}}{\text{European production}}$

Characteristics



- 7 Breeding companies
- All perform family selection
- Typically selected traits:
 - Growth
 - Processing yield
 - Product quality
 - Disease resistance
- Selected for ± 10 generations



Market share 2012

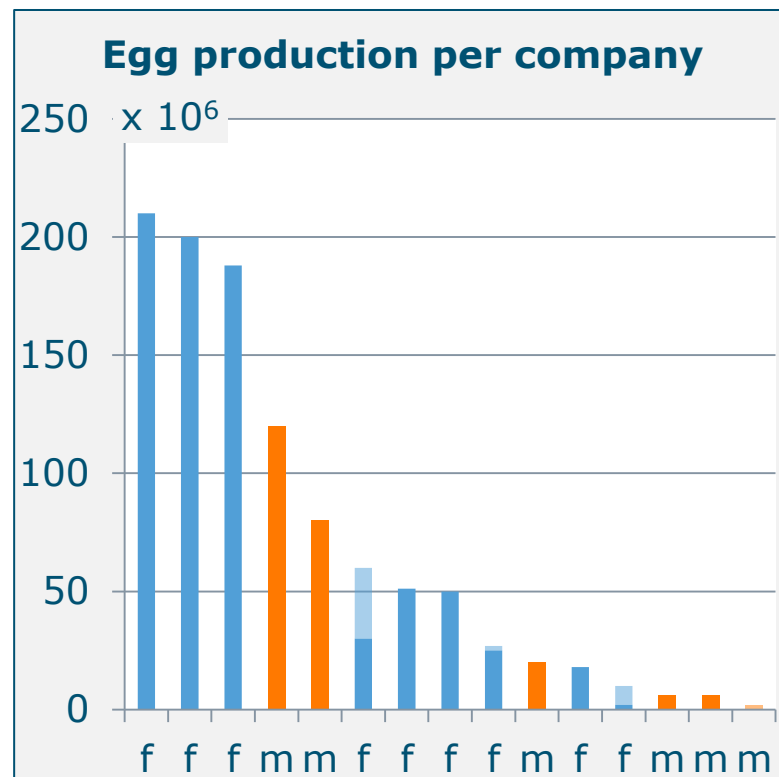


Market share breeding companies: **93-95%**

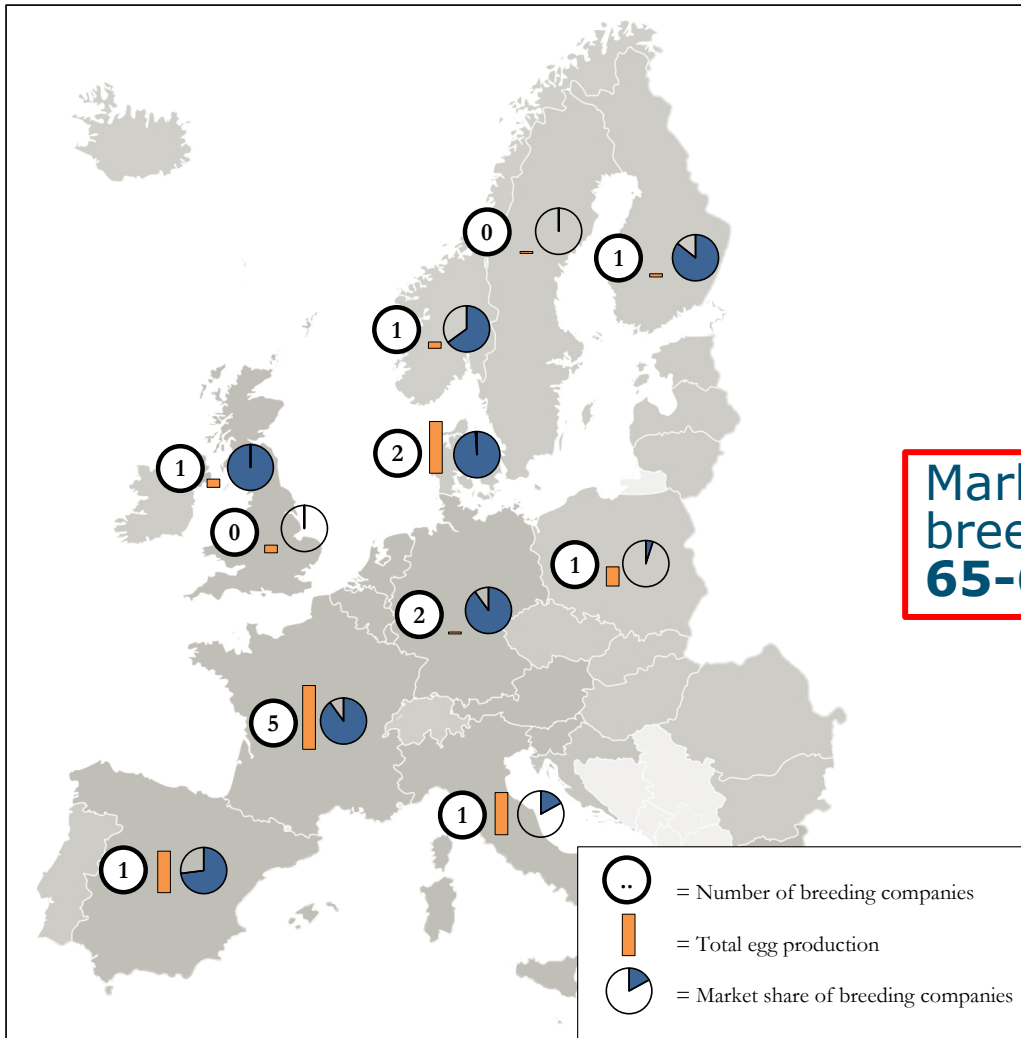
Characteristics



- 15 Breeding companies
 - 6 Mass selection: <20 generations
 - 9 Family selection: <14 generations
- Typically selected traits:
 - Growth
 - Morphology
 - Processing yield
 - Disease resistance
 - Reproduction

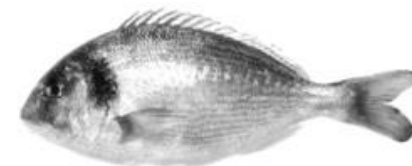


Market share 2011

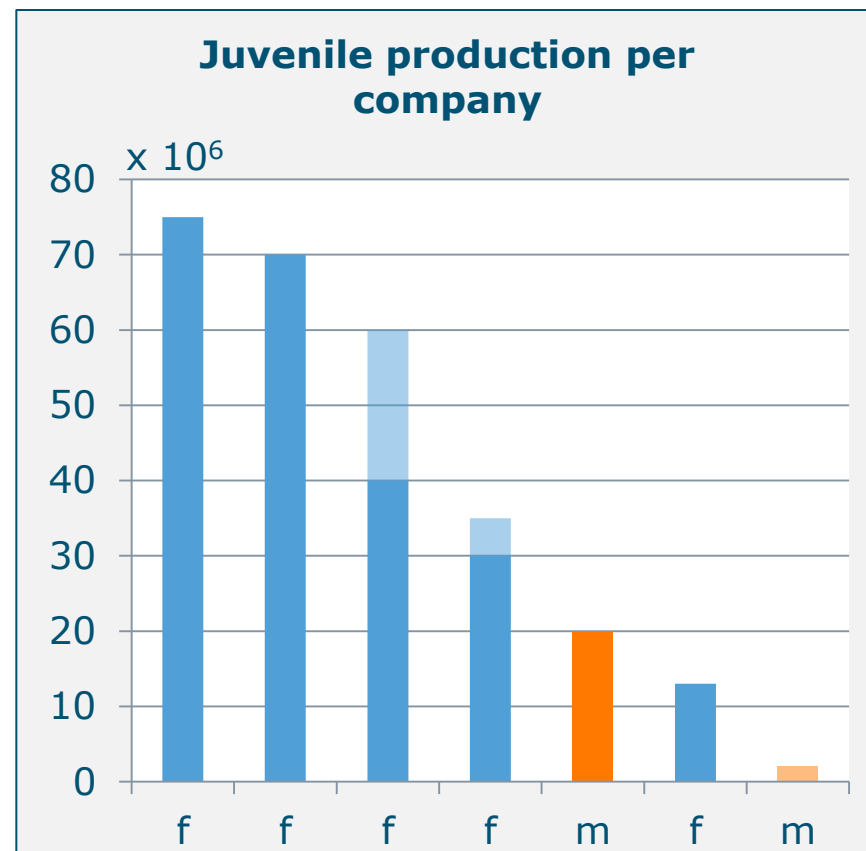


Market share breeding companies: **65-68%**

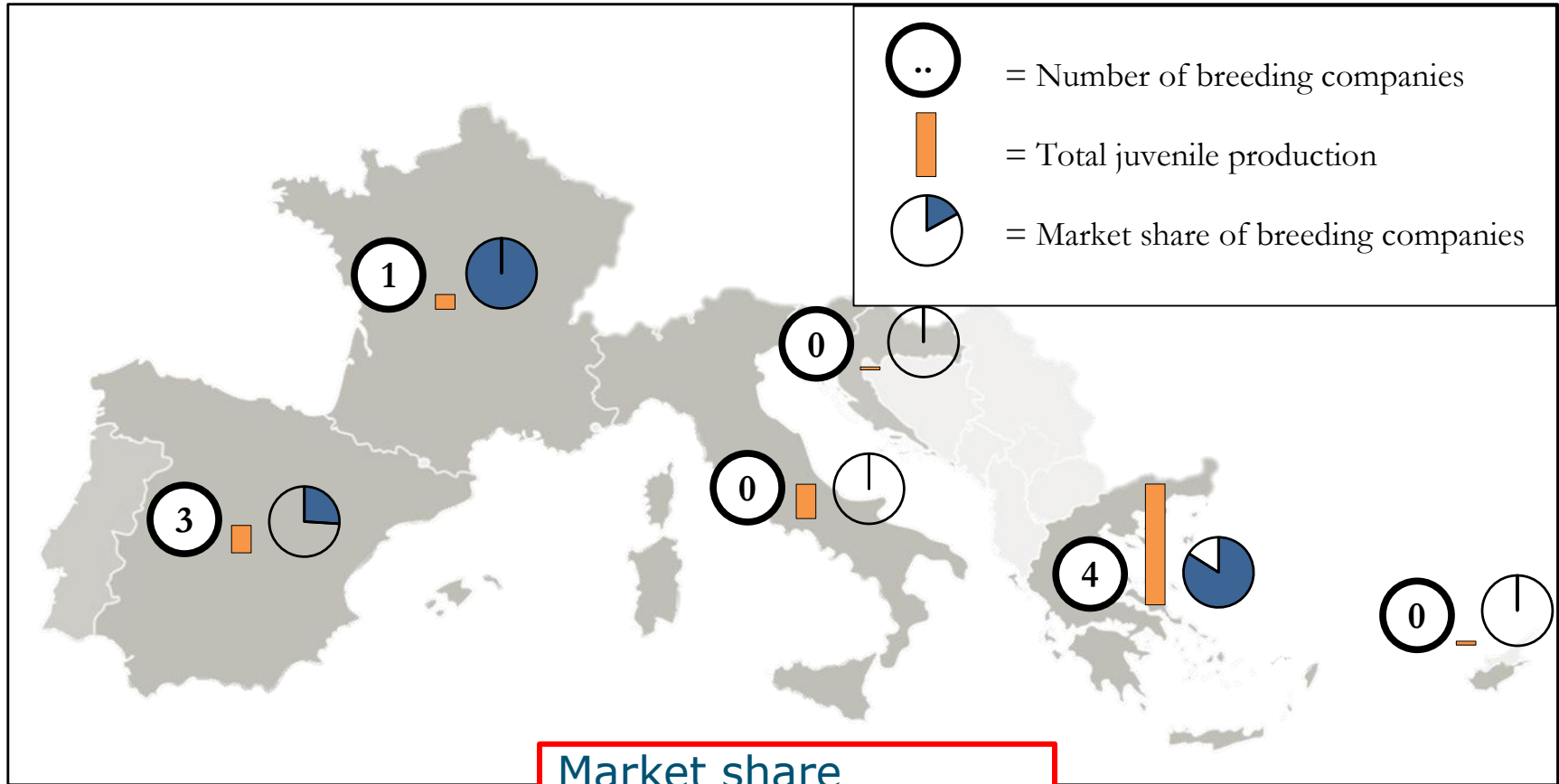
Characteristics



- Breeding companies
 - 2 Mass selection
 - 5 Family selection
- Typically selected traits:
 - Growth
 - Morphology
 - Product quality
 - Feed efficiency
 - Disease resistance
- Selected generations: 1-5



Market share 2012

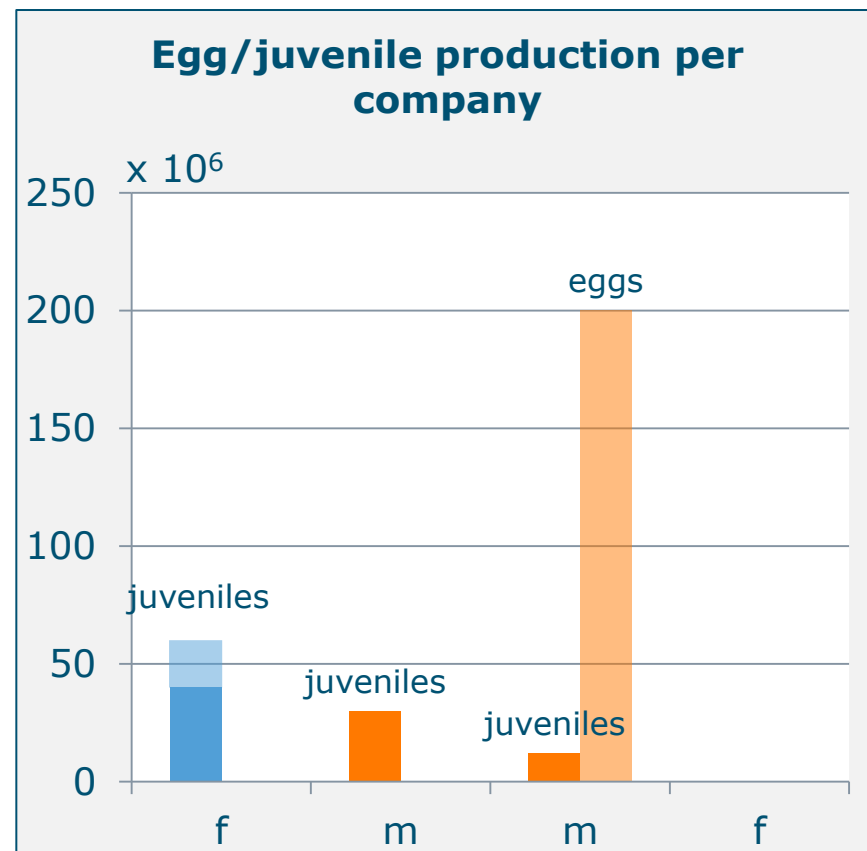


Market share
breeding companies:
60-66%

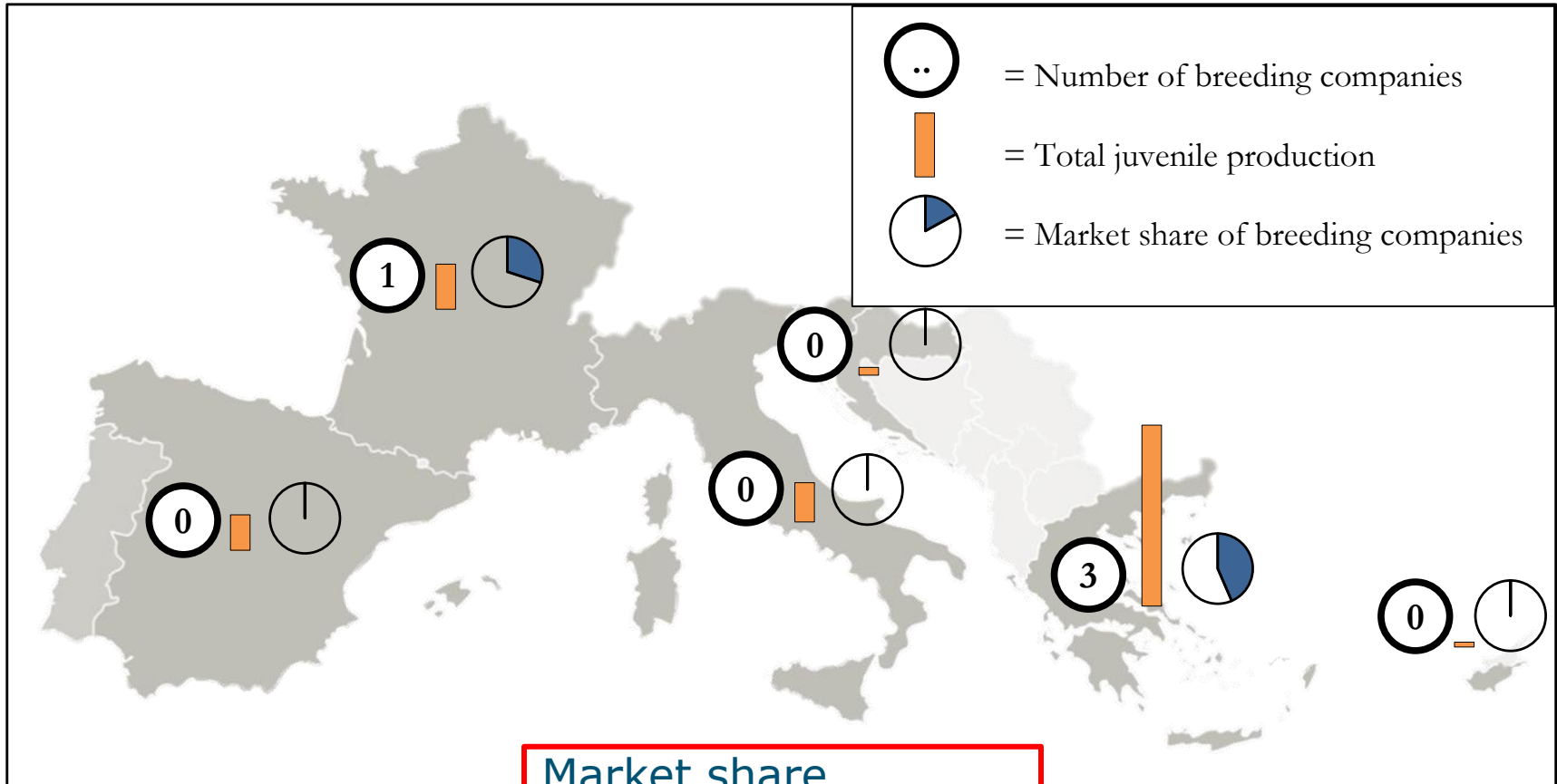
Characteristics



- Breeding companies
 - 2 Mass selection
 - 2 Family selection
- Typically selected traits:
 - Growth
 - Morphology
 - Processing yield
 - Disease resistance
- Selected generations: 3-8



Market share 2012

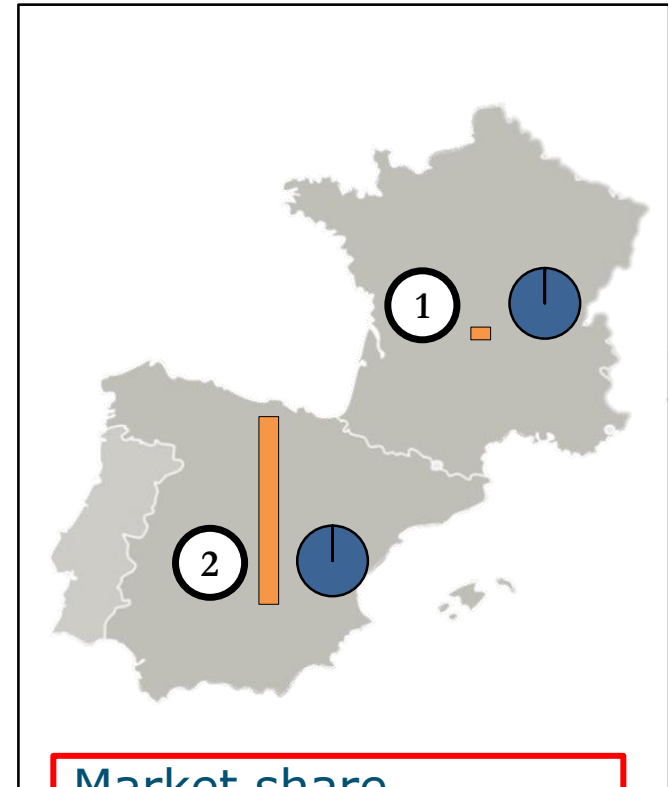


Market share breeding companies: **38-51%**

Characteristics & market share 2012



- Breeding companies
 - 1 Mass selection
 - 2 Family selection
- Selected traits:
 - Growth
 - Disease resistance
 - Morphology
- Selected generations: 3-5



Market share
breeding companies:
100%

Characteristics



- Longest history in domestication
- Strains maintained for >20 generations
- Minor role of selective breeding → **Market share \approx 0%**
- Genetic improvement = crossbreeding

Summary

- Number of breeding companies = 36
 - 25 family selection
 - 11 mass selection
- Most commonly selected traits:
 1. Growth
 2. Morphology
 3. Disease resistance
 4. Product quality
 5. Processing yield



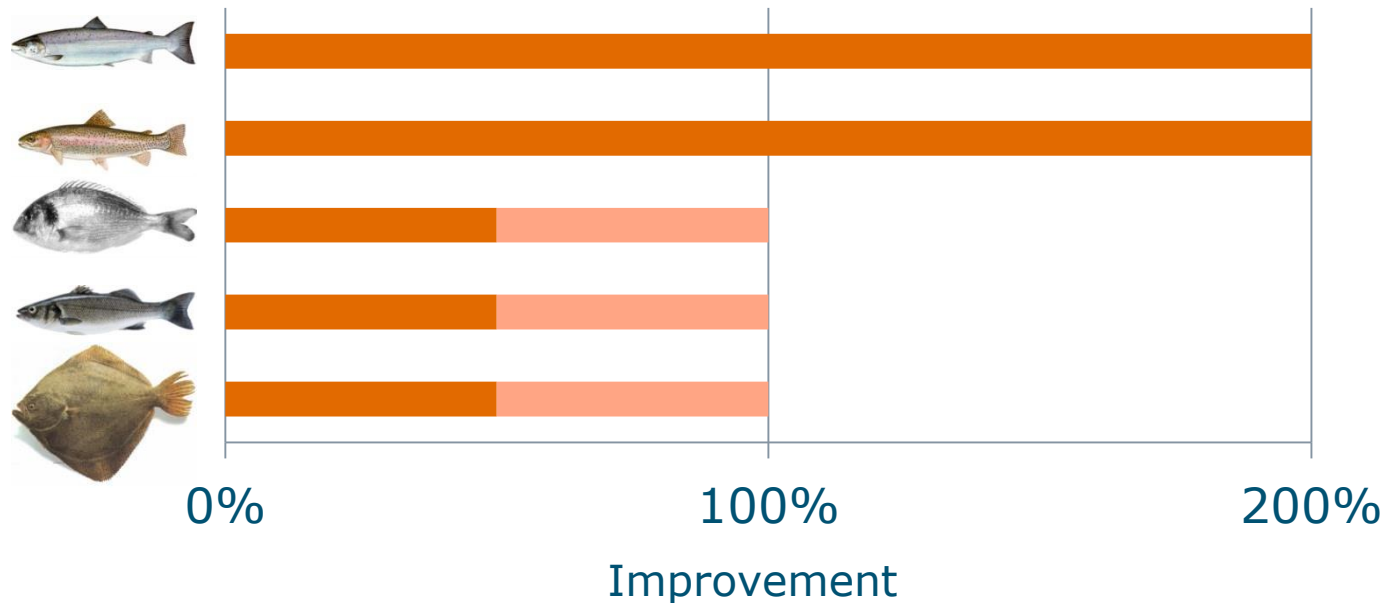
Over 80% of European production originates from selective breeding!

Species	Market share (%)		Production (1000 t)		From breeding companies (1000 t)
Salmon	93-95	x	1 487	=	1 398
Trout	65-68	x	253	=	168
Seabream	60-66	x	104	=	66
Seabass	38-51	x	71	=	33
Turbot	100	x	13	=	13
Carp	0	x	67	=	0
TOTAL			2 065		1 678

Impact of selective breeding

1. Market share > 80%
2. What is the cumulative genetic gain?

Increased bodyweight at harvest:



Thank you for your attention!



100%



0%



93-95%



44-65%



38-51%



60-66%



Supplementary information

Species	European egg/juvenile production (million)	By breeding companies (million)	Market share (%)
Salmon	473	...	93-95
Trout	1543	1006-1048	65-68
Seabass	319	82-102+40-60	38-51
Seabream	414	248-275	60-66
Turbot	20	20	100
Carp	...?	0	0