

A bovine model for equine digital cushion development

1J. Gard, ¹D. Taylor, ²D. Wilhite, ³S. Rodning, ¹C. Woodall, M. ¹M. Schnuelle, ⁴K. Sanders, ⁵T. Denny

¹Department of Clinical Sciences, Auburn University, Auburn, AL

²Department of Anatomy and Physiology, Auburn University, Auburn, AL

³Department of Animal Sciences, Auburn University, Auburn, AL

⁴Department of Radiology, University of Utah, Salt Lake City, Utah

⁵Department of Engineering, Auburn University, Auburn, AL

Clinical Application of the Research: This study was designed to develop a bovine model to study the impact of exercise and environment on digital cushion development.

Introduction: The digital cushion functions as the shock absorber for the foot and establishing appropriate management protocols is important for prevention of lameness.

Material and Methods: Twenty dairy bull calves were randomly assigned to two groups, treated and control. The control group was reared in calf hutches and then in grass lots following weaning. The treated calves were housed in calf hutches until weaning and then walked for a total of at least two miles a day for four months on rocky terrain. At six months of age, all calves were humanely slaughtered. The right front and rear feet were harvested and evaluated utilizing Magnetic Resonance Imaging (MRI) and Computed Topography (CT) scans and further analyzed with software programs Mimics 14™ and 3-D Studio Max.

Results: The calves in the treated group had on average a positive percent difference of 39.23%, and 20.44% in the total digital cushion volume and surface area when compared to the control group, respectively.

Discussion: Development of a larger digital cushion has the potential to prevent episodes of lameness. Therefore, creating management protocols to develop a healthier foot may help to proactively prevent lameness.

Conclusion: The bovine model presented herein provides a precise method model to study digital cushion development.