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Agricultural Catchments Programme – socio-economic studies



Key external stakeholders:

Policy makers including Department of Agriculture, Food and the Marine, Department of the Environment and Local Government, Environmental Protection Agency and Teagasc research and advisory colleagues.

Practical implications for stakeholders:

This project explored a range of socio-economic issues associated with nutrient management across farms and the implementation of EU Nitrates Directive based regulations.

- Dissemination of new and existing information on the scientific rationale behind certain EU Nitrates based measures may help to embed considerations on diffuse pollution and associated nutrient loss into the decision making processes of farmers.
- More efficient inorganic fertiliser applications and imported feed purchase has the potential to deliver a double dividend, win-win situation by reducing the risk of nutrient loss from agricultural land, thereby assisting in the achievement of environmental water quality objectives while improving economic margins at farm level.

Main results:

- Farmers are sceptical of the validity of certain Nitrates Directive based measures, especially in the area of temporal farm practices, however, there is acceptance among some farmers of environmental benefits deriving from the regulations.
- Results from a nationally representative sample of specialist dairy and tillage farms indicate that compared to the most efficient benchmark in the sample, the average farm had over-application of chemical fertilisers ranging from 22.8 to 32.8 kg N ha⁻¹ and 2.9 to 3.51 kg P ha⁻¹.
- 53% of catchment farmers surveyed indicated a negative preference for provision of a 10 metre riparian buffer zone. The mean willingness to accept was estimated at €1.51 per linear metre for willing adopters.
- Results from a nationally representative survey of farmers indicate that between 26% - 43% of farmers indicated a willingness to import organic pig or poultry manures either on a payment or free-of-charge basis.

Opportunity/Benefit:

The analysis conducted and published in this project is helping support agricultural policy formulation in the Republic of Ireland in the area of the EU Nitrates Directive based regulations. Results from this study helped inform the Teagasc submission on the review of the EU nitrates Directive regulations and are available to Irish policymakers to use in policy negotiations at EU level.

Collaborating Institutions:

None

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1. Project background:

The Agricultural Catchment Programme (ACP) integrates bio-physical with socio-economic processes in the evaluation of the impacts of EU Nitrates Directive measures. ACP socio-economic research aims to provide information on and analysis of the socio-economic impact of the implementation of the measures contained in the National Action Programme (for EU Nitrates Directive implementation) on farms in selected catchments (and nationally) with particular emphasis on - the attitudes and awareness of the farming community to water pollution issues, the measures used to address them and the economic impact of changing agricultural practices to comply with the measures.

2. Questions addressed by the project:

- What are farmer opinions on EU Nitrates Directive implementation in the Republic of Ireland?
- Is there room to improve nutrient management efficiency at farm level?
- Are farmers willing to import pig and poultry manures onto their farms?
- Are farmers willing to engage with riparian buffer zones?
- What are farmers manure application and storage practices?

3. The experimental studies:

Within the ACP framework, Q methodology was used to investigate farmer subjective opinions of the operation of the EU Nitrates Directive regulations after the first 4 year National Action Programme phase and explores the level of acceptance, and refutation of measures from the view of farmers own knowledge and experience of land stewardship.

Using data generated from a survey of catchment farmers with land adjacent to a watercourse the willingness of farmers to adopt a riparian buffer zone was investigated. The research was based on a proposal to install a 10 metre deep riparian buffer zone on a five year scheme and the analysis was based on principal components analysis, contingent valuation methodology and a generalised tobit interval model.

Using Teagasc National Farm Survey (NFS) data, research was undertaken to investigate whether there is room to reduce chemical Nitrogen and Phosphorus fertiliser applications and imported feeds by exploring the extent to which application rates may have exceeded optimum levels, using data envelopment analysis productivity analysis methodology. The investigation concentrates on specialist dairy and tillage farms in the

Republic of Ireland stratified by land use potential.

Using NFS data and a multinomial model, the willingness of the farming population to import pig and poultry manures was investigated.

Finally, a survey of manure application and storage practices was undertaken across farms in the National Farm Survey in 2009.

4. Main results:

Results from Q methodology analysis indicate 4 main opinion groups. A “Constrained Productionists” group remain unconvinced about the appropriateness of certain EU Nitrates Directive measures from a farm management, environmental and water quality perspective. A second group “Concerned Practitioners” share these concerns but are generally more positive regarding other farm management and environmental benefits accruing from the regulations. A third group, “Benefit Accepters”, indicated quite an environmentalist position and are generally very positive towards regulation implementation and associated environmental and farm management benefits. The final group “Regulation Unaffected” have some concerns but are mostly unaffected by the regulations. Results suggest scepticism remains around the validity of certain measures, especially in the area of temporal farm practices, however, there is acceptance among some farmers of environmental benefits accruing from the regulations.

Results indicated that farmers’ willingness to supply a riparian buffer zone depended on a mix of economic, attitudinal and farm structural factors. A total of 53% of the sample indicated a negative preference for provision. Principle constraints to adoption include interference with production, nuisance effects and loss of production in small field systems. Of those willing to engage with supply, the mean willingness to accept based cost of provision for a 10 metre riparian buffer zone was estimated to be €1513 ha⁻¹ per annum equivalent to €1.51 per linear metre of riparian area.

Results across specialist dairy and tillage farms in the NFS demonstrate some inefficiency in the utilisation of Nitrogen and Phosphorus fertilisers compared to benchmark farms across these systems. Average over application of chemical fertilisers ranged from 22.8 to 32.8 kg N ha⁻¹ and 2.9 to 3.51 kg P ha⁻¹ in 2008. Potential cost savings on chemical fertilisers across all systems on average ranged from €38.9 ha⁻¹ to €48.5 ha⁻¹. Additionally, potential cost reductions on imported feeds of €65 to €84 per livestock were indicated for dairy farms versus efficient cohort benchmark farms. Average excess of imported feedstuffs equated to 5.82-7.44 kg LU⁻¹ of N and 0.92-1.17 kg LU⁻¹ of P.

Based on a nationally representative survey (NFS) between 9 and 15% of farmers nationally would be willing to pay to import poultry and pig manures respectively and a further 17% to 28% would import if offered on a free-of-charge basis. Demand is strongest among arable farmers, younger farmer cohorts and those of larger farm size with greater expenditure on chemical fertilisers per hectare and who are not restricted by an EU Nitrates Directive derogation.

An NFS based nationally representative survey of manure application and storage practices on farms in 2009 estimated that 52% of all slurry was applied between the end of the closed period in January and April 30th in total volume terms. This contrasts with a 2003 survey which found that 35% of slurry was applied in the Spring season. Across all farm systems approximately 71% of slurry was estimated to be applied to conservation ground (hay/silage), 26% to grazing land with the remaining 3% applied to maize or tillage crops. These figures indicate a trend toward greater slurry application on land used for livestock grazing compared to a 2003 survey where 80% of the slurry applications was to hay or silage land and 16% was on grazing land. The report also indicates an increasing number of farmers are starting to engage with newer slurry application technologies. A total of 6% of dairy farmers reported using the trailing shoe method of slurry application.

5. Opportunity/Benefit:

The principle stakeholders for this research are policy makers in the Republic of Ireland. This includes officials within government (DAFM, DEHLG), state organisations such as the EPA as well as farm and agri-food industry representatives and colleagues within Teagasc research and advisory directorates. The research conducted is helping informed policy debate on the review of the EU Nitrates Directive based regulations.

Phase 1 of the ACP explored a range of socio-economic issues and laid the groundwork for longer term studies concerning farmer attitudes, economic impacts and uptake of nutrient management new practices which will be completed through the analysis of data to be collected in Phase 2.

6. Dissemination:

Main publications:

Buckley, C., Carney, P., (2013). The potential to reduce the risk of diffuse pollution from agriculture while improving economic performance at farm level. *Environmental Science and Policy*, 25, 118-126.

Buckley, C., Hynes, S. and Mehan, S., (2012). Supply of an ecosystem service - Farmers' willingness to adopt riparian buffer zones in agricultural catchments. *Environmental Science and Policy*, 24, 101-109.

Buckley, C., (2012). Implementation of the EU Nitrates Directive in the Republic of Ireland - A view from the farm. *Ecological Economics*, 78, 29-36.

Buckley, C., Fealy, R.M., (2012). Intra-national importation of pig and poultry manure: acceptability under EU Nitrates Directive constraints. *International Journal of Agricultural Management*, 1, 41-47.

Hennessy, T., Buckley, C., Cushion, M., Kinsella, A. and Moran, B. (2011). National Farm Survey of Manure Application and Storage Practices on Irish Farms. Teagasc, Athenry, Ireland.

Popular publications:

Jordan P., Melland A., Mellander P-E., Wall D., Murphy P., Buckley C., Mehan S. and Shine O. (2011). Nutrient loads from agri-catchments: environmental risk or economic write-off? *TResearch*, 4(6), 12-13.

7. Compiled by: Dr. Cathal Buckley