

PROJECT SUMMARY

The excessive use of antimicrobials (AMs) in both humans and animals has resulted in the proliferation of bacteria resistant to most available antibiotics (multi-resistant bacteria) that have also spread to the environment. When these bacteria infect humans, there is no treatment to stop them and it is expected more deaths due to these microorganisms than due to cancer by 2050.

Pigs are the main AM user in volume, especially in-feed, and there is a need for methods to reduce the use of AMs and the amount of multi-resistant bacteria present in pig farms. However, antibiotics are not the problem and are just the consequence of other measures failing to control infectious diseases in pig farms. A better understanding of the relationship between the host (pig), the pathogen and the environment they share will result in lower levels of clinical disease and dramatic reductions in antimicrobial use (AMU) and AMR. There is plenty of research available and ongoing in this area but there are still gaps, especially projects that offer integrated approaches combining different solutions. It is already clear that there is no magic bullet to reduce AMU in all situations. Project BM-FARM includes extensive expertise in the area of prudent AMU and has identified two areas that need further research. The first area is the use of biomarkers (molecules to study the physiological status of the animal) and the second area is the use of new molecular technologies to manage microbial populations in farms. In both areas there is knowledge in experimental situations, but they need to be applied at farm level to produce real impact and should be used in combination with other information to understand disease. The BM-FARM consortium has been successful using an entirely farm based approach working with a cohort of 60 commercial farms (1/3 of the Irish pig herd) to promote prudent AMU during the last 5 years. This approach allows to achieve rapid impact at the same time as high-quality science.

Teagasc-UCD have also developed a solid collaboration with the DAFM and Animal Health Ireland (AHI) and the result of the research projects has been adopted by these 2 agencies as monitoring programs like the national database for AMU, an initiative piloted by Teagasc-UCD (Project AMURAP ref: 15/S/676) and now maintained by DAFM or the implementation of the biosecurity risk assessment tool Biocheck.UGent (Project PathSurvPigs ref: 14/S/832) now used at a national level managed by AHI. These new research proposed by BM-FARM aims to further characterize the health and welfare status of the farms by describing the physiological status of the animal and the microbiological environment where they live and then study how these characteristics are associated to husbandry and clinical disease and use them to monitor health risks.

To study the physiological status of the animal, Teagasc-UCD have established a new collaboration with the group lead by José Joaquín Cerón in the Universidad de Murcia. This group is internationally known for its work in the area of animal biomarkers in areas like inflammation or stress. They have also extensive knowledge on adapting the analysis to different types of samples like saliva, blood or tissues.

To study the microbial populations in farms, Teagasc-UCD have state-of-the-art facilities available. However, there is a lack of knowledge in the analysis and interpretation of these results in pigs. For this reason, Teagasc-UCD have recently established a collaboration with one of the best groups in this area, the group lead by Dr. Jordi Estellé in INRAE. Dr. Estellé's group has extensive expertise in different approaches to data analysis and interpretation and the standardization of methodologies to obtain repeatable and comparable results.

Altogether, BM-FARM includes expertise and ambition to not only understand disease and reduce AMU but ultimately maximize the reduction of multi-resistant bacteria.