

Science for Environment Policy

Agri-environment scheme cuts nitrogen pollution from beef farm in Ireland

Ireland's national agri-environment scheme can reduce nitrate leaching from beef farming, shows a recent study. Nitrate leached at an average rate of 17.3 kilograms per hectare (kg/ha) on studied plots which complied with the scheme. This compares with 63.1 kg/ha on intensively farmed plots. The programme can therefore help Ireland meet requirements of the EU's Water Framework Directive (WFD) and Nitrates Directive, the researchers suggest.

Agri-environment schemes (AESs) are compulsory at national level under EU [Rural Development Policy](#)¹, although they are optional for individual farmers. They are designed to encourage farmers to protect and enhance the environment on their land through payments for farming in an environmentally friendly manner.

This study assessed the effects of the [Rural Environmental Protection Scheme \(REPS\)](#), established in 1994 as Ireland's AES. Under the scheme, there were a range of environmental measures including restricting the number of cattle on the land to ensure that the amount of excreta they produce is less than 170 kg of organic nitrogen per hectare.

The researchers compared nitrate leaching from intensively farmed plots with REPS plots on a research farm in mid-eastern Ireland. The farm produces beef on permanent grassland with a moderately well-drained clay loam soil.

They studied 15 plots altogether on the farm; nine were intensively farmed and six were REPS compliant. On average over the 3 years the REPS system had 61% lower nitrogen fertiliser applied and had 19% fewer animals than the intensive system.

On each plot, the researchers analysed soil samples in eight cups placed one metre deep in the ground. These were each analysed 53 times altogether over three consecutive years during winter to help estimate nitrate leaching rates.

In their calculations, they accounted for the farm's water balance — the amount of rainfall that filters through the soil minus the amount that evaporates to the air. They also considered its nitrogen balance — the sum of nitrogen added to land as fertiliser and deposited from the air, as well as how much is removed from the land by the cows (through eating grass) and leaching.

REPS plots leached much less nitrate than intensive plots, they calculated. On average, over the three years, 63.1 kg nitrate/ha leached from the intensive plots, compared with 17.3 kg/ha from the REPS plots.

There were also differences between plots depending on how they were farmed. For example, on plots which were grazed and harvested once for silage (grass stored to feed livestock during winter) each year, nitrate leaching rates were 63.9 kg/ha on intensive plots and 15 kg/ha on REPS plots. On plots which were grazed but not harvested (and which had less nitrogen applied) nitrate leached at average rates of 54.1 kg/ha on intensive plots and 19.7 kg/ha on REPS land.

REPS can therefore be an environmentally friendly beef farming system in Ireland, the researchers conclude. It can help the country achieve 'Good Ecological Status' under the [WFD](#)² as well as [Nitrates Directive](#)³ targets. Nitrate leached from agricultural soils is the largest contributor to eutrophication in Ireland. Improving water quality is one of the country's biggest environmental challenges.



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