Breaking barriers in veterinary education: SimuBov project

Ângela Dâmaso[1], José Carlos Neves[2], Susana Teixeira[3], Josué Baptista[3], Ricardo Cascalheira[4], Monalisa Farias[5], Rui D'Orey[1], Eduardo Marcelino[1], Joana Catita[1]

[1]Research in Veterinary Medicine (I-MVET), Faculty of Veterinary Medicine, Lusófona University, Lisbon University Centre, Portugal.
[2]CICANT, Lusófona University, Lisbon, Portugal.
[3]DCAM-LABTEC, Lusófona University, Lisbon, Portugal.
[4]MoveLab, Lusófona University, Lisbon, Portugal.
[5]Faculty of Veterinary Medicine, Lusófona University, Lisbon University Center, Lisbon, Portugal.

Objectives: Abdominal surgery is a frequent procedure in bovine clinics. Abomasal displacement is a common diagnosis that is usually demands surgical treatment, requiring blind palpation and assessment of abdominal organs, making this intervention a required Day One Competency for veterinarians. Training this procedure during undergraduate studies is challenging, since real cases are short for the high number of students and commercial bovine abdominal surgery simulators are not available for purchase. Therefore, the SimuBov project aims to develop a life-size model for comprehensive training in abomasal displacement diagnosis and correction.

Material and Methods: Digital modelling of a bovine stomach and greater omentum was achieved by 3D scanning of a miniature prototype, which combined a plastic anatomical model with clay-sculpted anatomical alterations (Milan®, Spain). The digital data was processed for 3D (Prusa Slicer) and printed in two parts with flexible materials (TPU) in a 50*50cm FDM printer. The next phase involves joining the parts of the life-size organ model and add the support system to be mounted within a full-size cow simulator.

Results: Our team has accomplished digital modelling and successfully printed a 3D bovine stomach and greater omentum prototype model, achieving a high-fidelity anatomical representation suitable for designing an abomasopexy and omentopexy simulator. The prototype model components exhibited the required flexibility, texture and durability for practical use.

Conclusion: Following the success in 3D model creation, further validation is needed to assess its effectiveness in improving veterinary students' surgical skills. Initial evaluations suggest the 3D-printed organs are suitable for practical training without live animals. However, comprehensive testing and feedback from students and veterinarians are essential to refine the model and confirm its educational impact.

Keywords: Bovine abdominal surgery, Veterinary training, Surgical simulator, 3D modelling.