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QUESTION 6: STATEMENT OF RESEARCH PROJECT

a. A description of the nature of the research project being conducted.

This research project is designed to quantify physiological and behavioral changes in cattle associated with mastitis, lameness, estrus, and metabolic diseases, using multiple precision dairy farming technologies.

One of the pieces of technology to be used in the study is the reason for the FCC Experimental radio service application. This project will use Kahne's sensor-based monitoring systems that allow continuous monitoring of individual health status of livestock. Kahne's monitoring systems measure pH and temperature inside the rumen of each animal and transmit the data to a receiver.

Consumer pressure for control of zoonotic diseases, pathogens, and medical treatments, coupled with increased awareness of animal welfare issues has altered decision-making processes on farms (Schukken et al., 2008, Bewley, 2010a). Precision Dairy Farming (PDF) is the use of technologies to measure physiological, behavioral, and production indicators on individual animals to improve management strategies and farm performance (Bewley, 2010a).

Precision Dairy Farming technologies have the potential to detect disease early, maximizing individual animal potential. Disease detection in the past has relied on producers observing clinical signs, but once clinical signs are displayed, it is often too late to act effectively. Clinical signs are often preceded by physiological changes that are undetectable with human senses, creating great potential to take preventive action (Bewley, 2010a).

Further information on this project can be seen in the attached study protocol *(Quantification of Physiological and Behavioral Indicators of Mastitis, Lameness, Estrus, and Metabolic Diseases in Dairy Cattle Using Precision Dairy Farming Technologies).*

b. A showing that the communications facilities requested are necessary for the research project.

Kahne's technology is the only rumen monitoring system available with automatic data and information system capabilities. Kahne's rumen monitors detect and reliably record pH and temperature on an ongoing basis. Examining the association between rumen pH and/or temperature to the onset of diseases and to productivity metrics in feedlot cattle is critical to understanding the corresponding conditions and solutions which can deliver significant value to the industry.

c. A showing that existing communications facilities are inadequate.

In vivo rumen monitoring systems available in the marketplace today are cumbersome with limited and poor data collection and information system capabilities, expensive pricing (average pricing is about NZD$1,000 per bolus), limited utility (pH life ranges from 40 to max 150 days), and poor bolus retention. Due to these factors and others, they are still mostly used in limited research environments and require tedious human intervention and fistulated animals.

In addition to this, other devices available are heavier, so they sink and reside in the reticulum. As a result, they suffer from a high incidence of regurgitation. Kahne's Sentinel bolus is lighter in weight so it bypasses the reticulum and rests in the dorsal sac of the rumen, where the fermentation process occurs.

Kahne's flexible wing structure is designed to retain the bolus within the rumen. These factors mean that Kahne's rumen monitoring sensors will provide the most reliable, accurate information for this research study, with very little intrusion on the animals regular activity.