



QUANTITATIVE SPLANCHNOLOGY STUDY ON EUROPEAN CATFISH (*SILURUS GLANIS*) RAISED IN RECIRCULATING AQUACULTURE SYSTEMS

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• Abstract

European catfish (*Silurus glanis*) is a species with considerable economic potential in aquaculture due to its adaptability and superior meat quality. The development of intensive breeding technologies has allowed the increase of production efficiency, making this species a viable choice for recirculating aquaculture systems (RAS) that have increased significantly in recent years in Europe and beyond. **The aim of the study was to highlight the anatomical peculiarities of the internal organs of European catfish raised in an intensive, closed-space recirculating aquaculture system (RAS), examining both morphological characteristics and quantitative splanchnology.** Five male catfish, aged 2 years and 10 months, were studied. Among the results obtained, it was noted that the fish raised in the RAS up to the age of slaughter did not accumulate perivisceral fat, and the segments of the digestive tract were reduced in size, likely due to a diet based on granulated compound feed. Thus, it can be said that the intensification of European catfish production has led to notable changes in the structure and function of internal organs, particularly within the digestive system, as a result of the feeding regime based on granulated dry feed. The particularities observed especially in the digestive tract reflect the adaptive responses of the fish to the environmental conditions and rearing practices used in intensive aquaculture.

• Materials and methods

Biometric measurements and dissection procedures:

Biological material: 5 male catfish, 2 years and 10 months, reared in a recirculating aquaculture system.

Measurements performed: Total length, standard length, head length, snout length, tail length, maximum body height, body girth, predorsal, preentral, preanal distances and body weight.

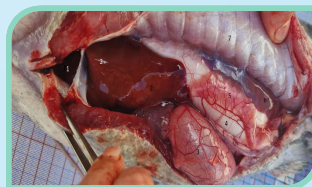
✓ Internal organs were measured and weighed according to literature information



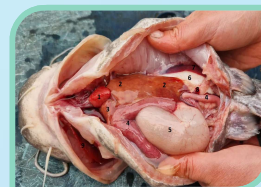
• Results and discussions

Biometric data of male European catfish in the study group (n = 5)

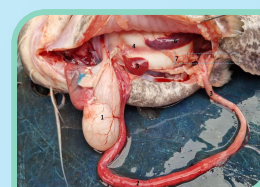
Specification	Total length (cm)	Standard length (cm)	Head length (cm)	Snout length (cm)	Tail length (cm)	Maximum body depth (cm)	Body girth (cm)	Predorsal distance (cm)	Preentral distance (cm)	Preanal distance (cm)	Body weight (cm)
MEAN	62.66	58.10	11.98	2.66	39.20	11.48	29.06	17.42	21.10	24.90	1.72
SD	4.60	4.81	0.68	0.56	3.02	0.73	1.69	1.91	1.84	2.14	0.35
SEM	2.06	2.15	0.30	0.25	1.35	0.33	0.75	0.86	0.82	0.96	0.16
CV	7.34	8.27	5.67	21.03	7.71	6.34	5.81	10.99	8.72	8.58	20.47
SEM%	3.28	3.70	2.54	9.41	3.45	2.84	2.60	4.92	3.90	3.84	9.16



1 - pericardial cavity; 2 - left lobe of the liver; 3 - stomach; 4 - swim bladder; 5 - testicle; 6 - kidneys; 7 - abdominal wall; 8 - spleen

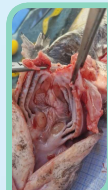


1 - heart; 2 - left lobe of the liver; 3 - right lobe of the liver; 4 - intestinal loops; 5 - stomach; 6 - swim bladder; 7 - kidneys; 8 - spleen; 9 - gills

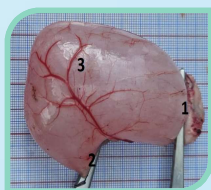


1 - stomach; 2 - middle intestine; 3 - posterior intestine; 4 - swim bladder; 5 - spleen; 6 - kidneys; 7 - gonads

Pharynx



Stomach



Data from quantitative splanchnology study of the digestive tract (n = 5)

Specification	Pharynx length (cm)	Esophagus length (cm)	Ø Esophagus (cm)	Esophagus mass (g)	Stomach volumetric capacity (ml)	Stomach mass (g)	Intestine length (cm)	Intestine volumetric capacity (ml)	Intestine mass (g)	Ø intestine (cm)		
										Anterior section	Median section	Posterior section
MEAN	5.54	2.50	1.06	2.62	56.00	16.60	64.36	56.50	21.60	1.72	0.92	1.01
SD	0.75	0.19	0.21	0.89	16.73	6.02	5.90	12.39	4.22	0.15	0.08	0.32
SEM	0.34	0.08	0.09	0.40	7.48	2.69	2.64	5.54	1.89	0.07	0.03	0.14
CV	13.60	7.48	19.56	34.07	29.88	36.29	9.17	21.93	19.53	8.62	8.24	31.78
SEM%	6.08	3.35	8.75	15.24	13.36	16.23	4.10	9.81	8.74	3.86	3.69	14.21

Liver quantitative splanchnology data (n = 5)

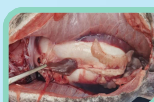
Specification	Left lobe length (cm)	Right lobe length (cm)	Left lobe width (cm)	Right lobe width (cm)	Liver mass with gall bladder (g)	Liver mass without gall bladder (g)
MEAN	9.56	5.24	3.68	3.12	29.20	26.00
SD	1.27	0.79	0.83	0.34	2.17	3.39
SEM	0.57	0.35	0.37	0.15	0.97	1.52
CV	13.26	15.06	22.61	10.96	7.42	13.04
SEM%	5.93	6.74	10.11	4.90	3.32	5.83



Liver

Data from the quantitative splanchnology study of some organs in the abdominal cavity of European catfish (n = 5)

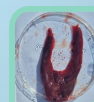
Specification	Spleen mass (g)	Kidney mass (g)	Kidney length (cm)	Testicles mass (g)	Heart mass (g)	Swim bladder			
						Length (cm)	Width (cm)	Volumetric capacity (ml)	Mass (g)
MEAN	1.16	9.00	7.84	4.00	2.28	10.00	5.48	56.60	12.40
SD	0.15	2.24	1.17	1.30	0.48	1.38	0.46	12.81	4.99
SEM	0.07	1.00	0.52	0.58	0.21	0.62	0.21	5.73	2.23
CV	13.07	24.85	14.92	32.55	20.90	13.84	8.40	22.64	40.26
SEM%	5.85	11.11	6.67	14.56	9.35	6.19	3.76	10.12	18.01



Spleen



Kidney



Testicles



Heart

• Conclusions

The fish used in the quantitative splanchnology study have an average length of 62.66 cm, a body mass of 1.72 kg, and a slaughter yield of 88.37%. The Fulton coefficient is 0.88, and the internal organs are easily visible due to the reduced perivisceral fat and include the heart, liver, spleen, stomach, intestines, gonads, kidneys, and swim bladder. The pharynx has a complex structure, essential for breathing and feeding. The esophagus is short and narrow, while the stomach has a small capacity due to feeding on granulated fodder. The intestine, adapted to a carnivorous diet, is slightly longer than the body and has three distinct regions. The liver is large, composed of two lobes, with the left lobe being larger, and has a mass of 29.02 g.