# Project proposal

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| *Project title* | Understanding the microbiology and antibiotic resistance profiles found in milk and bovine mastitis: the organisms and the antibiogram profiles pre and post treatment. |
| *First Supervisor* | Professor      ▾    Mark Fielder |
| *Second Supervisor* | Dr G Forster-Wilkins |
| *School* | Life Sciences     ▾ |
| *Other member of supervisory team* (no more than three KU supervisors in total) | Dr James Denholm-Price, Dr Tim Potter (Westpoint Vet Group) |
| *Specific requirements beyond 2:1 degree* | 2:1 degree or above in Biomedical Science/Microbiology/Biochemistry/Genetics |

## Project summary
### (max 4,000 characters)

The use of antimicrobials in human and animal medicine is a major achievement in terms of infectious disease control and the continued efficacy of food production. However in recent years concern has been expressed about the continued safe use of these drugs and their future efficacy.

The high level of usage of antimicrobials has been suggested as a major driver for the increasing levels of resistance. In 2005 total sales of antimicrobials for therapeutic use in veterinary species in the UK was 446 tonnes; approx 87% of which was destined for use in food producing animals.

The rise of resistance has been a concern for a number of years, currently in human medicine all infectious disease samples presented for culture are logged in terms of sample source, patient number, isolated organism and antibiogram profile. This led to the formation databases providing information on organisms associated with pathological scenarios and details of resistance patterns observed. This provides a retrospective view of resistance trends. Currently no such database exists serving veterinary medicine; this project will collate data to build profiles useful to veterinary clinicians, epidemiologists and the farming community.

Although antimicrobial usage on farm was implicated as a potential driver for the selection of resistant bacteria little is known of exactly how antimicrobials are currently being used on UK dairy farms, the effect on farm, pathogen profile and qualitative and quantitative impacts these medicines have on farm animal health and welfare.

Herd assurance schemes are based around control of infectious diseases and recording medicine use on farm. The greatest use of antibiotics on dairy farms is in the treatment of intra-mammary infections both in lactating and non-lactating cattle. Antimicrobial treatments may be administered either systemically or via intramammary infusion or in combination therapies. The current project would focus on dairy farms and specifically mastitis.

The project will provide valuable benefits to milk processors by reducing antibiotic usage on their supplying dairy farms, improving animal health by more targeted, responsible antimicrobial use. Results will benefit farmers in helping them implement the most appropriate control and treatment programme for pathogens that cause IMI's on farm whilst helping safeguard antibiotic efficacy.

The aim of the project is to develop an evidence based system to evaluate antimicrobial usage on farm; demonstrating responsible and prudent use of antimicrobials. The project affords the opportunity to examine the DNA composition of the whole milk to determine what other pathogens might be present possibly sub-clinically or as potential sources of resistance transmissible elements

This will be achieved by addressing the following objectives;

1. Examine current farmer practices, and attitudes towards antimicrobial usage.

2. Identify the pathogens causing mastitis on each farm at cow and herd level.

4. Determine the antibiotic efficacy profiles (antibiograms) for each mastitis isolate both pre and post treatment.

5. Examine the mega-genome analysis / sequencing of the mastitis samples

Dairy farms will be recruited and monitored during the course of the project. Details will be collected of current treatment practices for common diseases along with disease incidence.

**Outcomes**

1. Improved understanding of current farm practices and attitudes toward antimicrobial usage.
2. Analysis of pathogen patterns from individual cows will provide a means of routinely monitoring dairy farms.
3. Identification of risk factors for the development of IMI's on farm will enable the design and instigation of an evidence based herd assurance scheme to promote responsible antimicrobial use.
4. Targeted report for individual farms to target antibiotic use.
5. Provide evidence based medicine decisions for the use of certain classes of antibiotic