Benchmark Holdings

Commercially Available All-Female Atlantic Salmon

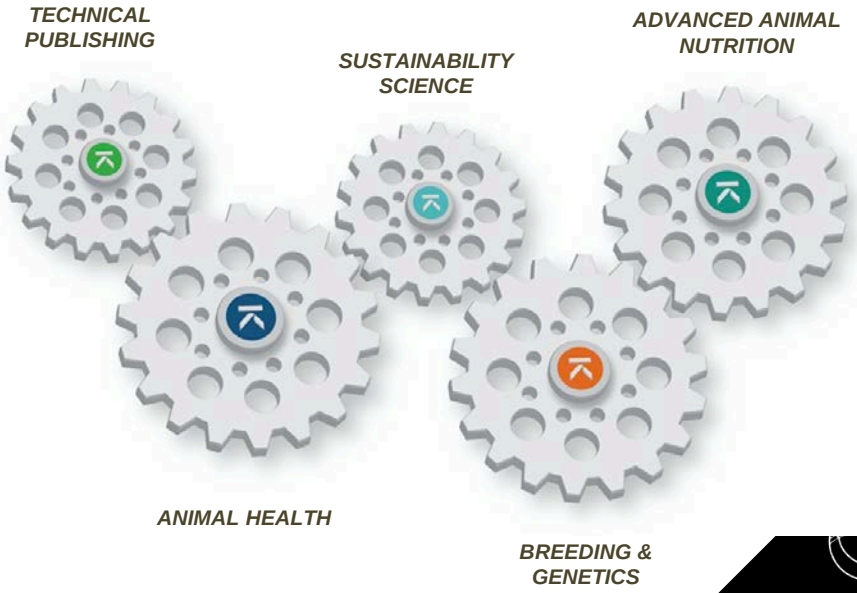
INTRODUCTION TO BENCHMARK

Founded in 2000 to build a company that progresses:

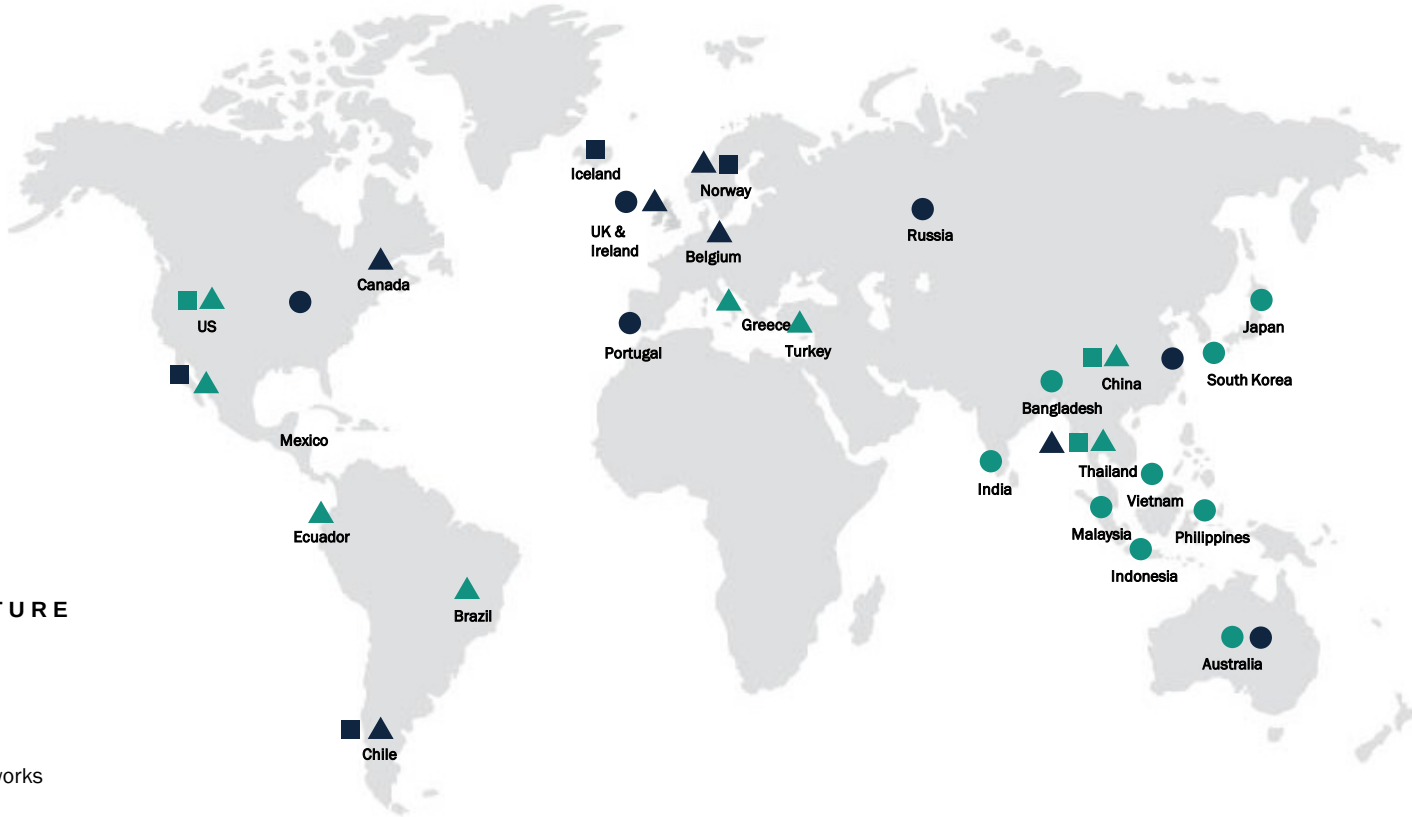
- sustainability of the food chain
- animal health and welfare
- robust animal genetics and breeding
- up-skilling of the food chain industry
- advanced animal nutrition

by building...

- a world-class team
- next-generation research facilities & state-of-the-art production capacity



OPERATIONS AND FACILITIES: 826 PEOPLE, 27 COUNTRIES



BENCHMARK

- Animal Health
- Breeding & Genetics
- Sustainability Science

INVE AQUACULTURE

- Technical Publishing
- Warehouses
- Production facilities
- Sales offices
- Main distribution networks

STOFNFISKUR HF WAS FOUNDED IN 1991

Employees: 54

Number of eggs sold in 2015: 94 million

Enough to produce 250.000 tons of salmon

Salmobreed sold about the same:

500.000 tons

World wide 2 million tons

COMPARTIMENTACIÓN

SANITARY COMPARTMENTS

Compartments is a tool recommended by the OIE sanitary code.

This tool is oriented to facilitate the international commerce between nations.

It was first a “reactive response”, however, Chile and Iceland have it now implemented in a preventive way.

Compartments approved by Sernapesca-Chile

1 **SALMON OVA INCUBATION CENTRE**
in Vogar

2 **VOGAVÍK**
Salmon Broodstock farm

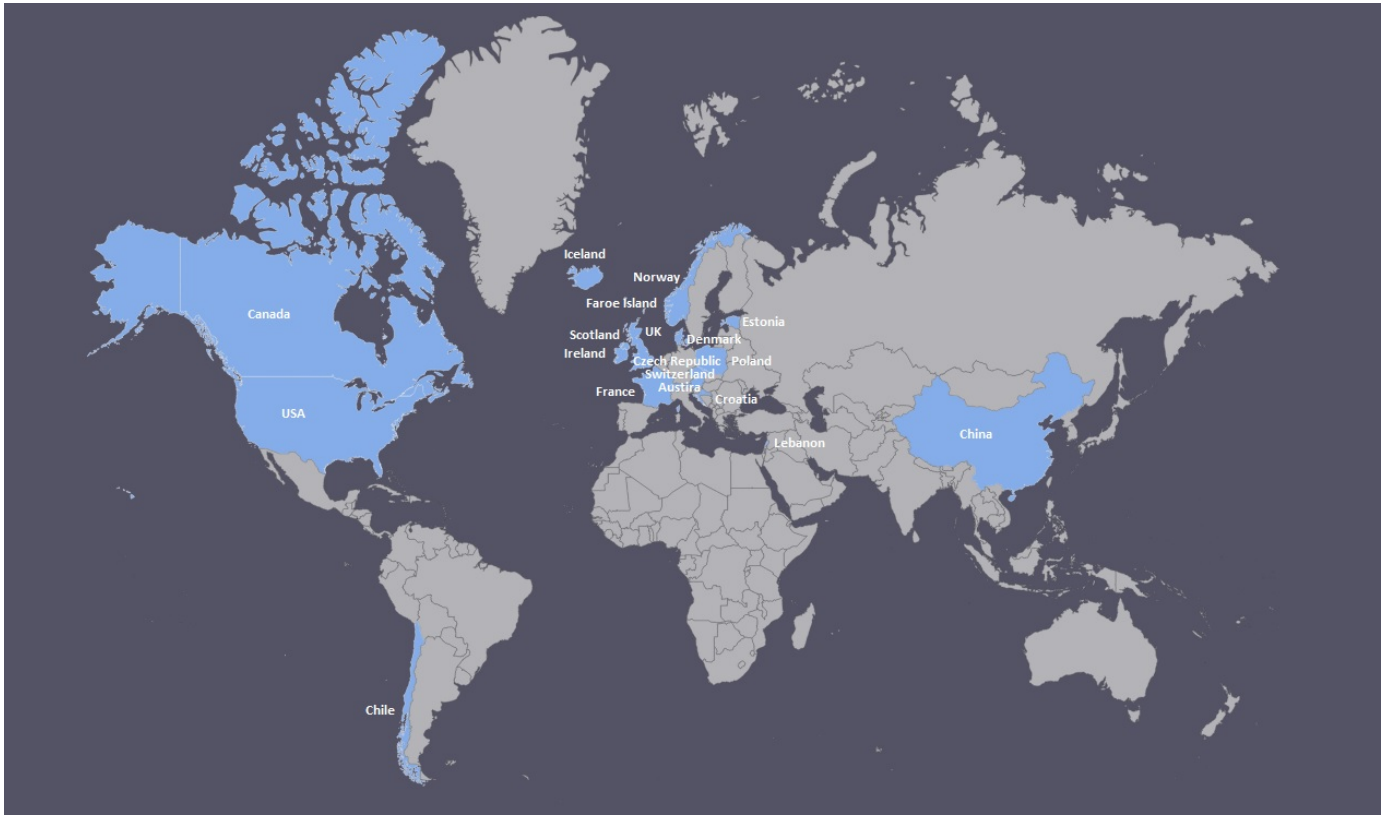
3 **KALMANSTJÖRN**
Salmon Broodstock farm

4 **KOLLAFJÖRÐUR**
Salmon hatchery and smolt farm


OVA INCUBATION CENTRE
KALMANSTJÖRN
VOGAVÍK
KOLLAFJÖRÐUR


KOB-B
201
KOB-B
200
KOB-B
199
OVA
52

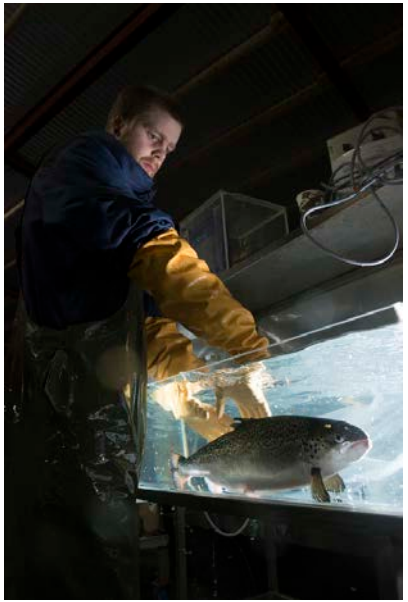
STOFNFISKUR EXPORTS EGGS ALL OVER THE WORLD



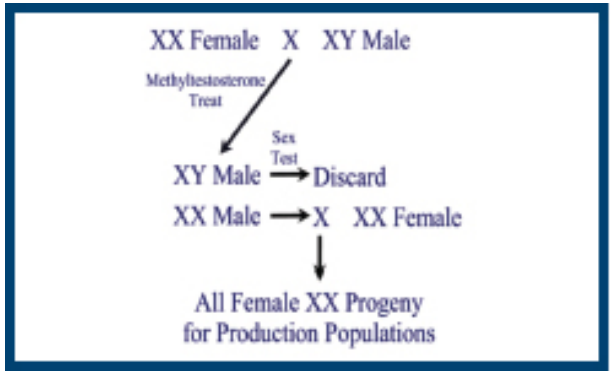
STOFNFISKUR HAS SELECTED SALMON FOR LANDBASED FARMING FOR 7 GENERATIONS

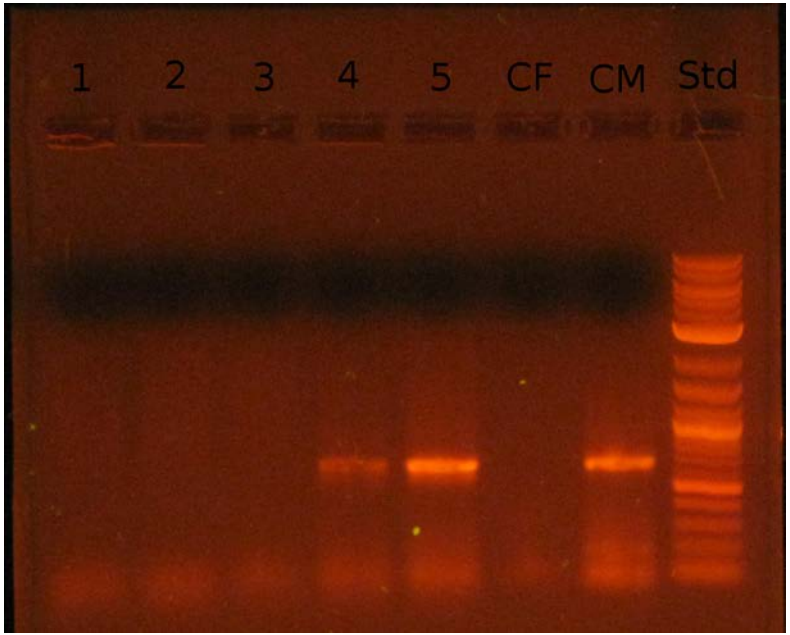
TOLERATES HANDLING

SALMON IS A DOMESTICATED ANIMAL



ALL-FEMALE PRODUCTION
SDY CHROMOSOME

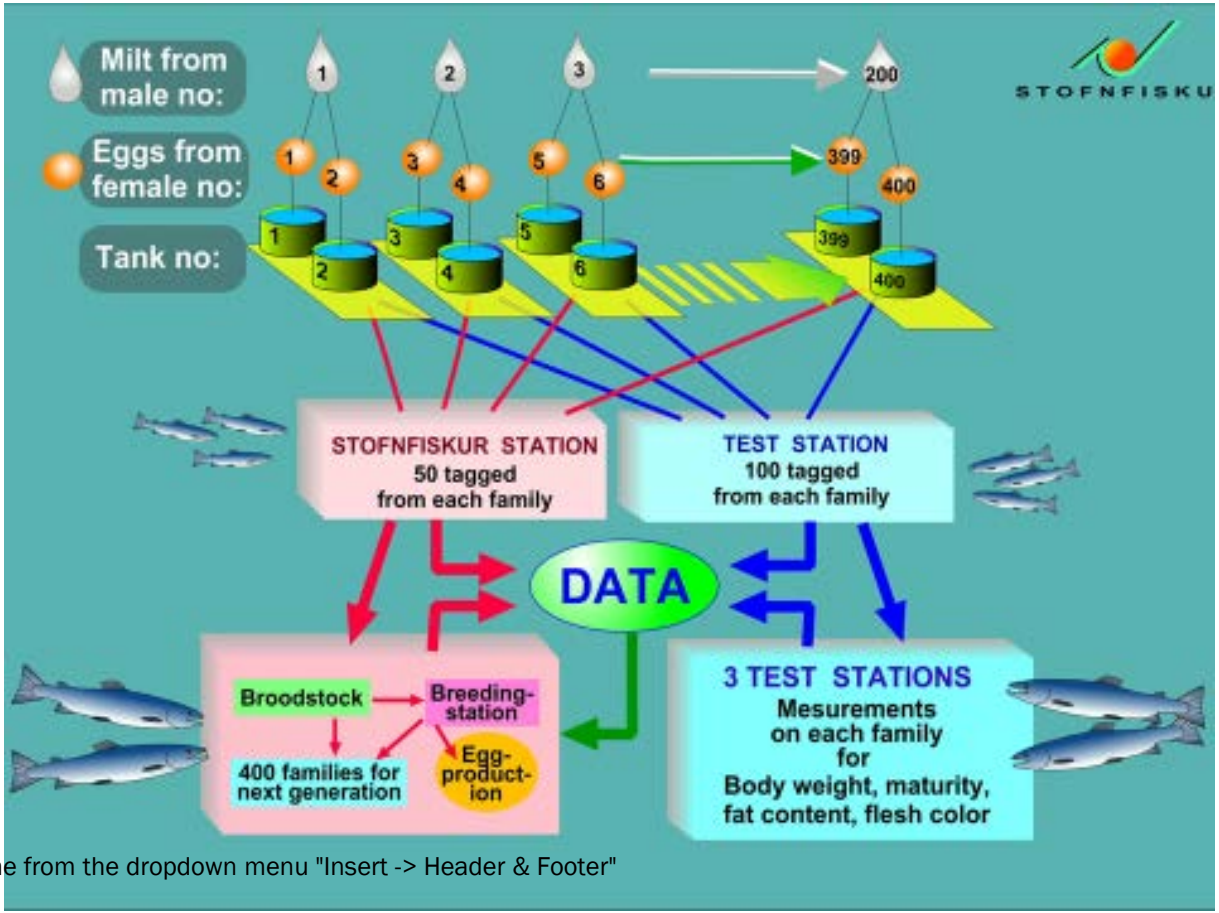




FEMALES GROW SLOWER THEN MALES AS IMMATURES- EFFECT?

	kg	TGC	°D	Days at 14°C	diff days
Male	4,74	3,07	3976	284,0	
Female	4,26	2,93	4167	297,6	8,4
Male+Female	4,5	3.0	4050	289,3	

OUR BREEDING PROGRAM-300 FAMILIES EACH YEAR



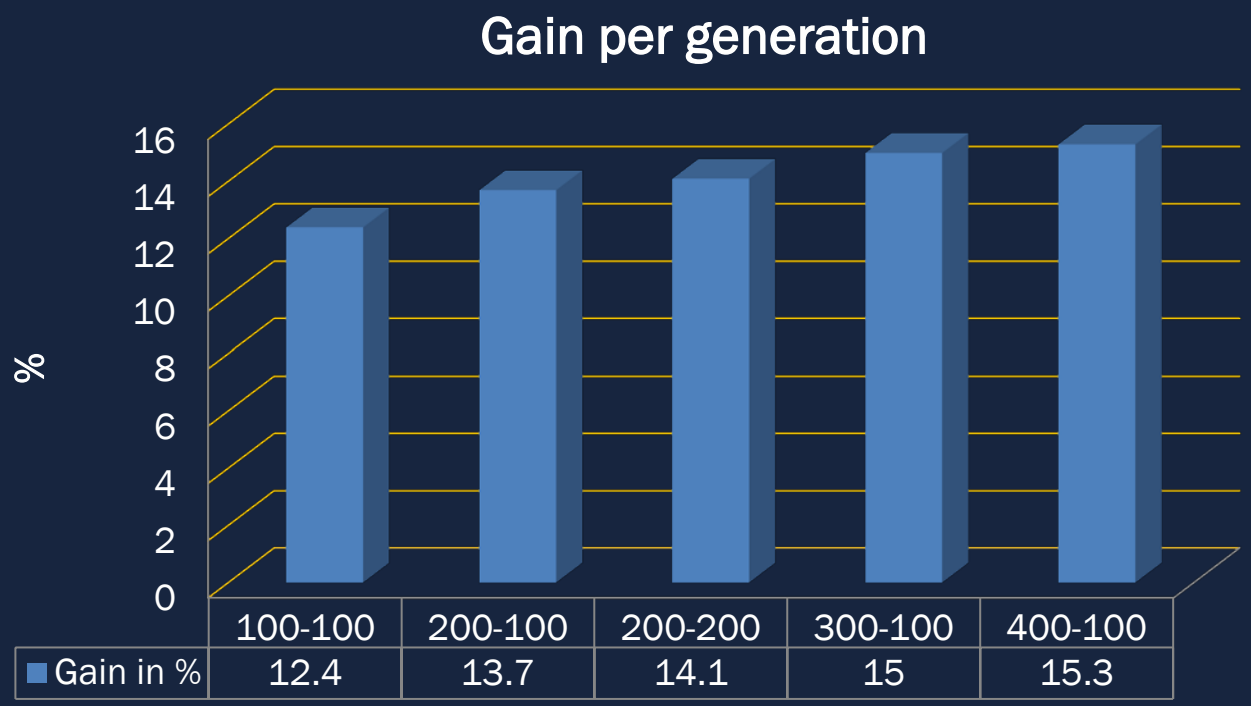
ESTIMATES ON GENETIC VARIATION OF TRAITS

Traits	Heritability	References
Body weight	0.3 – 0,4	Jonasson 1993 Jonasson & Gjedrem 1997 Rye & Restie 1995 Olafur Kristjansson 2016
Maturation	0.15 – 0.35	Gerde 1986 Olafur Kristjansson 2016
Flesh color	0.09 – 0.12	Rye & Gerde 1986 Olafur Kristjansson 2016
Fat percentage	0.25 – 0.38	Rye & Gerde 1986 Olafur Kristjansson 2016

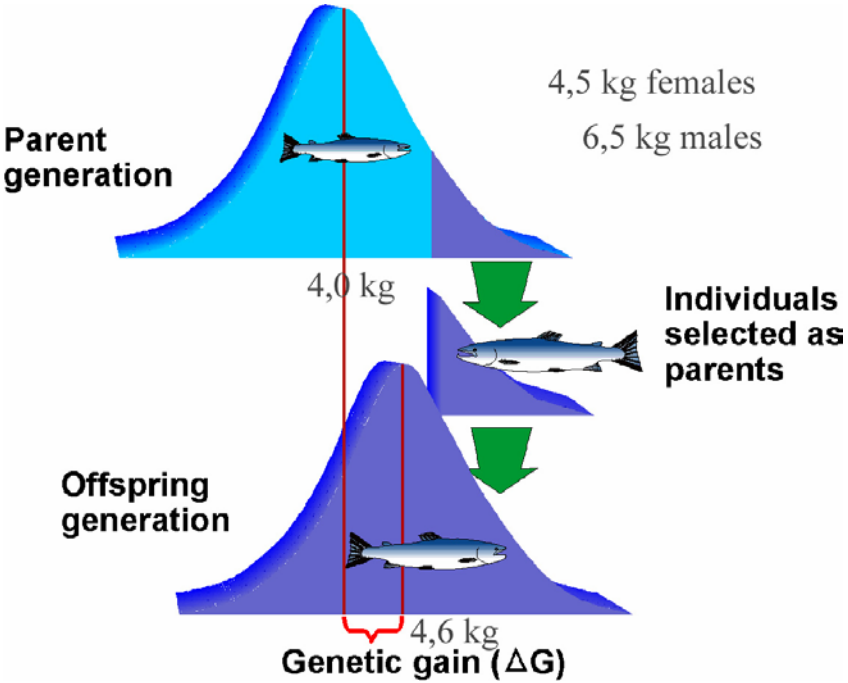
INDEX FOR LANDBASED FARMING, THE MAIN EMPHASIS IS ON INCREASING GROWTH RATE

h^2	Weight	Maturity	Color	Fat	Index	Mean
Weight	0,35				60 %	4 kg
Maturity	0,2	0,25			10 %	15%
Color	-0,19	0	0,10		15 %	7,0 mg
Fat	-0,20	0	-0,26	0,25	15 %	16,7%

EXPECTED GAIN IN BODY WEIGHT



CALCULATED RESPONSE –SIMPLE CALCULATIONS



Genetic gain (ΔG): Response to selection can be put in a simpler form.

Selection differential (S, superiority of the selected parents)

S=1.5 kg (0,5 for females+2,5 for males=3/2= 1,5

ΔG =S h2

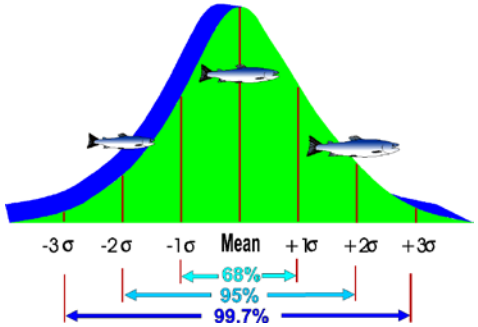
ΔG=1.5*0.4=0.6kg

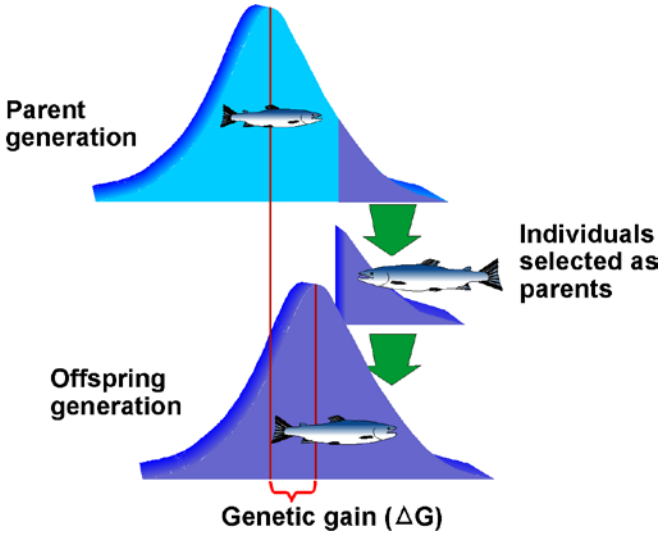
F1=4+0.6=4.6 kg

Response 15%

SELECTION EXPERIMENT-BODY WEIGHT

Selected material: 1 standard deviation unit over the mean, 26 families
Control: 8 families with breeding values as the population mean
Grilse = 0%

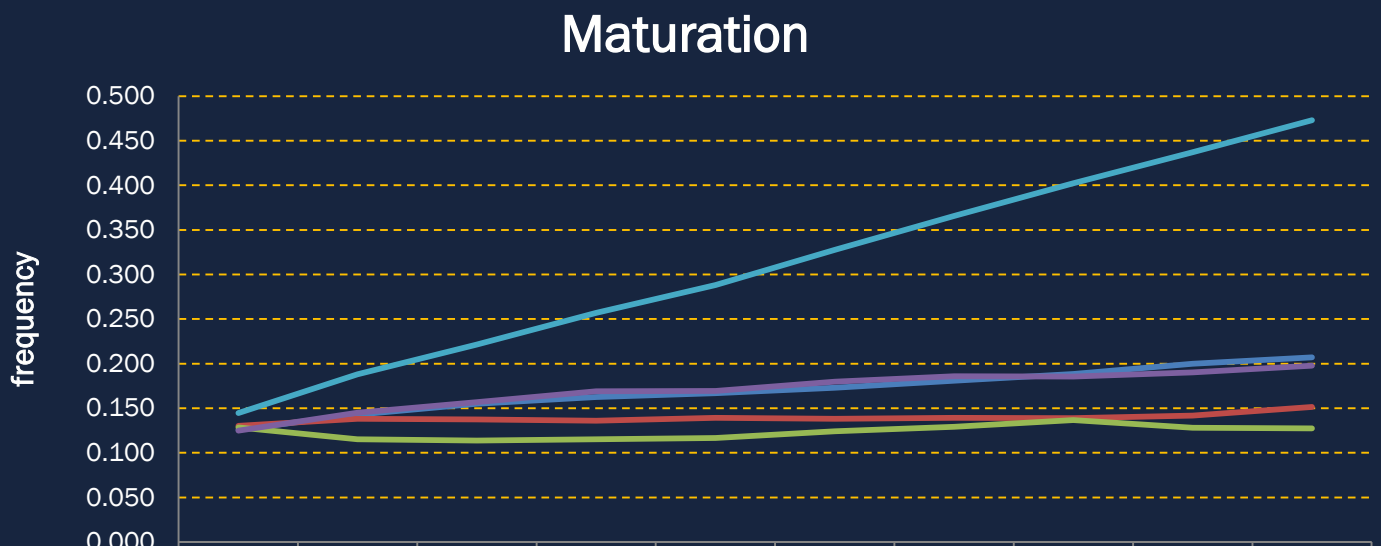




RESULTS

	N	Body weight, kg	% Grilse
Select	1021	2,1	6,4
Control	513	1,6	5,8

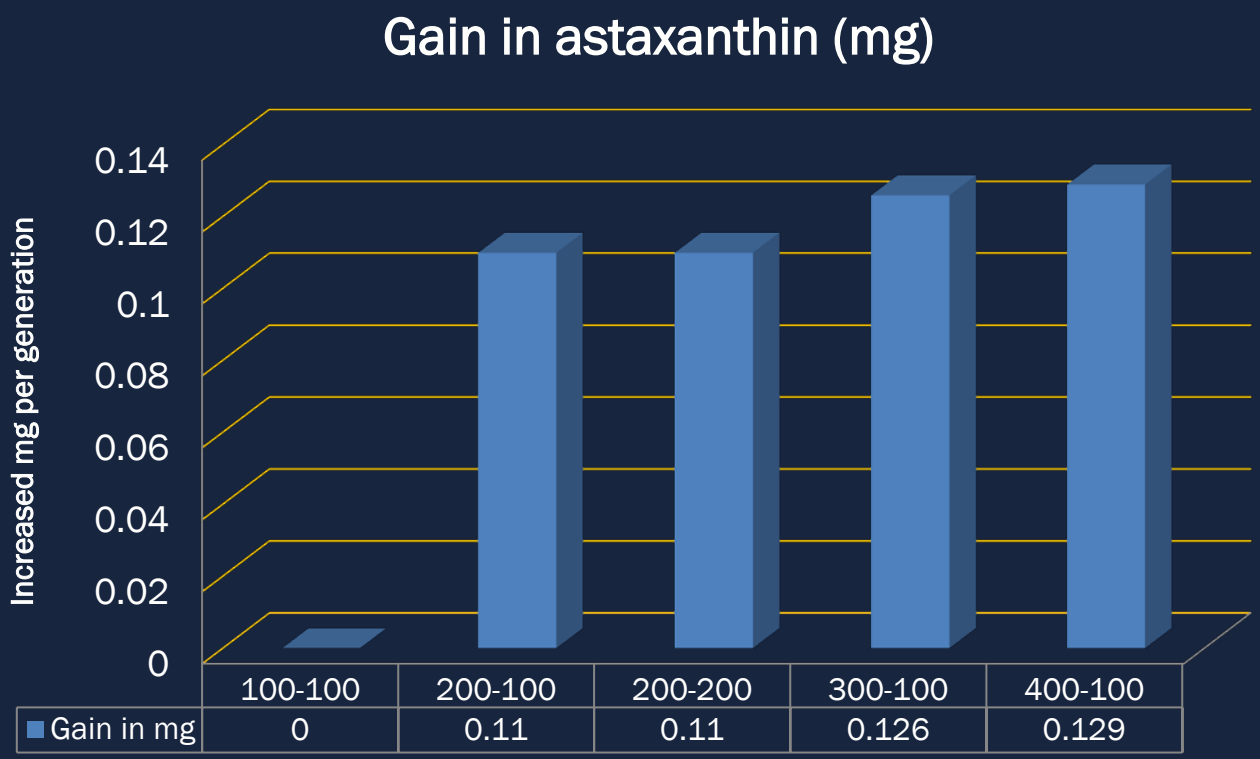
RESULTS OF SIMULATIONS FOR 100-400 FAMILIES. THE NUMBERS STANDS FOR (FAMILIES-WITHIN)



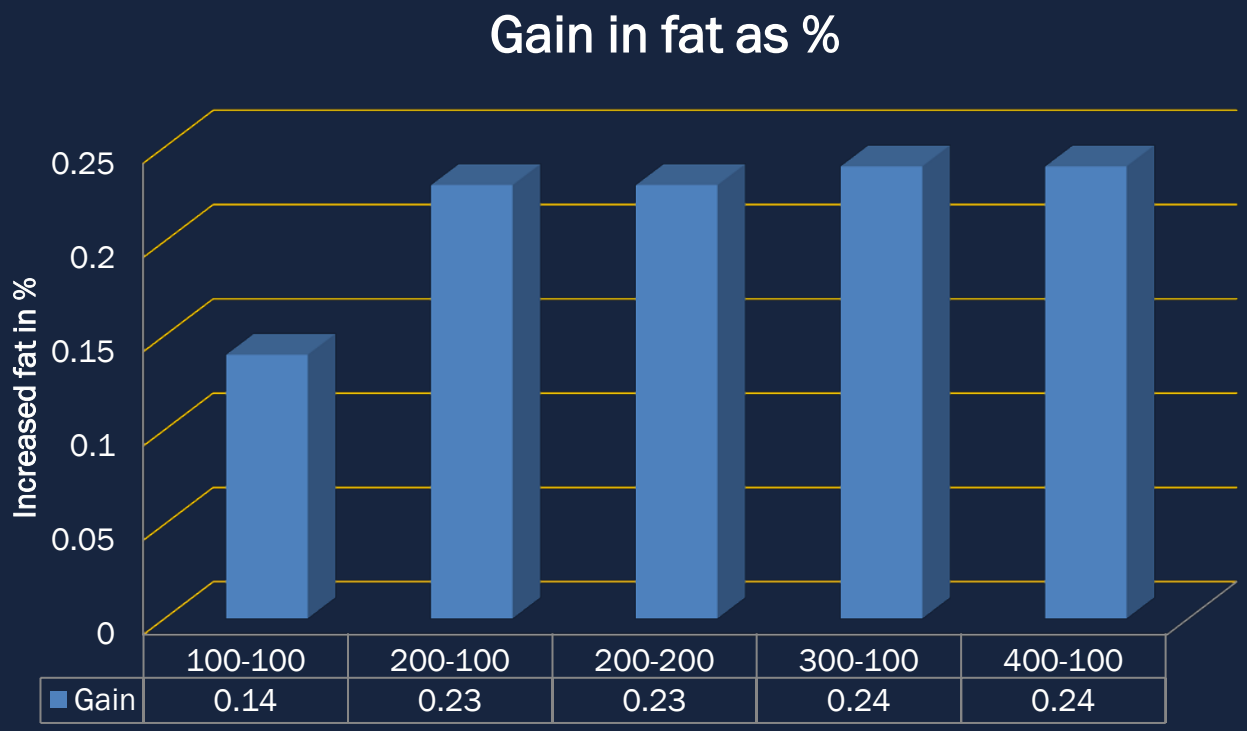
	1	2	3	4	5	6	7	8	9	10
400 - 100	0.126	0.143	0.155	0.163	0.167	0.173	0.181	0.188	0.200	0.207
300 - 100	0.130	0.138	0.137	0.136	0.139	0.138	0.139	0.139	0.142	0.152
200 -200	0.13	0.12	0.11	0.12	0.12	0.12	0.13	0.14	0.13	0.13
200 -100	0.12	0.14	0.16	0.17	0.17	0.18	0.19	0.19	0.19	0.20
100 -100	0.14	0.19	0.22	0.26	0.29	0.33	0.37	0.40	0.44	0.47

FAT AND FLESH COLOR

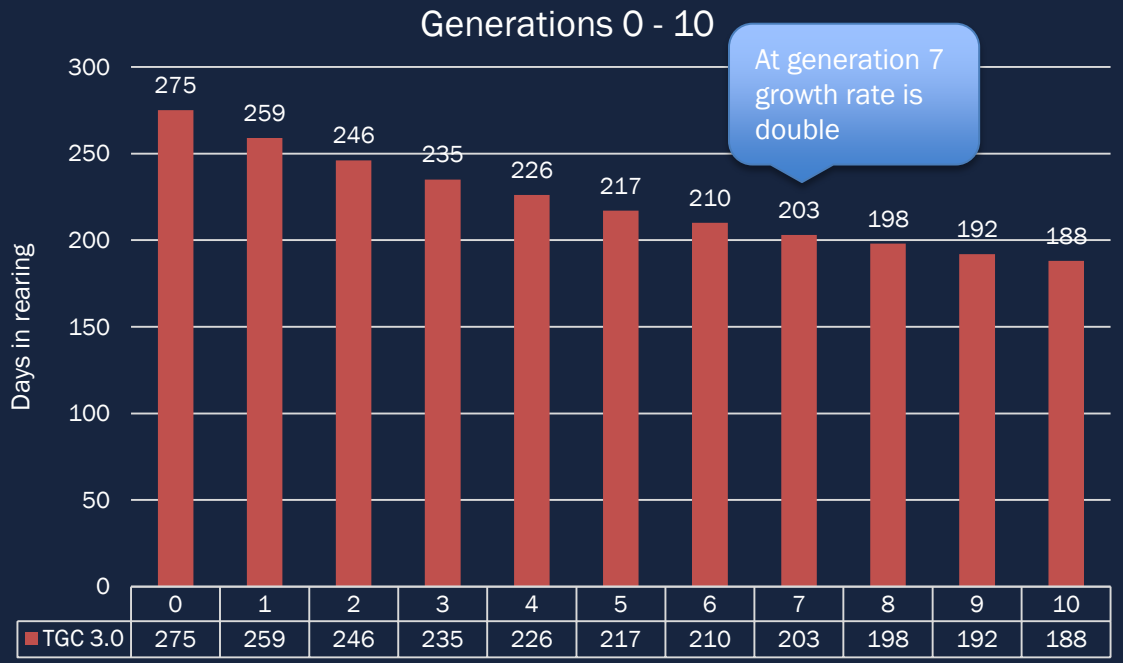
EXPECTED GAIN IN FILLET COLOR



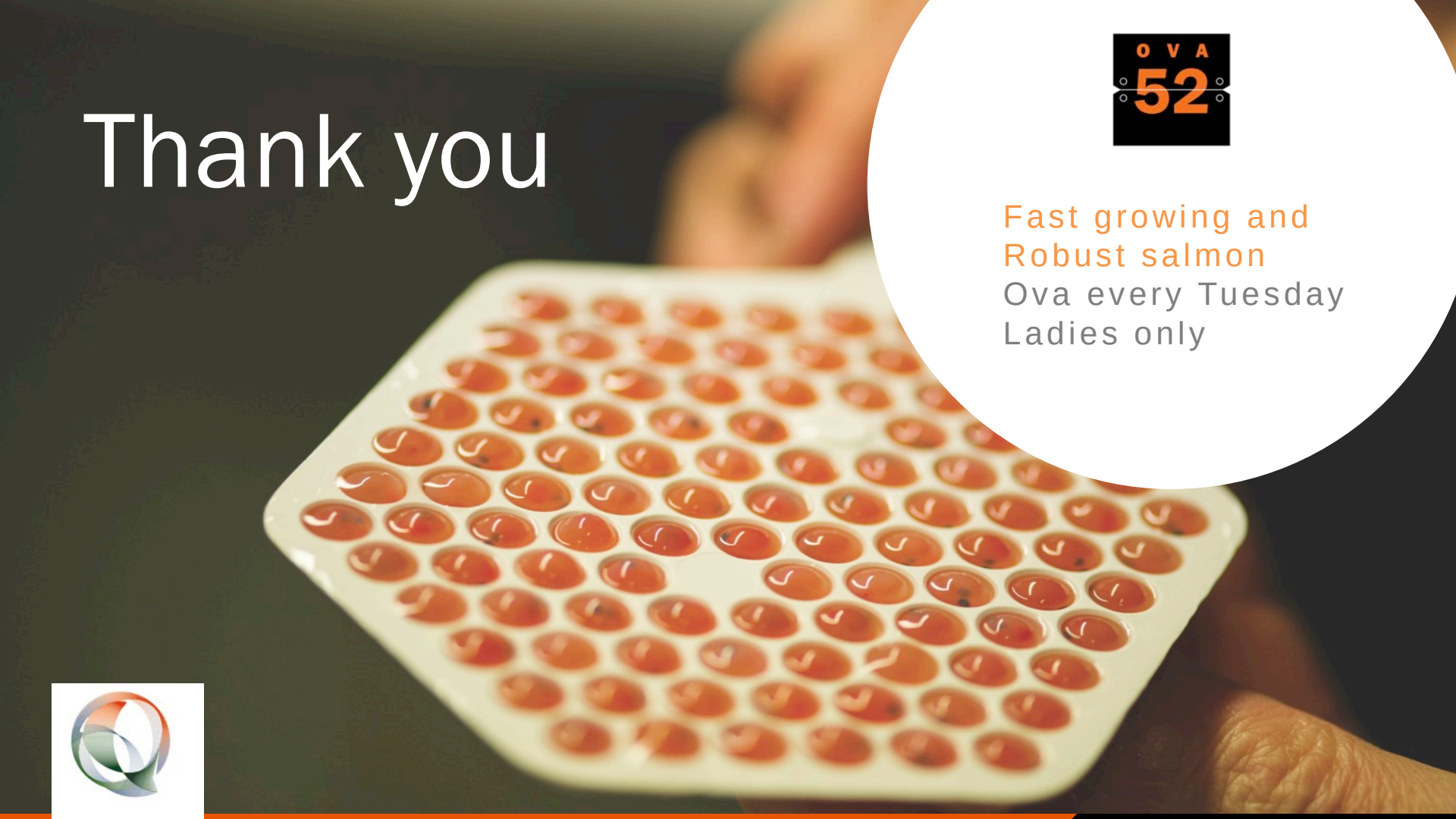
EXPECTED GAIN IN FILLET FAT



EXPECTED REARING TIME GIVEN TGC 3.0 AND GENETIC GAIN 14% AND REARING TEMP 14 °C 80 GRAMS TO 4 KG



Thank you



Fast growing and
Robust salmon
Ova every Tuesday
Ladies only