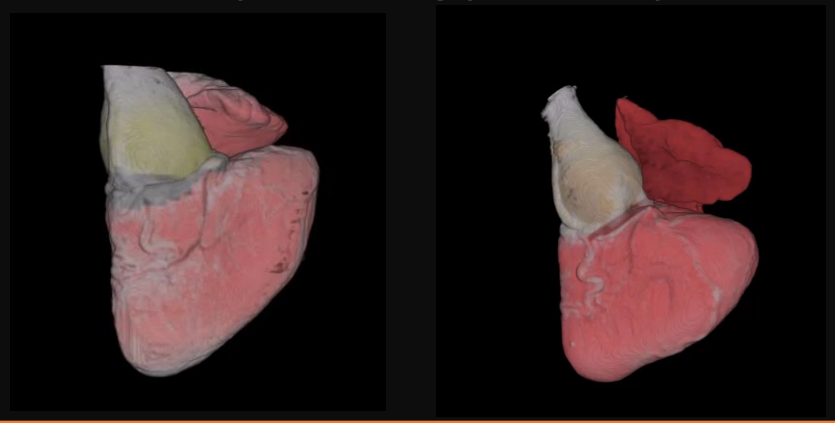
Hjertelidelser hos laks – årsaker og konsekvenser

Hvordan tidlige produksjonsforhold former hjertet - og fisken i sjø



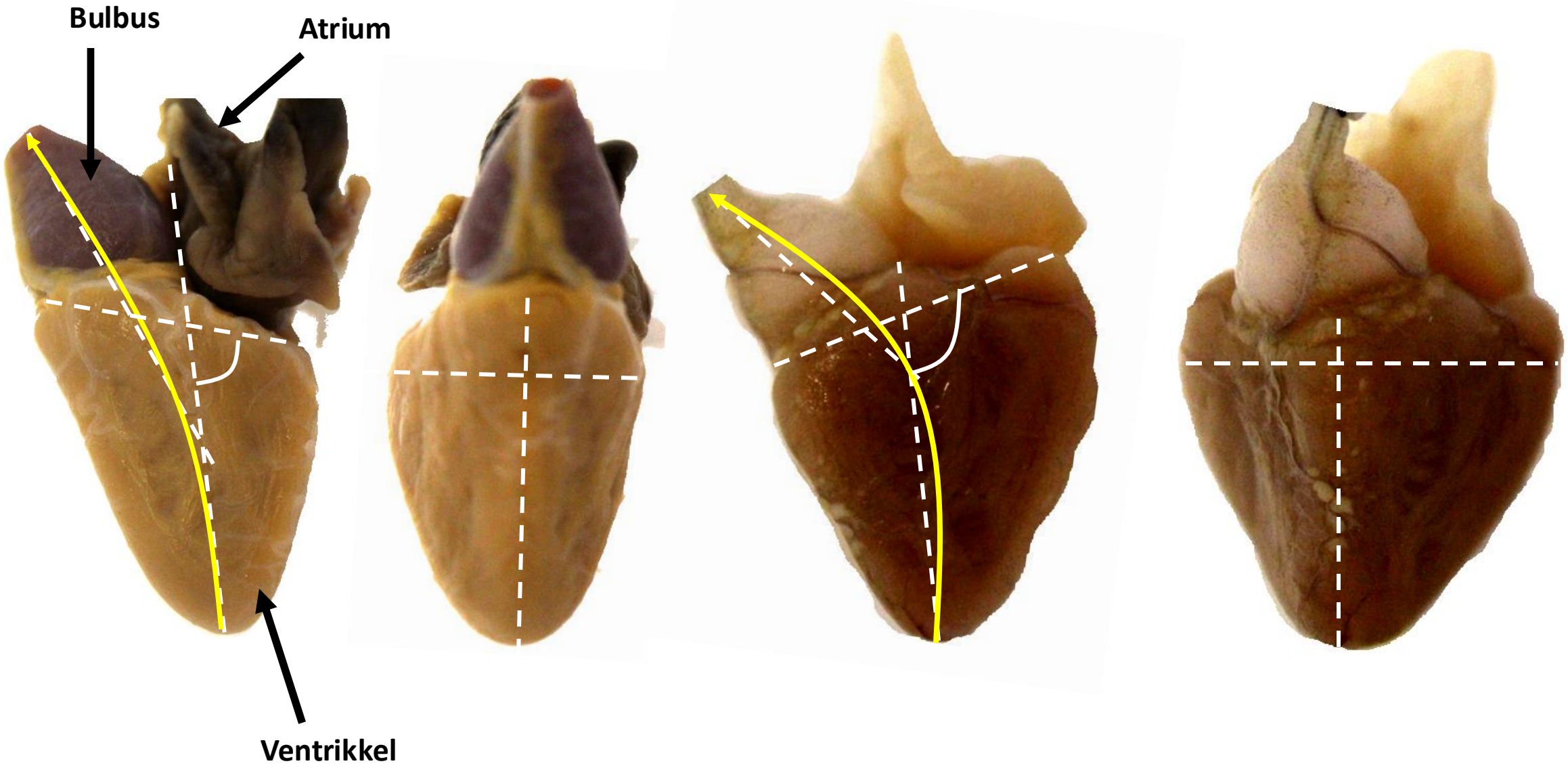


Fremtidens Smoltproduksjon

Ida Beitnes Johansen, NMBU Veterinærhøgskolen

FHF - HELSMOLT
FHF - DeviHeart
NFR - EnGenFys

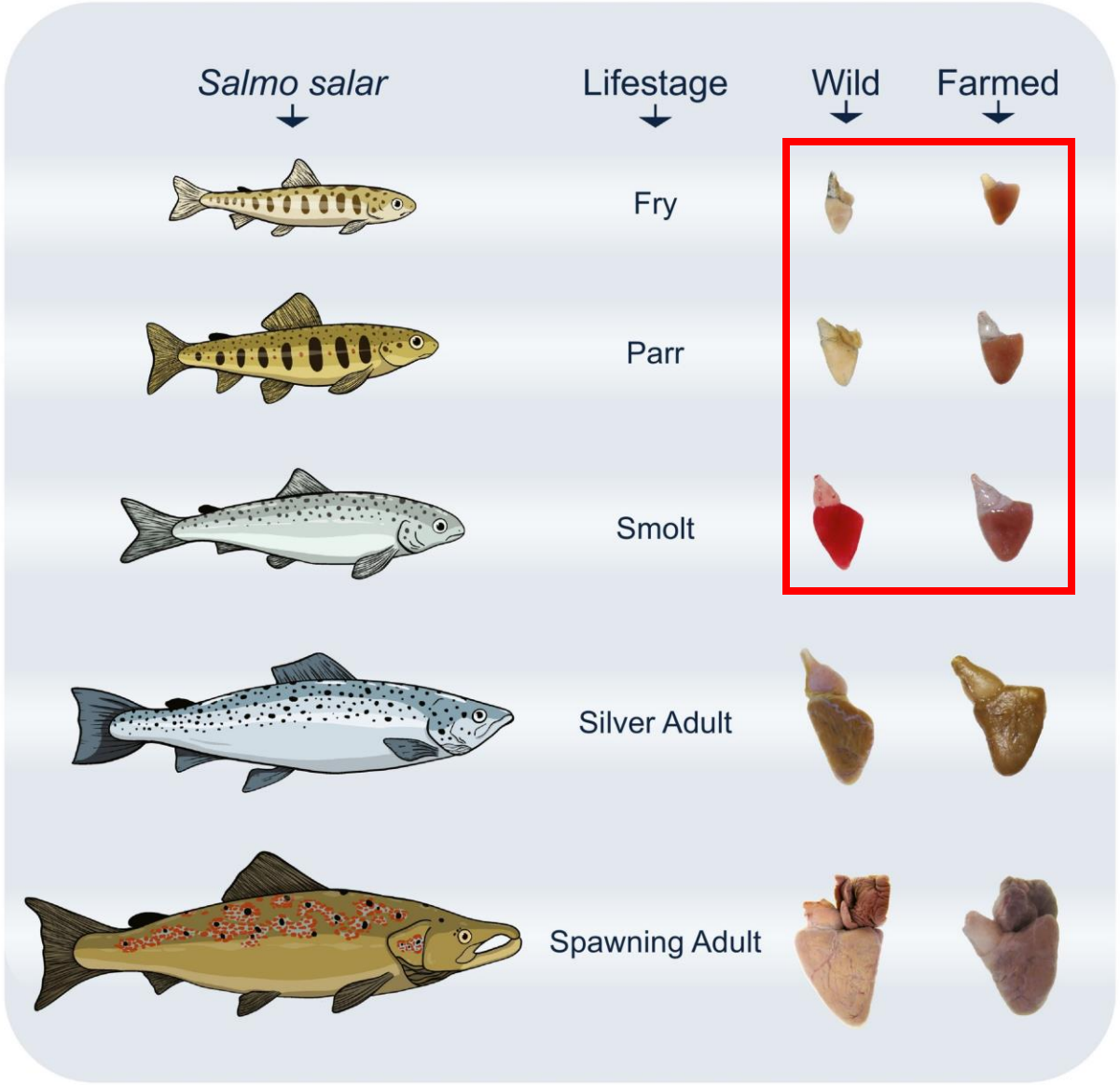
FISKERI- OG HAVBRUKSNÆRINGENS FORSKNINGSFINANSIERING



Villakshjerte

Opprettshjerte

Avvikende morfologi oppstår tidlig



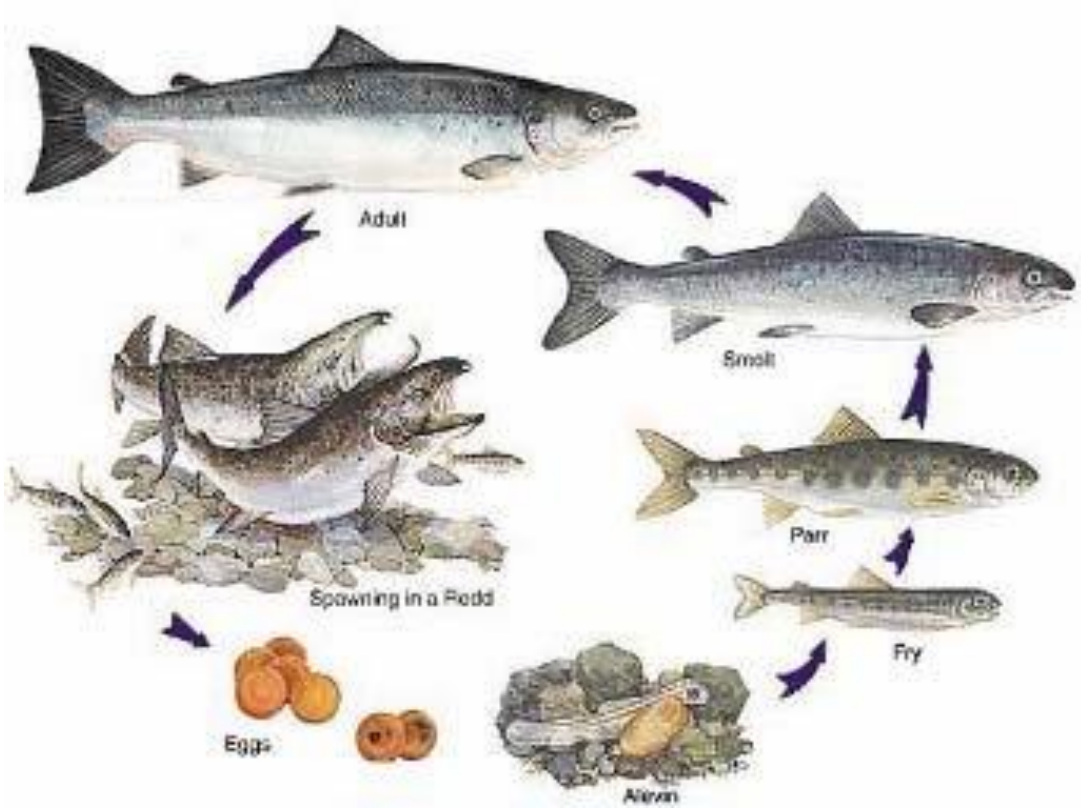
Engdal, Vilde Arntzen, et al. "State of the heart: Anatomical annotation and assessment of morphological cardiac variation in Atlantic salmon (Salmo salar L.)." *Aquaculture* (2023): 740046.







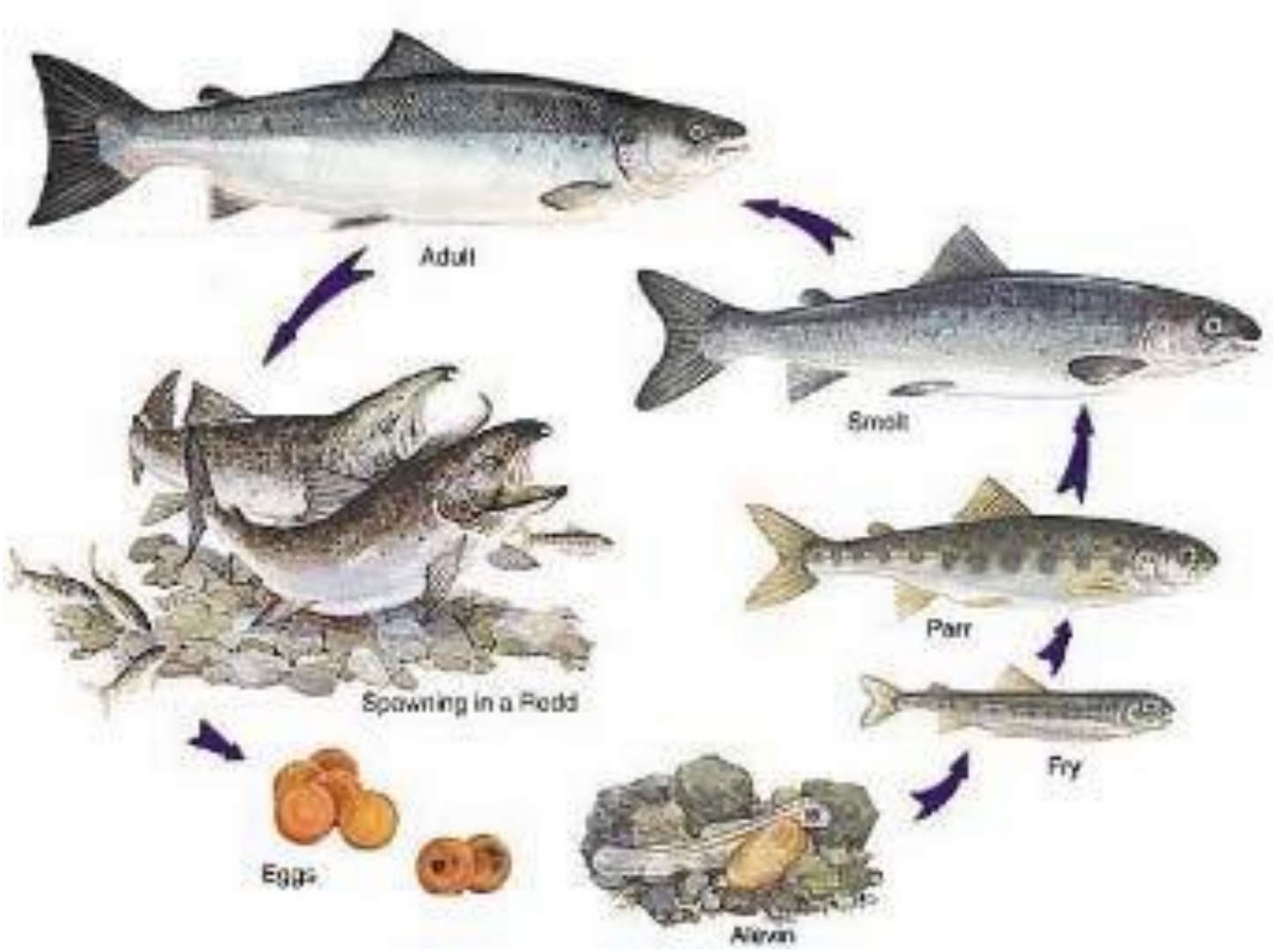




FHF, HELSMOLT

?

Hvordan påvirkes hjertets utvikling av tidlige miljøforhold?



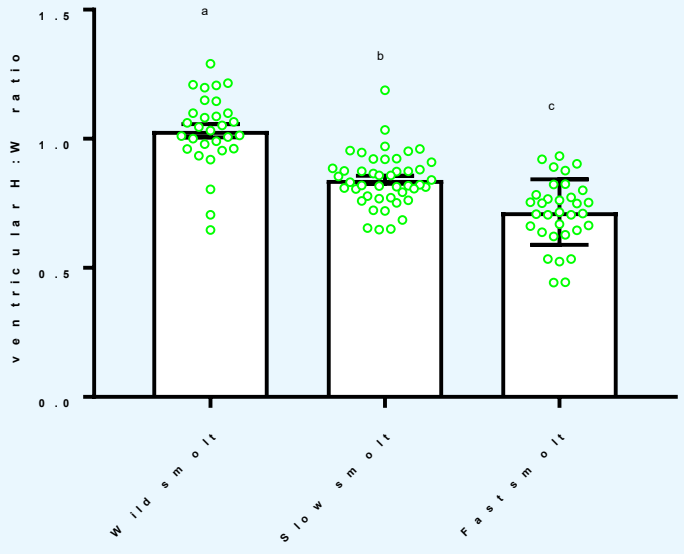
Eksperimentelle forsøk



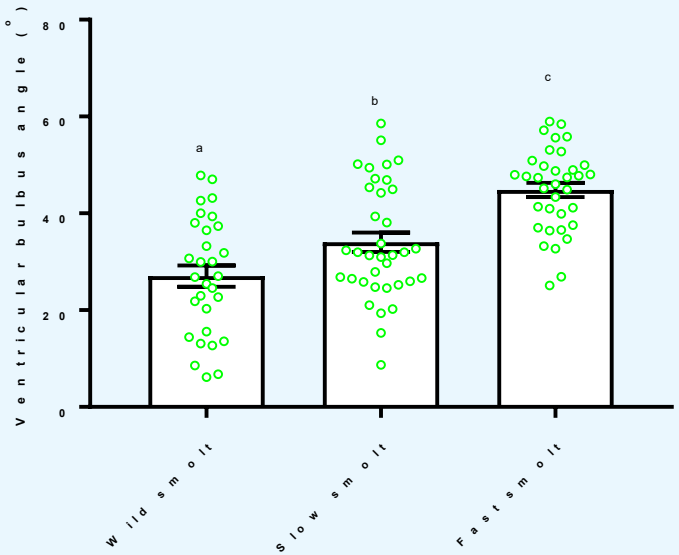


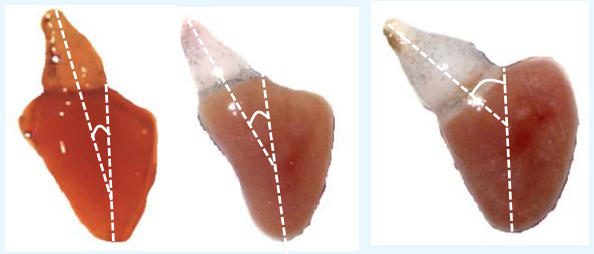
Eksperimentelle forsøk

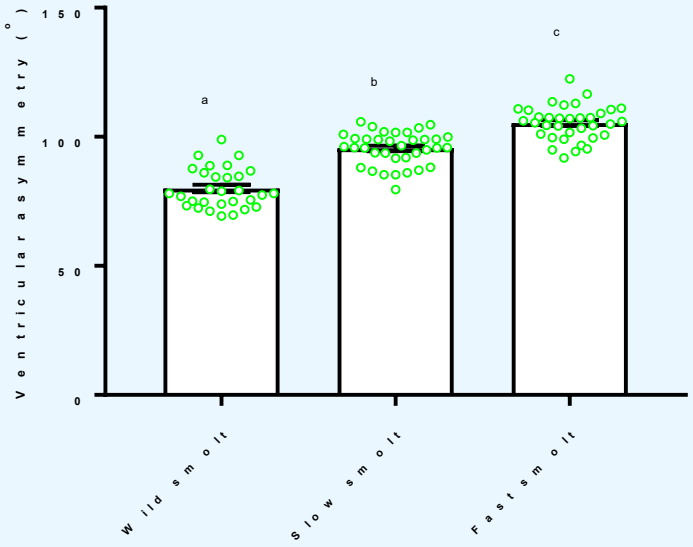
Rask produksjon gir avvikende hjertefasong

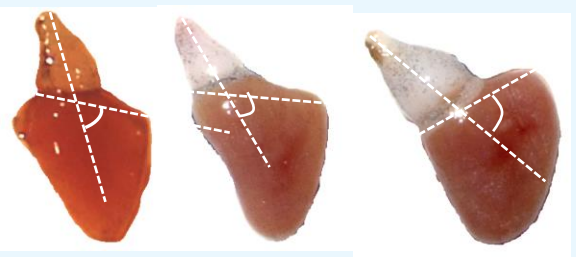








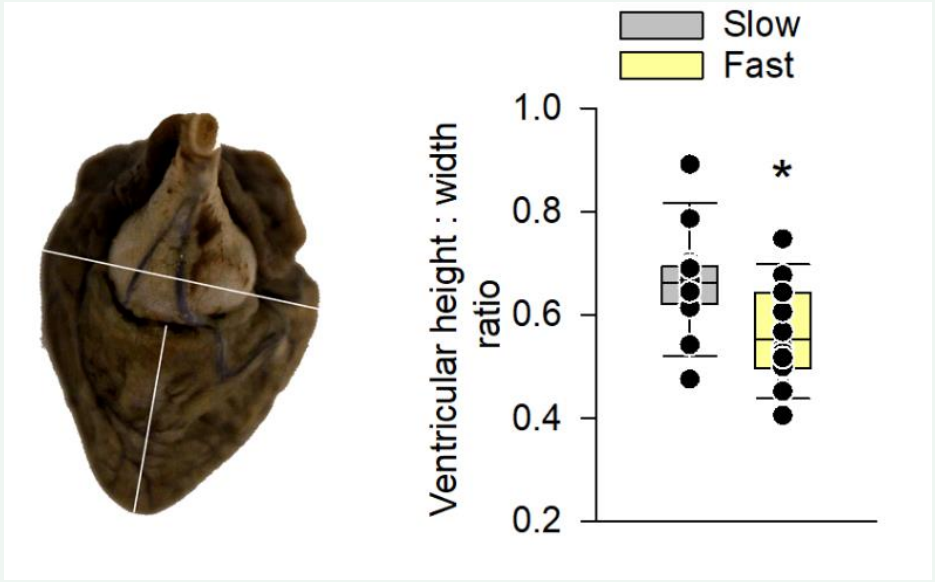




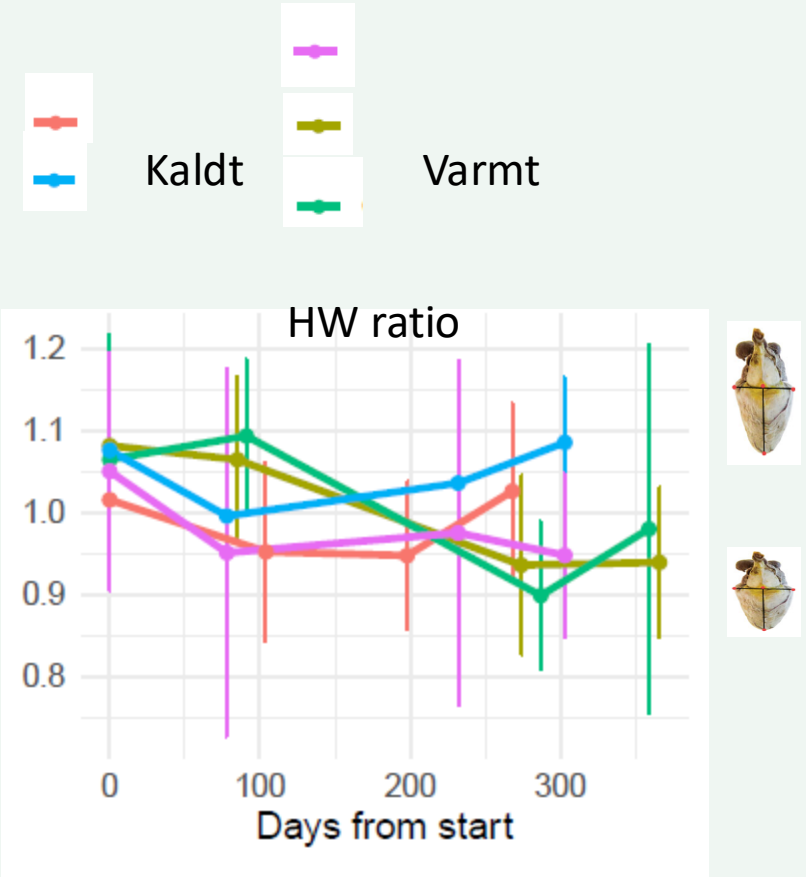
Vindas, Marco A., et al. *Journal of Experimental Biology* 227.20 (2024).

Kommersielle forsøk

Samme trend i kommersielle produksjoner



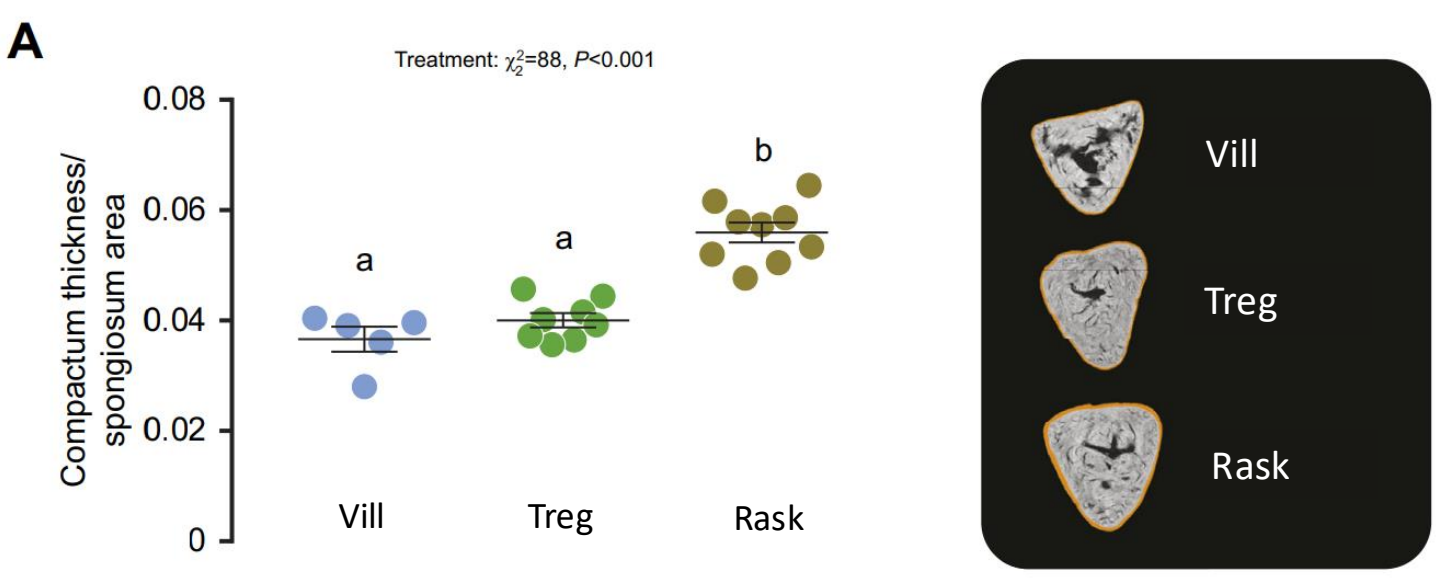
Frisk et al. Aquaculture (2020), 529; 735615

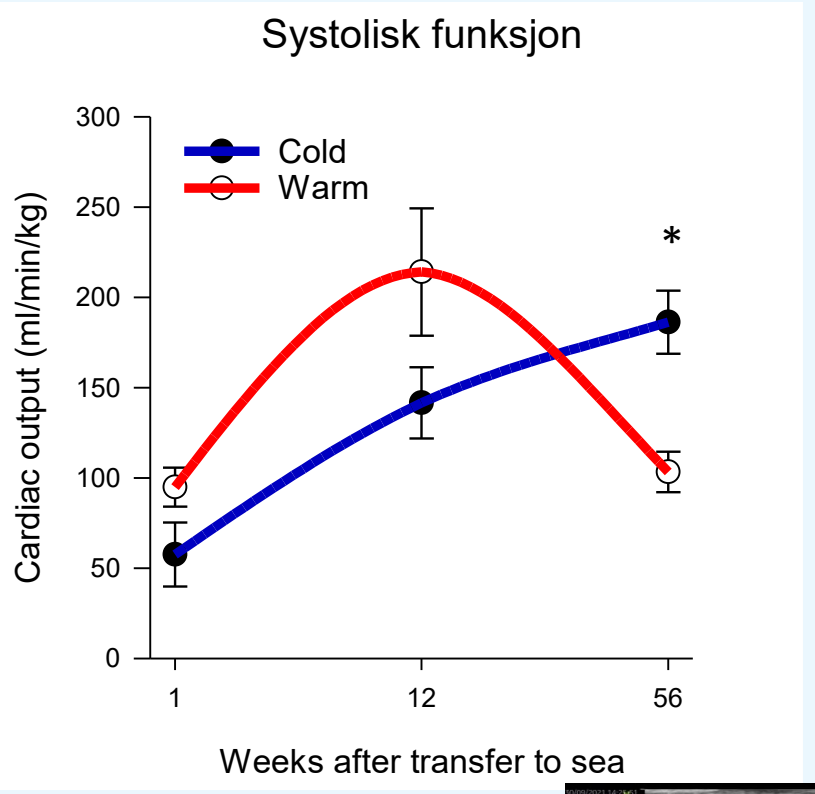


Halvorsen et al. Unpublished

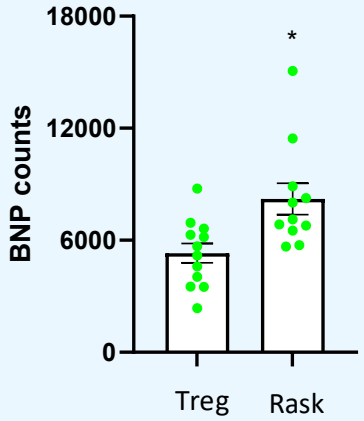
Eksperimentelle forsøk

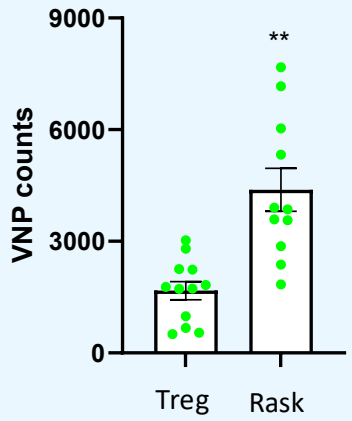
Avvikende hjertefasong er forbundet med tegn på overbelastning av hjertet

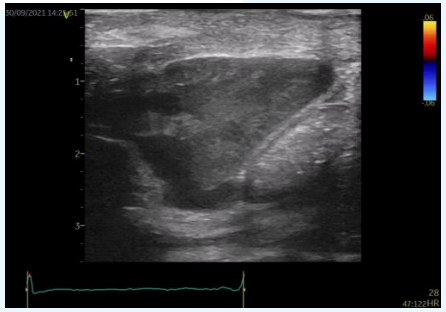








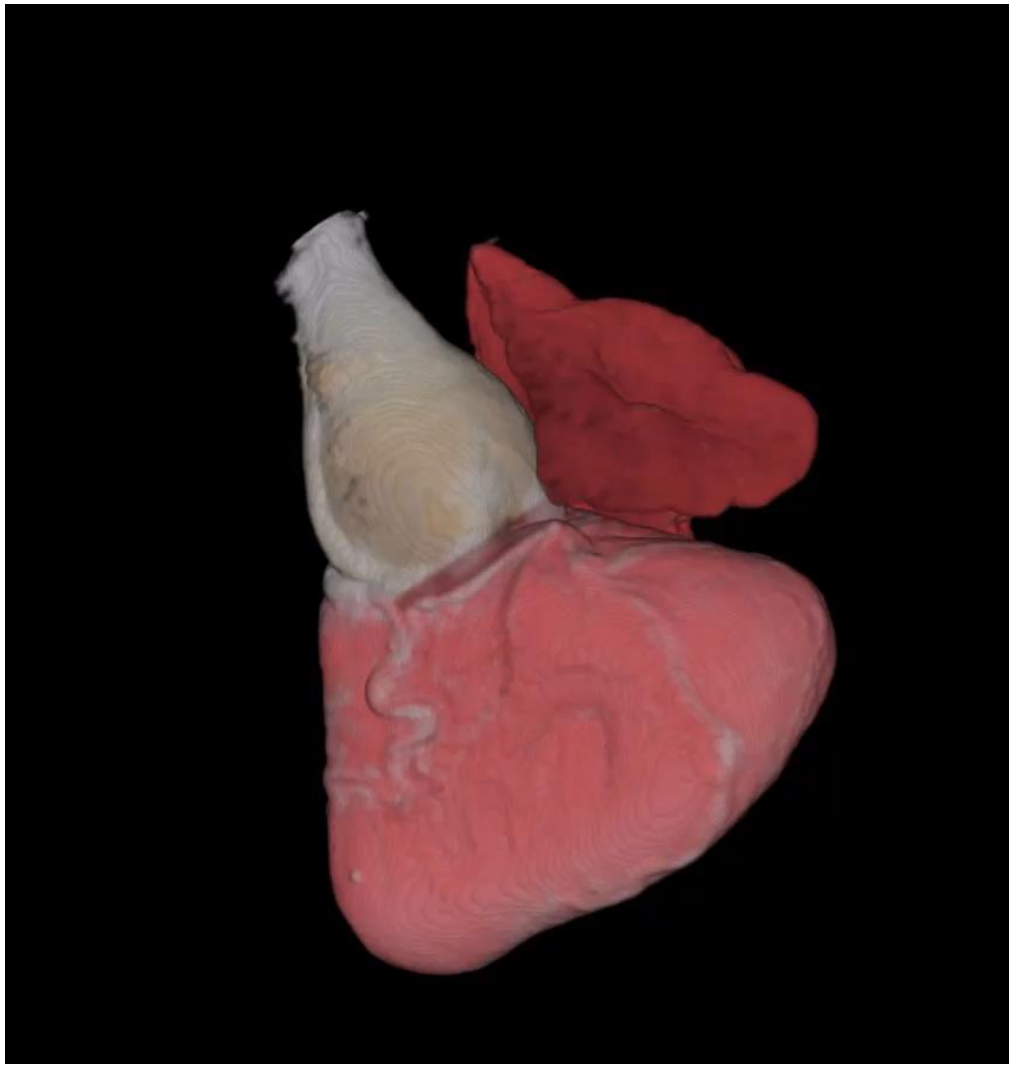




Kavaliauskiene et al., under forberedelse

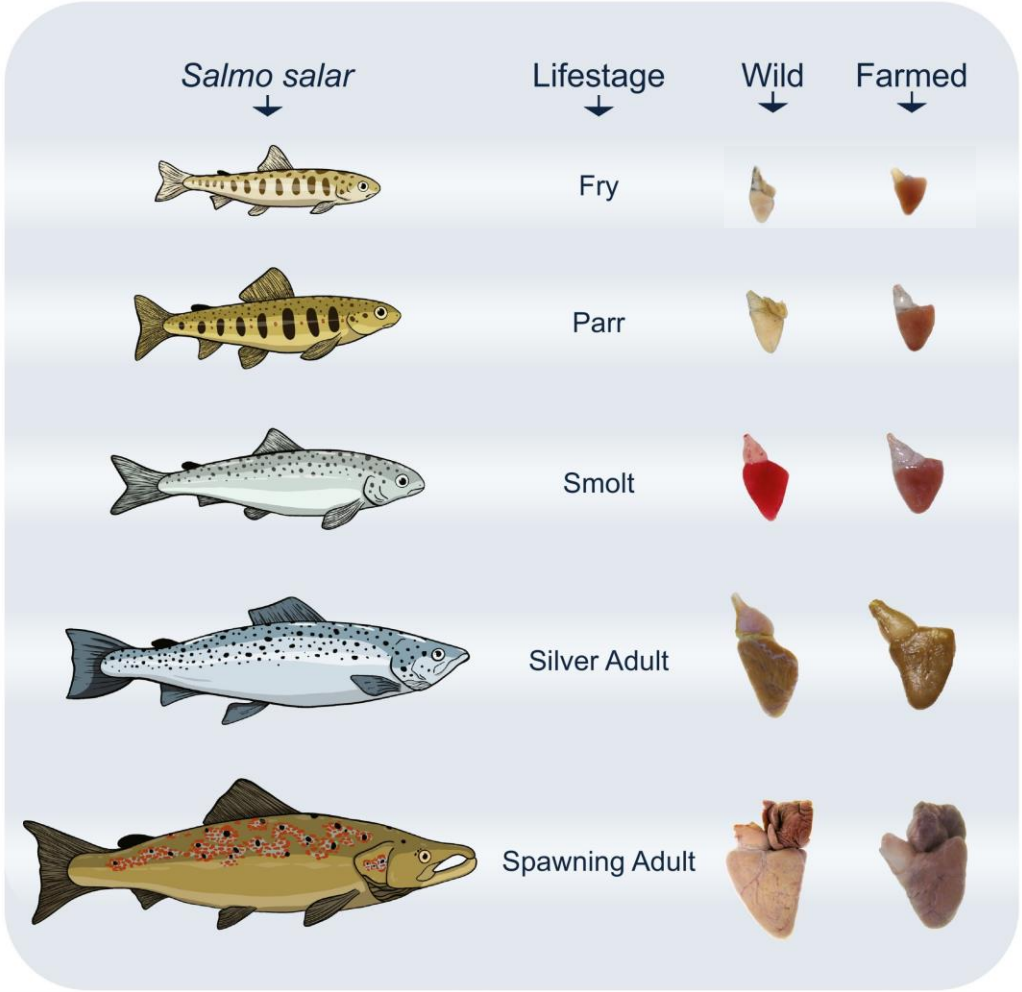
Foreløpig konklusjon

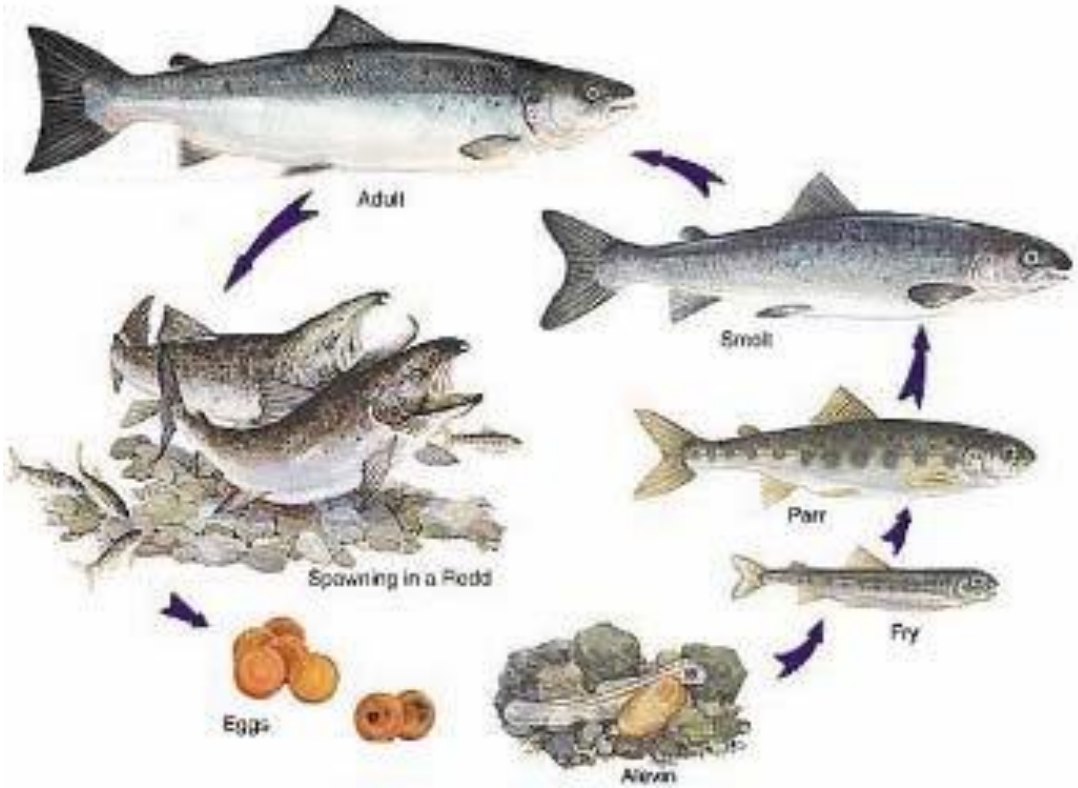
Langsom produksjon er forbundet med bedre hjertehelse!



Påvirker embryonal temperatur hjerteutvikling?

Engdal, Vilde Arntzen, et al. *Aquaculture* (2023): 740046.





8°C vs. ~0.5-4 °C

Eksperimentelle forsøk





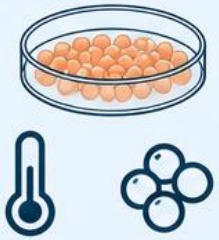
Kald egginkubasjon



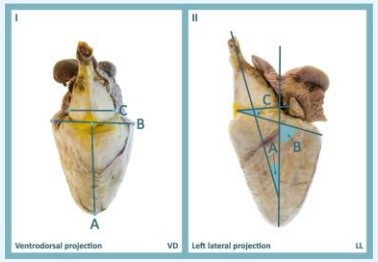
Varm egginkubasjon

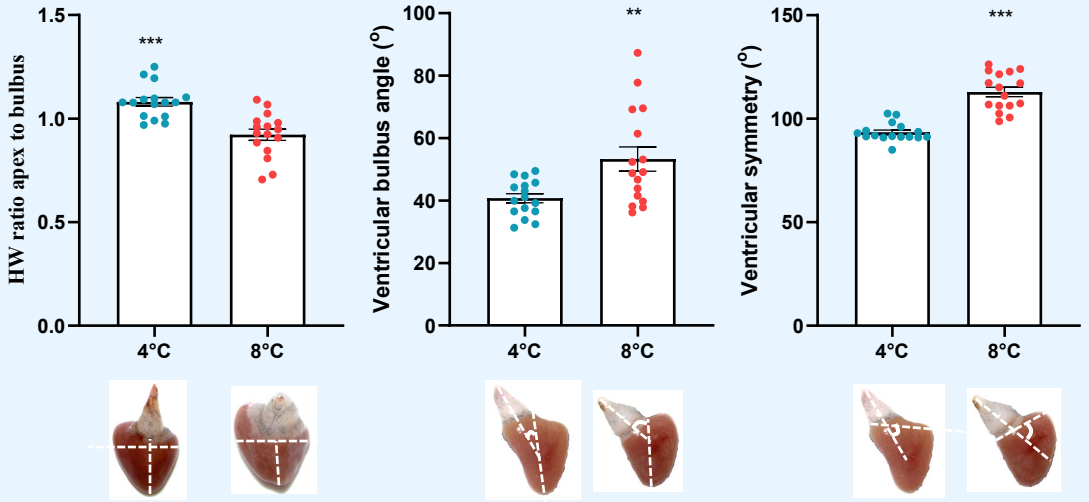


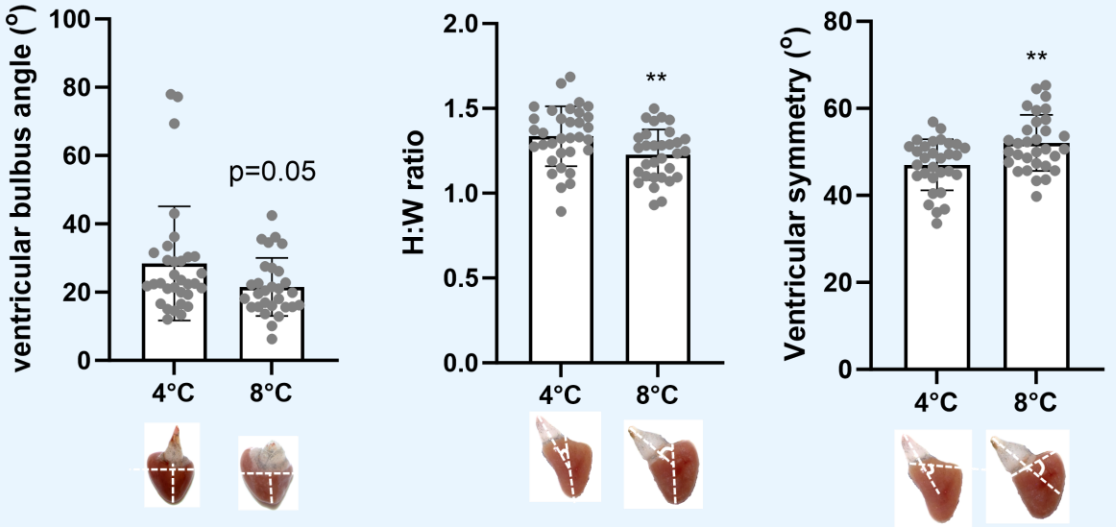
Eksperimentelle forsøk

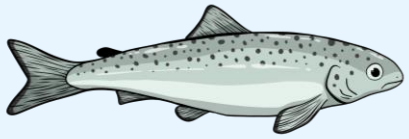


Hjertefasong påvirkes av embryonal temperatur!

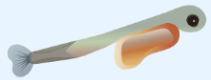








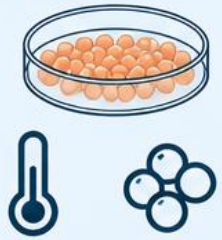
Smolt



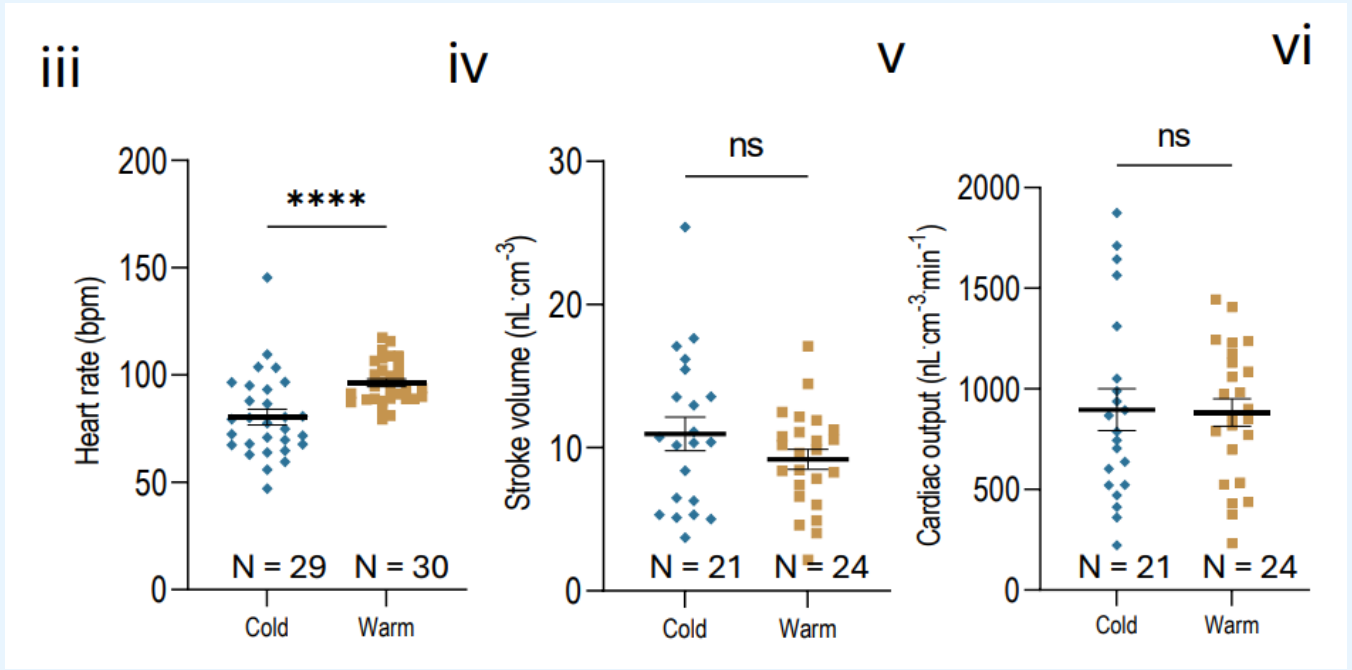
Plommesekkyngel

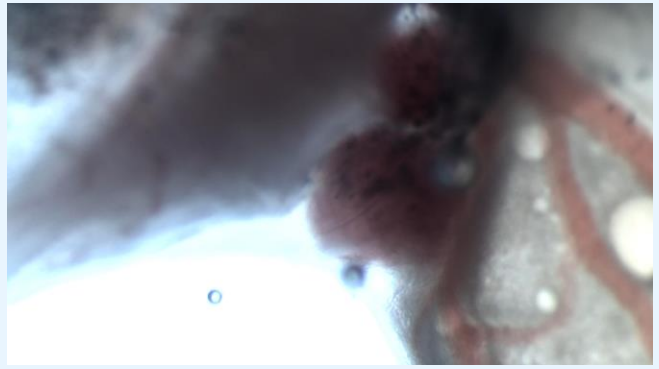
Halvorsen, P. S. et al. (2026). *Aquaculture*, 743755., Hvas, Malthe, et al. *Fish Physiology and Biochemistry* 51.4 (2025): 121.

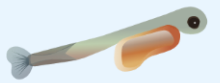
Eksperimentelle forsøk



Hjertefunksjon er også endret!







Plommesekkyngel

Halvorsen, P. S. et al. (2026). *Aquaculture*, 743755.

Kommersielle forsøk

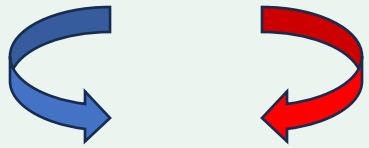


Kald egginkubasjon



Varm egginkubasjon





Ingen signifikante forskjeller i hjertefasong eller funksjon!



Common garden

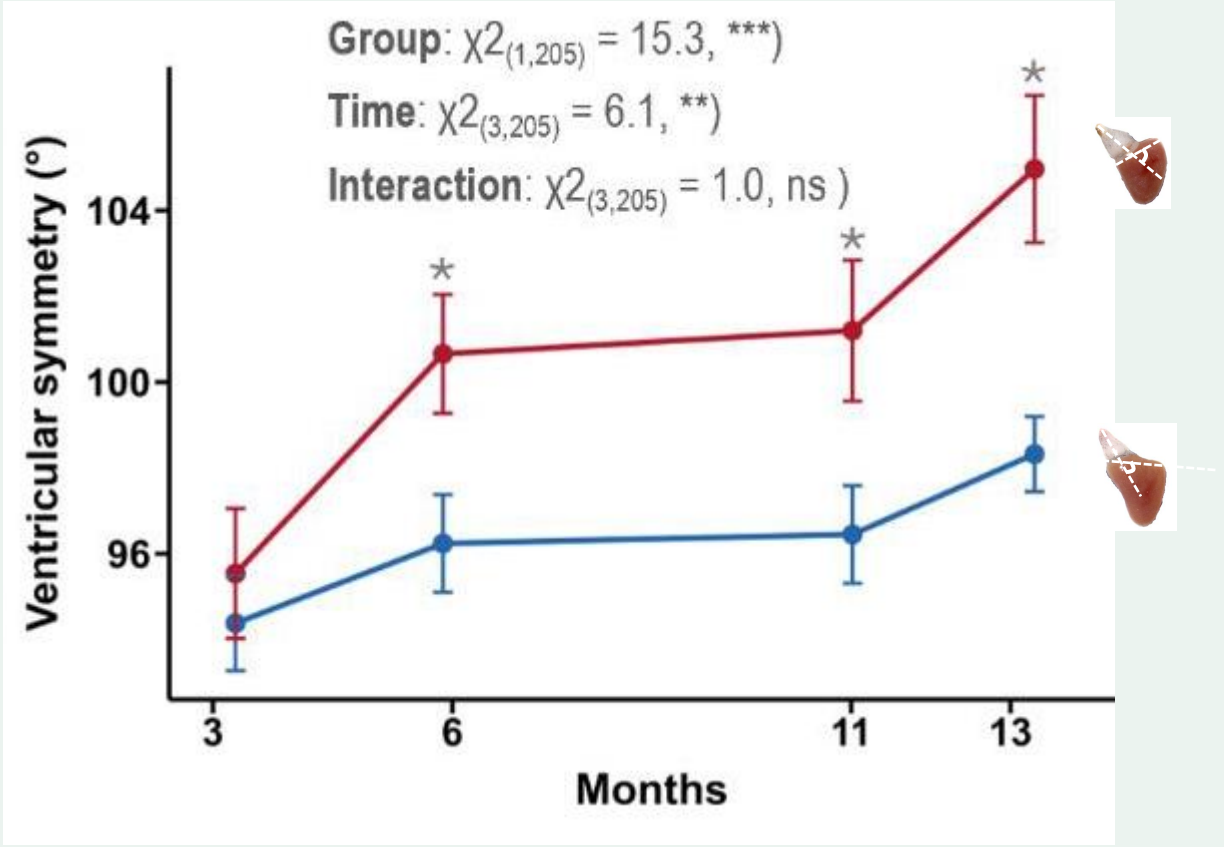


Smolt

Kommersielle forsøk



Hjerteavvik (gjen)oppstår hos varm fisk i sjøfasen!

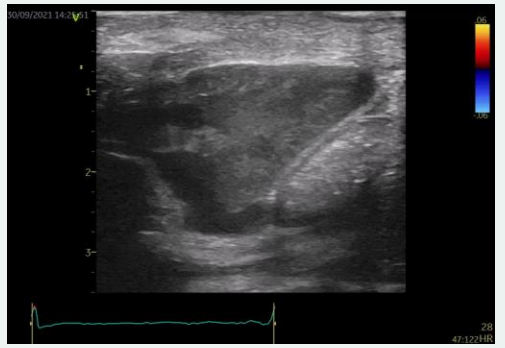


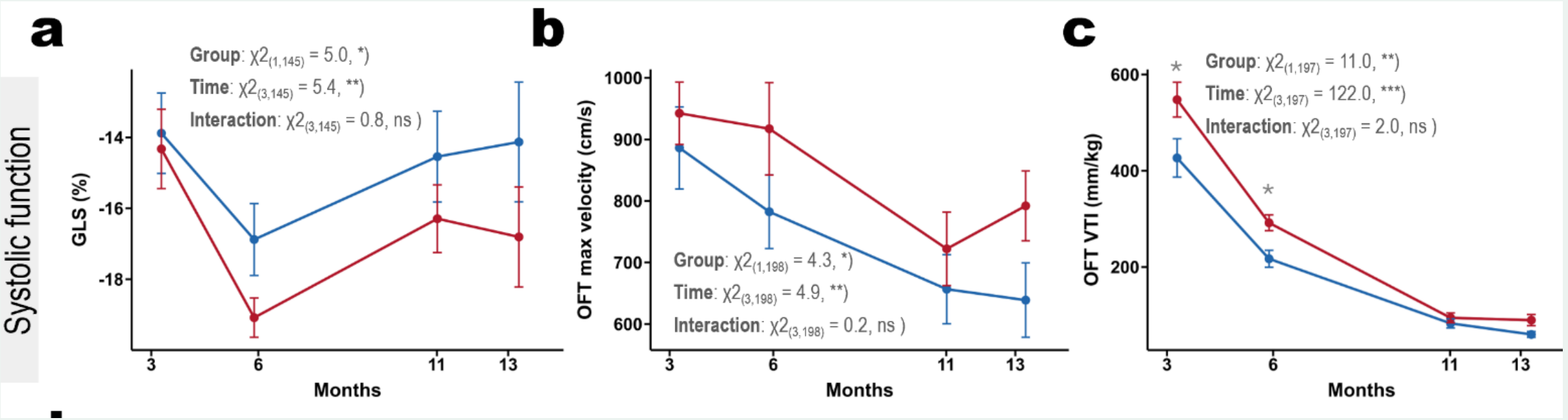
Halvorsen, P. S. et al. (*Under review*).

Kommersielle forsøk



Hjertefunksjon blir forskjellig mellom kald og varm fisk i sjø!







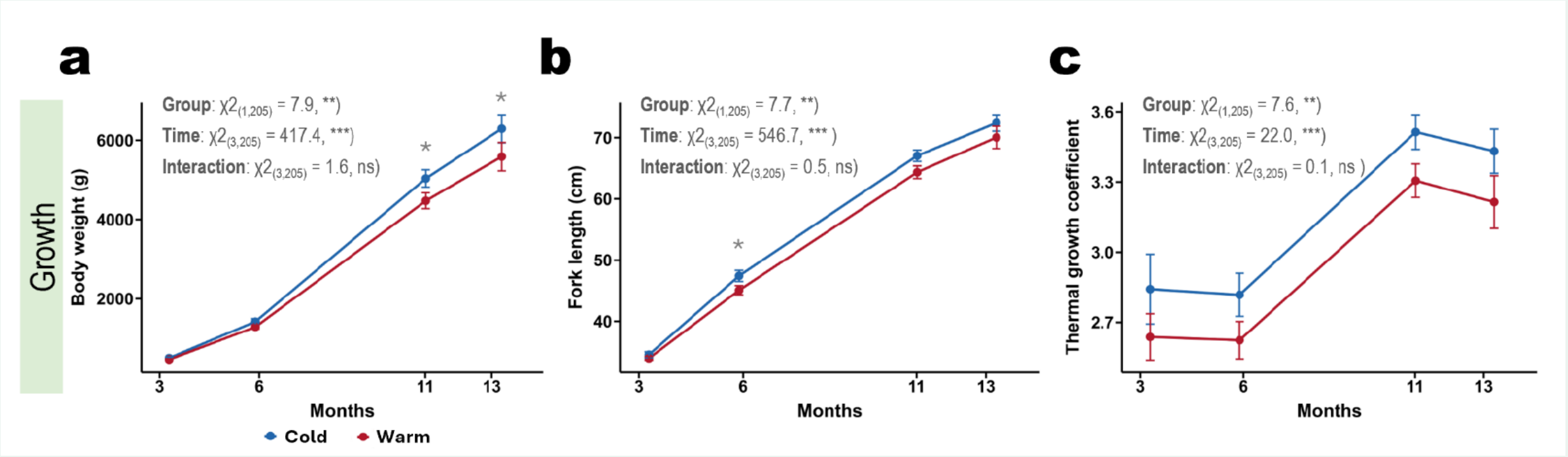
?

Halvorsen, P. S. et al. (*Under review*).

Kommersielle forsøk



Kald fisk vokser raskere i sjø

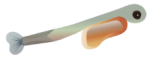


Halvorsen, P. S. et al. (*Under review*).

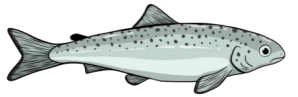
Oppsummering

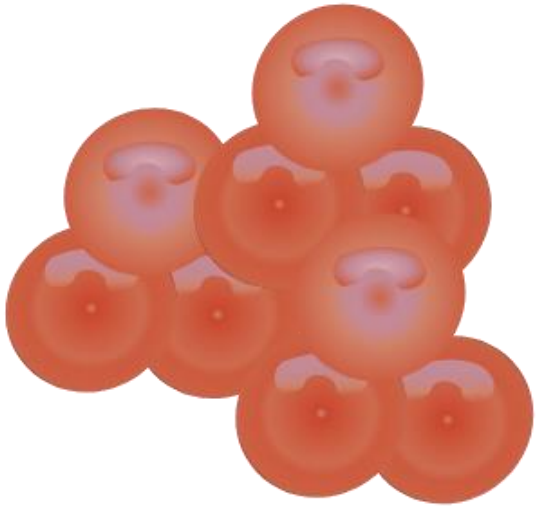
Forhold under embryonal og senere utvikling gir varige effekter på hjertet!

Forhold forbundet med tregere utviklingsrate på kald temperatur ser ut til å være mer gunstig for hjerteutvikling!











Takk!









Industripartnere:

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FLATANGER SETTEFISK AS

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Takk for oppmerksomheten!

