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EFFECT OF TEMPERATURE ON FATTY ACID COMPOSITION OF UNFED SIBERIAN STURGEON LARVAE

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INTRODUCTION

The fatty acid metabolism in fish is influenced by various factors, including fish species, water temperature, water environment and diet supply. Temperature could modify fish fatty acid metabolism by its influence on enzyme activity and its effect is the center of the attention of the scientific community that deals with fish nutrition.

Figure 1. Aquaria used during the trial

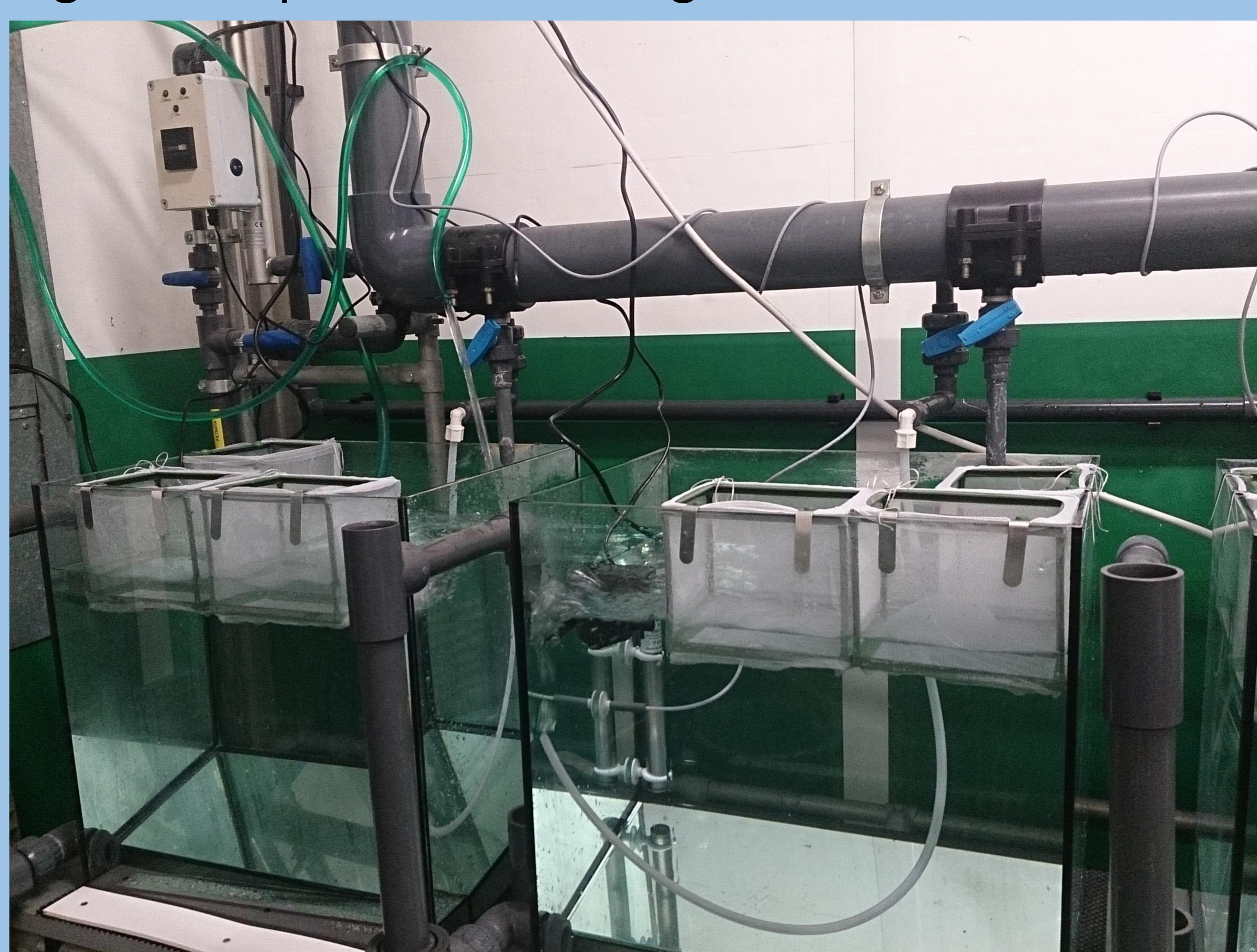
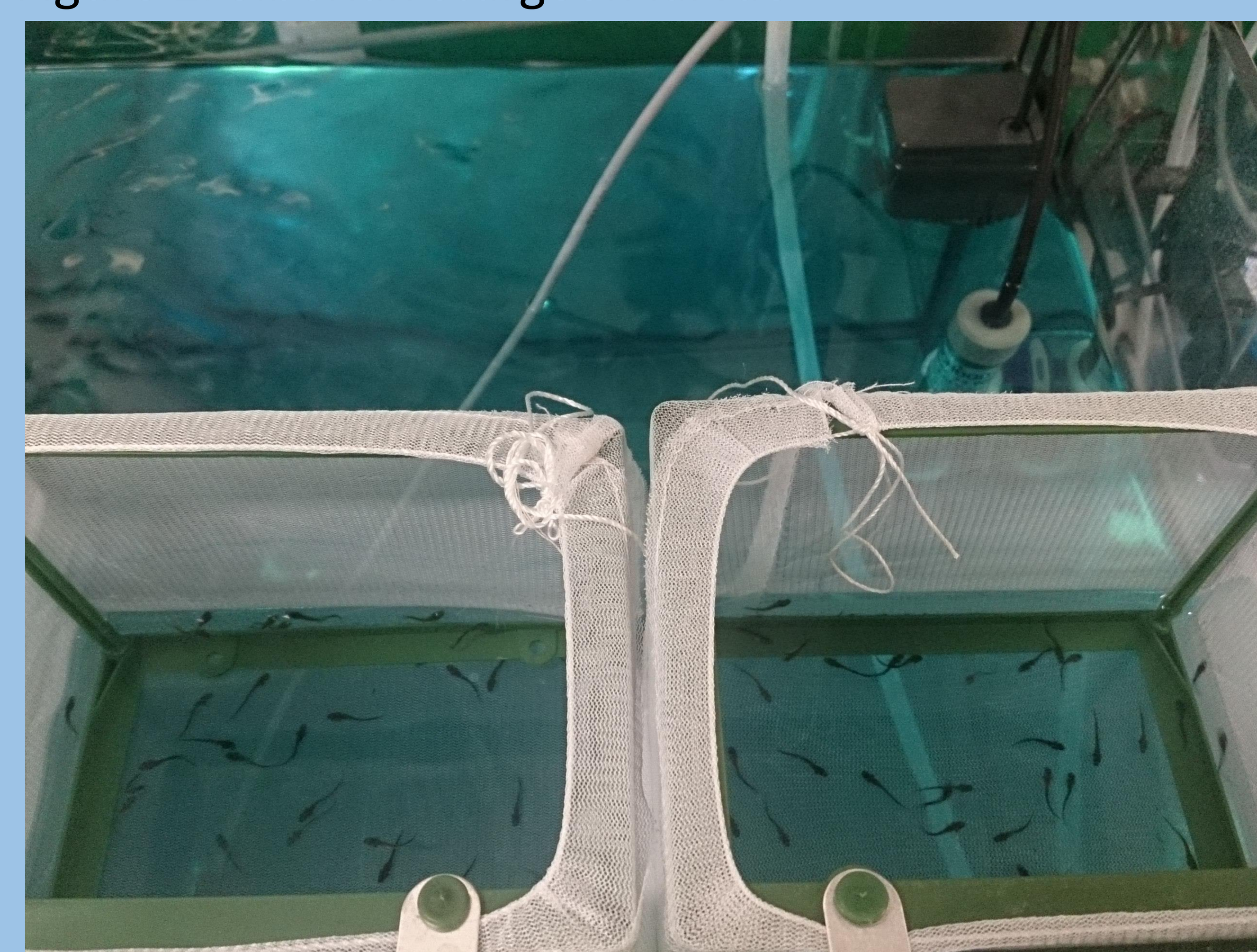


Figure 2. Siberian sturgeon larvae



The aim of present work was to investigate the fatty acid composition of yolk-stage Siberian sturgeon larvae reared at three different temperatures.

MATERIAL AND METHODS

A batch of fertilized Siberian sturgeon (*Acipenser baerii*) eggs were incubated at 16°C. At hatching they were divided into 3 groups and reared at the temperature of 16, 19 and 22 °C, 3 replicates per temperature, without feeding (Figure 1). At the end of the absorption of yolk sack 10 larvae were sampled from each aquaria (Figure 2). Larvae were weighted and lipid content was determined by chloroform methanol extraction. Fatty acid composition was determined by GC-FID analysis. Results were statistically analyzed by SPSS 24.0 software

RESULTS

Larval development has been influenced by temperature, since larvae reared at higher temperature grew faster. No difference was recorded for mortality, weight and lipid content of larvae (Table 1). The fatty acid composition of larvae resulted affected by temperature (Table 2). Larvae reared at 16°C presented a lower amount of saturated fatty acids, due to a low palmitic acid content, offset by a higher level of linolenic and linoleic acid, if compared with larvae reared at 19°C and 22°C.

CONCLUSIONS

Siberian sturgeon larvae lipid metabolism has been affected by temperature. Larvae reared at the lowest temperature consumed rather saturated fatty acid to obtain energy, sparing polyunsaturated fatty acid, more precious to maintain membrane fluidity. Results suggests that even in their first days of life Siberian sturgeon have the ability to select which fatty acids to use to meet their energy needs. This findings could be useful to formulate adequate feed according to the water temperature condition.

Table 1. Duration of experiment, larvae mortality, weight and lipid content

	16°C	19°C	22°C
Days to compete yolk absorption	9	8	7
Survival rate (%)	89.39	88.23	90.21
Weight (mg)	33.7±3.61	34.7±1.77	36.9±1.11
Lipid content (mg)	2.0±0.03	2.1±0.04	2.0±0.27

Table 2. Fatty acid composition (g/100g) of sturgeon larvae reared at different temperature. Data are expressed as mean ±St. Dev.

	16° C	19°C	22°C
14:0	0.40±0.014	0.41±0.011	0.41±0.024
16:0	18.72±0.175[a]	19.18±0.205[b]	19.24±0.227[b]
16:1 n-7	2.48±0.073	2.48±0.043	2.44±0.119
17:0	0.21±0.008	0.22±0.004	0.22±0.013
16:3 n-4	0.15±0.004	0.15±0.005	0.15±0.008
16:4 n-1	0.28±0.024	0.28±0.015	0.28±0.009
18:0	4.73±0.118	4.74±0.079	4.87±0.290
18:1 n-9	36.64±0.304	36.81±0.100	36.81±0.298
18:1 n-7	2.92±0.004[a]	2.95±0.012[b]	2.95±0.018[b]
18:2 n-6	9.20±0.062[b]	9.04±0.040[a]	9.09±0.047[a]
18:3 n-6	2.20±0.058	2.17±0.019	2.19±0.044
18:3 n-3	1.35±0.014[b]	1.31±0.010[a]	1.30±0.023[a]
18:4 n-3	0.49±0.012	0.49±0.009	0.50±0.023
20:1 n-11	0.91±0.006	0.90±0.008	0.89±0.019
20:2 n-6	0.36±0.003[b]	0.35±0.002[a]	0.34±0.008[a]
20:3 n-6	0.61±0.007	0.60±0.013	0.60±0.004
20:4 n-6	3.72±0.090	3.63±0.038	3.60±0.163
20:4 n-3	0.19±0.003	0.17±0.001	0.12±0.101
20:5 n-3	1.74±0.030	1.68±0.018	1.66±0.052
21:5 n-3	0.18±0.007	0.20±0.002	0.13±0.115
22:5 n-3	0.39±0.012	0.41±0.016	0.39±0.015
22:6 n-3	12.13±0.360	11.82±0.270	11.82±0.427
SFA	24.05±0.156[a]	24.55±0.180[b]	24.74±0.223[b]
MUFA	42.95±0.364	43.14±0.124	43.09±0.413
PUFA	33.00±0.362	32.31±0.304	32.17±0.371
n-3	15.99±0.373	15.59±0.287	15.42±0.319
n-6	16.09±0.047	15.79±0.054	15.82±0.100
n3/n6	0.99±0.025	0.99±0.019	0.97±0,017

Values in the same row that do not have the same superscript are significantly different at P ≤ 0.05, ANOVA and Student-Newman-Keuls post hoc test