

DIETARY METHANE-UTILIZED BACTERIA (*Methylococcus capsulatus*) PROTEIN AS A REPLACEMENT FOR FISHMEAL IN DIETS FOR SIBERIAN STURGEON (*Acipenser baerii*)

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INTRODUCTION: A current trend to ensure the sustainability of the aquaculture sector is the increasing use of alternative ingredients for fishmeal in aquafeed. Single cell proteins (SCPs) from high-protein microorganisms are promising as an aquaculture nutrient supplement because of their rich amino acid profile and high protein content. Methanotroph bacterial protein meal (MCP), produced from the fermentation of *Methylococcus capsulatus* grown on natural gas, contains approximately 90% dry matter, over 73% crude protein, and more than 5% crude lipids, making it comparable to or superior to fishmeal. Therefore, this study was designed to assess the impact of partially replacing fishmeal with MCP in 25%, 50 and 75% on the performance and somatic indexes of Siberian sturgeon.

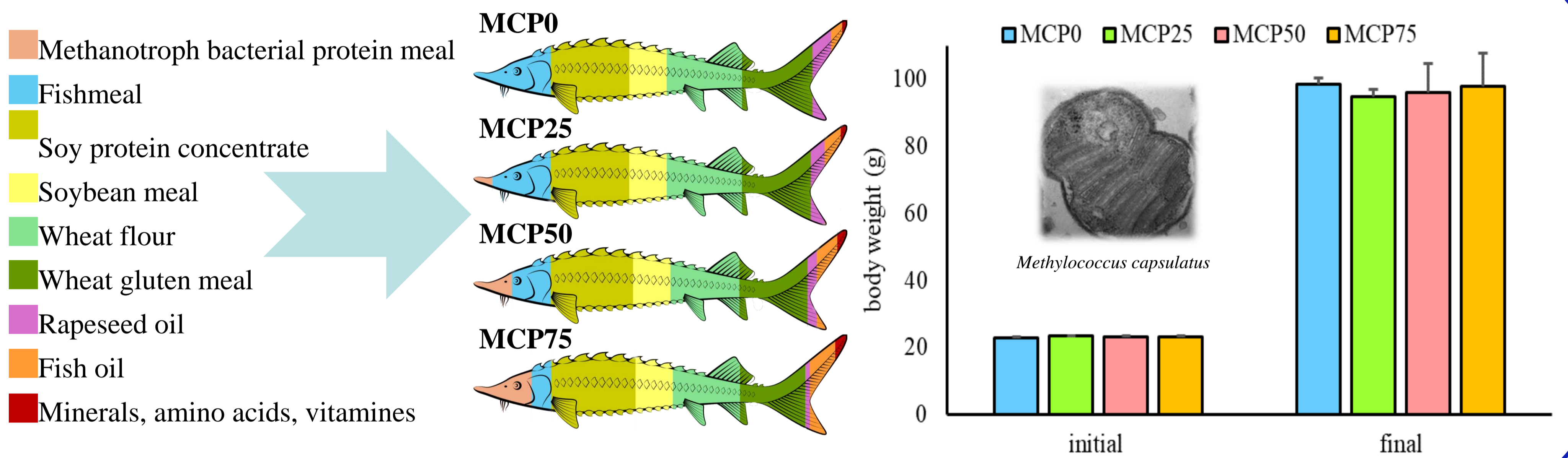


Fig. 1. Design of experimental feeds tested in Siberian sturgeon (*Acipenser baerii*) fed graded for 70 days.

Fig. 2. Initial and final body weight of Siberian sturgeon (*Acipenser baerii*) fed graded levels of methanotroph bacterial protein meal for 70 days.



Growth indices	units	Experimental diets				SEM	ANOVA p-value	Regression	
		MCP0	MCP25	MCP50	MCP75			p-value	ARS
Daily weight gain	(g/fish/day)	1.08	1.02	1.04	1.07	0.02	0.847	0.936	0.099
Specific growth rate	(%/day)	2.09	2.00	2.02	2.06	0.03	0.706	0.792	0.092
Feed intake	(g/fish/day)	0.74	0.72	0.73	0.74	0.004	0.259	0.69	0.081
Feed conversion ratio		0.82	0.85	0.93	0.97	0.02	0.084	0.007	0.48
Viscerosomatic index	(%)	6.29	6.38	6.38	6.74	0.12	0.623	0.223	0.056
Hepatosomatic index	(%)	1.63	1.71	1.72	1.95	0.05	0.08	0.016	0.399
Gastrointestinal index	(%)	4.02	3.83	3.79	4.03	0.08	0.678	0.985	0.099

Table1. Siberian sturgeon (*Acipenser baerii*)

Table1. Production performance, feed efficiency and somatic indexes of Siberian sturgeon (*Acipenser baerii*) fed graded levels of methanotroph bacterial protein meal for 70 days.

RESULTS:

- ✓ The inclusion of MCP did not have a significant effect on final body weight, daily weight gain, specific growth rate, feed intake, feed conversion ratio, visceral somatic index, hepatic somatic index, or gastrointestinal somatic index.
- ✓ Additionally, feeding sturgeons with dietary MCP did not impact survival rates after the 70-day trial.
- ✓ Positive correlation between MCP levels and hepatic somatic index was observed.

CONCLUSION:

- ✓ Research demonstrates that fishmeal can be effectively substituted with MCP at levels up to 75% without negative effects on fish performance or feed utilization. It is crucial, however, to closely monitor the hepatic index, as it is positively correlated with increased MCP levels.

MATERIALS AND METHODS:

- Four isoproteic (52 %), isolipidic (10%), and isoenergetic (18.4 MJ/kg) diets were formulated and extruded in a 3 mm diameter.
- All the diets were extruded by a commercial aquafeed manufacturer (Exot Hobby s.r.o, Černá v Pošumaví, Czech Republic) using a twin-screw extruder.
- Five hundred and forty Siberian sturgeon (23.15±0.35g) were randomly assigned in 300 L tanks (45fish/tank) connected to a recirculating system (total volume 11,400 L) and fed four diets (three replicates per diet) for 70 days.
- Fish were hand-fed twice daily, at 9:00 and 15:00, with an excessive amount of feed. Any uneaten feed was removed twenty minutes after each feeding and dried to measure the feed intake.

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