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Technical Note

Preliminary study on semi-closed incubator efficiency for hatching Persian sturgeon (*Acipenser persicus*) eggs

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Abstract: The present study investigated the efficiency of semi-closed incubator for hatching the Persian Sturgeon (*Acipenser persicus*) eggs. The incubator was basically designed according to Vase apparatus equipped with collector vessel, recirculation pump and aerator. 50% of water was changed every day. Triplicate groups of Persian Sturgeon (50 g) fertilized eggs were stocked in the incubators. Water flow rate was set not to harm the eggs and only circulating the eggs. The mortality of embryos and larvae at gasterula stage, formation of S-type heart stage, before hatching and hatching percent were recorded. Our results showed that semi-closed incubator circulated eggs completely and the probability of fungal infections was lower than that of flow through incubators. Since water used in semi-closed incubator is far less than that of flow through systems, thus semi-closed incubator may be a proper alternative for flow-through incubated systems in future.

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Introduction

Sturgeons are of extremely great commercial value and widely distributed in the northern hemisphere (Dettlaff et al., 1993). Sturgeon populations have suffered from over fishing, loss of habitat and decrease of water quality (Kynard, 1997). Severe decline of sturgeon populations in the Caspian Sea resulted in artificial propagation, especially for *Huso huso* and *Acipenser persicus*, in Iran (Pourkazemi, 1997).

Incubation period is a critical stage in artificial propagation of sturgeons. Before 1950, the eggs were incubated in river using Seth–Green incubators (Yushchen, 1957). To resolve several limitation of this device, the first out of water incubator was built by Yushchenko in 1952. After that other devices (e.g. Osetr, McDonald, Azarakhsh) invented for incubation of sturgeon eggs but still the most popular incubator in Iran is the Yushchenko (Yushchen, 1957; Azari Takami and Kohnehshahri, 1974). In most of mentioned incubators, constant water flow maintain oxygen for eggs and embryos which consumes large amount of water (Farabi et al., 2007). Development of incubators with a circulating system would be of tremendous benefit for hatcheries especially in areas with circulating water sources. Hence, this study was conducted to investigate efficiency of semi-closed incubator with circulating water system for Persian sturgeon (*Acipenser persicus*) eggs.

Materials and Methods

Eggs and sperm provided from migratory breeders of the southern Caspian Sea (Golestan Province). After fertilization and removing adhesiveness, 150 g eggs were stocked in three incubators with semi-closed

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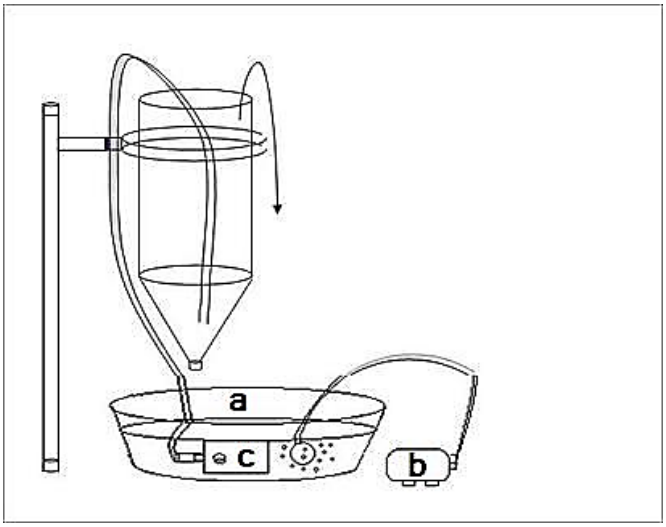

Figure 1. Schematic design of the semi-closed incubator: a, collector vessel; b, aeration pump; c, water recirculation pump.

water system. The incubator was a 5L jar, equipped with collector vessel, recirculation pump and aerator (Fig.1).

Circulative water was changed with freshwater by half every day. Water flow set at the rate that caused not harm to the eggs but circulating them gently. The Mortality of embryo and larvae at blastula and gastrula stage, total mortality percent of eggs during incubation period and survival rate of larvae during 15 day post hatch were recorded and compared with the other kind of incubators.

Results

Egg hatchability: Hatching occurred four days after fertilization (120 h). The Mortality of embryo and larvae at blastula and gastrula stages, and hatching percent of eggs were 64.06±3.85, 18.06±0.85, 88.22±3.81, respectively.

Mortality of larvae: Cumulative Mortality of larvae before and after exogenous feeding was 7.29% and 10.23%, respectively. Survival percent of larvae up to 15 days post hatch was 88.62% (Fig. 2).

Discussion

Our results showed that Persian sturgeon eggs can successfully develop and hatch in semi-closed incubator with much lower need of water. As water circulated the eggs completely in this system, the probability of fungal infections would be lower than

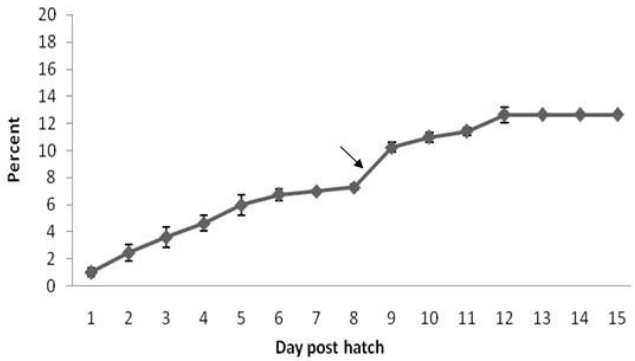

Figure 2. Cumulative mortality of larvae during 15 days post hatch (the intonation of exogenous feeding is shown by an arrow).

flow-through incubators and the unfertilized eggs were omitted automatically.

Circulation provided uniform water temperature and quality (the two major factors influences embryos mortality and abnormality) compared to other incubators. Other incubators use river water that that should pass a boiler when the environment temperature becomes cold (Abdolhay, 2006). Since water used in semi-closed incubator is much lower than other incubators (e.g. Osetr, Yushchenko and Azarakhsh), it is a good alternative where water is limited. In addition incubation in separate batch of eggs reduces the risk of disease transfer (AzariTakami and Kohnehshahri, 1974).

Although this incubation system shows some beneficial aspect, but it is mainly depend on electricity force. Further studies are needed to address the use of this incubator for various sturgeon species.

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