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EXTERNAL MORPHOMETRIC CHARACTERIZATION OF 18-MONTH-OLD EUROPEAN CATFISH (*SILURUS GLANIS*), REARED IN A RECIRCULATING AQUACULTURE SYSTEM

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Abstract: The European catfish (*Silurus glanis*) is a valuable freshwater species for aquaculture due to its growth potential, adaptability to controlled conditions, and commercial value. Rearing this species in a recirculating aquaculture system (RAS) allows the maintenance of optimal environmental conditions and supports the production of uniform, well-developed stocks. The main objective of this study was to evaluate the external morphometric characteristics of a population of European catfish aged 18 months, reared in a recirculating aquaculture system. For this purpose, 30 specimens from the “Pădurea Verde” Fish Farm, belonging to the Didactic Station of Timișoara, were analyzed. Standard morphometric measurements were recorded for each individual, and the resulting data were statistically analyzed to determine the main morphometric parameters, body indices, and the relationships between body length and body weight. The results revealed proportional body development and a high degree of uniformity within the analyzed population. The mean body weight was 759.20 ± 99.81 g, while the mean total length was 47.20 ± 2.09 cm. Most of the analyzed parameters exhibited low coefficients of variation, indicating limited individual variability. Body indices, head measurements, and fin parameters also showed low variability, supporting the uniform development of the analyzed stock. The relationship between body weight and total length was described by the equation $W = 0.0942 \times L^{2.3319}$, with a coefficient of determination of $R^2 = 0.6306$. The exponent value $b = 2.3319$ indicates a negative allometric growth pattern, characterized by a more pronounced increase in length relative to body weight. In addition, Pearson correlation analysis revealed significant relationships between body weight and the main morphometric parameters, including total length, standard length, maximum body height, and body perimeter. The obtained results contribute to the external morphometric characterization of European catfish reared in RAS and provide valuable information for the optimization of rearing technologies in intensive aquaculture systems.

Material and method

Biometric measurements

Thirty healthy specimens of European Catfish (*Silurus glanis*), aged 1 year and 6 months, reared under controlled conditions in a recirculating aquaculture system (RAS) at the “Pădurea Verde” Fish Farm, part of the University of Life Sciences “King Michael I” from Timișoara, were used for biometric measurements.

Measurements performed

The biometric measurements were performed according to the standard methodology used in fish biometric analyses, as illustrated in Figures 1–3..

Data analysis:

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

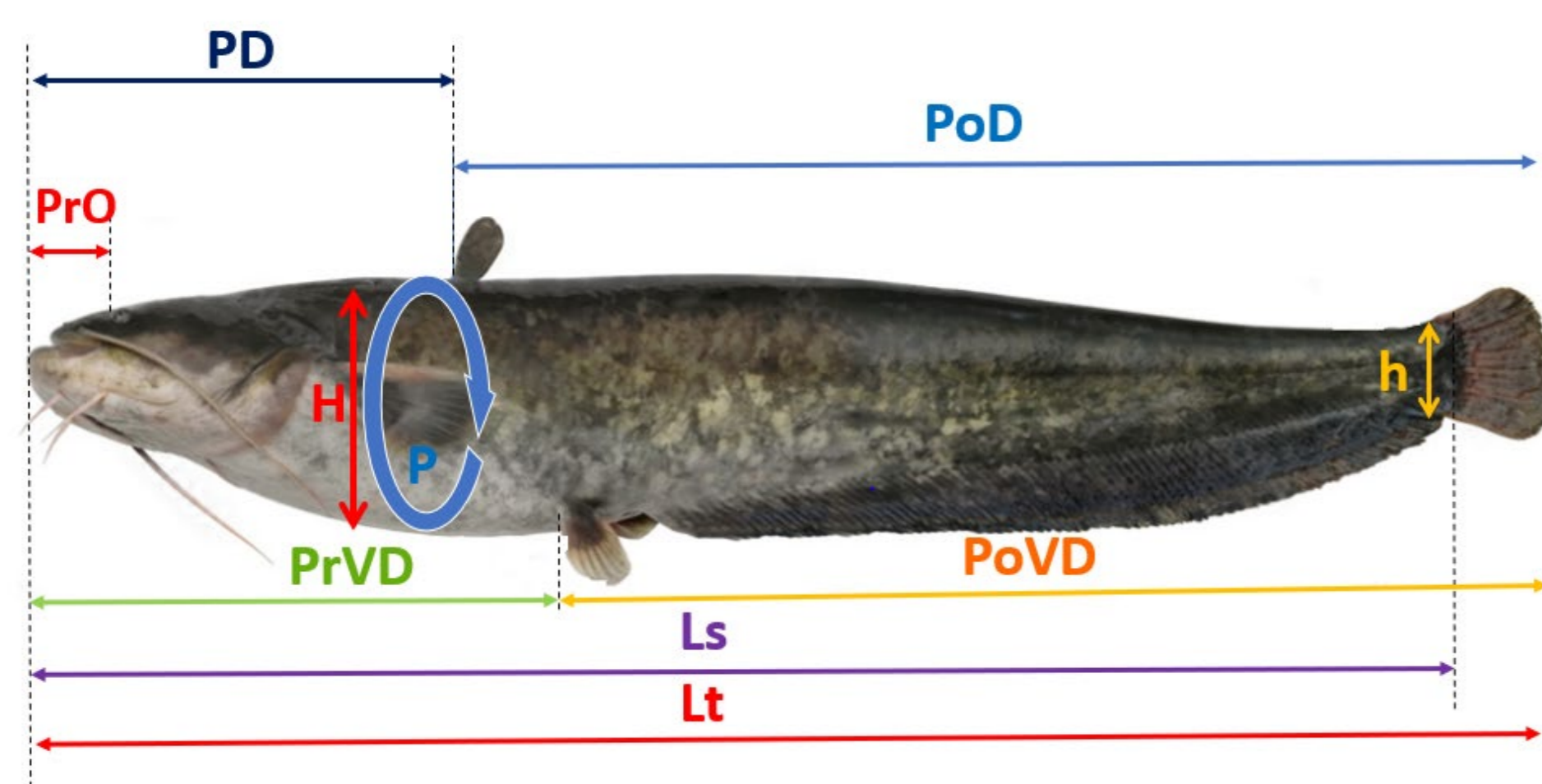


Fig. 1 Schematic representation of the main body lengths, heights, and perimeter used in the morphometric analysis of European catfish specimens. Total length (TL), Standard length (SL), Preventral distance (PrVD), Postventral distance (PoVD), Preorbital distance (PrO), Predorsal distance (PD), Postdorsal distance (PoD), Maximum body height (H), Minimum body height (h), Body perimeter (P)

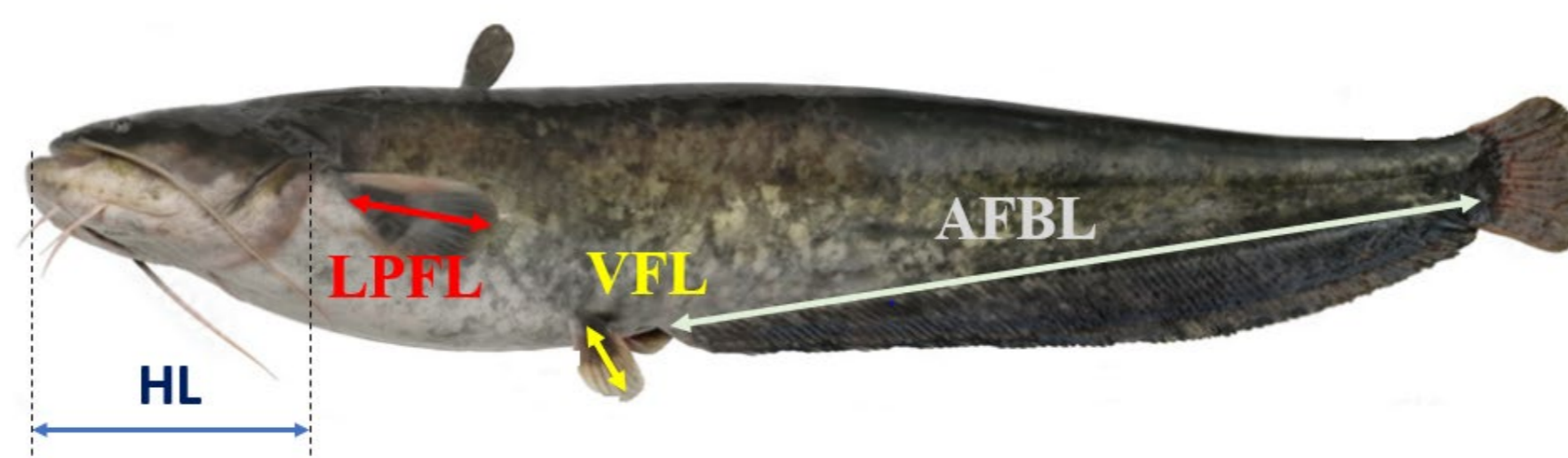


Fig. 2 Schematic representation of head length and the main fin lengths used in the morphometric analysis of European catfish specimens. Head length (HL), Left pectoral fin length (LPFL), Ventral fin length (VFL), Anal fin base length (AFBL)

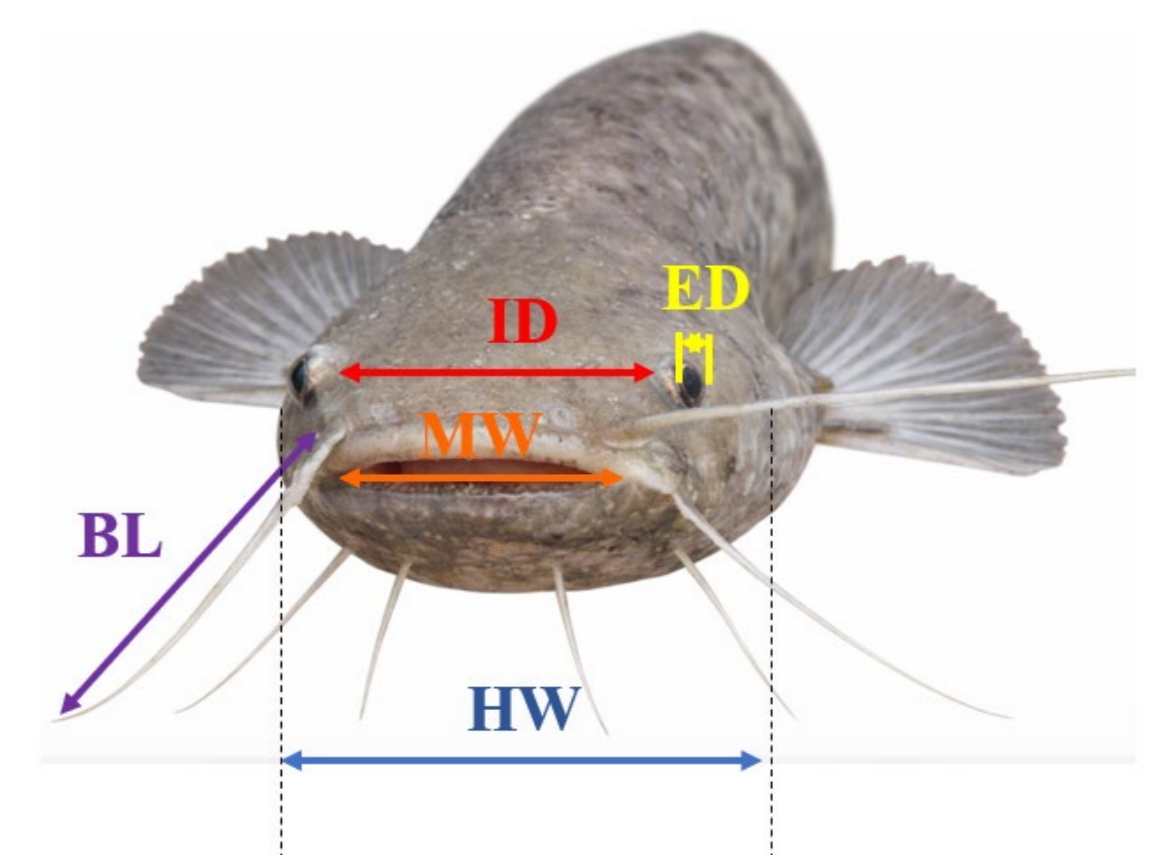


Fig. 3 Schematic representation of the main measurements of the head region and eye diameter used in the morphometric analysis of European catfish specimens. Eye diameter (ED), Barbel length (BL), Interorbital distance (ID), Head width (HW), Mouth width (MW)

Results and discussions

Mean values of the main body morphometric parameters in the analyzed European catfish specimens

Specification	Mean	SD	SEM	CV	SEM%
Body mass (BM)	759.20	99.81	18.22	13.15	2.40
Total length (TL)	47.20	2.09	0.38	4.43	0.81
Standard length (SL)	44.38	2.07	0.38	4.66	0.85
Maximum body height (H)	7.42	0.54	0.10	7.29	1.33
Minimum body height (h)	3.25	0.41	0.07	12.52	2.29
Body perimeter (P)	20.18	1.14	0.21	5.65	1.03
Predorsal distance (PD)	12.80	0.61	0.11	4.76	0.87
Postdorsal distance (PoD)	34.28	1.70	0.31	4.97	0.91
Preventral distance (PrVD)	15.19	0.64	0.12	4.21	0.77
Postventral distance (PoVD)	31.84	1.64	0.30	5.15	0.94

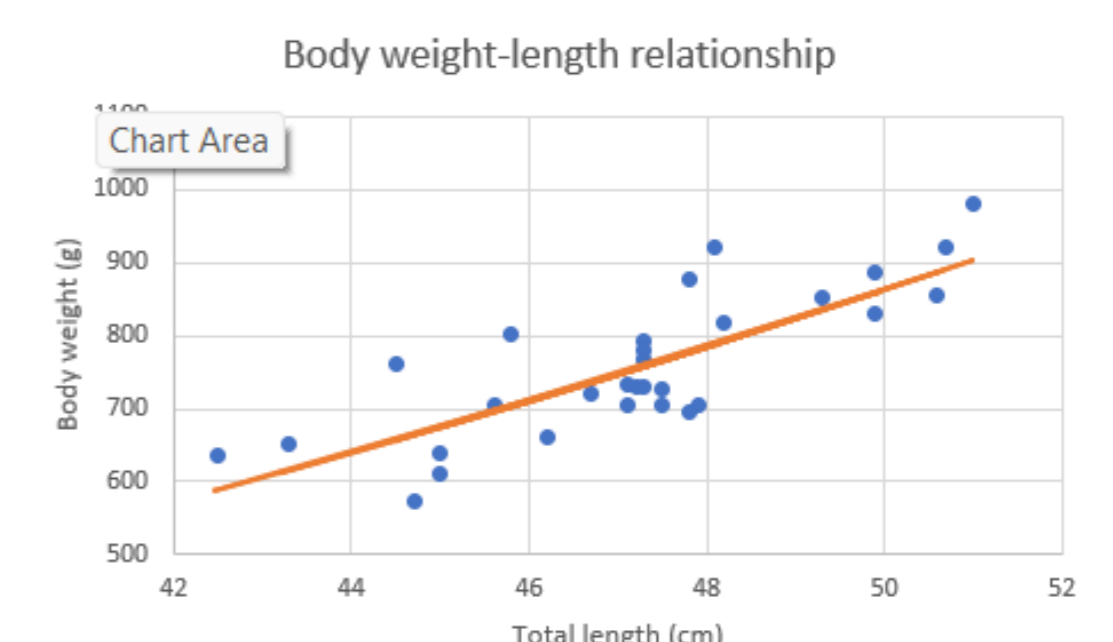
Mean values of the main fin morphometric parameters in the analyzed European catfish specimens

Specification	Mean	SD	SEM	CV	SEM%
Left pectoral fin length (LPFL)	4.14	0.37	0.07	8.92	1.63
Right pectoral fin length (RPFL)	4.11	0.29	0.05	7.10	1.3
Left ventral fin length (LVFL)	2.33	0.20	0.04	8.37	1.53
Right ventral fin length (RVFL)	2.38	0.24	0.04	9.99	1.82
Anal fin base length (AFBL)	25.34	1.78	0.32	7.02	1.28

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

Specification	Mean	SD	SEM	CV	SEM%
Head length (HL)	8.59	0.59	0.11	6.92	1.26
Preorbital distance (PrO)	2.58	0.32	0.06	12.5	2.28
Head width (HW)	6.83	0.36	0.07	5.25	0.96
Eye diameter (ED)	0.5	0.09	0.02	17.68	3.23
Interorbital distance (ID)	4.71	0.35	0.06	7.51	1.37
Mouth width (MW)	5.10	0.47	0.09	9.17	1.67
Right barbel length (BLr)	9.35	2.10	0.38	22.40	4.09
Left barbel length (BLl)	9.91	2.26	0.41	22.77	4.16

Body weight–length relationship in 1.5-year-old European catfish specimens



Correlations among the main morphometric variables of the European catfish specimens from the analyzed group

Specification	Body mass	Total length	Standard length	Predorsal distance	Postdorsal distance	Preventral distance	Postventral distance	Maximum body height	Minimum body height	Body perimeter
Body mass	1	0,798**	0,804**	0,808**	0,722**	0,824**	0,680**	0,760**	0,210	0,697**
Total length	0,798**	1	0,992**	0,899**	0,933**	0,774**	0,937**	0,427*	0,319	0,489**
Standard length	0,804**	0,992**	1	0,892**	0,934**	0,774**	0,932**	0,445*	0,289	0,505**
Predorsal distance	0,808**	0,899**	0,892**	1	0,784**	0,828**	0,769**	0,444*	0,43	0,542**
Postdorsal distance	0,722**	0,933**	0,34**	0,784**	1	0,661**	0,923**	0,453*	0,273	0,528**
Preventral distance	0,824**	0,774**	0,774**	0,28**	0,661**	1	0,600**	0,563**	0,428	0,568**
Postventral distance	0,680**	0,937**	0,932**	0,796**	0,923**	0,600**	1	0,368*	0,237	0,461*
Maximum body height	0,760**	0,427*	0,445*	0,444*	0,453*	0,563**	0,368*	1	0,121	0,689**
Minimum body height	0,210	0,319	0,289	0,343	0,273	0,428*	0,237	0,121	1	0,182
Body perimeter	0,697**	0,498**	0,505**	0,542**	0,528**	0,568**	0,461*	0,698**	0,182	1

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Mean values of the body indices determined in the European catfish specimens from the studied stock

Specification	Mean	SD	SEM	CV	SEM%
Profile index (Ip)	6.00	0.40	0.07	6.60	1.20
Fulton's condition factor (K)	0.87	0.08	0.01	8.77	1.60
Quality index (Ica)	2.20	0.11	0.02	5.15	0.94

Conclusions

The obtained results characterize a stock with good morphometric uniformity, harmonious body development, and balanced body conformation, which are typical features of specimens reared under controlled conditions.