AMPC
AUSTRALIAN MEAT PROCESSOR CORPORATION

Abattoir Virtual Tours

Development of Interactive Virtual Tours of red meat Abattoirs processes from lairage to package

Project Code	Prepared by	Date Submitted
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1.0 Executive Summary

The COVID-19 pandemic has caused a shift in education methods worldwide, with newer technologies such as virtual simulation being used to provide practical and clinical education in a safe, reproducible, and standardised environment. In this context, Murdoch University has partnered with AMPC to develop an interactive web-based virtual tour of red meat abattoir processes from lairage to package, to supplement student learning about animal welfare and veterinary public health. The aim was for students enrolled in the appropriate course at Murdoch University and various other Universities in Australia and New Zealand (University of Sydney, James Cook University, University of Adelaide, University of Melbourne, Charles Sturt University, University of Queensland, Massey University) to have the opportunity to navigate the abattoir tour at their own pace in preparation for abattoir visits and placements. They may also re-visit this resource for content revision and consolidation of their learning after lectures and abattoir visits.

This innovative online tool was designed based on a series of 360 degree and two-dimensional videos and photography recorded at processing facility. The tour comprises images showing both sheep and cattle processing plants, short video interviews with On-Plant Veterinarian and plant manager, and written bullet point information highlighting key learning messages on public health and animal welfare. Academics from various institutions (i.e., Murdoch University, University of Sydney, James Cook University, University of Adelaide, University of Melbourne, Charles Sturt University, University of Queensland and Massey University), as well as plant managers and AMPC representatives provided feedback and suggestions during the production process, and reviewed and approved the final version. The final version of and sheep abattoir virtual tour was completed and successfully deployed on the Murdoch University Learning Management System on 21 April 2023. It has been well received by academics, experts and industry.

To evaluate the attitudes and perceptions of Murdoch University veterinary students about the new VR tour, a Doctor of Veterinary Medicine research survey-based project was designed and is currently in progress. In this research, 50% of students have been given access and were to the VR technology prior to visiting the processing plant. Then, the entire group of students complete a questionnaire and quiz.

To date, a total of 23 students have enrolled in the DVM project and responded to the surveys; of which, 12 (52%) has used the VR tour, and the remaining 11 (48%) did not. Although the sample size is still small (it is expected to increase before the conclusion of the project in September), these preliminary results revealed that students were generally very positive about their experiences with the virtual tour technology, or positive about wanting to experience a virtual tour. Of the 12 students who used the tour, 100% indicated the virtual tour was a useful aid for teaching, and that they felt better prepared for the physical abattoir visit after using the virtual tour. Importantly, results from the Likert scale revealed a mean of 3.58 (standard deviation=1.04) (3= May or may not, 4 = probably yes, 5 = definitely yes) when these same students were asked whether the use of virtual technology had increased their motivation and interest to visit the abattoirs, compared to before accessing the online tool. A negative response ("definitely not") for this question was only obtained from one student (8%).

In conclusion, the abattoir VR tool was an important achievement as it is anticipated this tool will enhance student learning experience and consequently the overall veterinary graduate knowledge about public health and animal welfare. Importantly, the VR tour will constitute a readily available replacement for abattoir physical tours and placements in the event of new pandemics and restrictions in the future.

2.0 Introduction

Veterinarians play an essential role in promoting animal welfare and public health, working within the food-processing industry. It is fundamental that veterinary students receive training in these industries, which includes extramural placement within commercial abattoirs. Placement is designed to teach the regulatory framework for abattoir practice, and abattoir workflow chains for several domestic meat-producing animals. Students are to be familiarised with the structure and function of an abattoir, animal welfare practices, antemortem and post-mortem inspections, as well as occupational health and safety (1). This practical on-plant experience is crucial for providing education to veterinary students for their day-one competencies and accreditation by the Australian Veterinary Association.

Practical experience within abattoirs has become increasingly difficult to complete due to challenges associated with the recent COVID-19 pandemic. Access to commercial abattoirs has become difficult for a variety of reasons, including business concerns for employee health, lockdowns and Australian quarantine restrictions. This has impacted veterinary students by limiting or removing the opportunities for these learning experiences. From 2020 until 2022, veterinary students from Murdoch University were unable to visit abattoirs due to COVID-19 restrictions. These students were exempt from the Doctor of Veterinary Medicine accreditation conditions and limited to online course material. Similarly, other Australian Universities were impacted by the cancellation of intra- and extramural placements and therefore are also seeking possible alternatives to these physical placements.

One proposed alternative by tertiary institutions with veterinary programmes and the Public Health University Network was the use of virtual and interactive abattoir tours, known as virtual reality (VR). This tool consists of using computer modelling and simulation to enable a person to interact with a visual or sensory environment (2). Virtual reality technology as an educational tool has markedly increased in recent years, especially with the emergence of COVID-19. The pandemic has caused a shift in education methods worldwide, with newer technologies such as virtual simulation being used to provide practical and clinical education in a safe, reproducible and standardised environment (3).

The integration of virtual reality, virtual tours and interactive videos within veterinary courses is currently being implemented. The University College London (UCL) has recently started a virtual program which aims to assist students in reaching their extramural abattoir placement requirements, showing some evidence of positive feedback, suggesting these platforms could be a valuable learning tool. The Royal (Dick) School of Veterinary Studies in the United Kingdom has also trialled a similar technology known as the Virtual Slaughterhouse Simulator, a tool which aims to provide a visual learning experience to use with the support of lectures and practical classes. This tool demonstrated qualitative potential in enhancing the student learning experience (1), with many students finding the technology an engaging, positive experience and particularly useful for less-experienced students who had not visited an abattoir previously.

This project aimed to develop, for the first time, a VR tour demonstrating red meat abattoir processes from lairage to package in Australia. It is expected this VR will constitute a valuable teaching aid for Veterinary Public Health students in Australia and New Zealand, as well as a useful educational tool for the red meat industry. Importantly, the VR tour will constitute a readily available replacement for abattoir physical tours and placements in the event of new pandemics and restrictions in the future.

3.0 Project Objectives

To develop interactive virtual tours that will include beef and sheep processing plants. The proposed Interactive Virtual Tours followed the abattoir workflow chains from lairage to packing and load out, assisting students in visualising and gaining access to key information for their careers as veterinarians.

4.0 Methodology

In this project led by Murdoch University and AMPC, two interactive virtual tours displaying beef and sheep processing plants were developed by sub-contractor Think Digital Studios Pty Ltd. Various 360 degrees and two-dimensional videos and photography were recorded at a meat processor, and then combined in a way to convert into interactive virtual tours. The tour also includes short video interviews with On-Plant Veterinarian and plant manager, as well as written information (hotspots) highlighting the role of veterinarians in the meat industry, key learning messages on animal welfare, and technical instructions on how to use the platform. Importantly, the VR contains the following disclaimer for users: "We would like to remind you that the distribution of the abattoir tour link is strictly prohibited. Sharing this link with others who are not enrolled in the course, without prior permission from the course coordinator or the university, is a violation of academic integrity and may lead to serious consequences.". Additionally, before watching sensitive content such as animal stunning and killing, users receive the following warning: "The following video contains graphic content considered sensitive in the public domain. This footage is intended for educational purposes only, to support student learning about veterinary public health responsibilities and animal welfare in export abattoirs in Australia. Viewer discretion is advised."

Academics from various institutions (i.e., Murdoch University, University of Sydney, James Cook University, University of Adelaide, University of Melbourne, Charles Sturt University, University of Queensland and Massey University), plant managers and AMPC representatives reviewed the final version of the virtual tours in to ensure the aims and requirements were met.

To evaluate the attitudes and perceptions of Murdoch University veterinary students about the new VR tour, a Doctor of Veterinary Medicine research project was designed and is currently in progress. Results from this pilot study will provide valuable information on whether students believe it is a useful aid for teaching and generate important feedback which will inform future similar projects. In this project, the study population consisted of students from Murdoch University within the Bachelor of Science (Veterinary Biology)/Doctor of Veterinary Medicine course, in their final year of study who are enrolled in VET687 Production Animal, Public Health and Pathology in 2023. The students were divided into two groups: the control group and experimental group. The control group did not use the virtual tour technology, whereas the experimental control group did use the virtual tour technology prior to their abattoir visit. survey was disseminated online through a weblink and available on desktop or mobile devices using the Qualtrics survey tool. The survey questions involve a mixture of multi-choice, Likert scales (1 = definitely not, 2 = probably not, 3 = may or may not, 4 = probably yes, 5 = definitely yes) and a small number of open short answer text. The control and experimental groups received different questions based on their experiences.

5.0 Project Outcomes

The final version of cattle and sheep abattoir virtual tour was completed and successfully deployed on the Murdoch University Learning Management System on 21 April 2023, after several meetings and rounds of feedback from academics, industry experts and abattoir manager.

From 24 April 2023 to date, a total of 36 veterinary students (5th year) at Murdoch University, have undertook Veterinary Public Health training including abattoir visits, began having access to the technology. According to the DVM project methodology, 50% of these students were given access and were encouraged to watch the VR technology prior to visiting the processing plant.

To date, a total of 23 students have enrolled in the DVM project and responded to the surveys; of which, 12 (52%) has used the VR tour, and the remaining 11 (48%) did not. Although the sample size is still small (it is expected to increase before the conclusion of the project in September), these preliminary results revealed that students were generally

very positive about their experiences with the virtual tour technology, or positive about wanting to experience a virtual tour.

Of the 12 students who used the tour, 100% indicated the virtual tour was a useful aid for teaching, and that they felt better prepared for the physical abattoir visit after using the virtual tour. Importantly, results from the Likert scale revealed a mean of 3.58 (standard deviation=1.04) (3= May or may not, 4 = probably yes, 5 = definitely yes) when these same students were asked whether the use of virtual technology had increased their motivation and interest to visit the abattoirs, compared to before accessing the online tool. A negative response ("definitely not") for this question was only obtained from one student (8%).

The survey also revealed that 84% of users responded they found the tool useful to increase their knowledge about veterinary public health and animal welfare, 83% thought the virtual tour technology was of high quality and easy to use, and 75% found themselves engaged in the virtual reality learning experience.

Overall, students found the resource to be more appealing in its presentation compared to traditional online course material. Below are some representative student comments:

- The virtual tour was really good in that the videos and picture are of HD quality and with more in depth explanation of procedures.

- I think it's great as it is.

Whilst most of the feedback about the tour technology was positive, a few students pointed out some limitations related to its usability. Below are some representative student comments:

- I found some difficulties to go the next stage. Hence, if the way to access the next step is more straightforward and easier to find, it would be better.

- Maybe can add a bit information about how to use it.

- In the beef one it was not always clear which way to move forward through the tour. in the sheep one it was clear as buttons had "return" and "progress" (or equivalent) written.

6.0 Discussion

The VR abattoir tour project was successfully completed and has been well received by academics, experts and industry. In addition, pilot research has provided promising evidence that students have found the tour engaging and a useful aid to their veterinary education in conjunction with coursework. The tour has also assisted them in learning about the role of on-plant veterinarians in an abattoir setting.

Abattoirs are often very unfamiliar environments to students, and most experimental and control students reflected that use of the virtual tour would have made them feel better prepared. Some comments in the survey mentioned that using this technology earlier in the veterinary course would be especially beneficial to their learning.

A few challenges were faced during this project which caused delays in its conclusion. In particular, recruiting abattoirs interested in participating proved difficult. The team tried to approach several export abattoirs; however, due to COVID19 lockdowns and other logistical circumstances, it took longer than expected.

7.0 Conclusions / Recommendations

The conclusion of the abattoir VR tool was an important achievement as it will enhance student motivation and learning experience now and into the future. Thus, it is expected that this interactive technology will enhance the overall veterinary graduate knowledge about public health and animal welfare, and inspire more students to pursue a career as on-plant veterinarian in the meat industry.

Future directions include the distribution of the final version of the VR to other institutes in Australia and New Zealand including the University of Sydney, James Cook University, University of Adelaide, University of Melbourne, Charles Sturt University, University of Queensland, and Massey University. In addition, we anticipate that results from the DVM project currently in progress will be published in a peer-reviewed veterinary journal in 2024.

Finally, it is recommended that feedback provided by students and other users are incorporated into a new version of the tour for 2024. Another suggestion is to create a phase two of this project, in which the current web-based two-dimensional technology would be elevated into a three-dimensional VR headset tour, so that the students can be fully immersed in the experience as if they were physically in the abattoir.

8.0 Bibliography

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