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Maximising Production and Biodiversity in NI Agriculture

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Abstract

Agriculture in Northern Ireland (NI) has changed little from 1970 with its emphasis on grass production and livestock sectors. It is dependent on a narrow range of enterprises and subsidies, and beset by production, waste, financial and social issues. NI agriculture lacks a strategic plan that addresses its problems holistically, or prepares to meet global threats, in particular climate change, and priorities, most notably food security. The NI countryside also has experienced a loss of biodiversity and decline in environmental quality and, hence, provision of ecosystem services, e.g. water quality and pollination. The future of agriculture and environment are intertwined: if agriculture is to continue to absorb substantial public funds, it must deliver wider benefits to society but environmental interests must also revise their policies, if they are to promote conservation outside limited, and increasingly unmanaged, designated areas. This presentation delivers an analysis of the issues facing NI agriculture and environment, which indicate a common basis underlying their multiple problems. It addresses key results from recent research on grass production and variability in farmland biodiversity, which suggest a series of prescriptions that could benefit both agriculture and environment, and a means of bringing this about. The presentation explains that we need to change the way we farm as well as the landscape in which we farm.

Introduction

1. Agricultural change is nothing new; our landscape is as much the product of six millennia of agriculture as it is of climate, geology and ecology. There were three key changes to agriculture in NI during the 20th century along the transition from a mixed agricultural system with little mechanisation dependent on oats and horses to pastoral agriculture dependent on grass, silage and fossil fuels. Emphasis on manpower and the horse faded around and just after the 1st World War; chemical dependence started after the 2nd World War; and hay gave way to silage in the 1960s. The intensive, pastoral basis of our agriculture was underwritten by CAP from the 1970s. Whilst breeds, machinery and subsidies have changed since then, the essential composition of NI agriculture and the food sector has not changed much in the last 50 years. The trend has been to become ever more dependent on dairy and beef cattle and sheep meat. NI, however, can still do well in other sectors, e.g. poultry, pigs and apples, and related industry reflecting the endurance of our entrepreneurial tradition. Generally, NI agriculture is small in international comparisons, limited in breadth and diversity, dependent on EU subsidies and vulnerable to changes in world trade. Decisions that significantly affect our most important economic sector continue be taken outside NI and often a long way off.

2. Just as agriculture gradually became more intensive during the 20th century, there has been a decline in environmental quality most notably in the loss of biodiversity and eutrophication of freshwater and estuaries. This undermines the ecosystems that support agriculture threatening the food security, not least by affecting soil and water quality, pollination and natural pest control. Despite considerable efforts made to arrest and reverse these changes, it is difficult to claim anything other than partial success. This reflects our emphasis on designation of relatively small, widely separated, reserves comprising a single habitat which simply are insufficient to counteract the environmental losses in the much greater area of the wider countryside. Empirical studies generally support theoretical studies describing the negative relationship between species richness and reserve area and isolation. The linking of subsidies for agriculture to environmental objectives is unlikely to succeed if these prescriptions are based on agricultural systems to which land use in NI has little resemblance. More specific prescriptions can be more effective. Despite concerted efforts a succession of farmland bird species, for example, have declined markedly in the NI countryside.

3. Agricultural and environmental interests are intertwined, each dependent on the other. Piecemeal initiatives in addressing problems in agricultural production or environment, fail because we do not address the much wider context of these issues. A more holistic approach to management of the countryside and production would prove more rewarding than focussing, for example, on a short-term desire for cheaper food. Food policies are determined by national Governments, international treaties and multinational companies, all of which should consider the wider issues affecting the countryside, rural communities and food producers, as well as consumers.

4. The myriad plans, reports and visions of the past have not yet stopped environmental decline or secured the future of NI agriculture, Government being reactive rather than proactive in response to change. The challenges and opportunities in the requirement to feed 9 billion people at a higher nutritive standard than hitherto, whilst coping with uncertainties of environmental change and political and economic stability, may simply overwhelm the NI agriculture and food sector as well as our countryside and the ecosystem services it supplies. We require a sea-change in NI agriculture and environmental policies based on the integration of all relevant factors.

5. The purpose of this presentation is: (a) to demonstrate the common bases of the difficulties facing agriculture and environmental aspirations in NI; (b) identify potential, research-led solutions leading to a more ecologically sustainable and profitable form of agriculture in NI; and, (c) provide a means of implementation that incentivises and facilitates audit of change leading to an increasingly robust rural economy during the 21st century. It is inappropriate to consider the past as a template for the future. The future should be based on current agricultural and environmental science. This presentation is based on published and unpublished research in ecology and agriculture at Queen's and elsewhere, discussion with colleagues in Queen's and AFBI, as well as personal experience over seven decades.

NI Agriculture, Horticulture, Arboriculture (Rural Development Programme, DARD, Dec.2015; Provisional 2015 Agricultural Statistics, April 2016)

6. NI agricultural production and activity is proportionately more significant than in the UK as a whole (1.1% vs 0.6% total GVA) but this disparity is decreasing. Nevertheless, agriculture and

food represent 4% GVA and 6% employment. 74% NI land area is in agriculture, mostly grass with only 5% cereal, and 8% forestry. Agriculture is dependent on dairying and beef cattle, and sheep (71% Gross Margin) but there are significant poultry and pig sectors (13% Gross Margin). The number of farms is 26,000 (average size 41ha, 89% categorised as small or very small) with 47,000 farm workers (41% full time). The age structure is skewed towards older age groups (55%>55yrs). Total value of gross output for agriculture in 2015 was ca £1.74billion with decreases from 2014 in livestock as a whole (13%) and dairying (27%) in particular. Total income from farming (TIFF) in 2015 was £183million, 41% down on 2014. Direct subsidies (CAP, Basic, Greening and Young Farmer) amounted to £236million. Horticulture (mushroom and flowers) output rose (15%) in 2015 to £119million. Forest area has increased slowly particularly over the last 10 years. Forest Service manages state-owned and supports private forestry. It has income from timber sales, the value of which can lead to and overall operating surplus, e.g. £7million in 2014-15, or deficit, e.g. £18million 2013-14. Agriculture, horticulture and forestry contribute economically to NI, and add value through carbon sequestration (soil carbon and biomass), mitigation of climate change impacts, tourism and recreation and contributing to health and sense of well-being.

NI Environment (Northern Ireland Statistics Report, March 2016)

7. NI as part of an island on the north western edge of Europe, has a flora and fauna derived from multiple ‘refugia’ during successive glacial advances and recolonisations as ice retreated, creating unique populations, communities and habitats. Primary production is naturally lower than, for example, south east England and much of the land uneven or unsuitable in some other way for arable production. NI supports internationally recognised heath and bog land, wet meadows and rivers, lakes and estuaries. People have been in Ireland for at least 12,500 years and early people in particular opened up access through forests and added species diversity by importing animals and plants for food and materials. The frivolous imports of the 19th century to the present have been more destructive than constructive. As in the rest of the world, biological diversity has been lost due to agricultural intensification and habitat loss, and is further threatened by climate change. The water quality of NI rivers is poorer than elsewhere in the UK and RoI; in 2015, 33% of monitored rivers and 5 of 21 freshwater loughs were regarded as ‘good’ or better. There were 1,310 confirmed pollution incidents (16% high

or medium severity) with agriculture, industry, domestic sources and NI Water responsible for 26.9%, 18.5%, 18.3% and 16.3% respectively. Approximately a third of 'features' in ASSIs in 2015 were deemed in unfavourable condition. Both DARD and DOE had responsibilities for 'biodiversity in the wider countryside'. During the last 40 years there has been a significant loss of ground nesting and farmland birds such as the yellowhammer, corncrake, lapwing and skylark. Wet meadows are all but gone with small fragments only remaining.

CAP

8. CAP reform has led to a period of 7 years over which a single farm payment seeks to address key environmental objectives. Whilst the terms and conditions and value of CAP are determined at EU level, the details and exemptions are set by national and devolved governments. In NI, payments are paid on farms >3ha and fields >0.1ha. The maximum hedge width allowable is '2m from centre at base' and 'gappy' hedges are allowed provided no gap exceeds 5m. In NI, exemptions under the 'three crop rule' make this unlikely to reverse the dominance of grass. The annual value of CAP at ca. £250M roughly offsets farm deficits. In general, agri-environment schemes are more successful where there are specific objectives rather than general ones as in CAP.

9. The wider countryside in NI is generally pleasant but it lacks much of its former richness and diversity and showing increasing signs of neglect and abandonment. Species and habitat loss are important *per se* but the real damage is loss of functional diversity in ecosystems i.e. the ability to deliver ecosystem services through lower productivity and reduced resilience to perturbation. NI will be increasingly unable to compete effectively on cost and quality in its limited range of agricultural activities, as well as on welfare and environment. We must increase our productivity and resilience, as well as profitability, most probably through reducing costs and increasing value of what NI produces. Environment is the template of agriculture, forestry and horticulture. We should be deciding now how our environment should look and work as an ecosystem in the middle of 21st century.

Agriculture and environment face common problems

10. The issues affecting NI agriculture and environment can be grouped under: Weather and Climate; Land; Biosecurity, Pathogens, Pests and Pollutants; and, Social and Economic. Both agriculture and environmental interests are beset by multiple factors many of which are

common to both although there may be differing concerns. Solving problems permanently without unforeseen collateral effects on other agriculture or environmental interests requires a more holistic approach which addresses the fundamental issues across both sectors. Finding relationships and patterns is a critical to synthesis and establishing the fundamental basis of the multiple factors affecting the delivery of agriculture and environmental quality.

Focussing on the issues

11. Change requires the development of an Integrated Agriculture and Environment Plan (IAEP) which itself is capable of change as circumstances change. The approach here is to identify an overarching objective supported by more specific objectives. The overarching objective stresses world needs in terms of food and environment: *Meeting 21st century needs in food production through sustainable ecosystems.* This is applicable at the national and regional levels and, hence, to NI. There is no point in achieving greater food production if the environmental costs are unsustainable or the real costs of production are deferred to be picked up by the generations to come. Economic analyses often understate the longer term, larger scale costs. Similarly, consumers are unwilling to pay for and politicians see few votes in, services which are not obvious or immediate. 21st century consumers demand quality and value as well as expecting delivery of welfare and environmental objectives, but NI agribusiness cannot be expected to deliver on welfare and environmental concerns if it cannot make a living.

12. The objectives outlined can be broken down into four, related and interdependent themes: Land, Profit, Diversification and Services. The approach is holistic. Ignoring any single theme will have consequences for the others.

Land sharing and land sparing

13. Research in ‘Global Food Security’ often involves ecologists and environmental economists. In seeking to address the provision of food to meet the needs of 9 billion people by 2050 without losing the ecosystem services needed to maintain that level of food production, focus in continental areas is often been on ‘land sharing’ and ‘land sparing’. Sharing implies the integration of land use to meet the needs of production and maintaining biodiversity whilst sparing implies a separation of these land uses with some areas given over to maximise production, perhaps with appropriate levels of environmental protection to maintain farming,

and other places set aside for the benefit of nature, and maintaining hydrological cycles and the other services nature provides. Land sparing and sharing, however, may be extended from a continental scale right down to the level of a field. Hence, effective, integrated plans for maximising both production and ecosystem services must work on multiple scales e.g. with respect to diversification. Land sparing will predominate in some places and land sharing in others.

Practical, affordable action – ‘win-win’ prescriptions

14. Management prescriptions presented as a means of realising the objectives of an IAEP are based on ecological and agricultural research. These management prescriptions are not stand alone and will have cumulative effects. Five key, ‘win win’ actions are described, which could be implemented relatively quickly and would achieve benefits for both production and environment which would be immediate and continue to increase well into the 21st century. (1) Increased planting of pasture with grass legume mixes enhances both production and biodiversity e.g. with respect to pollinators. (2) Crop rotation should include vegetables, fruit, biofuels crops and cereals as well as grass with a view to addressing market trends, build-up of soil nitrates and reducing import costs. Landscape level heterogeneity will benefit wildlife and tourism and the amenity services it provides. (3) Production and biodiversity are enhanced where fields approach an optimal area, where necessary, through the selective removal of undersized hedgerows in combination with hedge and verge management that promotes biodiversity. (4) Shelter belts of trees and farm woodland mitigate the effects of extreme weather such as flooding and storm damage and provide for extra production, e.g. by reducing wind burn and evapo-transpiration in fields and they are a source of browse, fuel and raw materials. (5) Reservoir and pond creation and restoration provide for better drainage and a buffer against droughts, as well as meetings the needs of wildlife.

Larger, more competitive and innovative units

15. Incentives for larger farm units will provide the basis for expansion on the best land with more cohesive, resilient management units where effective biosecurity, land quality and suitability, and economies of scale can enhance the competiveness of NI agriculture. Here the emphasis is on land sharing. Less productive land should be managed primarily for the economic value and ecosystem services provided by the landscape such as flood management, forestry, tourism, recreation and health. This approach does not exclude extensive systems of

livestock husbandry which do not conflict with wider needs. Here the emphasis is on land sparing. IAEP should address problems with land management as distinct from ownership, by incentivising larger, more diversified farm units across NI, with lower production costs, higher productivity and higher environmental and welfare standards, enabling promotion of a stronger, more profitable product. The mechanisms for change involve: planning and monitoring at farm/field level using regular remote sensing surveys; and, the redirection subsidies and existing grant support away from smaller to larger farm units. Larger agribusiness units can deliver diversity and economies of scale and, thus, have the potential to be economically competitive and innovative, as well as to meet higher welfare and environmental standards required to meet the highest international standards. The creation of larger farm units – managed corporately or cooperatively or an individual farmer - will also secure better working conditions and job security, and provide career progression.

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