Executive summary

- Jembrana disease (JD), since the late 1960’s, has been responsible for the deaths of thousands of Bali cattle. Bali cattle are a major component of the Indonesian islands’ agriculture. They provide meat and leather to the population and income for their owners.
- The project confirmed that the pathogen responsible for Jembrana disease is a bovine retrovirus (a lentivirus). This was confirmed by observing that there was cross-reactivity between Jembrana disease virus (JDV) and bovine immunodeficiency virus (BIV). Two proteins, the p26 protein of Jembrana and the 26K capsid protein of BIV, cross-reacted in a Western blot test.
- Information gained on this project was transferred to Indonesian colleagues at the Bali Cattle Disease Investigation Unit at Denpasar.
- Researchers now need to develop a test to detect the virus in cattle in order to learn how the disease spreads. Cattle that require treatment also need to be identified.


Background

Bali cattle (Bos javanicus) are central to the agriculture of Indonesian islands. They provide draught power to cultivate the narrow and often precipitous rice terraces. Furthermore, within Balinese culture, the cattle are venerated. Many ceremonial festivals are directed at their worship.

In the late 1960’s, a catastrophic disease known as Jembrana disease (JD) occurred. In its first epizootic outbreak, JD killed 60,000–80,000 cattle. Since then, further epizootics of Jembrana disease have been recorded. It is now considered endemic within certain locations, including the main island of Bali.

The disease agent is thought to be a bovine retrovirus. Other work at the Institute of Animal Health (IAH) in the UK on another retrovirus, bovine
immunodeficiency virus (BIV), generated reagents and techniques that might be of use in identifying the Jembrana Disease Virus (JDV) pathogen.

**Objectives**
This DFID project aimed to compare JDV and BIV. Researchers believed that an exchange of serological reagents would show that the two were similar. A further exchange of viral, molecular and clinical materials would confirm the identification of the JDV pathogen. Information gained from this project would be shared with Indonesian colleagues for future research purposes.

**Highlights**
The initial exchange of reagents confirmed cross reactivity between JDV and BIV. The p26 protein of Jembrana cross-reacted with the 26K capsid protein of BIV using a Western blot test. Results were confirmed by raising monoclonal antibodies specific for p26 protein, which also reacted using protein 26K of BIV. Finally, molecular similarities were found between parts of the BIV and JDV genome.

Researchers between IAH at Compton and the Bali Cattle Disease Investigation Unit at Denpasar, Indonesia were exchanged. A full selection of tissues and blood samples (for DNA and mRNA) were taken in Bali from both JDV infected and control (disease free) animals. The DNA and RNA samples obtained were used to help confirm the identification of the pathogen involved in JDV. Subsequent work by researchers at IAH led them to believe the virus is a lentivirus.

**Impact**
Though this research is somewhat removed from the poor farmers in Indonesia, it is a vitally important first step in helping to improve their livelihoods. Now that the disease causing virus has been identified, research can begin to find ways to combat the disease.

Animal health workers will first need diagnostic tools and tests to identify cattle carrying the virus. This will help them understand how JDV spreads and allow farmers to treat their infected cattle and healthy cattle from coming into contact with sick ones. This project will eventually give farmers and the national agencies that help them a way forward in combating and defeating JD.

**Collaborators**

1. Bali Cattle Investigation Unit, Denpasar, Bali, Indonesia
2. Balivet, Indonesia
Related projects
R6556 - The Development of a Recombinant ELISA for Jembrana Disease Virus
R7361 - The development of simple virus detection assays for Jembrana disease virus

Selected publications