



## Rural Economy and Land Use Programme



### SUSTAINABLE AND HOLISTIC FOOD CHAINS FOR RECYCLING LIVESTOCK WASTE TO LAND

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#### Background

Conventional intensive livestock food chains provide consumers with cheap and reliable sources of milk and meat, but there are unseen and un-costed environmental and social costs in terms of the waste these food chains generate, and the manner in which waste is recycled to land in rural areas. The management of livestock and manures needs to be carried out in such a way as to minimise the risk of pathogen transfers to grazing and cropped land; to water supplies that themselves are used in the food chain (e.g. livestock drinking water and agricultural irrigation); to watercourses that are used by local industries (e.g. shell fisheries); and to recreational water bodies such as bathing waters.

This project will evaluate the impact of management practices to control the risk of pathogen transfers from grazing livestock, manures and other waste streams on the economics and practicalities at the farm level and the 'knock-on' effects of such decisions on local communities and industries reliant on clean water supplies. To do this we are bringing together experts in farmer decision making, farm business economics, consumer interests, the food chain, manure/residue management, pathogen transfers and the development of risk assessments for diffuse pollution.

**Aims** Our project integrates two research threads and will operate at two scales:

Farm to Regional Scale Here we will evaluate current perceptions of farmers, retailers, consumers and local 'downstream' industries (tourism and shell fisheries) to the issue of pathogen transfers to the food chain. Our research will (1) assess the impacts of changes in management practices at the farm level (to reduce the risk of pathogen transfers) on farm costs and costs to other stakeholder groups and the region as a whole; and (2) determine risk assessments of pathogen transfers to the food chain from a number of farms under current livestock and manure/residue management practices. Targeted monitoring on a limited number of farms (up to 10) will be undertaken to establish relationships between livestock and manure/residue management and effluent flows and transfers of faecal indicator organisms (FIOs) to the food chain. These farms will be encouraged to adopt management practices to reduce the risk of pathogen transfers and the impacts on effluent flows and FIO transfers to the food chain will be assessed.

Farm to Field Scale Here we will undertake experiments to determine the controls on pathogen survival on farmsteads (e.g. manure and dirty water stores and collection yards) where length of storage, temperature, ammonia concentration, UV radiation and nutrient availability are important. Pathogen survival in soil following dung deposition and waste applications and mechanisms of pathogen transport will also be investigated. This work will be built into new practical on-farm risk assessments tools that will also incorporate factors to evaluate the costs and applicability of on-farm management practices to reduce the risk of pathogen transfers to the food chain.

The Taw catchment in Devon will be used for this study because it is livestock dominated (dairy) and impacts on bathing waters and shell fisheries are well documented.



### **Programme of Research**

1. Interview farmers and assess what controls attitudes towards decision making on issues of waste and livestock management.
2. Establish focus groups involving farmers and other stakeholders to consider the changes that might be put in place to minimise pathogen transfers.
3. Identify a sample of farmers in the catchment and conduct a survey of current livestock and organic waste management practices and develop a risk assessment for pathogen transfers to the food chain.
4. Select 10 farms and set up monitoring of effluent flows and FIO transfers to watercourses. Commence detailed recording of farming activity data.
5. Review pathogen control measures and assess measures to reduce pathogens transfers to watercourses from grazing animals and after spreading manure and other waste streams. Elucidate factors controlling pathogen survival in manure stores and mechanisms of transfer from soil.
6. Change management practices on 10 farms and assess changes in the risk of pathogen transfers to watercourse.
7. Assess costs, practicalities and applicability of pathogen control measures on farms and impacts on local communities and industries.

### **Anticipated outcomes**

The project will develop management practices that will help farmers reduce the risk of pathogen transfers to the food chain and hence encourage consumer confidence in the safety of dairy products. It will do this by building farmer decision-making into the process of developing and adopting new management practices. We will improve understanding of farm-related pathogen issues through our stakeholder forums by facilitating dialogue between producers, processors, retailers and encouraging agreement on a way forward for the production and marketing of safe local quality food products. Since these goals are shared by other organisations, our research is of interest to other bodies such as Defra, the FSA and the Environment Agency. Furthermore, a clean 'green' dairy industry will contribute to the successful marketing of the area for tourism and as a source of quality local produce by maintaining clean beaches and enhancing water quality to support fish farming and shell fisheries.

### **Project resources**

This £400k project is a three year study joint-funded by the ESRC, NERC and BBSRC under the RELU programme. Defra and Seerad are also co-sponsors. The project will start in November 2004 and supports a team of three postdoctoral researchers, one based at each institution but all working together to achieve the cross-disciplinary needs of our research programme.

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