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University of South Bohemia in České Budějovice

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South Bohemian Research Center of Aquaculture and Biodiversity of Hydrocenoses

The effect of pikeperch (*Sander lucioperca*) broodstock origin on their ability to express natural reproductive behaviour

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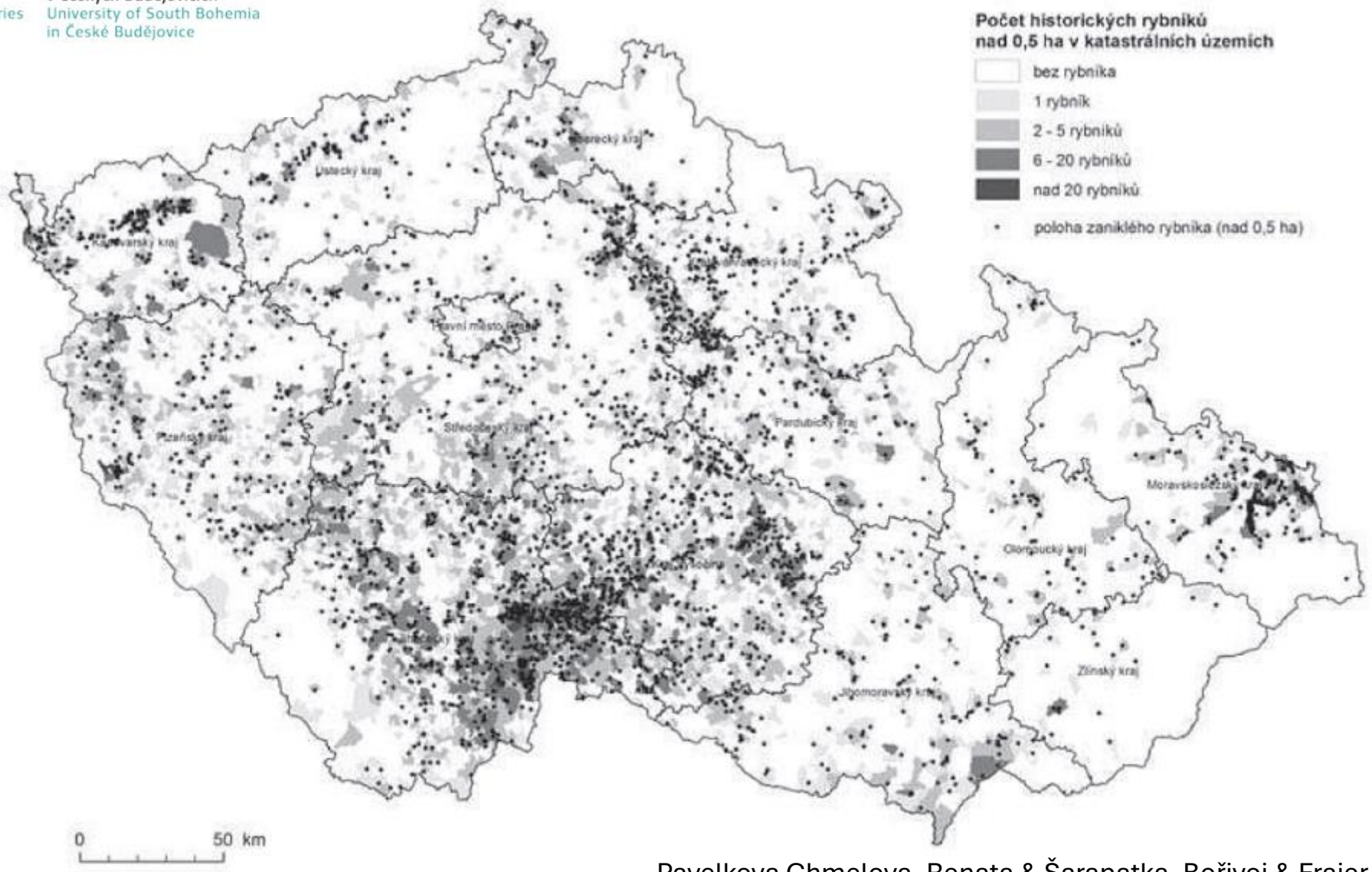

Přehled historických rybníků s rozlohou větší než 0,5 ha a lokalizace zaniklých rybníků.

Foto | Bořivoj Šarapatka a Renata Pavelková Chmelová / Naše příroda

foto 3 ze 4

Pavelkova Chmelova, Renata & Šarapatka, Bořivoj & Frajer, Jindřich & Pavka, Přemysl & Netopil, Patrik. (2013). Databáze zaniklých rybníků v ČR a jejich současné využití. Acta Environmentalica Universitatis Comenianae (Bratislava). 21. 87-98.


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The selection pressure

High density, dry-fed habituation, cannibalism, bacterial diseases, artificial light

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The design of the experiment

- **Pikeperch broodstock of two origins:** pond-cultured or semi-intensively reared pellet feeders.

- **Stocking:** either by origin – both sexes are of the same origin or mixed – male pond, female intensive and vice-versa.

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Image analysis

Total nest area

Cleaned area, %

Egg distribution, %

Blood sampling

Testosterone - males

Estradiol - females

Glucose

Cortisol

The interpretation of the results based on the origin

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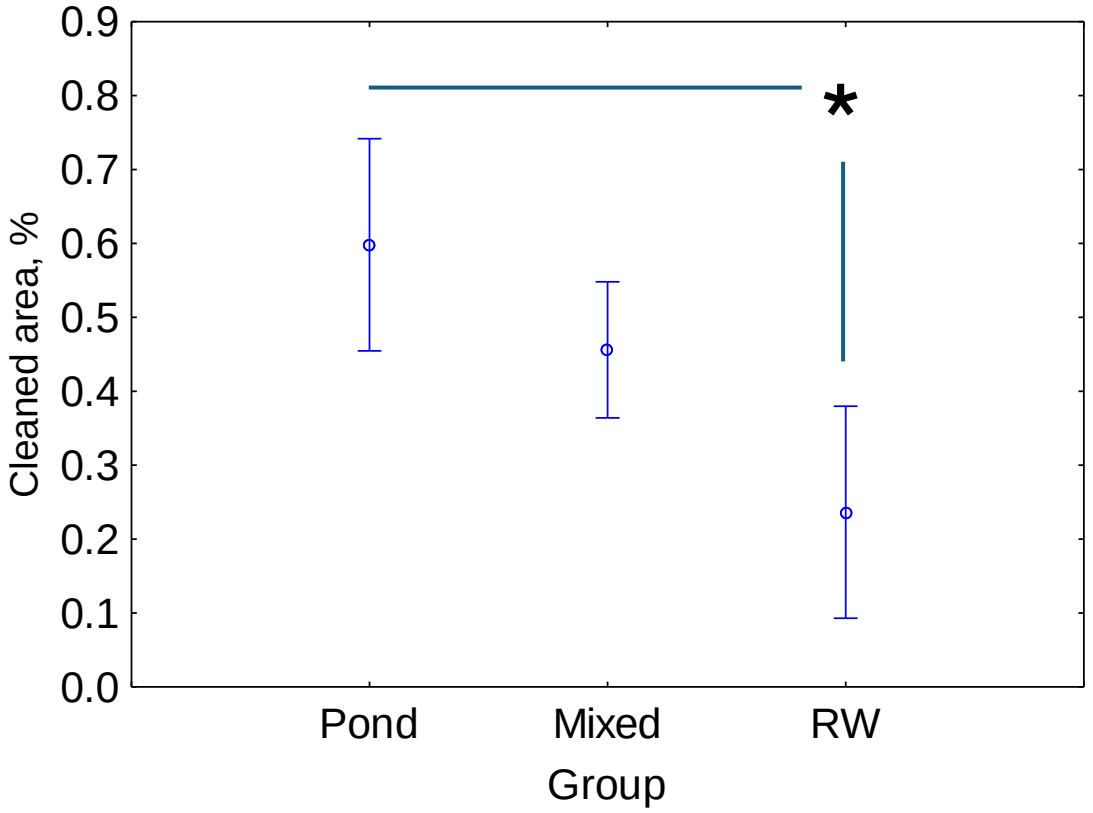
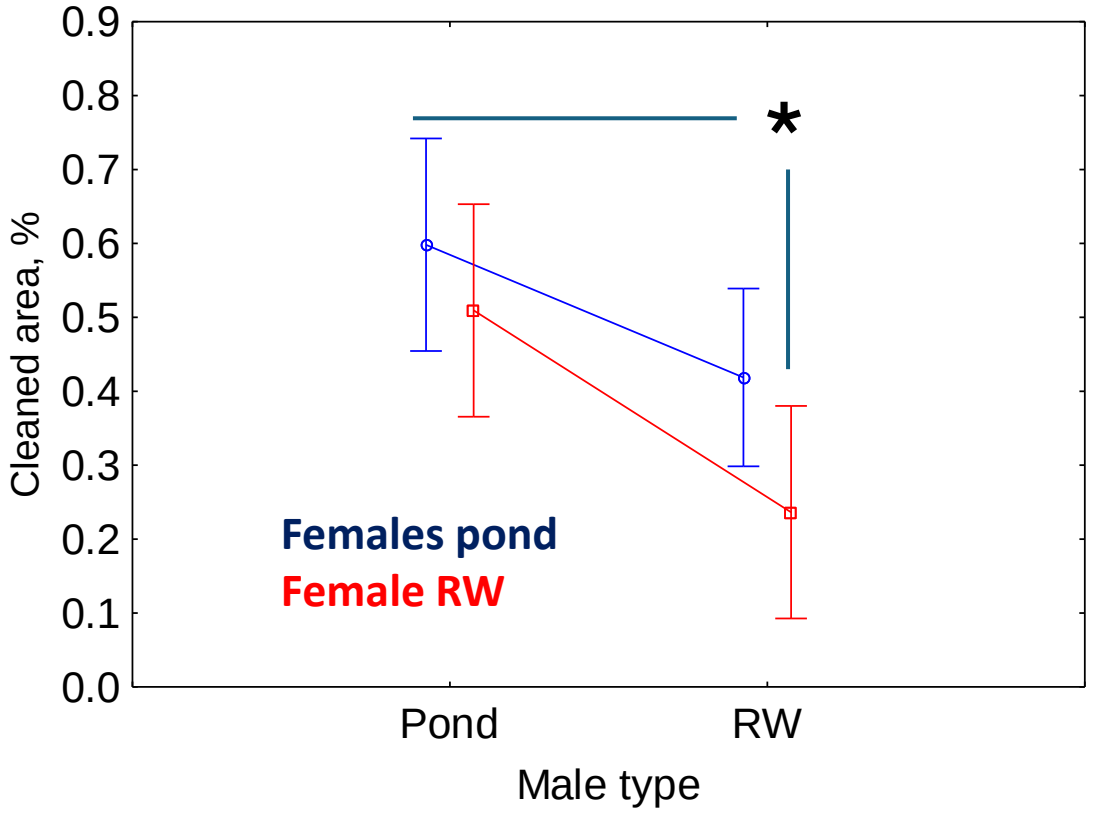
Cleaning efforts

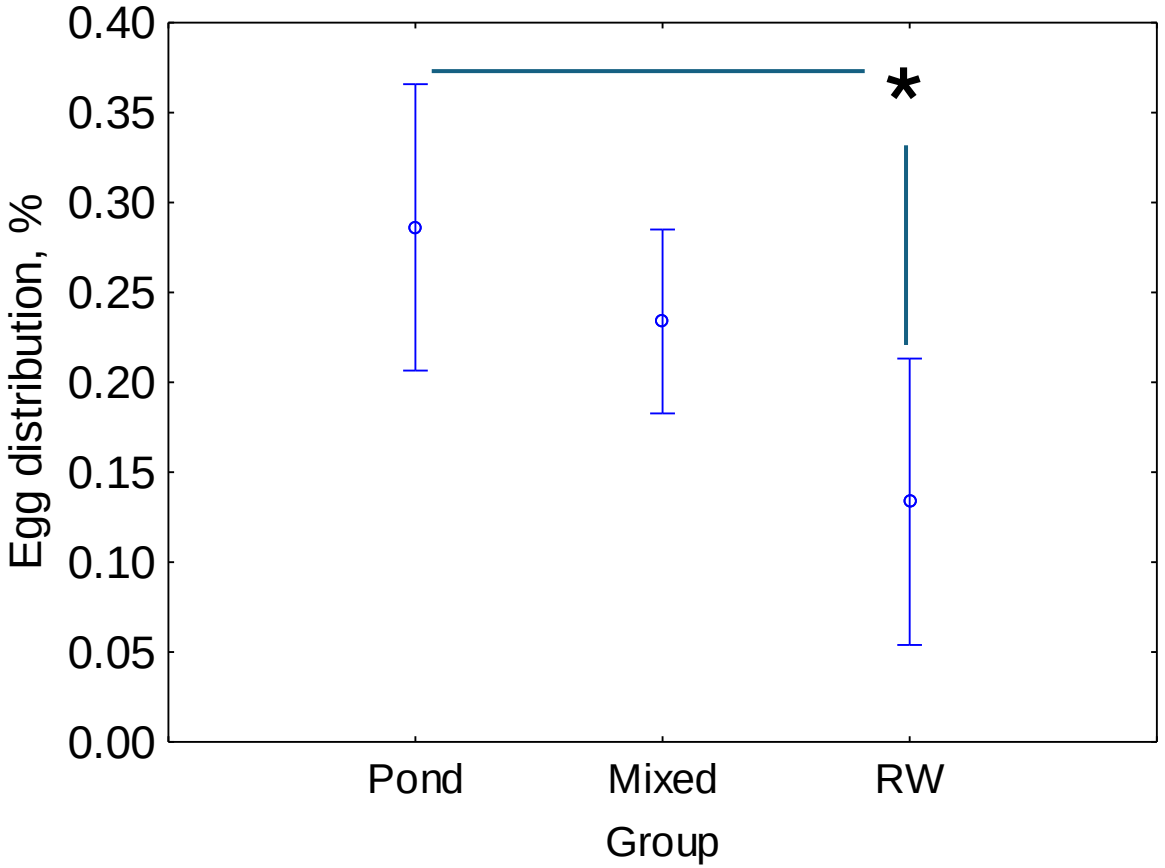


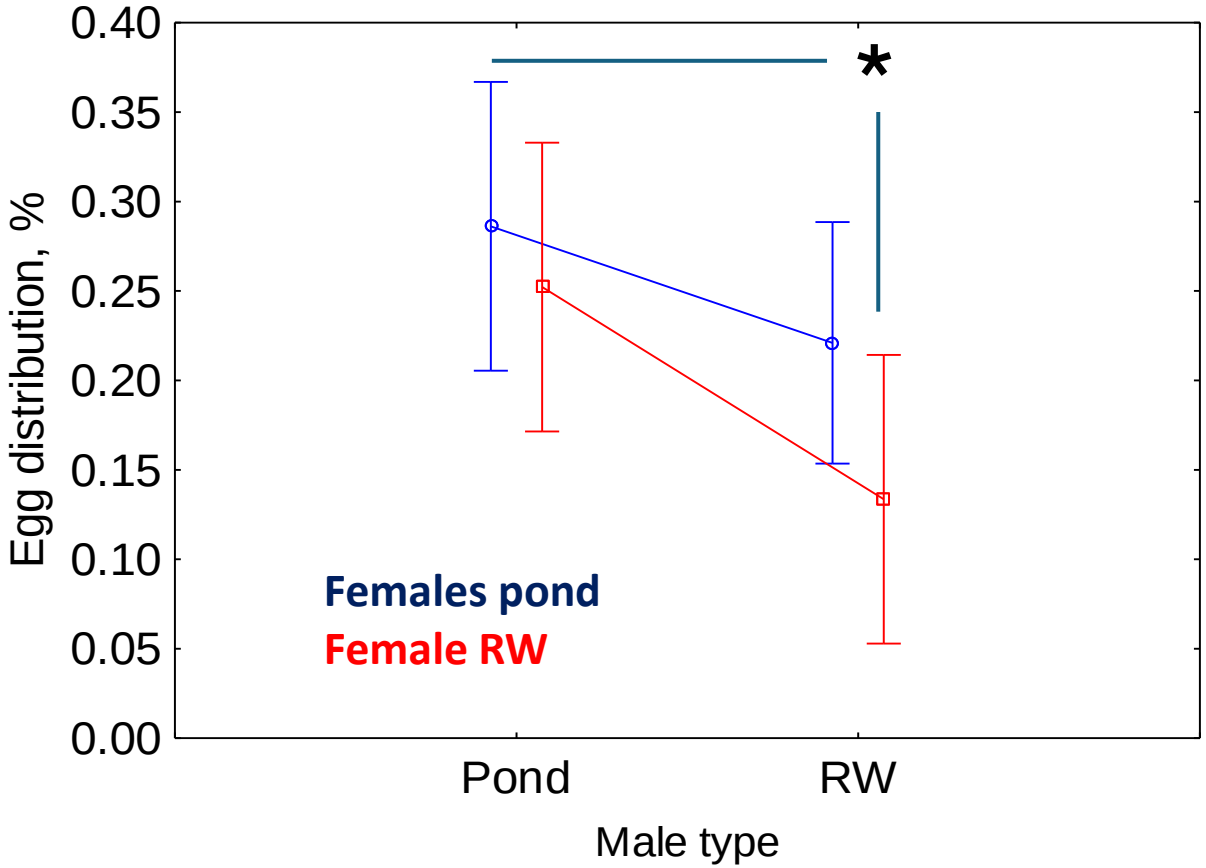


Effect	SS	Degr. of Freedom	MS	F	p
Female type	.139	1	.139	4.05	.054
Male type	.387	1	.387	11.27	.002*
Female type*Male type	.017	1	.017	.48	.493

Both males and female seem to have an effect on the spawning success

Cleaning efforts

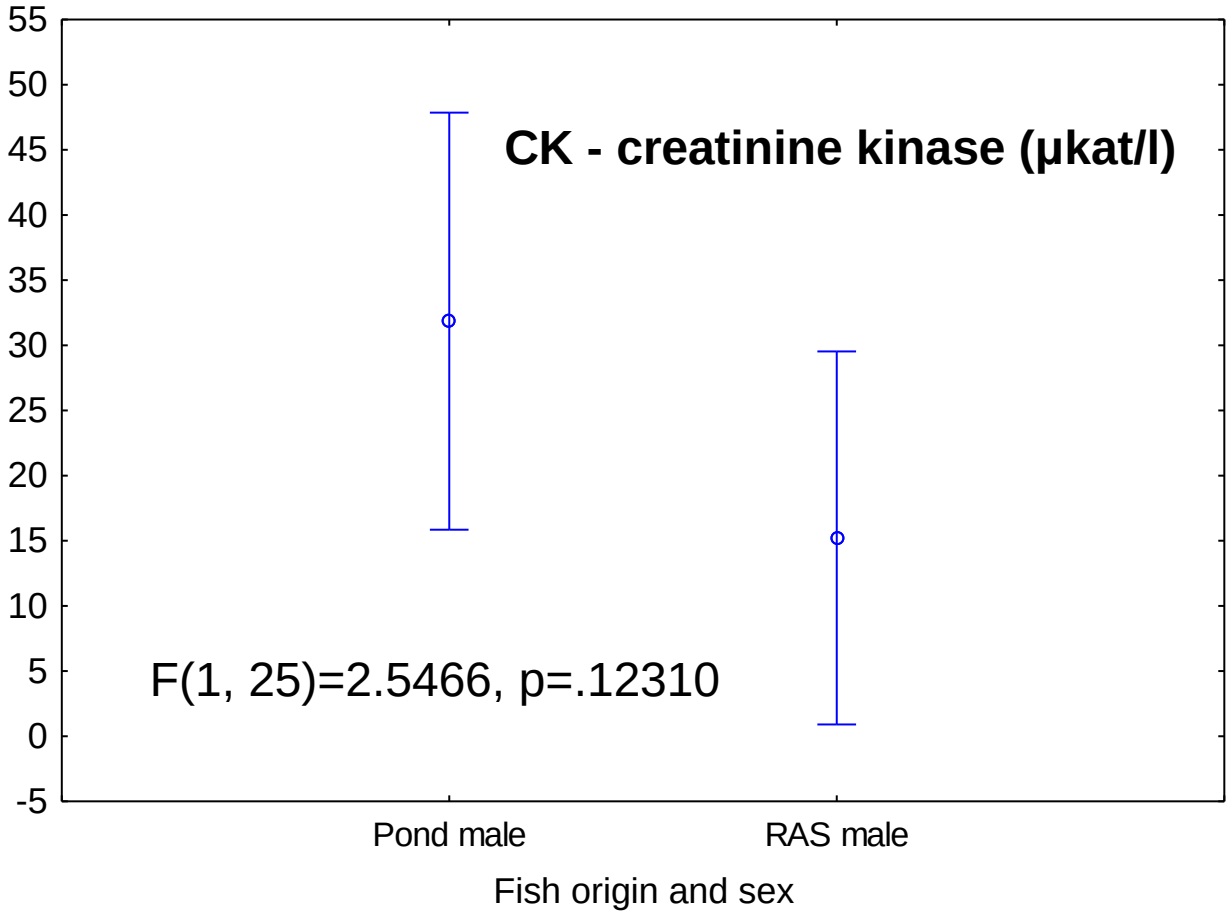


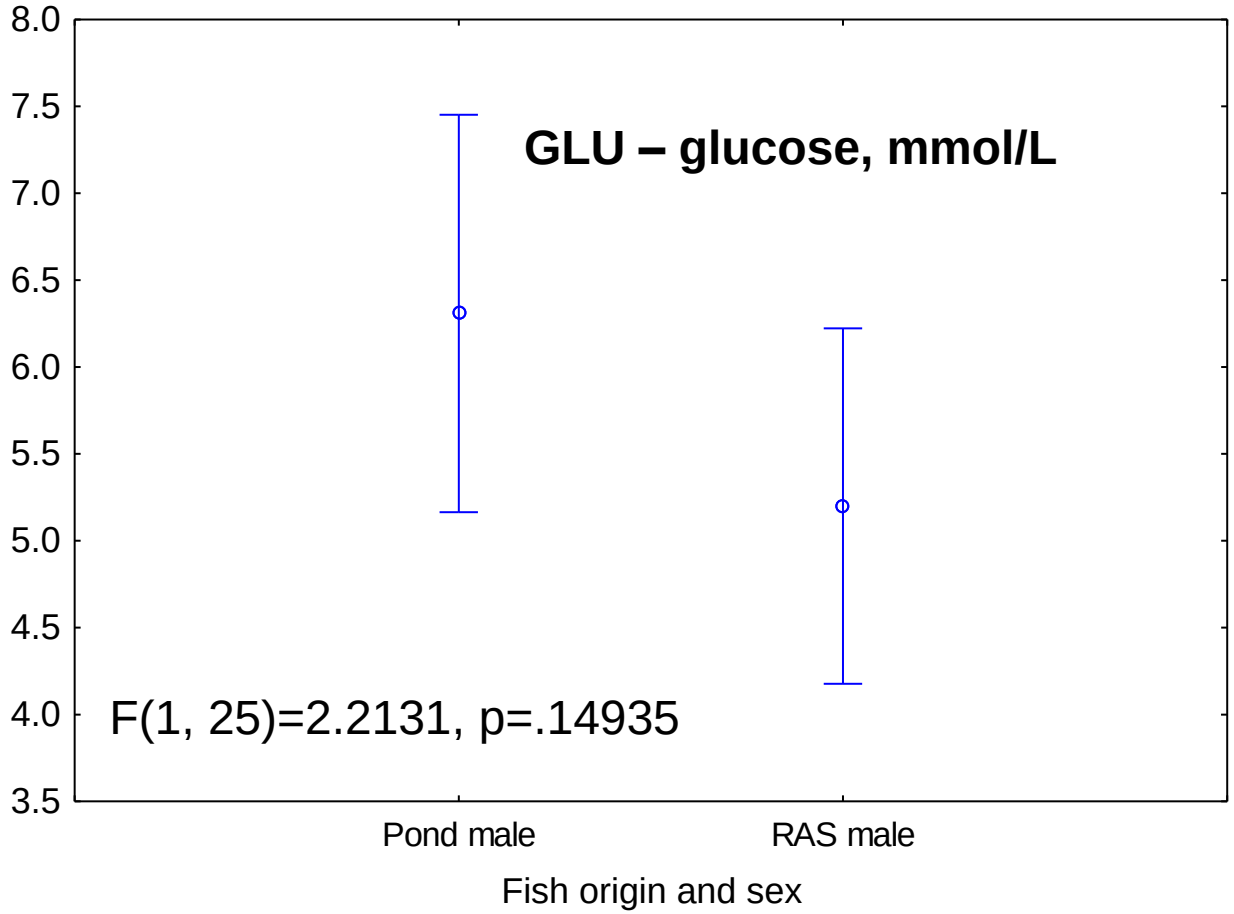


Effect	SS	Degr. of Freedom	MS	F	p
Female type	.028	1	.028	2.575	.120
Male type	.064	1	.064	5.900	.022*
Female type*Male type	.005	1	.005	.499	.486

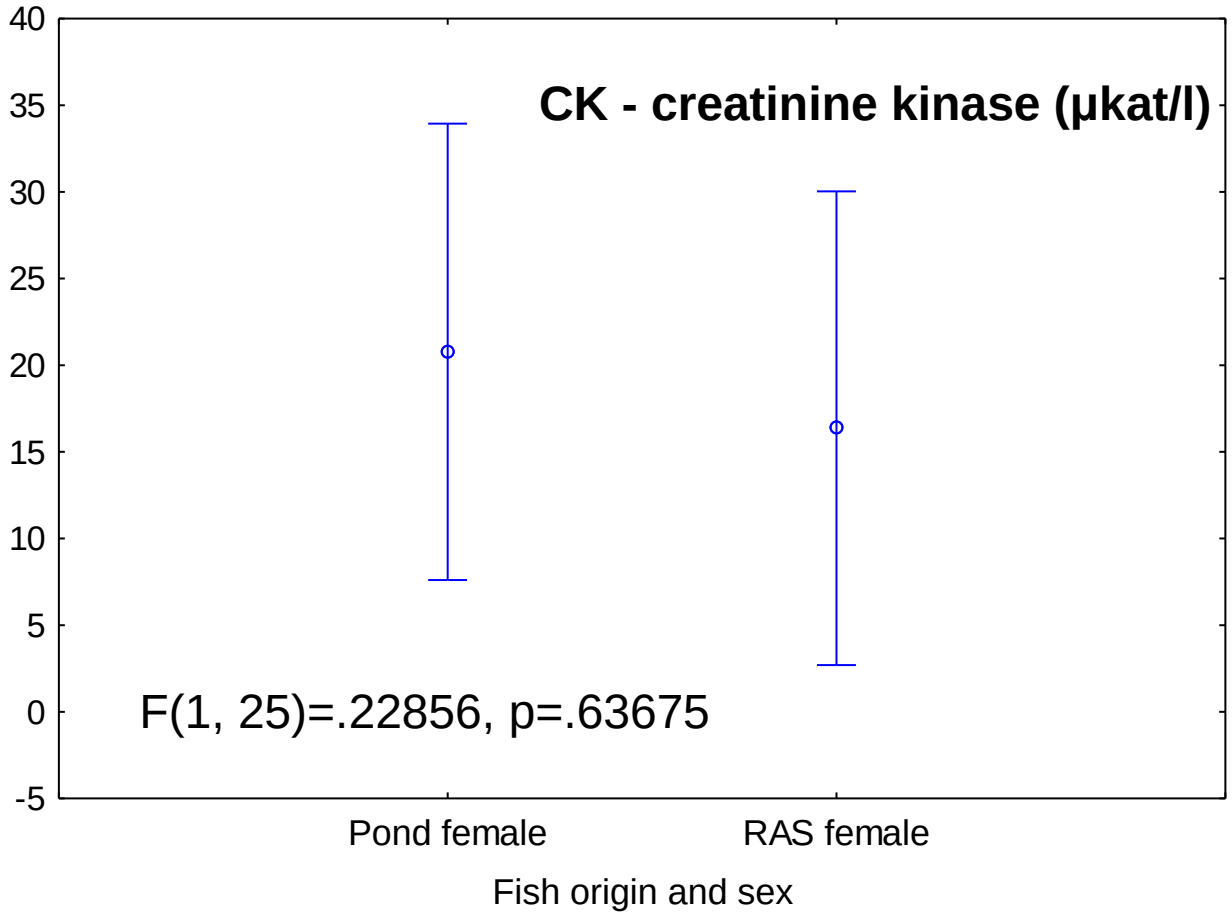
Both males and female seem to have an effect on the spawning success

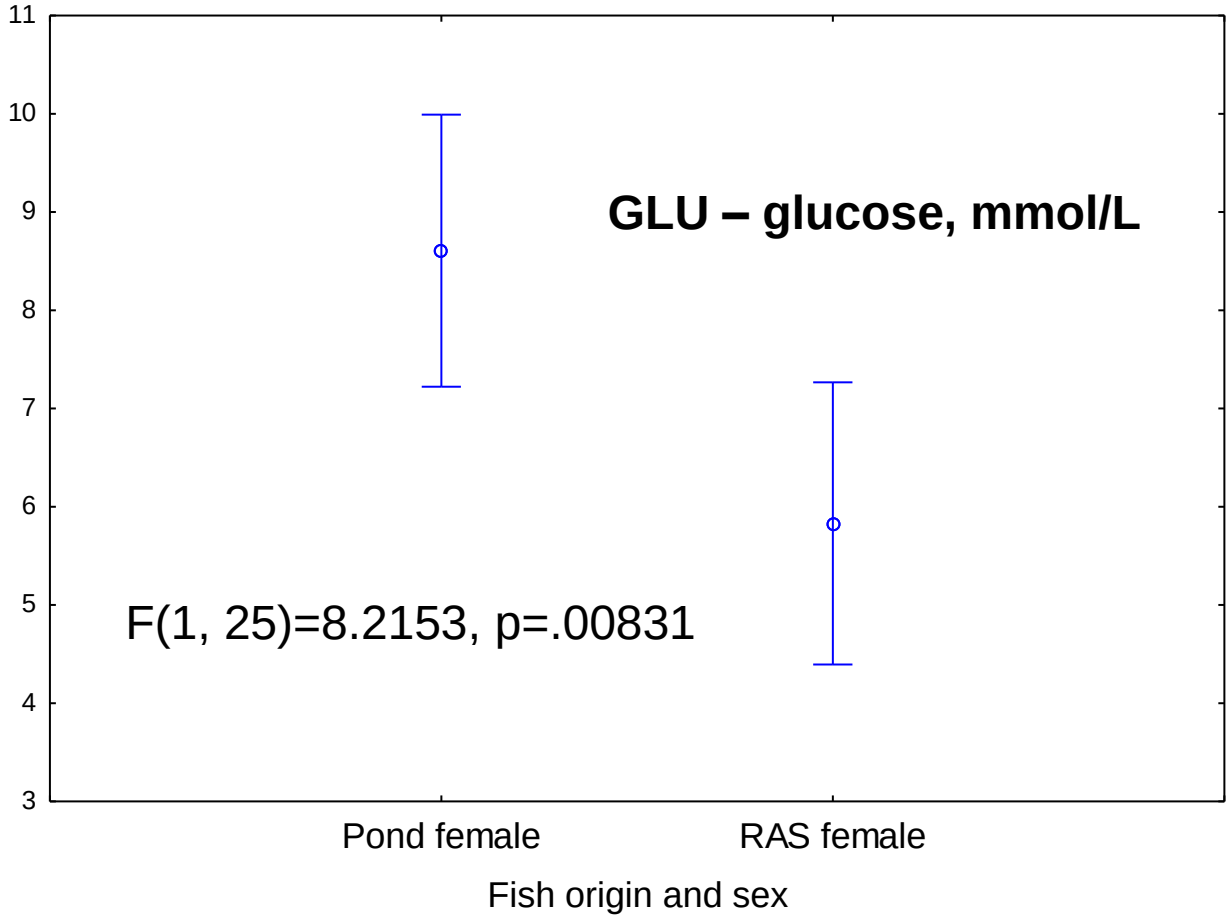
Movement of males



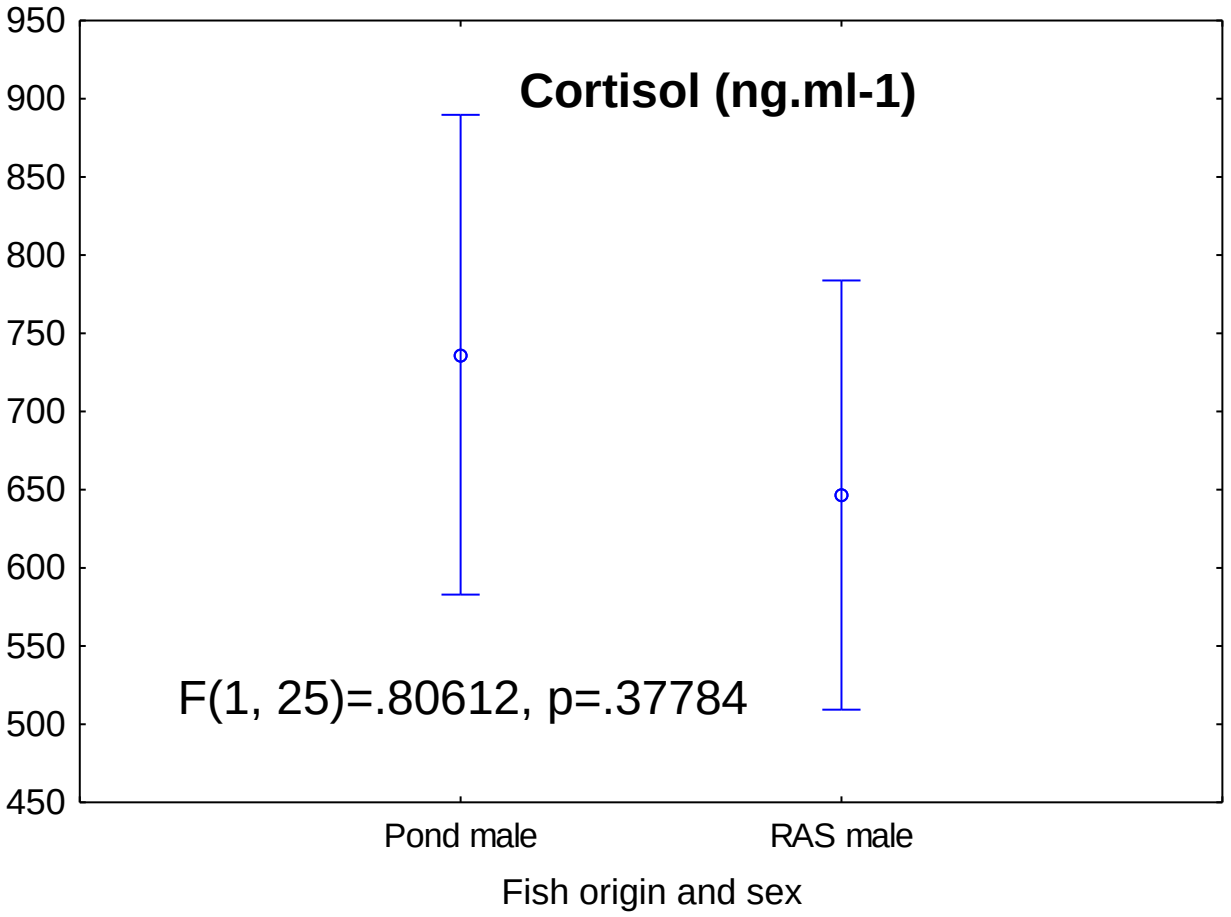


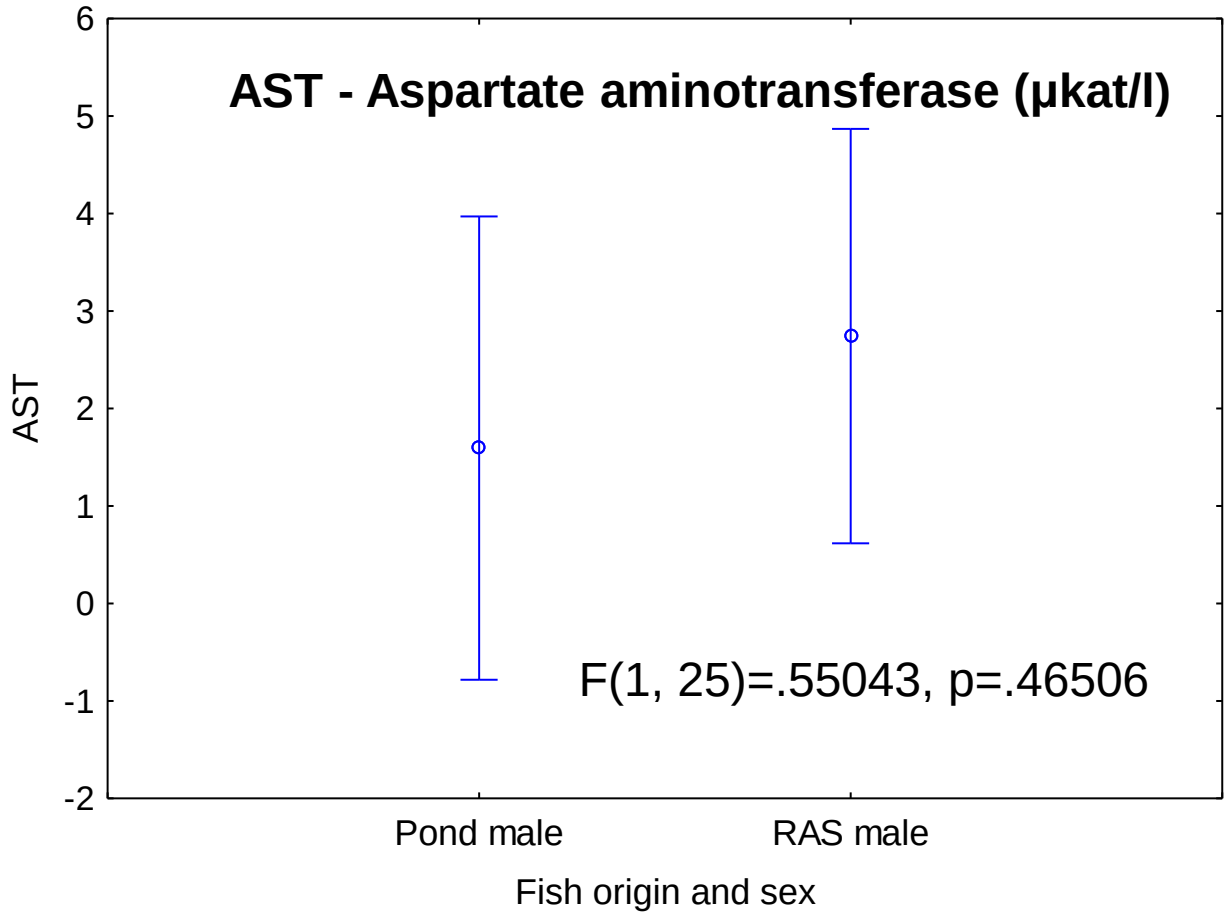
Movement of females



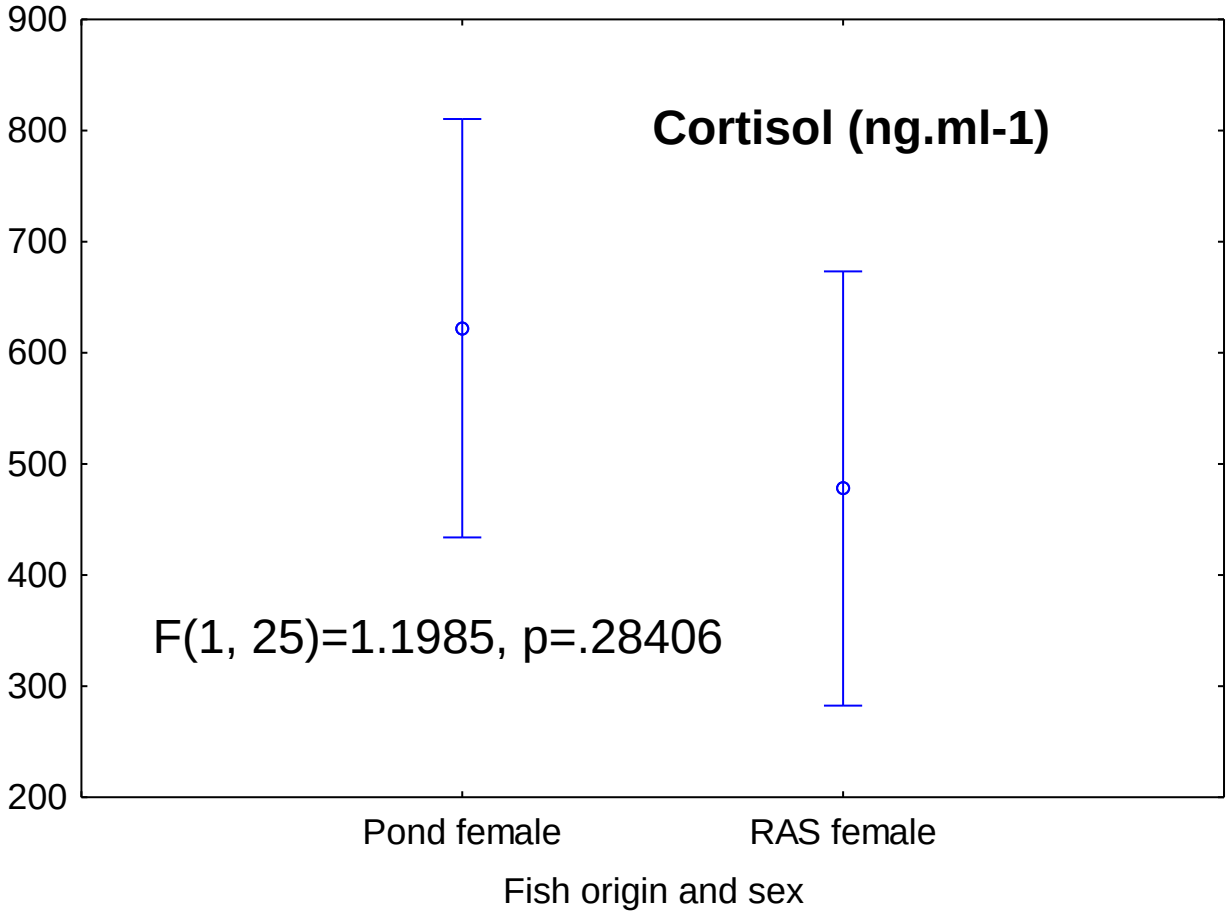


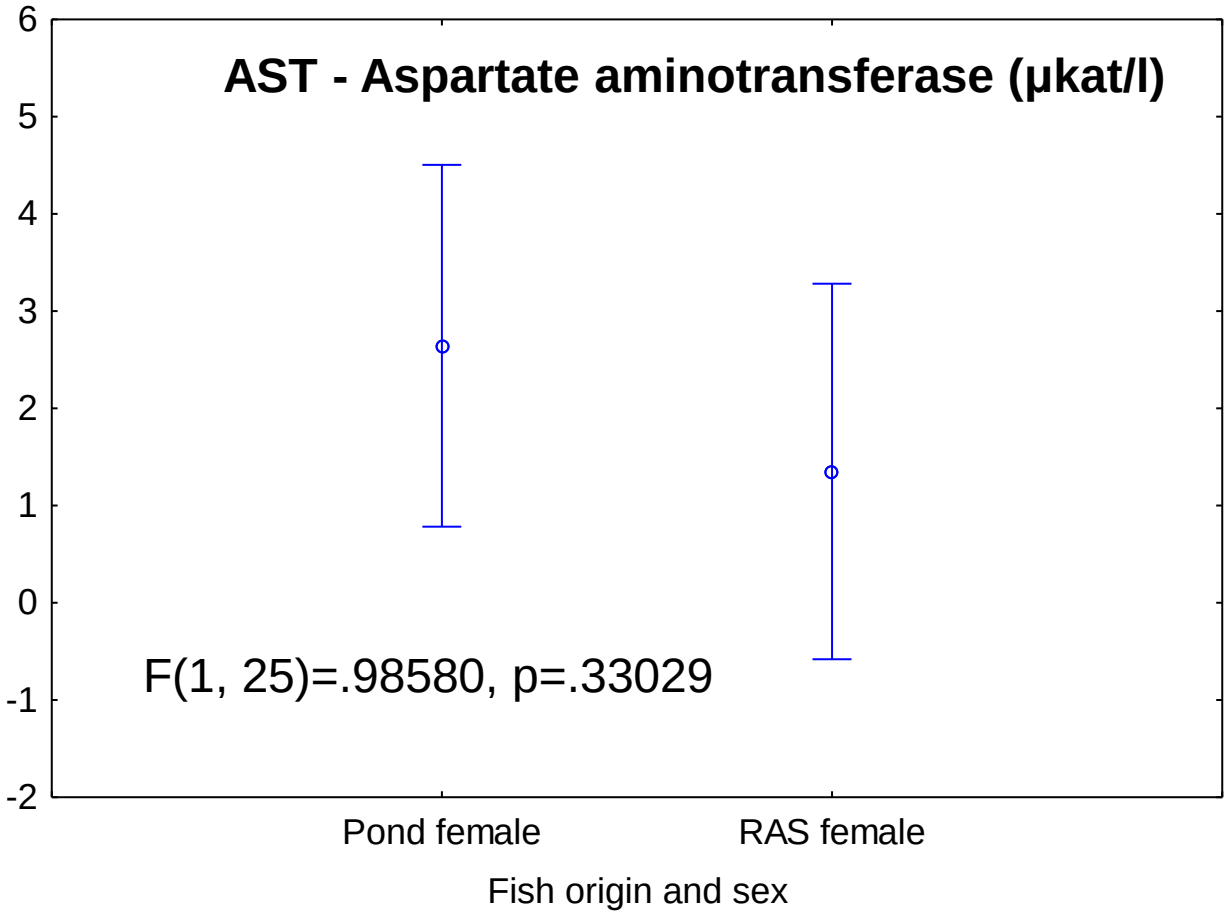
Stress in males



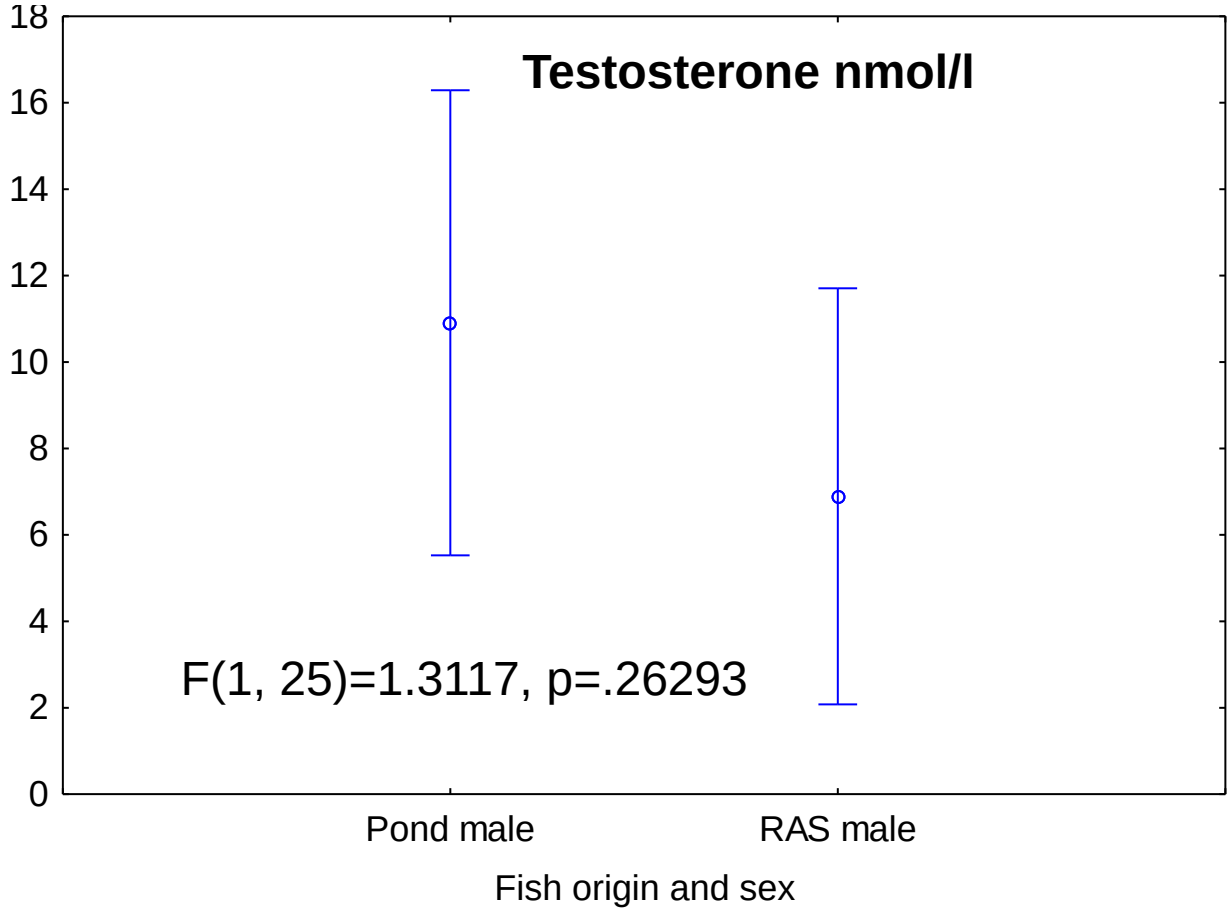


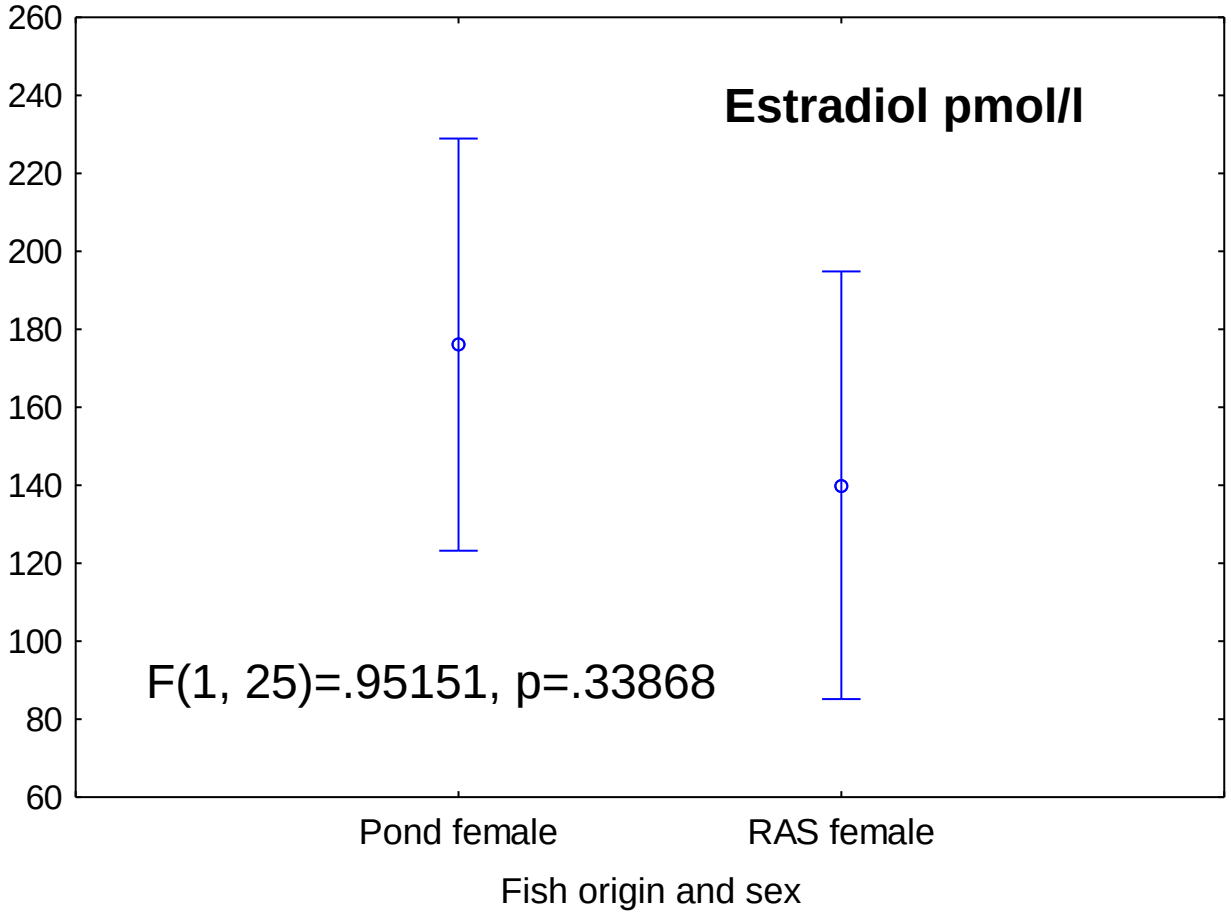
Stress in females





Hormones


Testosterone nmol/l
18
16
14
12
10
8
6
4
2
0
F(1, 25)=1.3117, p=.26293
Pond male
RAS male
Fish origin and sex


Estradiol pmol/l
260
240
220
200
180
160
140
120
100
80
60
F(1, 25)=.95151, p=.33868
Pond female
RAS female
Fish origin and sex

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The conclusions

- **The origin of pikeperch broodstock can significantly affect their ability to express natural behaviour**
- **When both sexes are of the same origin, it multiplies the effect**
- **The fish of semi-intensive origin seem to have shifts in the stress reaction**
- **The restocking with pikeperch of non-natural origin should be done carefully**

NAZV - QK23020002

Production of pikeperch (*Sander lucioperca*), their adaptability and optimisation of their stocking in open waters.

MINISTERSTVO ZEMĚDĚLSTVÍ

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Optimisation of pikeperch stocking to the open waters:

- Timing of stocking
- The effect of fish origin
- Evaluation of juvenile growth performance

Production of pikeperch juveniles for restocking purposes:

- Optimization of reproduction
- Following juvenile culture
- Predatory behaviour of pikeperch juveniles (RAS vs Pond culture).

Huvenov water reserviour

Water supply for 20% of the Czech Republic population

Bulding	1968-1972
Area	55 ha
Volume	3,385 mil. m^3
Water mirror	19,93 km^2

The research plan of the project

March 2023
Initial stocking of pikeperch juveniles:
10 000 RAS-cultured
10 000 Pond-cultured

March 2024
Second stocking of pikeperch juveniles:
10 000 RAS-cultured
10 000 Pond-cultured

March 2025
Second stocking of pikeperch juveniles:
20 000 RAS-cultured
20 000 Pond-cultured

2023 2024 2025

October 2023
Second stocking of pikeperch juveniles:
10 000 RAS-cultured
10 000 Pond-cultured

October 2024
Second stocking of pikeperch juveniles:
10 000 RAS-cultured
10 000 Pond-cultured

Growth and survival

1. **RAS vs pond fish**
2. **The effect of the season – autumn vs spring**

The environment

1. **Substantial increase in predator population**
2. **Water quality, phytoplankton and zooplankton dynamics**

Sampling for blood haematology and biochemistry

The duration of the trial was 6 weeks

Ad libitum consumption:
at 16 degrees C: 2 pcs (1 g)
at 20 degrees C: 3.2 pcs (2.2 g)
at 24 degrees C: 6 pcs (7.2 g)

FCR for granular feed is 0.9-1.0
FCR for prey is 5.5-6.0

Parameters	Groups			Statistical analysis
	Initial	Pellet feeding	Live prey feeding	
Growth indicies				
BW, g	30.7 ± 2.64b	54.9 ± 7.03a	57.2 ± 6.42a	**F(2, 27) = 66.0, P < 0.05**
TL, mm	164 ± 7.86c	186 ± 7.84b	194 ± 6.06a	**F(2, 27) = 47.2, P < 0.05**
SGR	-	1.03 ± 0.19	1.11 ± 0.21	F(1, 18) = 0.66, P = 0.43
Somatic indicies				
HSI	1.45 ± 0.36a	1.91 ± 0.76a	0.59 ± 0.21b	**F(2, 27) = 14.9, P < 0.05**
SSI	0.56 ± 0.58	0.13 ± 0.01	0.14 ± 0.26	F(2, 27) = 0.85, P = 0.44
V(F)SI	4.15 ± 1.45a	3.90 ± 0.81a	0.83 ± 0.24b	F(2, 27) = 36.0, P < 0.05
RGL	0.39 ± 0.05ab	0.40 ± 0.03a	0.36 ± 0.03b	**F(2, 27) = 3.81, P = 0.04**
GaSI	0.79 ± 0.28a	2.56 ± 0.39a	1.78 ± 0.64b	**F(2, 27) = 37.1, P < 0.05**
Biochemical indicies				
TP	37.3 ± 6.53a	34.7 ± 2.95ab	30.7 ± 2.31b	**F(2, 27) = 5.85, P < 0.05**
LIPA	0.35 ± 0.07	0.35 ± 0.14	0.26 ± 0.11	F(2, 27) = 2.18, P = 0.36
AMY	16.0 ± 3.11a	12.5 ± 2.17b	7.45 ± 0.91c	**F(2, 27) = 36.4, P < 0.05**
GLU	9.66 ± 5.10a	3.42 ± 0.56b	7.51 ± 2.34a	**F(2, 27) = 9.48, P < 0.05**
CHOL	4.39 ± 0.82a	4.31 ± 1.35a	2.30 ± 0.48b	**F(2, 27) = 15.3, P < 0.05**
ALB	5.00 ± 1.63b	4.26 ± 0.89b	6.16 ± 0.70a	**F(2, 27) = 7.06, P < 0.05**
ALT	0.78 ± 0.43a	0.35 ± 0.19b	0.24 ± 0.09b	**F(2, 27) = 10.7, P < 0.05**
AST	3.92 ± 2.24	2.13 ± 1.87	2.13 ± 1.21	F(2, 27) = 3.21, P = 0.06
TG	4.80 ± 3.04	6.50 ± 3.39	6.25 ± 6.27	F(2, 27) = 0.60, P = 0.56
NH3	632 ± 220b	1241 ± 259a	496 ± 142a	**F(2, 27) = 34.8, P < 0.05**

Conclusions

Live prey feeding of pikeperch has substantially improved their physiological status, suggesting their better survival after stocking

Pikeperch juveniles fed with live prey displayed similar body weight and total length, with live fed fish being slightly bigger in size

Pikeperch of RAS origin can be easily transitioned to the live prey, juveniles exhibited immediate predation behaviour after prey was introduced to the tank

Further evaluation of pikeperch predation behaviour must be considered

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Thank you for your attention!

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