Home Office

NON-TECHNICAL SUMMARY

Assessment of immunogenicity of and protection induced by an oral inactivated vaccine

Project duration

Years **1**
Months **0**

Project purpose

- (a) Basic research
- (b) Translational or applied research with one of the following aims:
  - (i) Avoidance, prevention, diagnosis or treatment of disease, ill-health or abnormality, or their effects, in man, animals or plants.
  - (ii) Assessment, detection, regulation or modification of physiological conditions in man, animals or plants.
  - (iii) Improvement of the welfare of animals or of the production conditions for animals reared for agricultural purposes.

Retrospective assessment

The Secretary of State has determined that a retrospective assessment of this licence is not required.

Objectives and benefits

Description of the project's objectives, for example the scientific unknowns or clinical or scientific needs it's addressing.

What is the aim of this project?

UK dairy farmers are currently under considerable pressure to minimise antimicrobial usage, specifically to prevent secondary bacterial infections after primary viral infections. This might be achieved through increased number of vaccinations. However, for many of the vaccines given systemically, the crucial cut-off is that these do not work (well) in the presence of maternal, colostrum-derived antibodies. Here, mucosal vaccination strategies might provide a way forward. Through the stimulation of the common mucosal system, it should be possible to reduce pathogen exposure on these ports of entry. However, for ruminants, oral vaccination may provide a challenge due to the development of the rumen within the first 2 months of life.

The overall aim of the project is to increase our understanding whether oral vaccination is possible to achieve using a yeast additive, and to assess its immunogenic effects in mounting a humoral and cellular immune response.

This will be assessed by testing for pathogen specific systemic and mucosal immune responses . We will also study the ability of the yeast construct expressing Bovine Viral Diarrhoe Virus proteins. This is endemic viral diseases effecting dairy and feedlot animals world-wide, leading to immunosuppression, thus enhanced occurrence of secondary bacterial infections as well as reduction in production parameters, such as milk production and increase inter-calving intervals

Potential benefits likely to derive from the project, for example how science might be advanced or how humans, animals or the environment might benefit - these could be short-term benefits within the duration of the project or long-term benefits that accrue after the project has finished.

What are the potential benefits that will derive from this project?

Our work will help us to understand whether it is in principal possible to orally immunize suckling calves, similar as it has been described for mice, chicken and pigs. Overall we are working closely with a veterinary pharmaceutical partner to ensure a potentially fast transfer of this strategy into the real world. This will benefit animal health, consequently improving cattle longevity and welfare.

Species and numbers of animals expected to be used

What types and approximate numbers of animals will you use over the course of this project?

The work will involve neonatal calves. Based on own experiences, we require a total of 9 animals for this proof-of-concept study.

Predicted harms

Typical procedures done to animals, for example injections or surgical procedures, including duration of the experiment and number of procedures.

In the context of what you propose to do to the animals, what are the expected adverse effects and the likely/expected level of severity? What will happen to the animals at the end?

All of the work will use calves kept according to normal husbandry procedures on dairy farms. Occasional blood samples will be taken for analysis. This is a standard procedures and the severity throughout will be mild. The animals will remain on the farm after use.

Application of the three Rs

1. Replacement

State why you need to use animals and why you cannot use non-animal alternatives.

We have performed already all necessary in-vitro experiments to assess the response generated to the yeast construct. However, we need to assess whether this construct is actually immunogenic in real animals to identify future directions.

2. Reduction

Explain how you will assure the use of minimum numbers of animals.

Our sampling strategy is based on previous experience to target the key time points. Individual blood samples will be split so that each can be used for a variety of tests.

3. Refinement

Explain the choice of species and why the animal model(s) you will use are the most refined, having regard to the objectives. Explain the general measures you will take to minimise welfare costs (harms) to the animals.

The project is only relevant to cattle. Animals will be exposed to normal husbandry procedures as used on UK farms. Only mild protocols will be used.