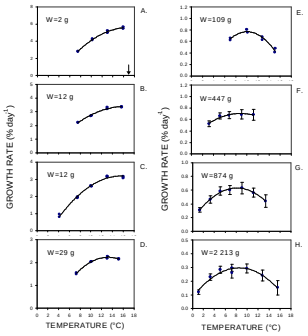
Vaxtarlíkan fyrir þorsk

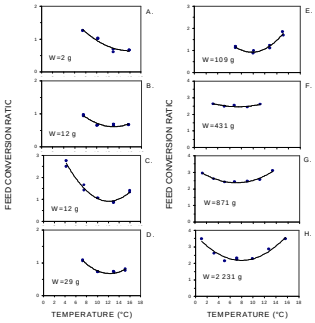
Björn Björnsson
Hafrannsóknastofnunin

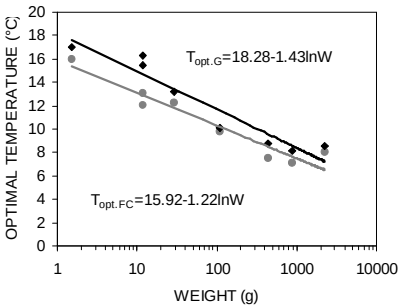
Björnsson, B., Steinarsson, A. and Oddgeirsson, M. 2001. Optimal temperature for growth and feed conversion of immature cod (*Gadus morhua* L.). ICES J. Mar. Sci. 58: 29-38.

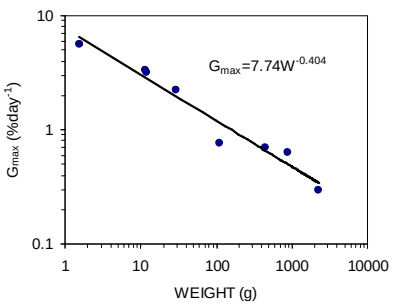
Björnsson, B. and Steinarsson, A. 2002. The food-unlimited growth rate of Atlantic cod (*Gadus morhua*). Can. J. Fish. Aquat. Sci. 59: 494-502.

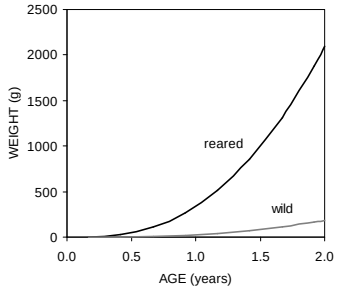
Björnsson, B., Steinarsson, A. and Árnason, T. 2007. Growth model for Atlantic cod (*Gadus morhua*): Effects of temperature and body weight on growth rate. Aquaculture 271: 216-226.





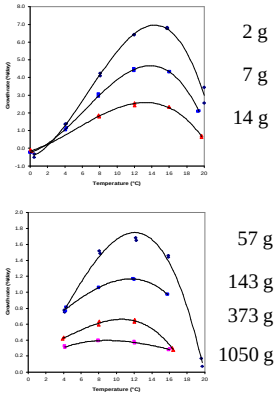


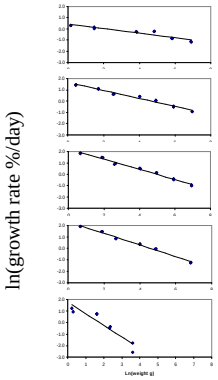


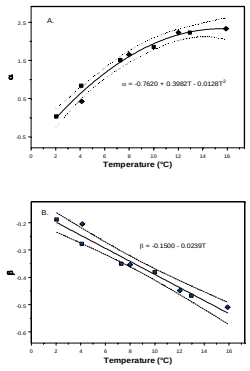


Líkan endurskoðað

- Sjö nýjar tilraunir: 2, 7, 14, 143, 373 og 1050 g
- Lýsing allan sólarhringinn (vöxtur góður, enginn kynþroski)
- Stærra hitasvið prófað (0-20°C fyrir seiði)
- Næturfóðrun fyrir smáseiði
- Súrefnisbæting (100% mettun)
- Ný gagnavinnsla
- Nýtt líkan







Nýtt vaxtarlíkan

$$\ln G = \alpha + \beta \ln W$$

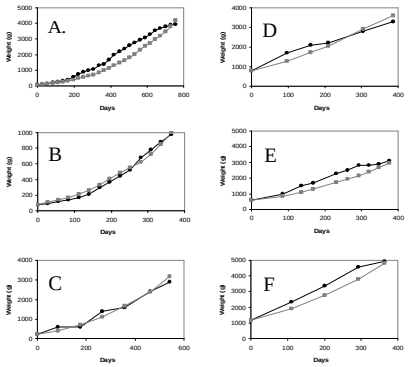
$\alpha = a + bT + cT^2$ $\beta = d + eT$

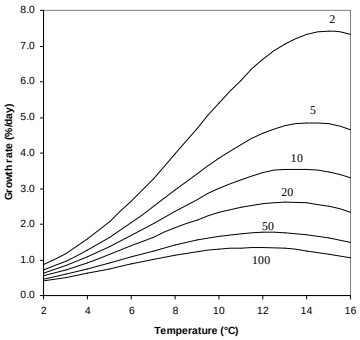
G er dagvöxtur (% af þyngd/dag)
W er þyngd fisks í grömmum
T er hitastig sjávar (°C)

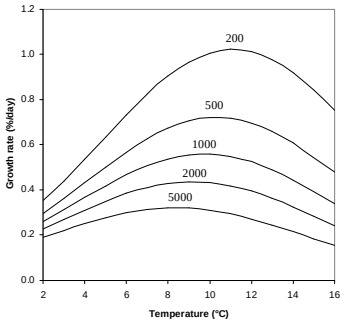
Líkanið fínstillt fyrir stóran þorsk í kvíum í Noregi (á lýsingu)

- Stóri þorskurinn vex hraðar en líkanið spáir
- Tilraunakerin of lítil til að vinna með stóran fisk
- Með því að breyta e-stuðli um 10% var hægt að fínstilla líkanið með hliðsjón af stóra fiski án þess að hafa umtalsverð áhrif á smáa fiskinn

(e-stuðli breytt úr -0.0239 í -0.0215)

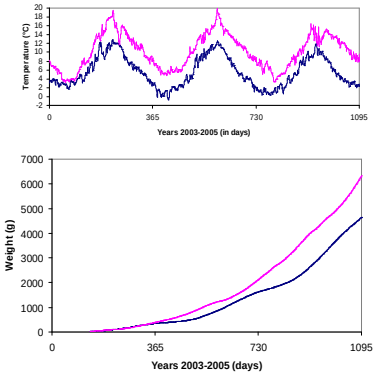






Kjörhiti þorsks og vöxtur við kjörhita

W (g)	Topt.G (°C)	Gmax (%/d)
2	15.0	7.41
20	13.0	2.62
200	11.1	1.02
2000	9.2	0.44



Þyngd þorsks eftir 1.5 ár í sjó

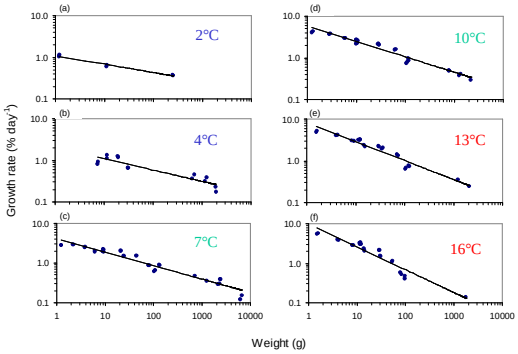
Stærð seiða (g)	Ísland (1-10°C)	V-Noregur (5-14°C)	Mismunur (%)
30	1624	2122	23
250	3434	3684	7

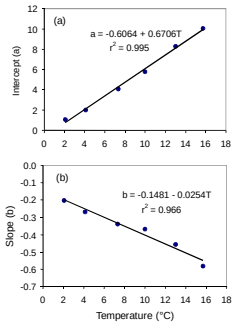
Samkeppnisstaða Íslands m.v. Noreg

- Lakari vöxtur smáseiða í sjókvíum
- Minni munur ef stórseiði notuð
- Betri skilyrði til stórseiðaeldis (jarðhiti)
- Skilyrði betri fyrir stóran þorsk (G, M)
- Kjörsláturstærð meiri (e.t.v. 4-5 kg)
- Aðrir þættir en sjávarhiti skipta máli (m.a. skjól, straumar, sjúkdómar, kynþroski, kynbætur, gæði og verð seiða, fóðurverð, laun, sölusamningar, þjónustustig (infrastructure), þekking)
- Samkeppnisstaðan svipuð eða lakari

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)

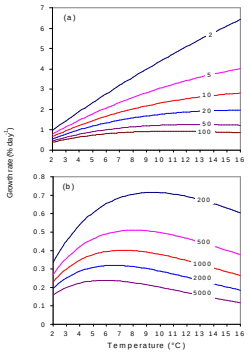




Linear regression on a log-log scale corresponds to the following formula:

$$G = aW^b$$

- 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 (fx day^{-1})
Temperature (°C)