



UNIVERSITY OF LIFE SCIENCES "KING MIHAI I" FROM
TIMISOARA

"YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH
IN APPLIED LIFE SCIENCES"

13-14 November, 2025



"Young people and multidisciplinary
research in applied life sciences"

EXTERNAL MORPHOMETRIC ASSESSMENT OF A 1.5-YEAR-OLD
STERLET (*ACIPENSER RUTHENUS*) POPULATION, REARED IN A RECIRCULATING
AQUACULTURE SYSTEM

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Abstract:

The sterlet (*Acipenser ruthenus*), one of the smallest species within the *Acipenseridae* family, is a freshwater sturgeon of significant ecological and economic value. Its rapid growth rate, early maturation, and high-quality meat are the main factors that have led to the widespread cultivation of this species in numerous fish farms, particularly those practicing intensive rearing in recirculating aquaculture systems (RAS). Rearing sterlet under controlled conditions is also considered a sustainable approach to the conservation of natural populations, as fish farms can provide biological material for restocking programs. The main objective of this study was to evaluate the external morphometric characteristics of a 1.5-year-old sterlet population reared in a recirculating aquaculture system. To achieve this, morphometric measurements were carried out on 30 sterlet specimens of 1.5 years of age, reared exclusively under RAS conditions at the „Pădurea Verde” Fish Farm, part of the Didactic Station of Timișoara. The recorded data were statistically processed and used to determine the main body indices describing the population’s conformation, proportionality and condition. In addition, correlations among the principal morphometric traits were analyzed and interpreted. The results revealed a harmonious body development and low variability within the analyzed group, specific to RAS rearing conditions where environmental parameters and feeding are strictly controlled. The results also contribute to a better understanding of the morphometric particularities of sterlet reared under intensive conditions and provide a scientific reference framework for future studies on the growth dynamics of this species.

Keywords: body indices, correlations

• Material and method

Biometric measurements

Thirty healthy sterlet specimens (*Acipenser ruthenus*), 1 year and 6 months old, reared under controlled conditions in a recirculating aquaculture system (RAS) at the “Pădurea Verde” Fish Farm, USV “King Michael I” of Timișoara.

Measurements performed

The biometric measurements were carried out according to the methodology described by Bura & Grozea (1997) and illustrated in Figures 1–3.

Data analysis:

The recorded data were processed in Microsoft Excel and IBM SPSS Statistics 26. Descriptive statistics (mean, SD, CV) and Pearson correlation analysis were applied to evaluate variability, uniformity, and the relationships among morphometric parameters.

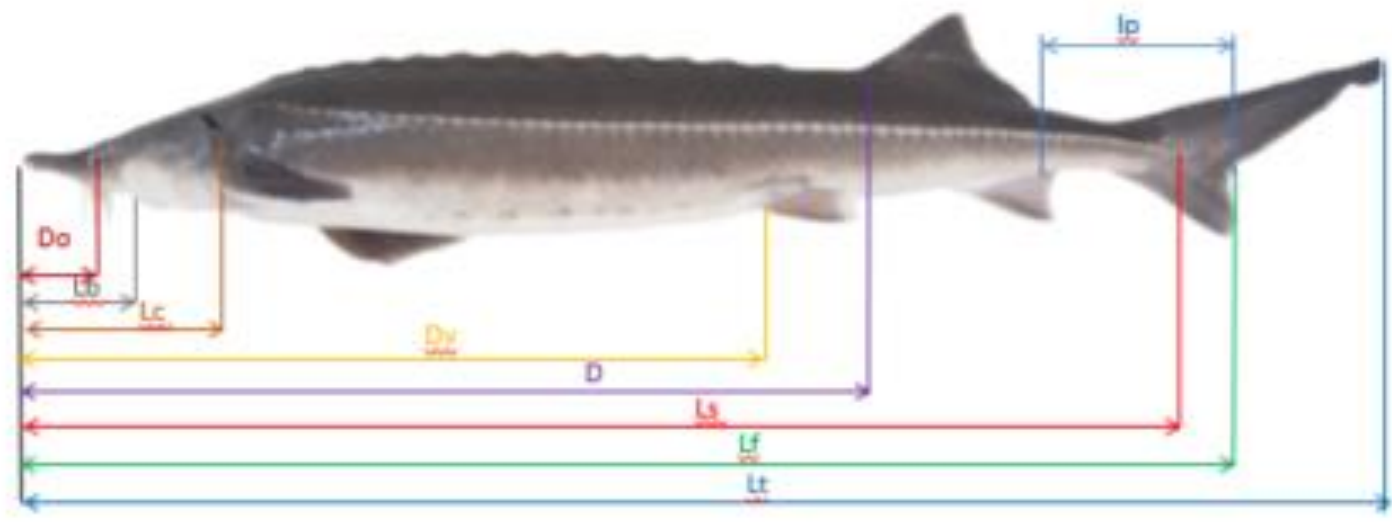


Fig. 1 Schematic representation of the main body lengths used in the morphometric analysis of sterlet specimens. Total length (Lt), Standard length (Ls), Fork length (Lf), Predorsal distance (D), Preventral distance (Dv), Head length (Lc), Snout length (Lb), Preorbital distance (Do), Caudal peduncle length (lp).



Fig. 2 Schematic representation of the main body heights and fin lengths used in the morphometric analysis of sterlet specimens. Maximum body height (H), Body girth/perimeter (p), Minimum body height (h), Head height (hc), Ventral fin height (hv), Dorsal fin base length (ld), Maximum dorsal fin height (hd), Anal fin base length (la), Upper caudal fin lobe length (lcs), Lower caudal fin lobe length (lci).



Fig. 3 Schematic representation of the main head region lengths and pectoral parameters used in the morphometric analysis of sterlet specimens. Eye diameter (do), Barbel length (lm), Interorbital space (F), Head width (lat. c), Left pectoral fin height (hps), Right pectoral fin height (hpd).

• Results

Mean values of the main body morphometric parameters in the analyzed sterlet specimens

Specification	Mean	SD	SEM	CV	SEM%
Body mass (BM)	723.37	80.48	14.69	11.13	2.03
Total length (Lt)	55.71	1.73	0.32	3.10	0.57
Standard length (Ls)	45.54	1.55	0.28	3.41	0.62
Fork length (Lf)	49.20	2.21	0.40	4.50	0.82
Caudal peduncle length (lp)	8.83	0.47	0.09	5.34	0.97
Maximum body height (H)	7.07	0.36	0.07	5.07	0.93
Minimum body height (h)	1.95	0.17	0.03	8.92	1.63
Body girth (p)	18.84	1.46	0.27	7.73	1.41
Predorsal distance (D)	34.14	1.15	0.21	3.36	0.61
Preventral distance (Dv)	28.98	2.00	0.36	6.89	1.26

Mean values of the main fin morphometric parameters in the analyzed sterlet specimens

Specification	Mean	SD	SEM	CV	SEM%
Right pectoral fin height (hpd)	6.23	0.49	0.09	7.82	1.43
Left pectoral fin height (hps)	6.21	0.39	0.07	6.36	1.16
Right ventral fin height (hvd)	2.87	0.39	0.07	13.54	2.47
Left ventral fin height (hvs)	2.84	0.42	0.308	14.65	2.68
Maximum dorsal fin height (hd)	3.37	0.39	0.07	11.72	2.14
Dorsal fin base length (ld)	5.71	0.45	0.08	7.89	1.44
Anal fin base length (la)	2.49	0.31	0.06	12.41	2.26
Upper caudal fin lobe length (lcs)	12.21	0.86	0.16	7.06	1.29
Lower caudal fin lobe length (lci)	5.61	0.72	0.13	12.75	2.33

Mean values of the body condition indices determined in the sterlet specimens from the analyzed group

Specification	Mean	SD	SEM	CV	SEM%
Body profile index (lp)	6.45	0.32	0.06	4.97	0.91
Fulton’s condition factor (K)	0.77	0.07	0.01	9.00	1.64
Quality index (lca)	2.43	0.16	0.03	6.72	1.23
Fleshiness index (lc)	19.41	1.12	0.20	5.78	1.06

Correlations among the main morphometric variables of the sterlet specimens from the analyzed group

Mean values of the main head region morphometric parameters in the analyzed sterlet specimens

Specification	Mean	SD	SEM	CV	SEM%
Head length (Lc)	11.44	0.69	0.13	6.02	1.10
Snout length (Lb)	6.34	0.50	0.09	7.84	1.43
Preorbital distance (Do)	5.76	0.51	0.09	8.83	1.61
Head height (hc)	2.39	0.23	0.04	9.66	1.76
Head width (lat. C)	5.05	0.32	0.06	6.43	1.17
Eye diameter (do)	0.49	0.07	0.01	14.02	2.56
Interorbital space (F)	3.02	0.15	0.03	4.85	0.89
Mouth width (lat. g)	2.04	0.15	0.03	7.35	1.34
Barbel length (lm)	1.66	0.20	0.04	12.14	2.22

Specification	Body mass (BM)	Total length (Lt)	Standard length (Ls)	Fork length (Lf)	Caudal peduncle length (lp)	Maximum body height (H)	Body girth (p)	Head length (Lc)	Head height (hc)	Head width (lat. C)
Body mass (BM)	-	0.536**	0.655**	0.597**	0.089	0.743**	0.687**	0.460*	0.240	0.233
Total length (Lt)	0.536**	-	0.846**	0.603**	0.049	0.285	0.440*	0.513**	0.338	0.095
Standard length (Ls)	0.655**	0.846**	-	0.755**	0.183	0.352	0.444*	0.557**	0.393*	0.226
Fork length (Lf)	0.597**	0.603**	0.755**	-	0.078	0.363*	0.426*	0.560**	0.425*	0.362*
Caudal peduncle length (lp)	0.089	0.049	0.183	0.078	-	-0.074	-0.046	-0.015	0.421*	-0.136
Maximum body height (H)	0.743**	0.285	0.352	0.363*	-0.074	-	0.533**	0.427*	0.092	0.223
Body girth (p)	0.687**	0.440*	0.444*	0.426*	-0.046	0.533**	-	0.565**	0.282	0.452*
Head length (Lc)	0.460*	0.513**	0.557**	0.560**	-0.015	0.427*	0.565**	-	0.376*	0.504**
Head height (hc)	0.240	0.338	0.393*	0.425*	0.421*	0.092	0.282	0.376*	-	0.246
Head width (lat. C)	0.233	0.095	0.226	0.362*	-0.136	0.223	0.452*	0.504**	0.246	-
**. Correlation is significant at the 0.01 level										
*. Correlation is significant at the 0.05 level										

• Conclusions

The results revealed a harmonious body development and low variability within the analyzed group, specific to RAS rearing conditions where environmental parameters and feeding are strictly controlled. The results also contribute to a better understanding of the morphometric particularities of sterlet reared under intensive conditions and provide a scientific reference framework for future studies on the growth dynamics of this species.