Ultrasonography of Ovarian Follicular Dysplasia in beef cattle

Humberto Nobre[1], Julie Gard[1], John Roberts[1], Tim Braden[2], James Wenzel[1], Misty Edmondson[1], Ricardo Stockler[1]

[1]Department of Clinical Services, Auburn University College of Veterinary Medicine (AUCVM), Auburn AL, 36849. [2]Department of Anatomy, Physiology and Pharmacology, AUCVM, Auburn, AL, 36849

Corresponding author: Humberto Nobre, Department of Clinical Services, Auburn University College of Veterinary Medicine, 1500 Wire Road, Auburn, AL 36849, hdn0004@auburn.edu

Abstract

Studies commissioned by the Florida Cattleman's Association in 2007 and 2016 found ovarian follicular dysplasia as a primary cause of infertility in Florida beef cows. Ovarian Follicular Dysplasia (OFD) is a slowly progressive bilateral abnormal growth and/or development of ovarian follicles that eventually transforms into "Sertoli-form" Granulosa Cell Tumor (GTCT). Later stages OFD, grades III and IV seem to be able to be reliably detected via ultrasound examination of the ovaries using a 7 MHz rectal linear probe. The objective of this study was to determine the variation in ante-mortem and post-mortem ultrasound examination when compared to histologic findings utilizing a 7 and 8.5 MHz ultrasound probes. Our hypothesis was that a 7 or 8.5MHz ultrasound rectal linear probe could be utilized for detection of earlier stages of OFD. The goal of this study was to access the usefulness of ultrasound by bovine practitioners for on-farm diagnosis of ovary follicular dysplasia.

Keywords: dysplasia, infertility, tumor, histologic, ultrasound.

A slaughterhouse study commissioned by Florida Cattleman's Association in 2007, identified ovarian follicular dysplasia (OFD) as a primary cause of infertility in Florida beef cows. Ovaries with OFD have progressive bilateral development of solid clustered follicles containing multiple Call-Exner bodies that appear to originate in the rete ovarii and the hilar region and progress into the cortex. Advanced stages have formation of bilateral "Sertoli-type" Granulosa theca cell tumors (GTCT). Ovaries with Type 3 and 4 OFD have decreased numbers of Graffian follicles which can be noted on ultrasound. Additionally, significant mineralization within the ovary can also be visualized via ultrasound. Abnormal folliculogenesis occurs with OFD. The abnormal follicular development can result in calcium influx within the follicle resulting in mineral deposition within the ovary. Then areas of mineralization can be seen throughout the ovary on histologic analysis and ante-mortem via ultrasongraphy. The areas of mineralization appear hyperechoic, similar to bone density on the ultrasound. Ovarian cysts, small chronic cystic follicles (approximately 0.5 to 1.0 cm) and mucometra can all be associated with OFD and visualized via ultrasound. The goal of this study was to access the usefulness of ultrasound by bovine practitioners for on-farm ante-mortem diagnosis of OFD to minimize the financial annual loss due to subfertility and infertility of cows for beef producers.

Methods: In 2016, 28 cows and heifers with subfertility and two "control" females from two Florida beef herds underwent trans-rectal ultrasound of both ovaries. All images where recorded and evaluated for mineralization score and follicular numbers. The 30 animals were followed to slaughter. Ovary, uterus, and oviducts were collected post-mortem. Fixed ovaries were

measured, sectioned para-sagittal through the hilus, photographed, and arranged in histology cassettes for complete examination of the cut surface. The ovaries were then graded for presence of OFD (0–IV) and other diseases. Gross morphology of fixed sagittal sections and ultrasound images were blindly compared against OFD grade in the individual ovaries.

Results: Of the ranches sampled, 86% of the sub-fertile cattle were OFD positive. At the first ranch, 10 animals had grade I OFD and at the second ranch seven were grade I, five were grade II and the two were grade III. There was a 94% agreement between the ultrasound and histological diagnosis of OFD. There was 100% (25/25) agreement between the 7MHz and the 8 MHz when diagnosing OFD.

Conclusions: Early of grades of OFD (I & II) can be reliably diagnosed via ultrasound, utilizing 7-8.5 MHz or greater ultrasound probe.

The collected data from this study will be paired to magnetic resonance imaging (MRI) of the same ovaries later on as another part of the project. The goal is to verify and estimate how accurate the ultrasonography really is in terms of showing all of the mineralized areas within the ovaries (ante- and post-mortem ultrasound exams).

All of the ovarian examinations (ante-mortem ultrasonography, post-mortem ultrasonography, MRI, and histologically) are being graded separately, then the ovaries will receive a final OFD grade based on all of the findings together.

All procedures were approved by the Institutional Animal Care and Use Committee (IACUC).

References

Roberts J, Gard J, Braden T, et al. – Ovarian Follicular Dysplasia, unpublished data.