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Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 1 Agricultural and Horticultural Science RAS 2023

91931 Demonstrate understanding of sustainability considerations that influence primary production management practices

EXEMPLAR

Merit

TOTAL 06

Water sustainability:

Sustainability in agriculture means the production of food, animals and plants using farming techniques that prove to be beneficial for public health and promote economic profitability. Dairy farming impacts the environment, by the cow's urine producing a surprising amount of methane, notorious oxide which comes from the stock's urine, CO₂, and many other greenhouse gases that are released into the air. My two management practices that tie in with dairy farming are riparian margins and effluent management. Riparian margins are the planting of native bush/plants around native waterways to protect the water, stabilize soil and prevent erosion. Riparian margins decrease the number of faecal pathogens, sediment, and nutrients from leaching/running off into the waterways. With all these sediment/nutrients/pathogens leaching into the water it causes algae growth, and sickness of people/animals. When algae grow, it then turns to a biomass of algae bloom which can lead to eutrophication, this is when there is not enough dissolved oxygen in the water for the living organisms/water to stay fresh because it will become toxic. Waterways need 50-80% of dissolved oxygen because algae uses oxygen to respire, and the water will become toxic. As the planting helps with nutrient uptake, if there is too much from stock or fertiliser it is still able to get into the water. The margins also help with shading of the water, which need to be 70% shaded for the sustainability otherwise the algae can photosynthesize. The water also needs to be 10 degrees, or this process will carry out. The environmental considerations of riparian planting are prevention of erosion, livestock injuring themselves and keeping the waterways fresh for the environment to look clean and healthy for future generations. The economic consideration of this is the prevention of livestock not being able to injure themselves, by falling into the water or hurting themselves and prevention of erosion is cared for, so the financial problems are decreased. The social impacts are as the water is kept clean and fresh it looks nice, can be swam in by people and the planting can also help with jobs for people in need.

My other management practice is effluent management. Effluent is the waste of cows (poo and wee), that can be stored in effluent ponds until it is ready to be spread onto the paddocks. Effluent comes from milking sheds, animal shelters, holding stands and runoff pads. Effluent is a natural, dilute fertiliser that contains phosphorus, nitrogen, potassium, sulphur, magnesium, and any natural resources that is found in fertiliser that is brought in a shop. It is stored until ready to be spread, but there can be some risks involved including, when it is too wet it can cause runoff into the waterways/leaching and ponding polluting the waterways, spreading too much and the spray mist spreading into the water. This can provide for the algae to grow. When effluent is spread it allows for maximum nutrient uptake and maximum grass growth. As the grass becomes healthier this allows for the cows to become more healthy, bulky and the milk quality will increase. To improve the water sustainability, it is important to follow the rules of spreading effluent from irrigators in paddocks near waterways. These rules include leaving a wide 20-meter strip from the waterways, so if the nutrients are to leach/runoff they are not able to leach that far to the waterways, make sure fertiliser mist does not drift off into the waterways, and do not spray within 50 meters of a water supply. The maximum amount of fertiliser applied per person is 150kg per hectare of grazed grass annually. The environmental considerations of effluent are with it being a natural fertiliser are that the resources are natural meaning the cows/grass/soil will not get exposed to anything toxic, and the effluent being stored in ponds means it can sit till it is ready to be used. As economic considerations, the fact that the effluent is spread as natural resources from the dairy farm means the financial costs are decreased as you do not buy many things other than to irrigate it. The grass will become healthy, and the waterways will already be sustainable if spreaded correctly. Social considerations are the grass looking healthy for people, and the process can help with people in need of jobs.

A Māori value that is relevant to sustainability in dairy farming and the two management practices is tiakitanga. Tiakitanga means guardianship and protection of the land, and the responsibility to care for and protect the land, food, animals for future generations. Tiakitanga is shown with the riparian margins and effluent management improving the water sustainability. By protecting the land and ensuring it is cared for, e.g., planting plants and spreading effluent the future generations can sustain that and will be proud as you protect your land for the future generations.

I believe that out of these two management practices riparian margins will have the greatest impact upon the sustainability of water, because of all the benefits it produces. The prevention of stock injuries, nutrient runoff and leaching is a massive benefit as few other management practices will prevent most of these. With riparian margins being better than effluent, this is because of the shading the plants produce for the water to stay healthy and reduce the algae rate of photosynthesizing. Effluent does not do this, but it still has some impacts on the water sustainability, including spreading it right by following the rules can not harm the water. Overall riparian has a more beneficial effect on the water quality, with many considerations being positive and tiakitanga being showed throughout the process.

Merit

Subject: Agricultural and Horticultural Science

Standard: 91931

Total score: 06

Q	Grade score	Marker commentary
One	M6	The candidate has explained in detail the impacts that dairy farming can have on water sustainability. They have linked the use of riparian planting and correct effluent application to reducing the negative impacts that dairy farming can have on water. The candidate has shown a good understanding of kaitiakitanga. For a higher grade the candidate needed to justify the use of riparian planting by saying how it will improve the sustainability to a greater extent than effluent application. The candidate needed to cover social or economic sustainability for Excellence.