

Testicular harvest as a tool to increase milt availability in Sauger (*Sander canadensis*)

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Production of Saugeye (*Sander vitreus* x *S. canadensis*), a popular sport fish with large economic impact, is frequently hindered by flooding due to variable spring weather patterns. As a result, the number of male Sauger (*S. canadensis*) available for milt collection is limited and the production of Saugeye is compromised. Testicular harvest is used in some species of fish as an alternative to traditional strip spawning and has shown that a large quantity of sperm remains in the sperm duct after milt collection. Therefore, the objective of this study was to compare Sauger sperm quantity and quality between strip-spawn (SS) and testicular harvest (TH) methods. We hypothesized that higher numbers of sperm could be collected by TH compared to SS. However, the sperm quality would be reduced after TH compared to SS. On the first day of the study (Day 0), milt was collected from 20 wild-caught male Sauger using the SS technique. On Day 5, fish were randomly divided into two groups: Group TH: fish (n=10) were euthanized and milt was collected by TH; Group SS-TH: milt was collected by SS (n=10). Five days later (Day 10), the same fish were euthanized and milt was collected by TH. We evaluated total sperm production, and sperm quality [total motility (TM), progressive motility (PM), velocity (VAP), viability (VIA), and morphology] for each sample. Data were analyzed using ANOVA and linear mixed models. Significance was set at $p < 0.05$. A significant reduction in sperm volume (0.22 ± 0.03 mL vs. 0.11 ± 0.03 mL) and total sperm production ($10.58 \pm 1.64 \times 10^9$ vs. $4.82 \pm 1.83 \times 10^9$ sperm) was observed between the first and second SS collections. Both sperm quantity and quality were different between sperm collected by TH or SS. Total motility (70.11 ± 2.11 % vs. 44.27 ± 5.68 %) and PM (18.49 ± 1.63 % vs. 8.05 ± 1.43 %) were higher in TH sperm than in SS sperm, respectively. TH samples contained fewer morphologically normal sperm (76.41 ± 1.28 %) than SS sperm (92.83 ± 0.96 %). Overall, TH increased the total number of sperm collected ($55.40 \pm 3.55 \times 10^9$ sperm) compared to SS ($7.71 \pm 2.67 \times 10^9$ sperm). A single SS collection followed by TH (Group TH) resulted in an approximately 10-fold increase in the number of motile and morphologically normal sperm compared to two sequential SS collections ($39.45 \pm 4.10 \times 10^9$ vs. $3.61 \pm 4.10 \times 10^9$ sperm). Addition of a second stripping prior to TH (Group SS-TH) did not significantly increase sperm production compared to Group TH ($39.45 \pm 4.10 \times 10^9$ vs. $31.14 \pm 4.90 \times 10^9$ sperm, respectively). The significant increase in sperm harvest efficiency obtained in the Group TH may allow for adequate Saugeye production even when a limited number of male Sauger is available. In addition, TH provides additional sperm that could potentially be cryopreserved to maintain stable Saugeye production independent of adverse weather conditions.

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