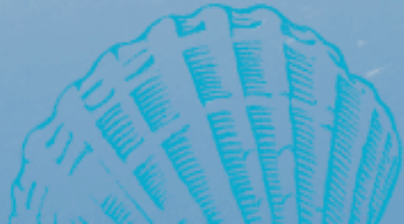




 **INSTITUTE OF MARINE RESEARCH**
HAVFORSKNINGSINSTITUTTET



Plasma concentrations of sex steroids and gonadotropins in farmed and wild-captured halibut broodstock

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Broodstock management



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Biometric and spawning performance data of wild-caught and farmed female halibut

	Wild-caught females	Farmed (F1) females
n	3 (4 ^a)	5
length (cm)	150.7 ± 6.2	113.4 ± 3.9
weight (kg)	48 ± 5.7	19.2 ± 2.3*
number of batches · female ⁻¹	7.3 ± 0.6	9.4 ± 1.7
spawning interval (hours)	82.2 ± 8.4	72.4 ± 22.9
batch volume (mL)	2300 ± 900	700 ± 300*
total fecundity (mL · female ⁻¹)	16700 ± 420	6800 ± 130*
relative fecundity (mL · kg ⁻¹)	347 ± 70	349 ± 84
average fertilization (%)	89 ± 7	61 ± 29

^a One wild-caught female was left undisturbed for most of the season, due to a large skin lesion, and was not included in calculations.

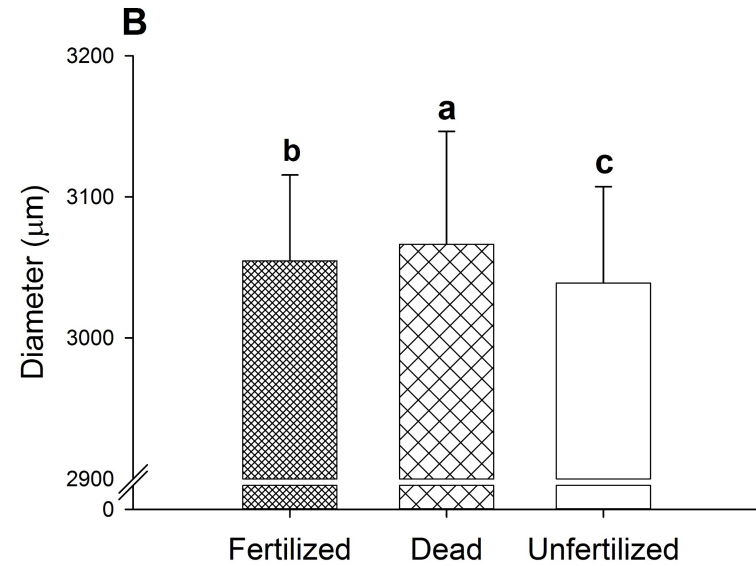
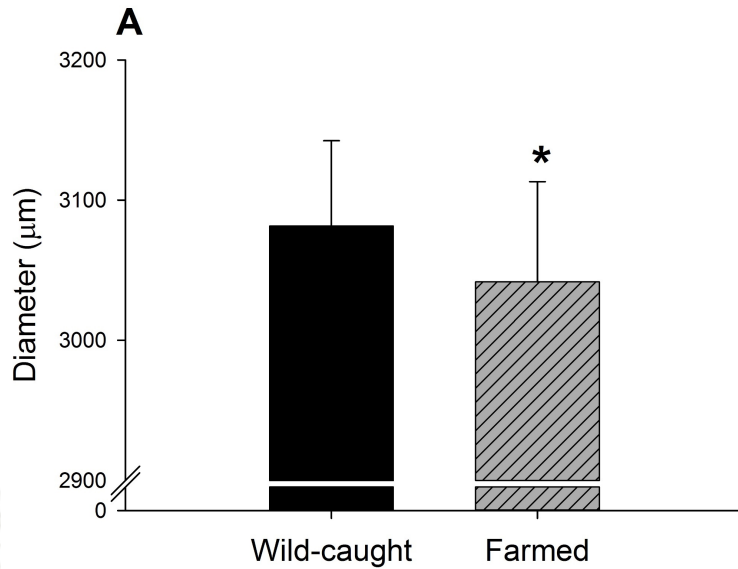
*Significant difference (P<0.05; Mann-Whitney U-test)



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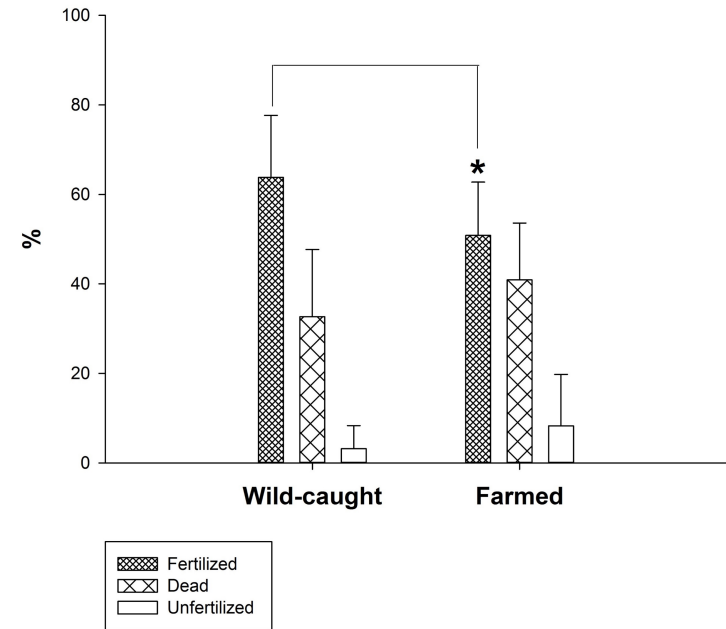
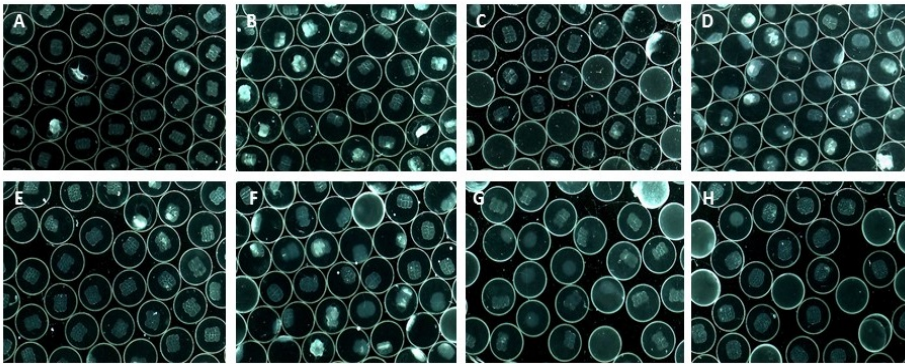
Egg diameter



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Egg viability in wild-caught and farmed females



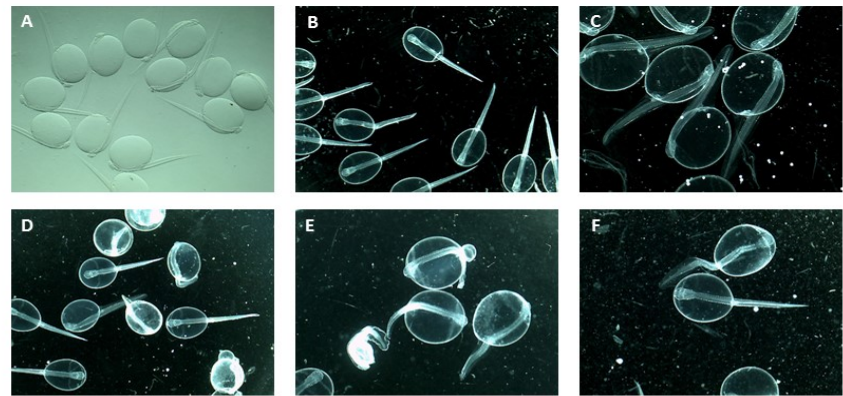
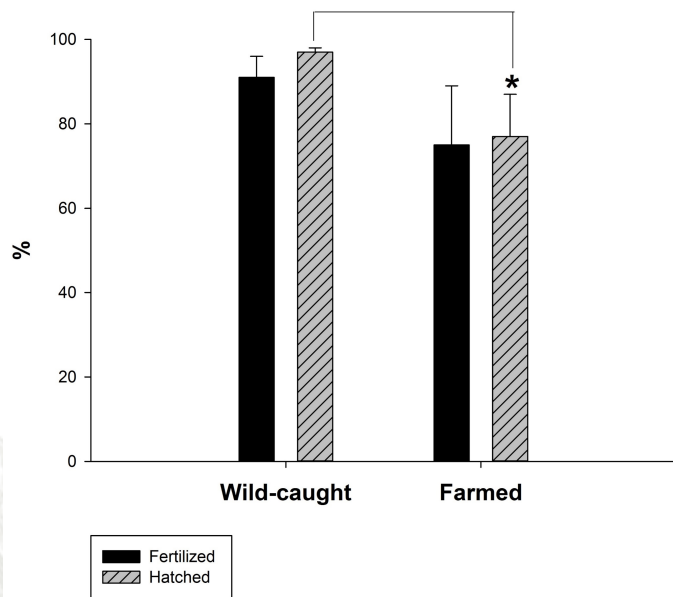
In all females, egg batch no 3 was photographed and egg viability parameters analysed



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Fertilization, hatching and development in eggs from wild-caught and farmed females



- Eggs from the photographed groups were incubated in triplicate for calculation of hatching success.
- Newly hatched larvae were photographed



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To summarise:

- Farmed (F1) broodstock had more variable ovulatory intervals and fertilisation rates
- Eggs from F1 broodstock
 - Were smaller
 - Had lower fertilisation and hatching rates
 - Had higher density (heavier), leading to extra challenges in incubation



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Question

- Are the observed differences between farmed and wild-caught females reflected in plasma profiles of steroids and gonadotropins?



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Five wild-captured and five farmed female halibut breeders were followed through an annual reproductive cycle



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Sampling and analyses

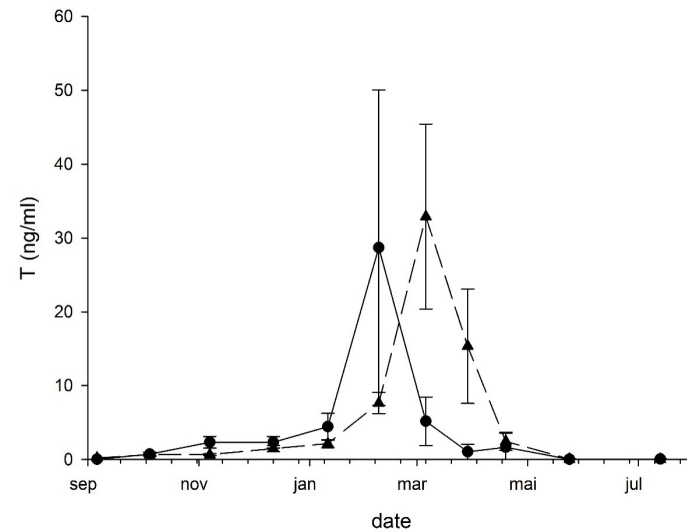
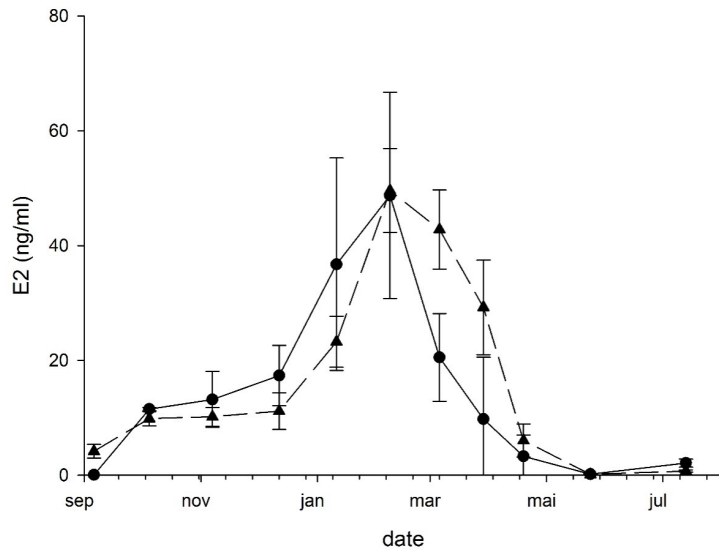
- Blood samples were taken at 3-6 week intervals from September 2016 to July 2017
- Plasma concentrations of estradiol-17 β , testosterone, FSH and LH were analysed
- Time and duration of spawning was recorded



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Plasma concentration of steroid hormones



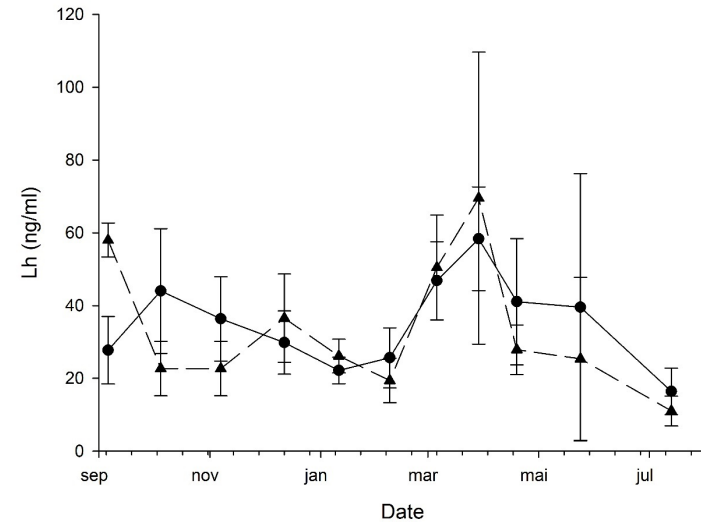
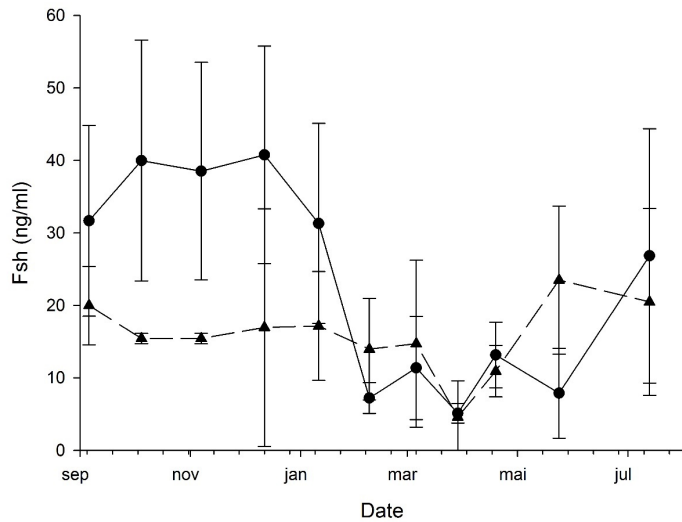
---- Farmed
— Wild-caught



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Plasma concentration of Fsh and Lh



---- Farmed
— Wild-caught



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In conclusion

- Plasma steroid concentrations were similar in farmed and wild-caught females, and reflected maturity stage
- Average plasma Fsh concentrations were higher in wild-caught females during vitellogenesis, but individual variation was high
- Plasma Fsh concentrations were low during spawning, and increased after spawning in both farmed and wild-caught females
- Plasma Lh concentrations were highest during spawning in all fish



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Future work

- Further studies are needed, with a higher number of individuals, to confirm
 - a) Whether low Fsh concentrations during vitellogenesis are common in farmed halibut females, and
 - b) What the implications, if any, are for egg quality and larval development
 - c) Larvae from F2 and F3 broodstock observed to have less yolk or absorb yolk sac faster – why?



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