BIOMEDICAL & VETERINARY SCIENCES GRADUATE PROGRAM

ANNOUNCES

The Master of Science Seminar and Examination of

Emily Hellstern

“Determining the Effects of Nerve Growth Factor-β Supplemented In-Vitro Fertilization Medium on Embryo Development”

Friday, June 24th, 2022
9:00AM
Vet Med Classroom 220

Bio

I was born and raised in Crystal River, Florida. I received my bachelor's degree at the University of Florida in animal science with a focus in animal biology. During my time there I worked in Dr. Pete Hansen's animal reproduction lab where I discovered my passion from reproductive science. I started my masters at Virginia Tech in 2020 where I began my work with nerve growth factor in Dr. Jamie Stewarts lab. After I receive my degree, I will be continuing my education by getting my PhD at the University of Maryland in Fall 2022.

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Presentations

Biomedical and Veterinary Sciences Seminar
Reproductive Biology Club Virginia Tech

Awards and Achievements

BMVS Masters Student of the Year

Lay Language Abstract

In cattle, the early reproductive loss is the most significant detriment to successful pregnancy rates. The largest portion of loss occurs in the first 30 days of pregnancy. As advanced reproductive technologies (ART) have gained popularity, in vitro produced (IVP) embryos, have become a valuable tool for researching reproductive loss in cattle and preserving genetics. However, IVP embryos have the highest rate of loss once transferred to a recipient compared to other ARTs. Therefore, researchers are working to determine ways to produce more developmentally competent embryos by improving culture systems. One strategy that is being researched is the addition of growth factors to different IVP media. Nerve growth factor (NGF) has been shown to have implications on female reproduction in cattle, specifically in the ovary, follicle, and oocyte cell types (granulosa and thecal). Researchers recently supplemented IVF media during the summer with bovine NGF. They witnessed developmental improvement in the form of increased cleavage rates at 48 hours. A more significant number of Day 8 hatched blastocyst out of the group's total number of oocytes produced. The objectives of the first experiments were to determine if human recombinant (95% pure) or bovine (60% or 90% pure) NGF will lead to improved development rates when supplemented during oocyte fertilization during the fall and spring. The second objective was to determine if bovine (90% pure) could provide a heat protectant by improving IVP embryo development rates. In Experiment one, bovine COCs were collected and processed through standard in vitro embryo production until fertilization, when COCs were treated with either bovine (60% pure), human (95% pure) NGF, or sterile distilled water (control). Experiment two used a similar design scheme to experiment one. The only difference was the purity of the bovine NGF (90%) used; the other treatments remained the same. Experiment three heat-shocked half of the COCs collected during maturation, then supplemented during in-vitro fertilization (IVF) with either bovine (90% pure) or sterile distilled water (control). The first two studies noted that bovine and human NGF did not affect bovine embryo development. The second study illustrated that even with heat shock, there was still no embryonic improvement occurring with NGF supplantation. It is still unclear whether NGF can play a role in improving IVP embryo development; further studies need to be conducted for researchers to say NGF cannot elicit improved bovine embryo development explicitly.

Examination Graduate Committee

Major Advisor/Chair:

Jamie Stewart, DVM, PhD., Dipl.ACT
Assistant Professor in Production Management Medicine
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