Student 2: Introduction.

The primary production sector contributes significantly to New Zealand's economy. Over 40% of New Zealand's overseas income is sourced from agricultural and horticultural products (excludes forestry)[1]. However with significant reliance on production from the land impacts are often felt on the local environment. This includes features such as land / soil, water and air. Effects on the quality of these also have an effect on the co-existing living organisms (plants and animals).

Water is being affected largely in New Zealand. Water quality has been decreasing considerably in many areas where intensive farming such as dairying, is being carried out in the catchment zones. Nitrogenous fertiliser applications and dairy effluent is having the greatest effect on water quality; often leading to eutrophication. This affects the waterways relating ecosystems and recreational users, thus labelling it "dirty dairying". However, this name is unfavourable when the dairy industry attempts to sell its product abroad and locally, therefore management practices must be adopted to correct this perception.

Background to the environmental issues and causes of eutrophication.

Nitrogen from high nitrogenous fertilisers and dairy effluent is having damaging effect on the environment. The atmosphere and waterways are being devastated by the escaping nitrates (NO_3^-) and nitrous oxide. The atmosphere is being filled with three main gases; CO_2, methane and nitrogen. This is accelerating the greenhouse gas effect due to higher concentrations. Human activity is the result of this increase, including intensive agriculture; i.e. dairying farming. Global warming is the result of the greenhouse gas effect however this is having a detrimental effect on ecosystems worldwide. Therefore it is important to reduce nitrate emissions from agricultural practices.

Nitrates escape into the atmosphere during fertiliser and dairy effluent application. This is due to volatilisation, where ammonium nitrogen NH_4^+ is converted by bacteria into nitrates NH_3^- which the soil can't absorb[2] (2). It is necessary for the nitrogen application to be quickly absorbed by the soil or plant to avoid this from happening.

Waterway contamination is also another significantly damaged environment by nitrogen. This may be either groundwater or surface water pollution. The nitrogen accesses these channels through leaching (diffuse) or run off (land overflow). Leaching occurs when soil moisture levels are at saturation and evidently can't absorb anymore nutrients causing the N to percolate past the root zone and into the water table (1). Also timing of application and application rates has a significant affect. It should only be applied as plants require it and the soil can absorb it. Large application rates over 50kg/N/ha causes wastage and the excess N makes its way into waterways[3] (3). Application prior to heavy rainfall is a waste of the farmer's time and money along with causing damage to the environment, as N often flows off the paddocks and into open waterways. "Keep the nutrients in/on the land and not the water and no one losses"[2]. When high concentrations of nutrients reach open waterways (streams, rivers and lakes) eutrophication occurs. This is where high nutrient levels of the water is accessed by aquatic plants and algae which causes them to grow and multiply in to unsustainable levels, to the extent where they deplete the water of oxygen. The lack of oxygen has a devastating effect on all other marine life in the water bodies (1).