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# Ultrasound helps stage sturgeons for caviar production

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By Brian C. Donahower, Ph.D. , Steve DuMond , Leo Ray , Linda Lemmon , Gary Fornshell , Terry Patterson , Jodi Rockett , Madison S. Powell and Wendy M. Sealey

## Technique valuable for determining gestational age, fetal viability



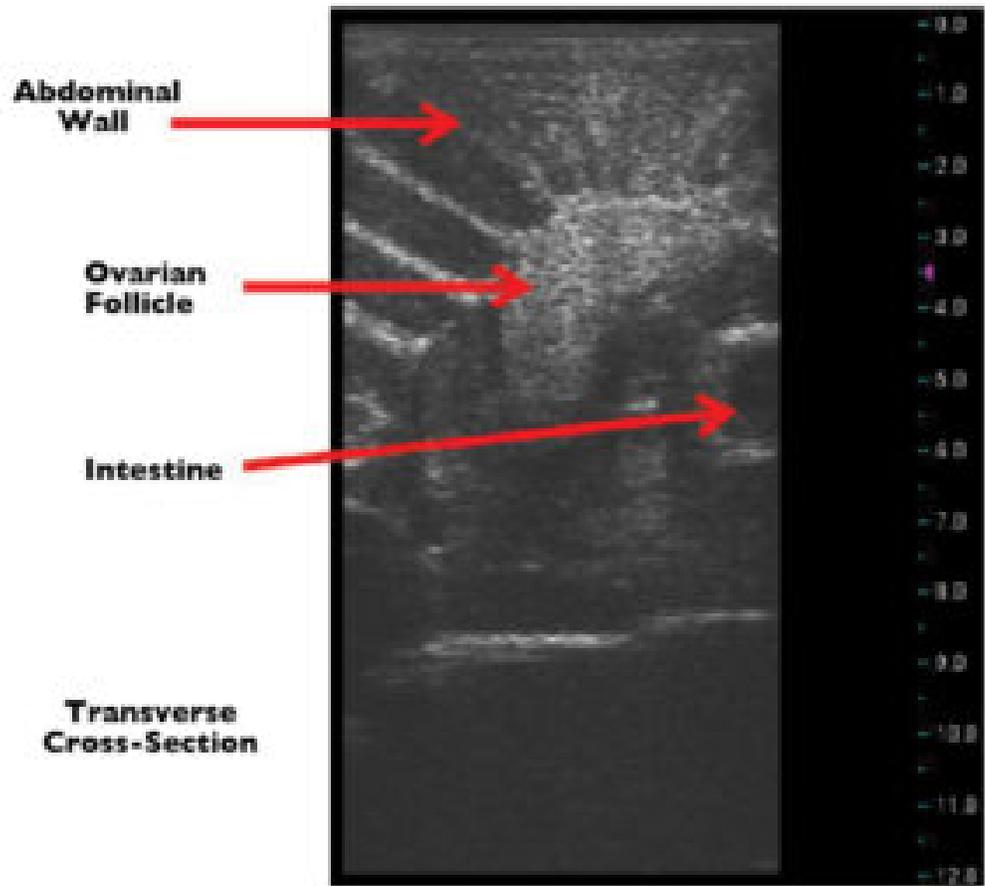
Caviar eggs removed from the abdomen of a mature female white sturgeon.

Currently, the only means of sexing sturgeons and measuring oocyte maturity involves biopsying the reproductive tissue of mature sturgeons and measuring its oocyte polarization index (P.I.). P.I. is the measure of the position of the germinal vesicle (nucleus) relative to the animal pole. Initial P.I. measurements are used to determine when during the year the eggs will reach spawning readiness. Generally, optimal caviar yield and quality are reached when the P.I. is 0.10 to 0.12.

Biopsying requires anesthetizing the sturgeons. It is a labor-intensive and invasive procedure in which a 1-cm incision is made along the abdominal wall, and gonad tissue is aspirated. Consequently, this procedure stresses the fish and results in scarring and other undesirable effects.

Due to the time-consuming nature of these procedures, biopsy and P.I. measurements are generally only performed once in the fall to predict the timing of oocyte harvest the following winter and spring. However, P.I. measurements are highly variable among mature females and are not always an accurate predictor of egg maturity, often resulting in improper timing of harvests, decreasing caviar yield and quality, and increasing rates of resorption of eggs.

Additional methods of staging oocyte ripeness are necessary. These methods should be more reliable, non-invasive and, if possible, less time-consuming.



This ultrasonic image of a mature female white sturgeon identifies the ovaries.

## Ultrasound

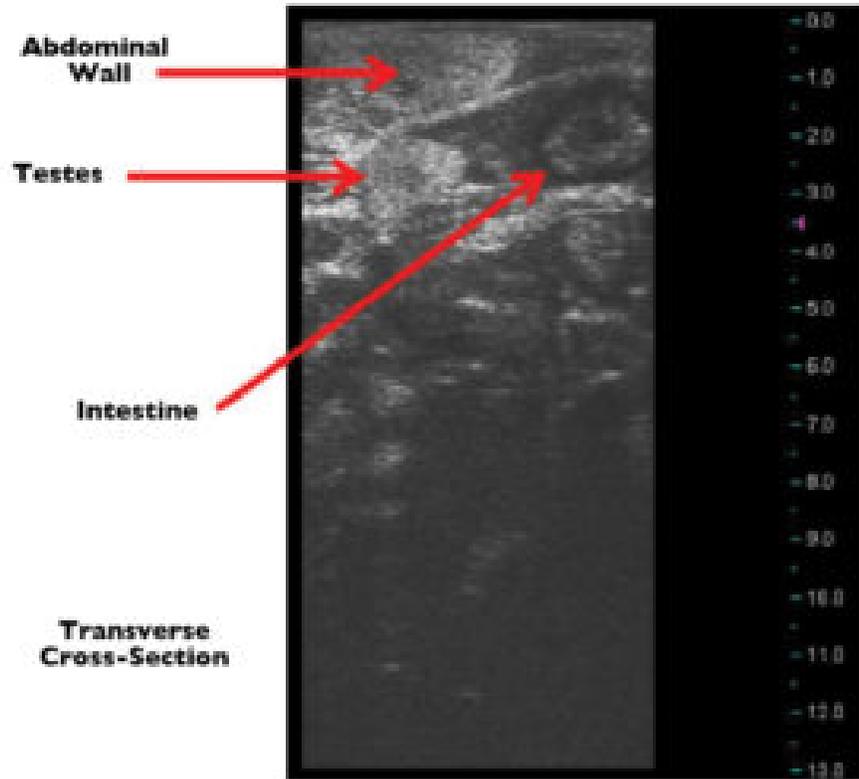
For many years, ultrasound has been a valuable tool in the medical field and terrestrial animal agriculture for non-invasively assessing soft tissue within live animals. Ultrasound is a cyclic sound pressure with a frequency of roughly 20 kHz or greater. As the wave energy passes through tissues, energy is scattered, absorbed or reflected back to the transducer depending on the properties of the tissue and the relative changes of those properties between tissues.

Ultrasound is most commonly used as a medical diagnostic tool to visualize internal body tissues, such as muscles, tendons and organs. Additionally, ultrasonic imaging (sonography) is a valuable technique for determining gestational age and fetal viability. Ultrasonic imaging offers advantages over magnetic resonance imaging and computed tomography scans that include relative portability, straightforward operation and lower costs.

## Oocyte study

In a study, the authors assessed the utilization of ultrasound in determining both the sex and oocyte maturity in adult white sturgeons. To accomplish this, a portable, waterproof ultrasound machine was used. Transverse and sagittal ultrasonic images were captured at multiple sections along the left and right abdominal walls between the pectoral and pelvic fins of 54 adult female white sturgeons and four adult male white sturgeons.

Among the female fish, 30 were identified as having a distinct, mature egg mass in both the transverse and sagittal planes. These findings were confirmed by biopsy. Furthermore, egg size from each mature female sturgeon was calculated using the measuring tool on the ultrasound device and compared to measurements taken following biopsy, leading to mixed results. The female sturgeons that did not display clear signs of a mature egg mass were found to have immature or atretic eggs, which was also confirmed by biopsy.



Ultrasound testing clearly identified the testes in adult male sturgeons.

## Gonad comparison

A secondary aspect of this study was to use ultrasonic imaging technology to evaluate the gonad tissue of adult male sturgeons and compare the images to mature female sturgeons. Despite the few adult male sturgeons scanned, the identification of testes was unambiguous. However, the occurrence of large fat deposits made positive identification of testes more difficult than confirming the presence of mature egg masses in adult females.

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## Authors

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**BRIAN C. DONAHOWER, PH.D.**

University of Idaho  
Hagerman Fish Culture Experiment Station  
3059F National Fish Hatchery Road  
Hagerman, Idaho 83332 USA  
[donahower@uidaho.edu](mailto:donahower@uidaho.edu) (<mailto:donahower@uidaho.edu>).



**STEVE DUMOND**

University of Idaho  
Hagerman Fish Culture Experiment Station  
3059F National Fish Hatchery Road  
Hagerman, Idaho 83332 USA



**LEO RAY**

University of Idaho  
Hagerman Fish Culture Experiment Station  
3059F National Fish Hatchery Road  
Hagerman, Idaho 83332 USA



**LINDA LEMMON**

University of Idaho  
Hagerman Fish Culture Experiment Station  
3059F National Fish Hatchery Road  
Hagerman, Idaho 83332 USA



**GARY FORNSHELL**

University of Idaho  
Hagerman Fish Culture Experiment Station  
3059F National Fish Hatchery Road  
Hagerman, Idaho 83332 USA



**TERRY PATTERSON**

University of Idaho  
Hagerman Fish Culture Experiment Station  
3059F National Fish Hatchery Road  
Hagerman, Idaho 83332 USA



**JODI ROCKETT**

University of Idaho  
Hagerman Fish Culture Experiment Station  
3059F National Fish Hatchery Road  
Hagerman, Idaho 83332 USA



**MADISON S. POWELL**

University of Idaho  
Hagerman Fish Culture Experiment Station  
3059F National Fish Hatchery Road  
Hagerman, Idaho 83332 USA



**WENDY M. SEALEY**

University of Idaho  
Hagerman Fish Culture Experiment Station  
3059F National Fish Hatchery Road  
Hagerman, Idaho 83332 USA

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