

Research project and plan of the activities

Veterinary surgeons working on farms and at food processing establishments play a fundamental role in safeguarding public health and animal welfare. The Meat Hygiene curriculum in European veterinary schools needs to equip veterinary students with the skills necessary to satisfy the Day One Competences ([D1C](#)), required by the European Association of Establishments for Veterinary Education ([EAEVE](#)).

The D1C in meat hygiene required by veterinary students revolve around the ability to conduct ante-mortem and post-mortem inspection of animals presented for slaughter. This aims to contribute to the prevention of foodborne hazards entering the food chain, posing a risk to public health. EAEVE also identifies auditing skills as a required D1C.

Ante-mortem inspection, post-mortem inspection, and auditing are the key veterinary tasks carried out according to the European Union (EU) Regulation [2017/625](#), on the delivery of Official Controls at the abattoir. As such, an essential part of the meat hygiene undergraduate training in Europe involves students undertaking placements within abattoirs. This practice remains vital to the educational experience of future veterinary professionals and is crucial to providing veterinary students with the practical skills necessary to satisfy the D1C. However, several issues have adversely affected the ability of students to gain such work placements, in particular the closure of many slaughterhouses across Europe and the difficulty, for biosecurity reasons, to give visitors access. The pandemic period further decreased the number of visits while the training in veterinary public health continued.

To surpass this barrier and update the training tools in the current digital era, prof. Alessandro Seguíno of the University of Edinburgh developed a demo of bovine virtual slaughterhouse the students can use during their teaching activities. Since the bovine virtual slaughterhouse has been highly appreciated by the students and other stakeholders, as public authorities and food animal producers, the main aim of this project is to develop a pig slaughterhouse simulator which can be used by the students as part of their teaching activities and by regulatory agencies for training activities. Risk assessment models for categorized biological hazards in meat will be integrated in the simulator as well based on data provided in EFSA scientific opinions.

The incorporation of virtual reality in teaching tools can increase the engagement of the new generations of university students and can help them to develop critical thinking skills needed in the real working environment where many observations and connections must be assessed to perform fit for purpose diagnosis and to understand quickly changing scenarios. The possibility to use virtual reality can allow to develop for the student scenarios which are likely to occur in the near future (e.g., spreading of biological hazards due to the re-use of water in food establishments) but also completely unexpected scenarios as those occurring during the pandemic when slaughtering schedule changed radically due to the lack of personnel and increase of isolation periods. As a consequence, the timing for ante-mortem and post-mortem inspection changed and veterinary surgeons must be able to assess if these changes might affect the probability to identify diseases or not. The incorporation of risk assessment models in the pig virtual slaughterhouse will increase the students understanding of why specific regulations are implemented to protect animal and human health.

The project will include 4 stages from M1 to M12 as shown in Figure 1. The work for the project can be performed remotely both completely or partially.

Figure 1: Project GANTT chart

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Phase 1												
Phase 2												
Phase 3												
Phase 4												

In phase 1 (M1-M6) the infrastructure of the pig virtual slaughterhouse will be developed following the example of the bovine virtual slaughterhouse (Figure 2). However, in comparison to the bovine virtual slaughterhouse, the slaughtering line will be that for pigs, the images will be 3D and the students will have the possibility to virtually interact with the operators at the slaughterous making questions to the students on what they need to do in specific cases. When the students will make wrong choices or provide wrong answers the virtual operators will remind them the relevant regulations they need to know to provide the right answer or to identify specific lesions.

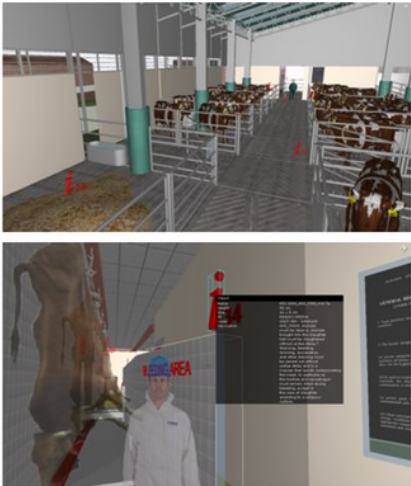


Figure 2: photos of the bovine slaughterhouse

In phase 2 (M3-M7) the list of scenarios to be implemented in the pig virtual slaughterhouse will be completed and will include both showcases of specific diseases as well as showcases resulting from the combination of different issues the student should be able to identify and connect.

In phase 3 (M4-M8) the risk assessment models will be incorporated in the tool based on contents of EFSA scientific opinions on biological hazards as well as animal health and welfare. One of the scientific opinions

which will be used in that published by [EFSA](#) in 2020 on the potential effects of a 24 or 72-h delay in post-mortem inspection of ungulates on public health and monitoring of animal health and welfare.

In phase 4 (M8-M12) the pig virtual slaughterhouse will be finalized for the use in education and training.