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Wpływ rodzaju pokarmu na wskaźniki hodowlane, rozwój układu pokarmowego i rozrodczego sterleta *Acipenser ruthenus* L.

Praca doktorska

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pod kierunkiem

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ENGLISH SUMMARY

The effect of food type on the rearing parameters, development of the digestive and reproductive tracts of the sterlet *Acipenser ruthenus* L.

Sterlet (*Acipenser ruthenus* L.) is the smallest sturgeon, considered as a model organism among all Acipenserids for biotechnological studies. In sturgeon aquaculture, sterlet ranks the third position in terms of production frequency, providing tasty meat and roe from which black caviar is produced. Biotechnological approaches for sturgeon reproduction and optimization of larval rearing techniques are crucial to developing a captive breeding program for these species.

Due to the increasing demand for sturgeon products (mostly meat and caviar), sturgeon culture is getting popular day by day. Therefore, the demand for sturgeon juveniles has increased in European countries for aquaculture purposes. Recently, considerable emphasis has been given on controlled reproduction and the development of effective larvae rearing methods to produce viable offsprings of sturgeons in captivity.
For developing the larval rearing technique, it is crucial to use appropriate research methods that enabling subjective identification of the growth parameters. The commonly used technique is the use of morphological indicators based on length or weight measurement. Another technique is the histological observation that enables an assessment of the developmental stages of the digestive tract, which indicates the readiness of the larvae for feeding and digestion. On the other hand, the most advanced techniques make it possible to track the development of organisms during the experimental research (e.g., selected rearing methods) at the molecular level and enable genomic manipulation research. Although research on the use of meiotic gynogenesis (based on genome manipulation) of sturgeon is highly advanced, primary data of feeding effects on the development of the digestive system and development of the reproductive system in sturgeons are still limited. Therefore, in this doctoral dissertation, experimentation was conducted based on the following hypotheses:

1. **Different types of food might affect the growth performance and development of the digestive system in sterlet *Acipenser ruthenus* L. at the early stage of ontogenetic development.**
2. **Meiotic gynogenesis, as a method of reproduction, might influence the differentiation and development of gonads in sterlet *Acipenser ruthenus* L.**

The main goals of the doctoral dissertation were achieved as a result of experimental and laboratory work, thus making it possible to obtain results on the impact of selected feeding methods on the growth performance and development of the sterlet digestive system. This study extended by studies regarding the influence of the applied nutritional variants on the breeding index of a sterlet subjected to meiotic gynogenesis. Additionally, an analysis of the development of the reproductive system of gynogenetic sterlets was performed where an experimentally developed feeding protocol was applied.

The results presented in this doctoral dissertation provide new information in regards to the impact of the applied feeding methods (based on live food and compound feed) on the breeding indicators and the development of selected "elements" of the digestive system (intestine, liver etc.) in sterlet subjected to meiotic gynogenesis. Histological analysis of gonads carried out during experimental rearing allowed the obtainment of the information regarding the sex ratio and the regularity of the development of reproductive system of gynogenetic sterlets in comparison with individuals from the control groups. The obtained results of the analysis of *Fox12* gene expression confirmed by previously determined (using the histological analysis of gonads) sex ratios of gynogenetic and controlled sterlet.

The present results proclaim a new scientific value, broadening the knowledge on the development of the digestive and reproductive systems of sturgeon fish. Additionally, this work contains an important practical aspect which, in the form of the developed feeding methods, can be directly applied in the aquaculture of sturgeon.

Keywords: sterlet, gynogenesis, *Artemia nauplii*, formulated diet, sex differentiation, gene expression