Cod feeding trials

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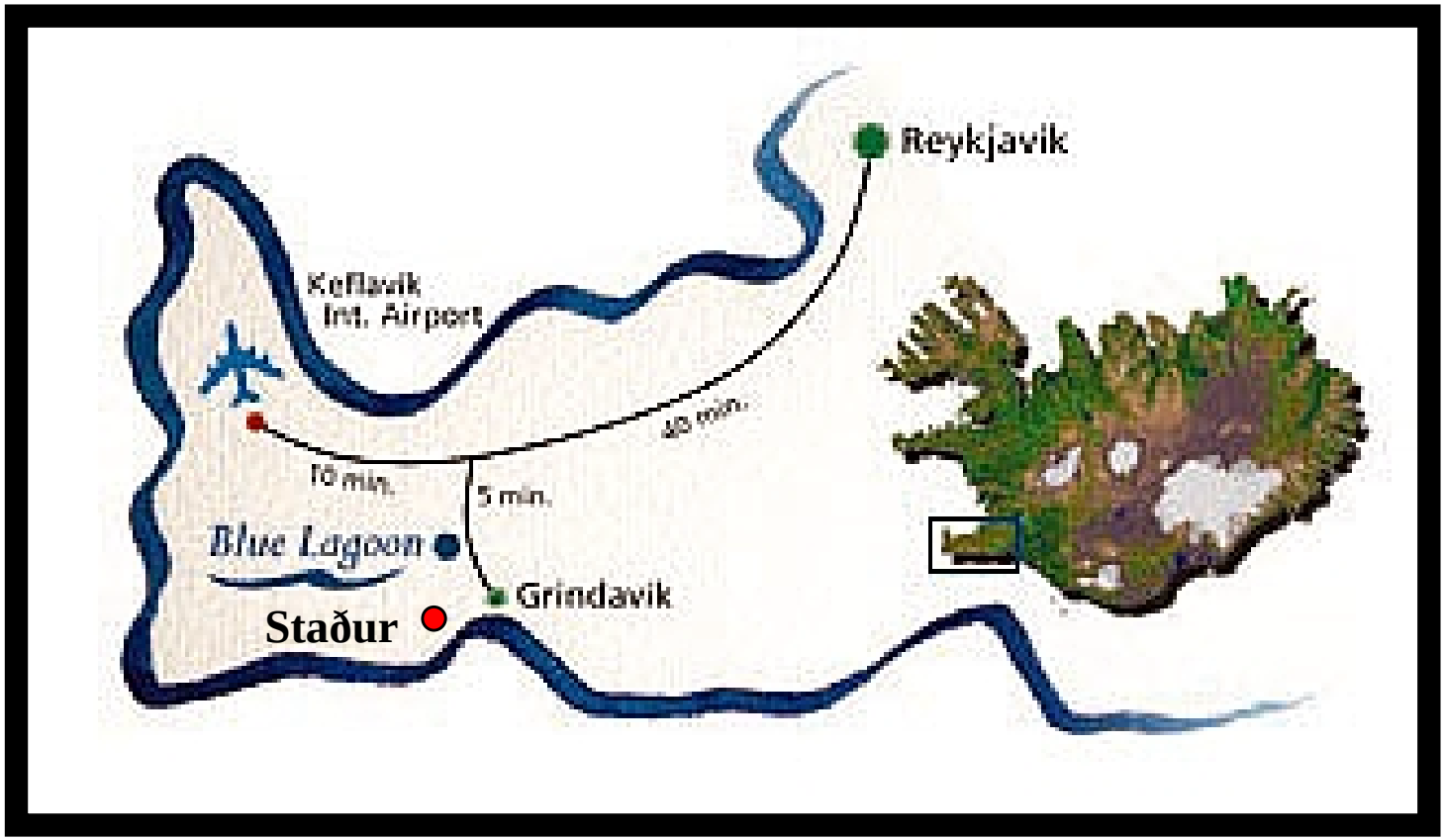
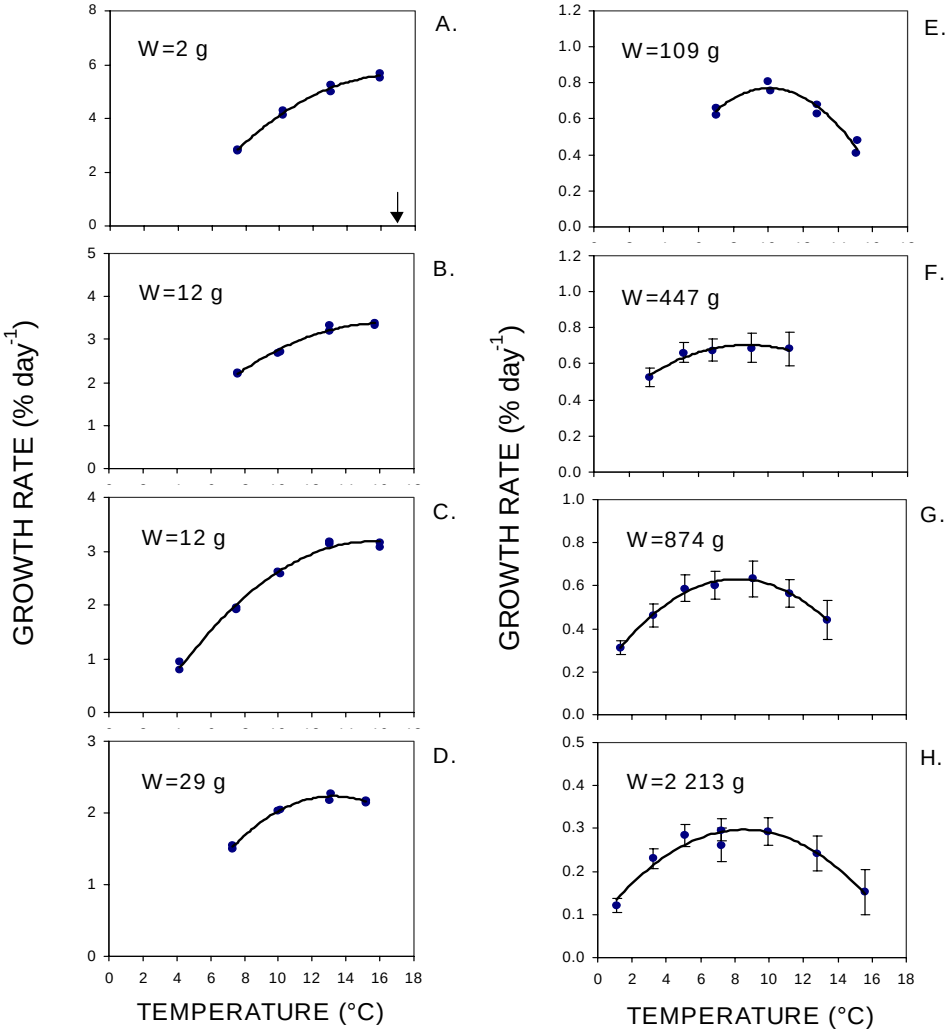
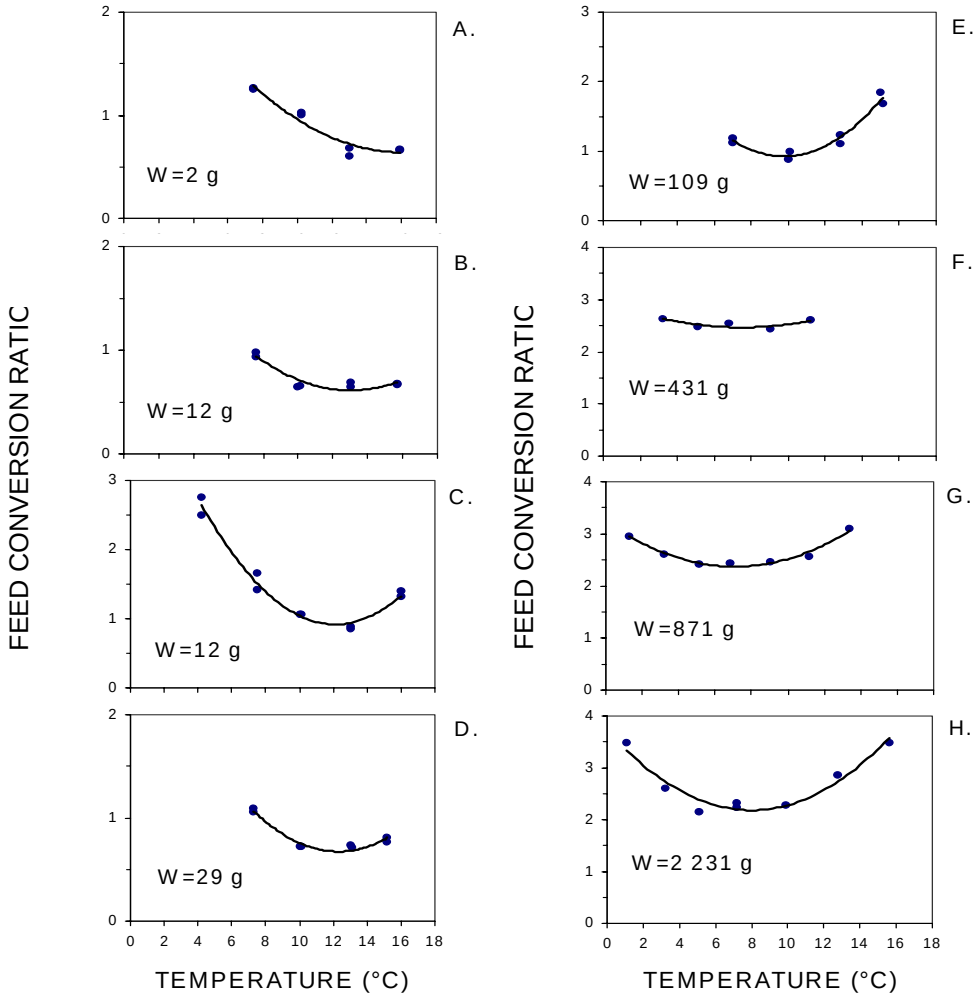

Reykjavik
Keflavik
Int. Airport
40 min.
10 min.
5 min.
Blue Lagoon
Grindavik
Staður

Björnsson, B., Steinarsson, A. and Oddgeirsson, M. 2001. Optimal temperature for growth and feed conversion of immature cod (*Gadus morhua* L.). ICES J. Mar. Sci. 58: 29-38.

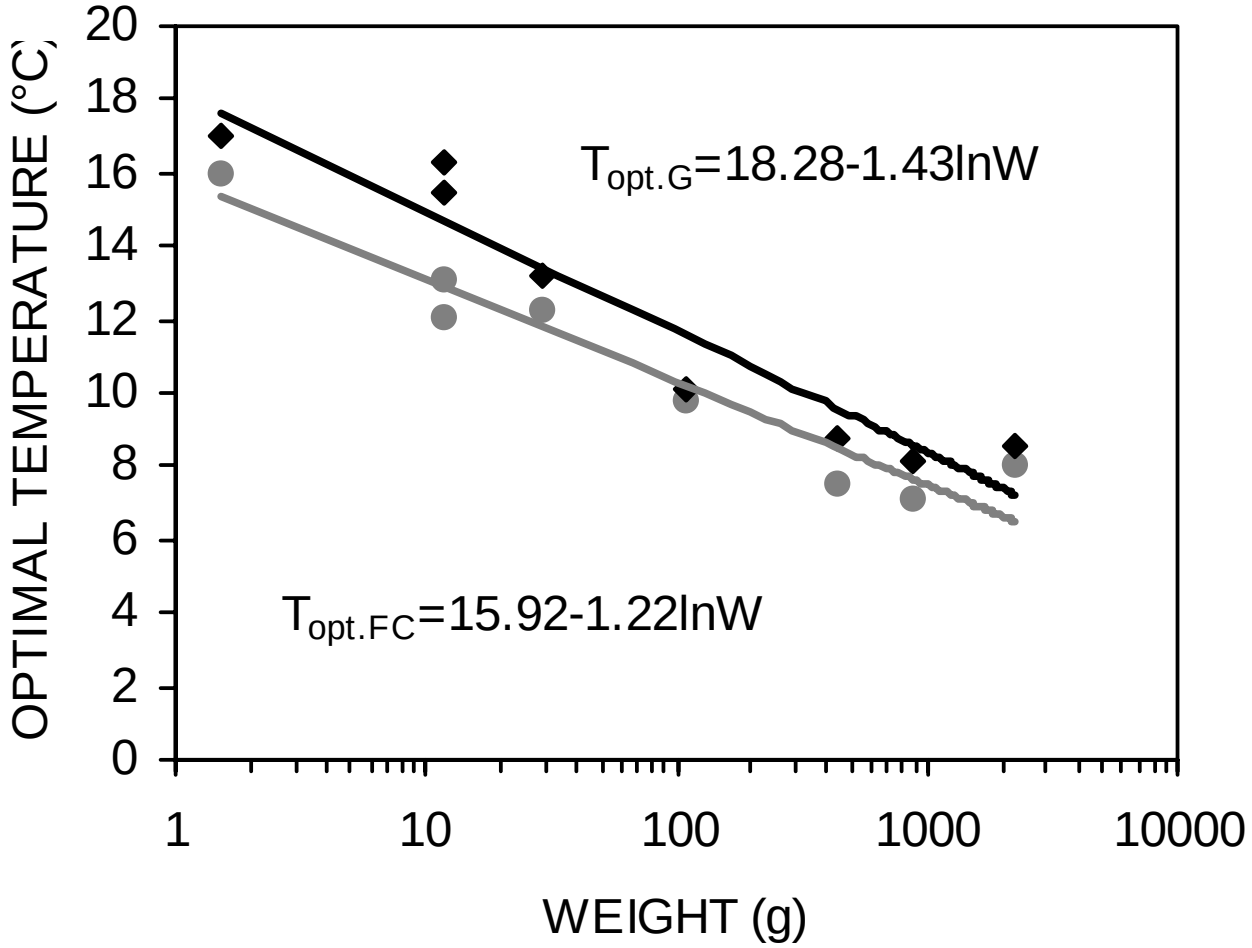
Björnsson, B. and Steinarsson, A. 2002. The food-unlimited growth rate of Atlantic cod (*Gadus morhua*). Can. J. Fish. Aquat. Sci. 59: 494-502.

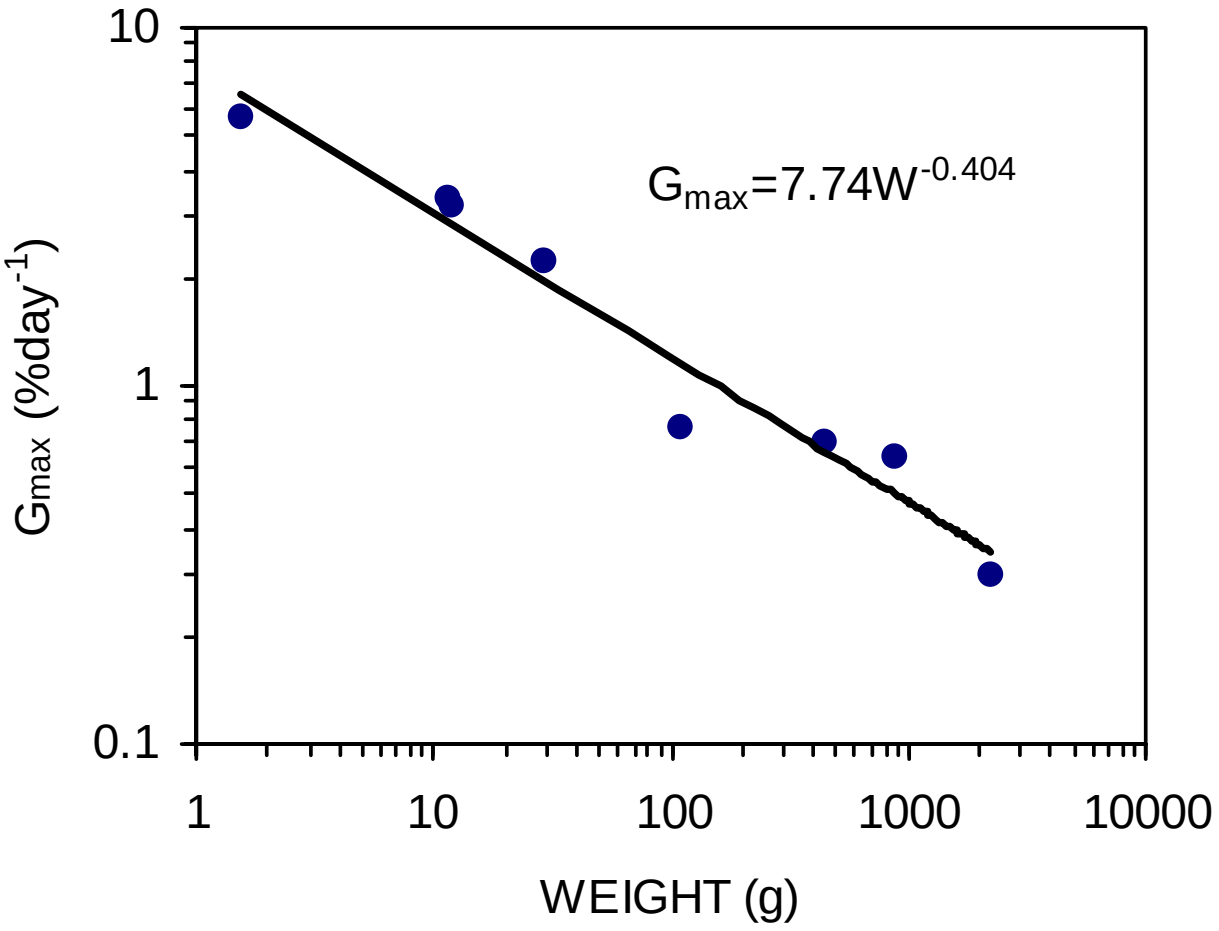

A.
W=2 g
B.
W=12 g
C.
W=12 g
D.
W=29 g
E.
W=109 g
F.
W=447 g
G.
W=874 g
H.
W=2 213 g
GROWTH RATE (% day-1)
GROWTH RATE (% day-1)
TEMPERATURE (°C)
TEMPERATURE (°C)

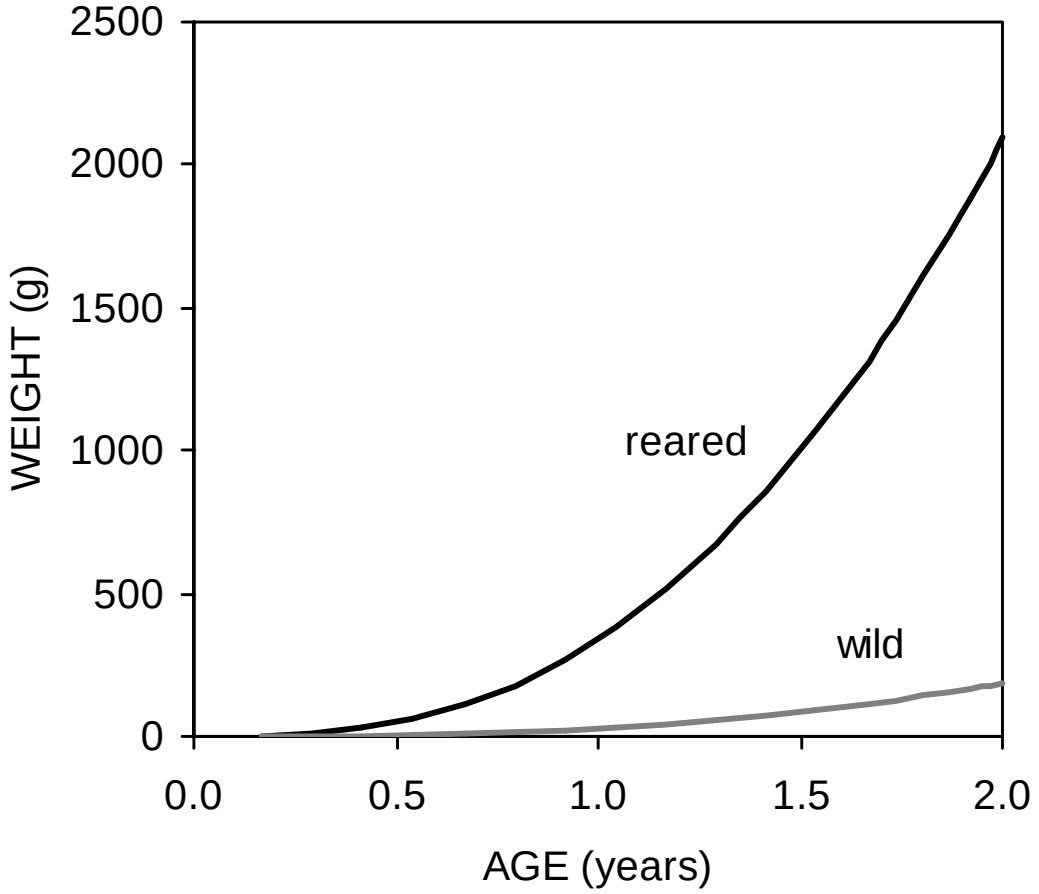

FEED CONVERSION RATIC
A.
W=2 g
B.
W=12 g
C.
W=12 g
D.
W=29 g
E.
W=109 g
F.
W=431 g
G.
W=871 g
H.
W=2 231 g
TEMPERATURE (°C)
TEMPERATURE (°C)

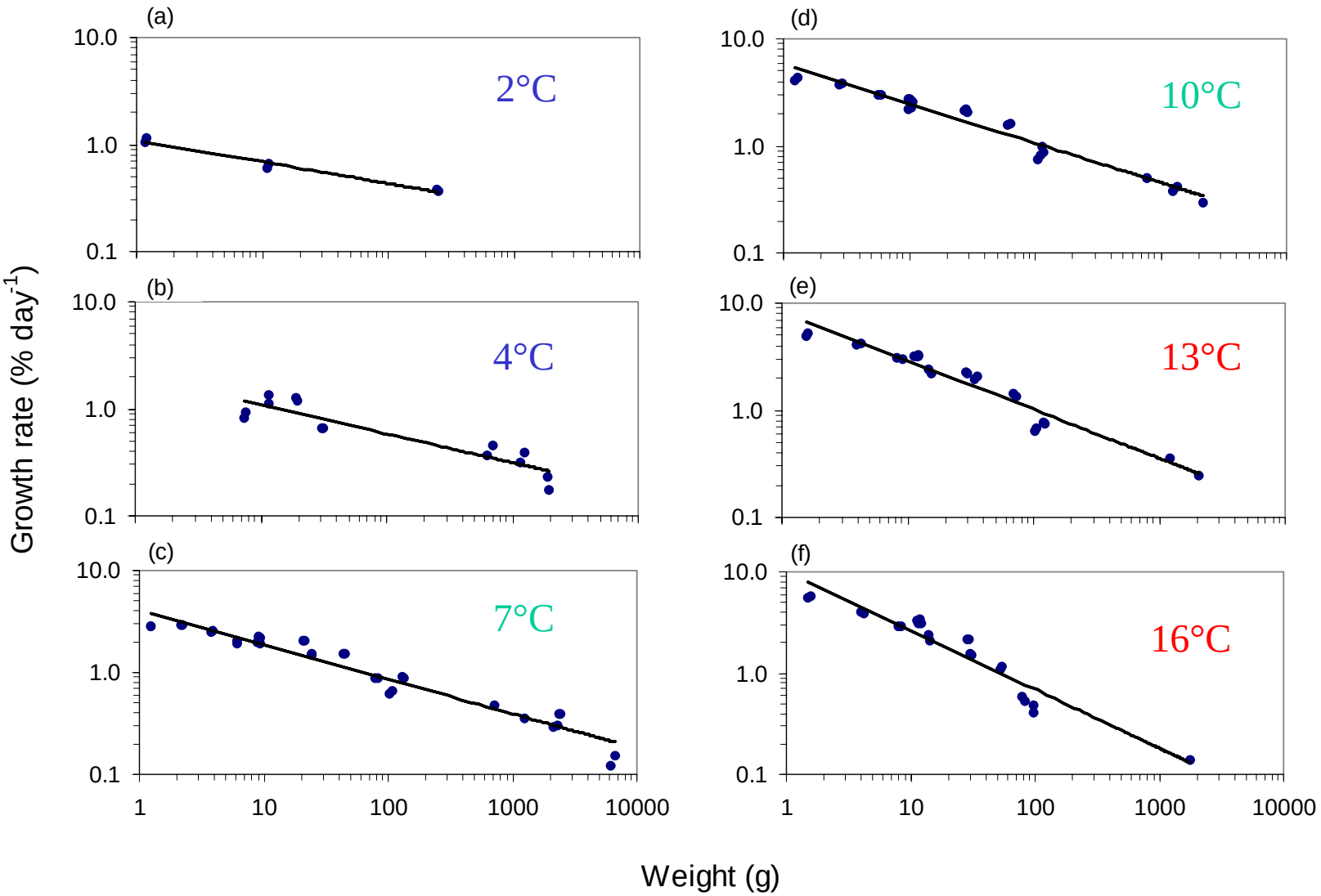
Feedconversion by cod

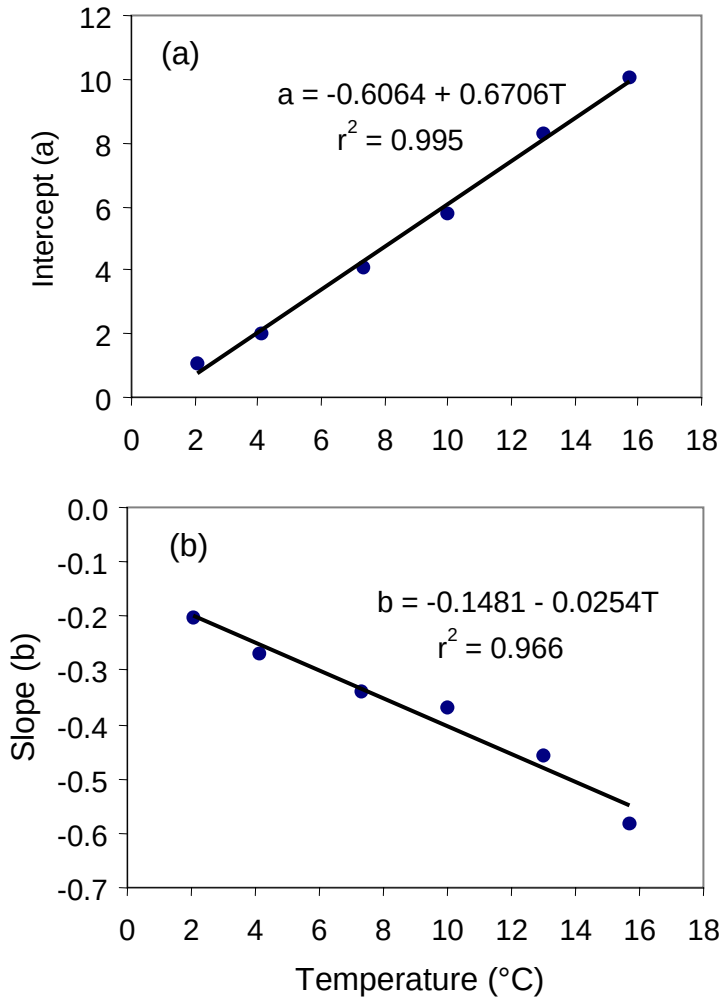
Experiment	W (g)	Feed	Topt.FC	FCmin
A	2	Vextra start	16.0	0.64 (0.58)
B	12	Vextra mini	13.1	0.60 (0.55)
C	12	Vextra mini	12.1	0.91 (0.83)
D	29	Vextra mini	12.3	0.67 (0.61)
E	109	Vextra trout	9.8	0.92 (0.84)
F	431	Capel/shrimp	7.5	2.46 (0.68)
G	871	Capel/shrimp	7.1	2.37 (0.65)
H	2231	Capelin	8.0	2.18 (0.72)


OPTIMAL TEMPERATURE (°C)
20
18
16
14
12
10
8
6
4
2
0
1
10
100
1000
10000
WEIGHT (g)
$T_{opt.G}$=18.28-1.43lnW
$T_{opt.FC}$=15.92-1.22lnW


10
1
0.1
1
10
100
1000
10000
Gmax (%day-1)
WEIGHT (g)
Gmax=7.74W-0.404


2500
2000
1500
1000
500
0
WEIGHT (g)
reared
wild
0.0
0.5
1.0
1.5
2.0
AGE (years)

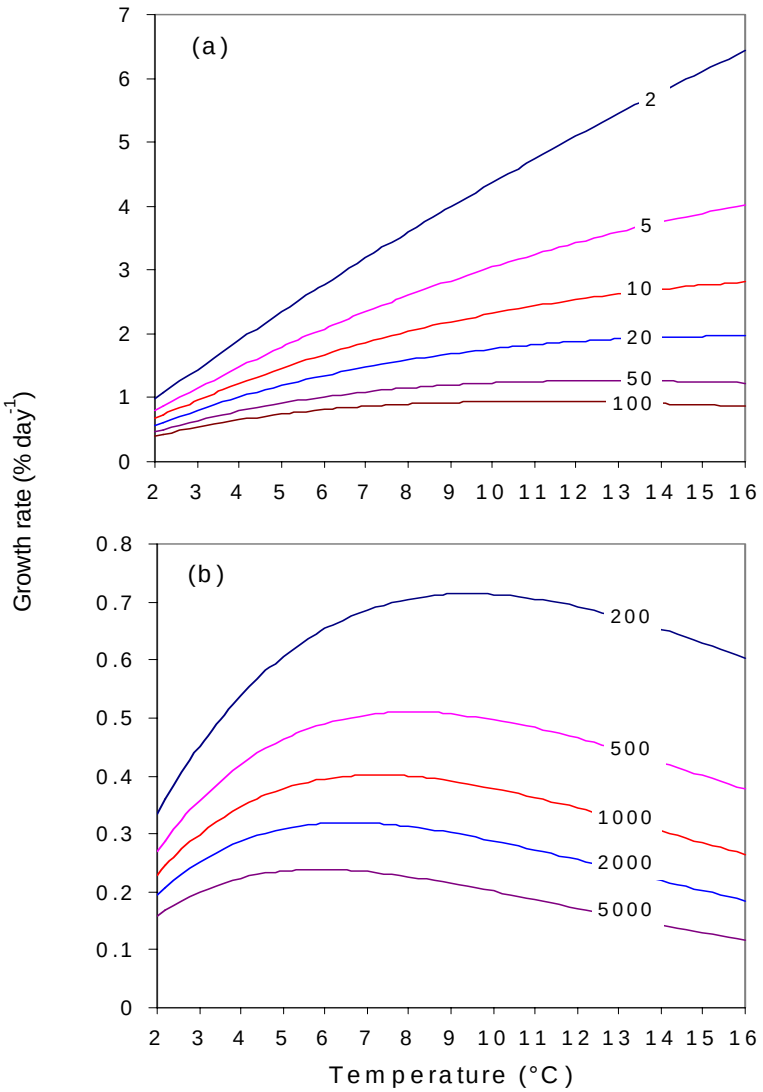

(a)
2°C
(b)
4°C
(c)
7°C
(d)
10°C
(e)
13°C
(f)
16°C
10.0
1.0
0.1
1
10
100
1000
10000
Growth rate (% day-1)
Weight (g)

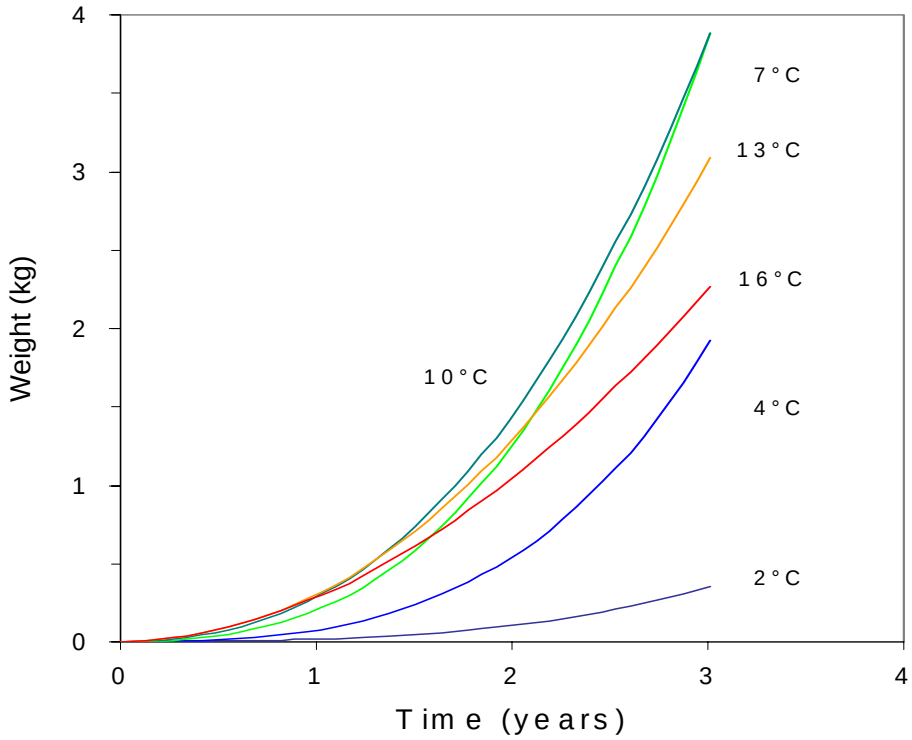

(a)
a = -0.6064 + 0.6706T
r2 = 0.995
Intercept (a)
0
2
4
6
8
10
12
0
2
4
6
8
10
12
14
16
18
(b)
b = -0.1481 - 0.0254T
r2 = 0.966
Slope (b)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
Temperature (°C)

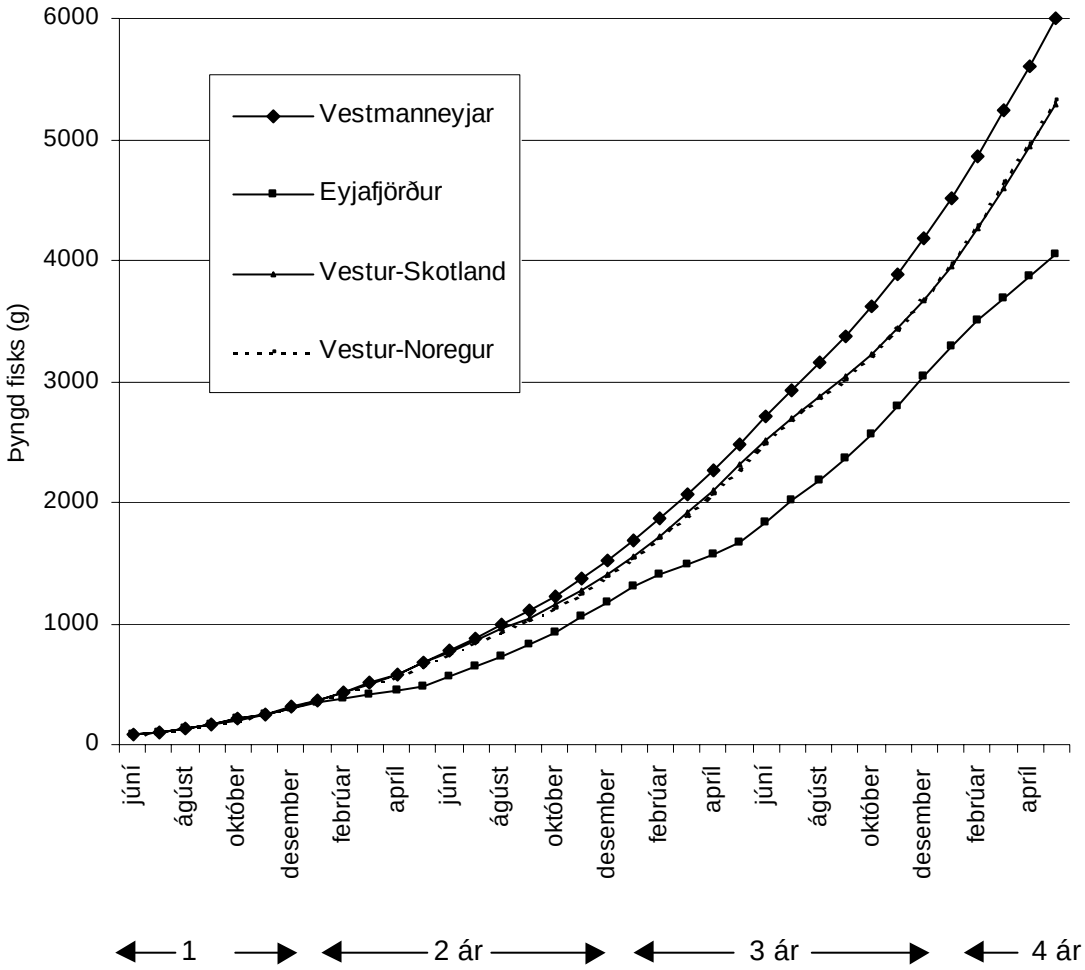
Linear regression on a log-log scale corresponds to the following formula:

$$G = aW^b$$

- the intercept increases with temperat.: $a = c + dT$
- the slope increases with temperature: $b = e + fT$
- the growth model becomes: $G = (c + dT)W^{(e + fT)}$
- $G = (0.5735T)W^{(-0.1934 - 0.02001T)}$


(a)
2
5
10
20
50
100
(b)
200
500
1000
2000
5000
Growth rate (% day-1)
Temperature (°C)


Weight (kg)
Time (years)
0
1
2
3
4
7°C
13°C
16°C
10°C
4°C
2°C


6000
5000
4000
3000
2000
1000
0
Þyngd fisks (g)
Vestmanneyjar
Eyjafjörður
Vestur-Skotland
Vestur-Noregur
júní
ágúst
október
desember
febrúar
apríl
júní
ágúst
október
desember
febrúar
apríl
júní
ágúst
október
desember
febrúar
apríl
1
2 ár
3 ár
4 ár

Effects of fat content of feed in a nine month feeding trial with 2 kg cod at 7.2°C

Feed type	Fat capelin	Lean capelin	Shrimp
Fat content (%)	16.6	4.3	3.4
% of dry wt.	50.2	21.1	13.9
Dry wt. cont.(%)	33.1	20.4	24.5
SGR (% per day)	0.279	0.278	0.288
Feed conv. wet	2.28	4.16	4.30
Feed conv. dry	0.76	0.84	1.06
Liver index	17.3	9.3	9.2

Effects of fat content of feed in a four month feeding trial with 150 g cod at 8-10°C

Feed type	DANEX 1562	50:50	DANEX 2446
W1	69.30	69.18	69.95
W2	230.77	216.13	196.87
SGR	1.002	0.949	0.862
Feed conversion	0.774	0.776	0.941
Liver index	11.5	13.5	13.8

Optimal fat content in the diet of cod ?

- Good growth and feed conversion on fat capelin (50% dry wt.)
- Good growth and feed conversion on dry feed with low fat content (15% dry wt.)
- Why this difference between natural prey and dry feed?