

Elizabethtown College

JayScholar

---

Biology: Student Scholarship & Creative Works

Biology

---

Summer 2020

## Serum Progesterone and Reproductive Ultrasounds Provide Further Insight on *Ursus Americanus* (American Black Bear) Pregnancy Timelines

Biyar Ahmed

Elizabethtown College, ahmedb@etown.edu

Follow this and additional works at: <https://jayscholar.etown.edu/biostu>



Part of the [Biology Commons](#)

---

### Recommended Citation

Ahmed, Biyar, "Serum Progesterone and Reproductive Ultrasounds Provide Further Insight on *Ursus Americanus* (American Black Bear) Pregnancy Timelines" (2020). *Biology: Student Scholarship & Creative Works*. 10.

<https://jayscholar.etown.edu/biostu/10>

This Student Research Paper is brought to you for free and open access by the Biology at JayScholar. It has been accepted for inclusion in *Biology: Student Scholarship & Creative Works* by an authorized administrator of JayScholar. For more information, please contact [kralls@etown.edu](mailto:kralls@etown.edu).

Ahmed, B.<sup>1</sup>, Sterbens, J. D. <sup>1</sup>, Olfenbuttel, C.<sup>3</sup>, Brown, J. L.<sup>4</sup>, Vaughan, M.<sup>2</sup>, Kelly, M. J.<sup>2</sup>, Mesa-Cruz, J. B.<sup>1,2</sup>

1. Department of Biology, Elizabethtown College, Elizabethtown, PA.
2. Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, VA.
3. North Carolina Wildlife Resources Commission, Raleigh, NC.
4. Center for Species Survival, Smithsonian Conservation Biology Institute, Front Royal, VA.

Serum progesterone and reproductive ultrasounds provide further insight on Ursus americanus (American black bear) pregnancy timelines.

American black bears (ABBs), *Ursus americanus*, are the product of exceptional gestational adaptations. After mating in the summer, fertilized ABB embryos experience obligate delayed implantation for over 100 days. Thereafter, in the late fall, embryos resume their developmental activity to complete an active gestational with parturition during hibernation. However, exact timing of implantation and embryo reactivation are unknown in ABBs. Our objective is to determine embryonic implantation time in ABBs through transabdominal ultrasound analysis and changes in serum progesterone concentrations. This study included transabdominal ultrasound images and serum progesterone from 17 pregnant ABBs. We collected samples in 10-day intervals from November until birth in January-February (years 2001-2016). We scanned and measured fetal structures from ultrasounds using ImageJ open software. We measured progesterone using commercially available radioimmunoassay kits (ImmuChem™, MP Biomedicals, LLC. Orangeburg, NY). Our preliminary findings show that embryonic structures are first visualized about 33 days before parturition and 13 days following the progesterone peak. We also observed that it takes about 28 days from the initial rise in progesterone to reach its peak concentrations. Other carnivore species, such as domestic cats and dogs, experience embryo implantation simultaneously with the peak of progesterone. Therefore, we suggest that the actual active gestational phase in ABBs is around 46 days. Thus, we propose that embryonic reactivation starts with the rise in progesterone in the fall, implantation occurs about 28 days later and cubs are born about 46 days post implantation. Our results indicate that the active gestational phase in ABBs is shorter than the 60-day suggested by previous studies. The gestational growth of the embryos is best represented through a logistic growth model in fetal length and height which both have an average growth rate of 0.1 cm/day. The lower asymptote, which represents the embryo size at reactivation, has the dimensions of 0.45 cm and 0.23 cm. The upper asymptote is 9.33 for length and 3.83 cm for height. Regarding absolute growth rate, the fetus grows at a much faster rate length wise and reaches its peak of around 0.23 cm/day later in gestation compared to the 0.12 cm/day peak

observed in fetal height. There is no strong relationship between fetal heart rate and gestational age.