Data Supermarket

Land Use Opportunities for Aotearoa

GUIDANCE DOCUMENT

AGRESEARCH

Table of mitigation effectiveness for reducing nitrogen and phosphorus with their greenhouse gas emissions co-benefits for contrasting sheep+beef types

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HOW TO USE THIS INFORMATION

A sheep+beef typology classification system was used to develop 36 sheep+beef types based on rainfall, topography and soil properties (see table below).

Estimates of nitrogen (N) and phosphorus (P) losses were predicted for each sheep+beef type, with N loss ranging from 7 to 26 kg N/ha while P loss ranged from 0.5 to 3.2 kg P/ha (see "Sheep+Beef types and N, P and GHG losses" in the Data Supermarket).

Primary attribute	Class within attribute	Description
Rainfall	Dry	farms where mean annual rainfall was less than 700 mm
	Moist	farms where mean annual rainfall was between 700 mm and 1200 mm
	Wet	farms where mean annual rainfall was between 1200 mm and 1700 mm
	Very wet	farms where mean annual rainfall exceeded 1700 mm
Topography	Low	farms with <7° average slope
	Medium	farms with 7–14° average slope
	High	farms with >14° average slope
Soil	Light	soils, defined as having plant available water holding capacity to 60 cm (PAW60cm) of less than 85 mm
	Poorly-drained	soils, classified as having 'imperfect', 'poor' or 'very poor' soil drainage classes
	Well-drained	soils, classified as 'well' or 'moderately well' drained.

Mitigation opportunities are limited in sheep+beef systems. Riparian protection, fertiliser management and land retirement are the main options for mitigating nutrient loss to water. Engineering solutions e.g. constructed wetlands have some potential in limited types. Retiring steep erodible land or wet swamp/boggy land will achieve the largest reductions for the smallest loss of production.

The table of mitigation effectiveness contains information on published effectiveness of a range of mitigation measures aimed at reducing N and P losses to water for the range of sheep+beef types. The tables also include generalised information on the impact of these mitigations on greenhouse gas (GHG) emissions and whether they produce a co-benefit (reduction of both losses to water and GHG) or little to no co-benefit. Greenhouse gas emissions are split into methane (CH_4) and nitrous oxide (N_2O).

The mitigations exclude examples that are too variable to adequately generalise into sheep+beef types or mitigations where effectiveness is strongly dependent on farm practices and management rather than farm attributes. These include reducing cultivation, maintaining buffer strips, best fertility management for P; as well as reducing crop areas, use of catch crops, and best fertility management for N.

REFERENCES

Monaghan, R., Manderson, A., Basher, L., Spiekermann, R., Dymond, J., Smith, C., … McDowell, R. (2021). Quantifying contaminant losses to water from pastoral landuses in New Zealand II. The effects of some farm mitigation actions over the past two decades. New Zealand Journal of Agricultural Research, 64(3), 365–389.

Landuse change pasture to trees is low when averaged over the whole farm.
The impact on the hectare that is converted will be much higher.

C.C. Tanner, M.L. Nguyen, J.P.S. Sukias, (2005). Nutrient removal by a constructed wetland treating subsurface drainage from grazed dairy pasture. Agriculture, Ecosystems & Environment, 105(1–2), 145-162.