Defining and Delivering 'Sustainable' Agriculture in the UK after Brexit: Interdisciplinary Lessons from Experiences of Agricultural Reform

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Abstract

Defining and achieving sustainability in the context of complex, multi-scale and constantly changing agricultural systems is a challenge for research and policy. In UK agriculture, the European Union and its Common Agricultural Policy has been a key source of funding for and approaches to sustainability in the agriculture and rural development sectors. The decision to leave the European Union represents a significant moment in UK agriculture and rural development policy, and both an opportunity and responsibility for the UK government to set out and commit towards achieving sustainability goals for the sector. In this study a combination of ethnographic case study research, focusing on the case of upland farmers in the Yorkshire Dales, policy analysis and national agricultural sector data is referred to in describing experiences of agricultural policy reform over recent decades. From these experiences lessons for the design and delivery of future agriculture and rural development are drawn out. It is argued that, the integrated assessment of multiple sources of knowledge can provide a means to critically reflecting on evidence about sustainability in complex systems, better understanding trade-offs, and creating a more complete and inclusive knowledge base from which to define sustainable agriculture.

Key words: agricultural systems, sustainability, UK agriculture, interdisciplinarity, Brexit

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Introduction

Continued contestation over the extent to which the United Kingdom and European Union governments should prioritise agricultural production within multifaceted objectives for the rural economy, highlight the challenging nature of achieving sustainable and multifunctional agriculture. A changing political landscape, which has most recently been transformed by the outcome of the UK public referendum on leaving the EU, and the capacity and willingness of the state to subsidise the agricultural industry, mean that questions about the future of agriculture and what is sustainable in the UK have particular and timely significance. The agricultural sector in the UK is heavily influenced by the single market trading of food and agricultural commodities with EU member states; the direct farm payment subsidies that operate through the Common Agricultural Policy (CAP); and related greening measures, agri-environment schemes and EU environmental directives. Owing to the opportunities and challenges of operating outside of EU governance and the trading agreements, and based on the indicated priorities for the agricultural sector of the UK government as well as its budgetary constraints, Brexit is likely to bring about significant change in UK agricultural policy. Aside from trading agreements, some key issues to be determined are the extent to which the government supports agricultural production through direct payments and the form that agri-environment and ecosystem service payment schemes take. There is limited understanding of the implications of different policy options for the sustainability of different types of agricultural enterprise (i.e. small family farms compared with larger agri-businesses) and for the nature and value of the UK's diverse agricultural landscapes. In considering a future for agriculture in the UK, and how the devolved governments of the UK might support and incentivise change in the sector following their withdrawal from the EU and its CAP, there is much to be learnt from a recent history of experience of agricultural policy reform.

This paper is based on the premise that a recent history of CAP reform and associated UK agricultural sector changes, holds within it important analogies and lessons for future policy change. Since its inception in the early 1960s, the CAP has continually shaped markets and farm payments, with significant implications for how agriculture is practiced in the UK. A series of reforms have seen the promotion of modernisation and farm growth in the 1970s, the placing of quotas on production in the 1980s and 1990s, and the introduction of environmental stewardship schemes in the 1990s and 2000s. In response to European Commission spending reviews, 2014/2015 reforms of the CAP led to the 'greening' of capped single farm payments and support for small farms and young, active farmers. As EU priorities have changed, CAP budgets have contracted and farming practices have shifted in response to the changing value, conditionality and beneficiary profile of subsidy payments.

Given the multiple roles that agriculture plays within the rural economy and the diversity of production systems, livelihoods, and interactions with wildlife, there is a need for policy analysis that is broad in scope. Although the sector-wide market implications of some of the potential changes to have been modelled (van Berkum et al., 2016), there is limited understanding of the implications of different policy options for the sustainability of different types of agricultural enterprise and agricultural landscapes. This paper is premised on the assertion that a dialectical cross-analysis of multiple disciplinary approaches can allow for a more critical engagement with complex questions of sustainability. The paper outlines the complex and contested objectives for agriculture and the recent history of change, and describes an interdisciplinary approach to evaluating and drawing lessons from this recent history. It presents evidence from a combination of policy analysis, ethnographic oral

history interviews with pastoral farmers in the Yorkshire Dales National Park, and sector-wide data. From these combined approaches, lessons are specifically drawn out in relation to experiences of agricultural sector market liberalisation, the decoupling of subsidies from production, and rural development and agri-environment schemes. The discussion highlights some implications of these lessons from the recent history of agricultural reform for the future design of, and the process of implementing, agricultural policy change in the UK in the post-Brexit era, emphasizing the importance of recognizing diversity within the agricultural sector and drawing on local knowledge of agricultural landscapes.

Sustainability and the Future of the Agriculture in a post-EU UK

The European Commission's vision for the future of European Agriculture, set out in the Agenda 2000, advanced a discourse of sustainable and multifunctional agriculture that would simultaneously be characterised by liberalisation and competitiveness, play a key part in a secure and equitable rural economy, contribute to environmental sensitivity and protection, ensure food safety and security, and maintain cultural landscapes (EC, 1997). The 2002 Curry Policy Commission on the Future of Farming and Food set out the following vision:

> "We look for a profitable and sustainable farming and food sector, that can and does compete internationally, that is a good steward of the environment, and provides good food and a healthy diet for people in England and around the world. …Farmers are rewarded for looking after their land and for providing an attractive countryside. They have embraced the management of the land for environmental public good as a key part of what farming is about." (Cabinet Office, 2002: 9)

Carefully directed public funding that recognises and rewards farming as a public service provision, across the multifaceted objectives of food security, environmental stewardship, and a stimulated rural economy, and the simultaneous need for agriculture to grow as a competitive market-led sector, were central to the vision that the Curry report set out. This principle of multi-functionality has seemingly become manifest within UK policy that has increasingly emphasized farm land diversification (e.g. the 1988 Ministry of Agriculture's Farm Diversification Scheme) (Marsden and Sonnino, 2008) and strong support to farmers in their role in conservation activities and environmental protection (McNicholas and Ward, 1997).

An emergent discourse of sustainable intensification, linked to international food security concerns and international sustainable development goals (SDGs), has increasingly shaped discussion of farming futures in the UK and globally (Tilman et al., 2011, Godfray and Garnett, 2014). The Environment Food and Rural Affairs Committee of the House of Commons, made the point in relation to the 2013 CAP reforms that "the aim for this round of CAP reform should be to enable EU farmers to achieve the 'sustainable intensification' that is required to meet the global challenges of feeding a predicted world population of 9 billion by 2050 without irrevocable damaging our natural resources" (EFRA, 2011), reflecting language used in the 2011 Foresight report on the future of food and farming. As Franks (Franks, 2014) points out, it is a concept that has been differently interpreted along 'land sharing' and 'land sparing' lines (see Franks' comparison of the 2011 Foresight Report and the 2009 report of the Royal Society), as well as being accompanied by other concepts of multiple wins agriculture, such as

'climate smart agriculture' (Whitfield et al., 2015), that simultaneously contribute to the meeting of multiple sustainability priorities.

Although supporting rural economy growth has been recognised as a priority challenge that requires tailored strategies for diverse rural contexts, production systems, and agricultural households and enterprises (Jack, 2009) agricultural subsidies and agri-environment payments have largely been administered in standardized ways, with some research indicating that these have had differential impacts across production systems (Tzanopoulos et al., 2012), and small and large (Lobley and Butler, 2010), and tenanted and non-tenanted farms (Maye et al., 2009).

Prior to the June 2016 referendum, implications of a Brexit vote for the agricultural sector were associated with significant uncertainty and mixed stances across farming unions, ministers within the Department for Environment, Food, and Rural Affairs (DEFRA)[1], and the farming population themselves[2]. It has been argued since, particularly by the current Conservative government, that withdrawal from the EU will represent greater national control over agricultural policy with the potential for this to be more appropriately targeted at local, landscape and rural economy-specific functions. There is some indication that agri-environment schemes will continue to be funded, at least in the immediate post-Brexit period, and new rural development funds made available, however, trends towards decoupling of payments from production and market liberalization, that have been evident under CAP, are likely to continue. Although the sector-wide market implications of some of the potential changes to these policy aspects have been modelled (van Berkum et al., 2016), interpreting the impacts of reform on multi-functionality of the agriculture across diverse contexts, different types of agricultural enterprise (i.e. small family farms compared with larger agri-businesses) and for the nature and value of the UK's diverse agricultural landscapes, is a significant challenge.

A retrospective and cross disciplinary study of a recent history of agriculture sector policy change allows us to draw on experiences of the impacts and experiences of policy changes that are somewhat analogous to, or the precursors of, potential policy change. The CAP has undergone significant reform over its sixty year history, and whilst the initial common and open market objectives have been sustained, the 1980s saw a move away from production protection towards addressing over-production, the liberalisation of international trade, and the rise of the environmental agenda. The reforms of the policy under European Commissioner Ray MacSharry in 1992, represented a significant reduction in support for cereal and meat production and the introduction of payments linked to land stocking quotas and for set-aside land. The vision of the CAP in the new Millennium set out in Agenda 2000 saw a restructuring of the CAP into two Pillars that separated direct production payments (Pillar I), which continued to be reduced, from those that were directed towards rural development, through Rural Development Regulation (RDR), and environmental stewardship (under Pillar II). This set in motion a move towards the decoupling of payments from production in 2003, under the Fischler reforms, which would see Pillar I payments allocated through a single farm payment, linked to land area rather than production. Despite the centralized nature of this reorientation of the objectives of agricultural policy, Marsden and Sonnino also describe the associated 'regionalization of rurality';

[1] Demonstrated by the opposing positions taken by DEFRA Secretary of State Liz Truss and Farming Minister George Eustice

[2] A survey published in Farmers Weekly on 29th April 2016 suggested that 58% pf farmers intended to vote 'leave' and 31% 'remain'

which manifest in the regionally distinct Rural Development Plans that were drawn up as a strategy for guiding Pillar II action. Under Commissioner Dacian Ciolos, changes made to Pillar I payments in 2014 have seen increasing green conditionality be placed on the single farm payment, meaning that a proportion of this direct subsidy was made contingent on the adherence to farmers of some basic environmental cross compliance activities, designed to maintain habitats and reduce soil erosion and runoff, for example.

The interconnected nature of agricultural systems, particularly in relation to the trade of commodities and latterly in relation to multiple other cross-scale flows, such as the migration of wildlife, has been a driver of common and centralised governance. Simultaneously, recognition of the localised nature of production practice, agro-environments, cultural landscapes and, in some cases, markets has been associated with a devolvement and decentralisation of governance and agenda setting, as evident in the Rural Development Programmes drawn up as part of requirements of RDR and Natural England's Landscape Character Assessments used in Local Authority planning processes. Across the multiple scales and stakeholders of farming systems can exist a variety of values and priorities for the system – from economic integration and trade liberalization to maintaining local cultural heritage and livelihoods – a variety of knowledges and experiences, that sometimes sit in conflict with each other and can become the basis of alternative evaluations of sustainability (Scholten, 2013). Achieving a sustainable agricultural system represents a significant challenge, not least for research that as aims at defining what sustainability is in these complex, interconnected, multi-scale and multi-sited, and constantly changing contexts, and, in doing so, to capture the values of those that may be marginalised within or dislocated from the system and to do justice to future generations and non-human stakes. Markets for agricultural commodities, the impacts of rural economies and employment, the movement of livestock and of vector-borne diseases, the cultural services and value associated with wildlife species, for example, can link geographically dislocated actors and processes, within systems that cross multiple spatial and temporal scales. This challenge requires research that "engages critically with questions about sustainability; what is to be sustained, where, at what scales, and for whom" (Whitfield et al., 2015: 1297), and in this paper the assertion that such engagement can be achieved through interdisciplinary research and analysis is explored.

Methods

A cross-disciplinary retrospective study of agricultural change, which draws on critical policy analysis, ethnographic case study work, and sector-wide data analysis is presented. This was conducted as three simultaneous short studies that focus specifically on agricultural policy change from 1992 onwards, capturing those that occurred in association with the MacSharry CAP reforms. The findings of the three studies iteratively informed each other. For example, ethnographic research on agricultural choice pointed to key political moments that were subsequently investigated through policy analysis, which revealed key assumptions or sector wide trends that were then investigated through secondary data analysis, which was subsequently triangulated through ethnographic work and farmer interview. As such an iterative cycle of research was somewhat self-propelling.

Sheep, beef and dairy production systems in the Yorkshire Dales, UK, represented a focal point of study of agricultural system change, on the understanding that this case study approach offers insight into localised dynamic processes that are themselves linked to sectoral and national-level policy as well as international markets. Upland pastoralists in the Yorkshire Dales are predominantly family

farmers operating in medium productivity environments and markets of marginal profitability (Acs et al., 2010). Subsidies play an important role in making upland agriculture economically viable. In upland areas, landscape and environmental stewardship generally equates to the destocking and setting aside of land to prevent overgrazing and conserve certain wildlife habitats and ecosystem services (e.g. regulating river basin hydrology). However, in the Dales, agriculture itself is synonymous with a cultural landscape that attracts tourism and that institutions such as the National Park Authority have been established to conserve. In a context of agricultural policy change, and the demand for cheap food being met by imports and intensive production elsewhere, there are questions about long term impacts on the livelihoods of farmers, the stewardship of sensitive areas, and subsequently on rural cultures and economies in this area. (Shaw and Whyte, 2013, Reed et al., 2006).

Analysis of policy and strategy documents, media reports and press statements, and campaign literature (detailed in table 1), was achieved through manual coding, which focused on the identification of narratives (or narrative elements) regarding a sustainable agricultural system. Coding terms used included, but were not limited to: productivity, ecological sensitivity, flexibility (and lock-ins), set-aside, cultural landscape, red/green tape (paperwork), animal welfare, health, social equity, market liberalization.

Oral history interviews with 26 upland pastoralists in the Yorkshire Dales were conducted in 2015-16. Timelines of farm changes were constructed with participants, each bounded by participants' own experience and recall and focused predominantly on identifying significant changes in activity on the farm (e.g. entering into new production systems, buying/selling land, new contracts/markets) and the main drivers of those changes (markets/prices, environmental/disease-related, regulations/policy opportunities, etc.) (See figure 1).

Basic regression analysis was used to examine evidence about the vulnerability of dairy farms to market price changes based on farm-gate milk price and agricultural input cost, and time series information on sector structure, from the annual DEFRA June agricultural survey and the Agriculture and Horticulture Development Board.

Information sources	**Description**
Policy/strategy documents	UK government department white papers and outline strategy documents, and European Commission proposal and consultation documents (e.g. the European Commission Legal proposals for the CAP after 2013) – initially identified from search of media reports and subsequent snowball sampling (**n = 18**)
Media reports/press statements	Archived copies of Farmers Weekly, Farmers Guardian, and Farm Industry News journal articles archived by Nexis©, for the period 1995-2016, searched using key terms in the Nexis search engine (**n ≈ 3800**)
Campaign literature	Reports developed by non-governmental organisations such as the RSPB and the NFU as well as short information pieces by campaign groups – initially identified from search of media reports and accessed online. (**n = 28**)

[Table 1: Descriptions of information sources used in the policy analysis]

Results

Insights from this interdisciplinary study are organised here into three main themes reflected in the recent history of UK agricultural change, and that are analogous to or precursors of, and therefore hold lessons for, potential policy directions in the post-Brexit era – market liberalisation, the decoupling of agricultural subsidies from production, and the directing of payments towards rural development and agri-environment schemes.

Market Liberalisation

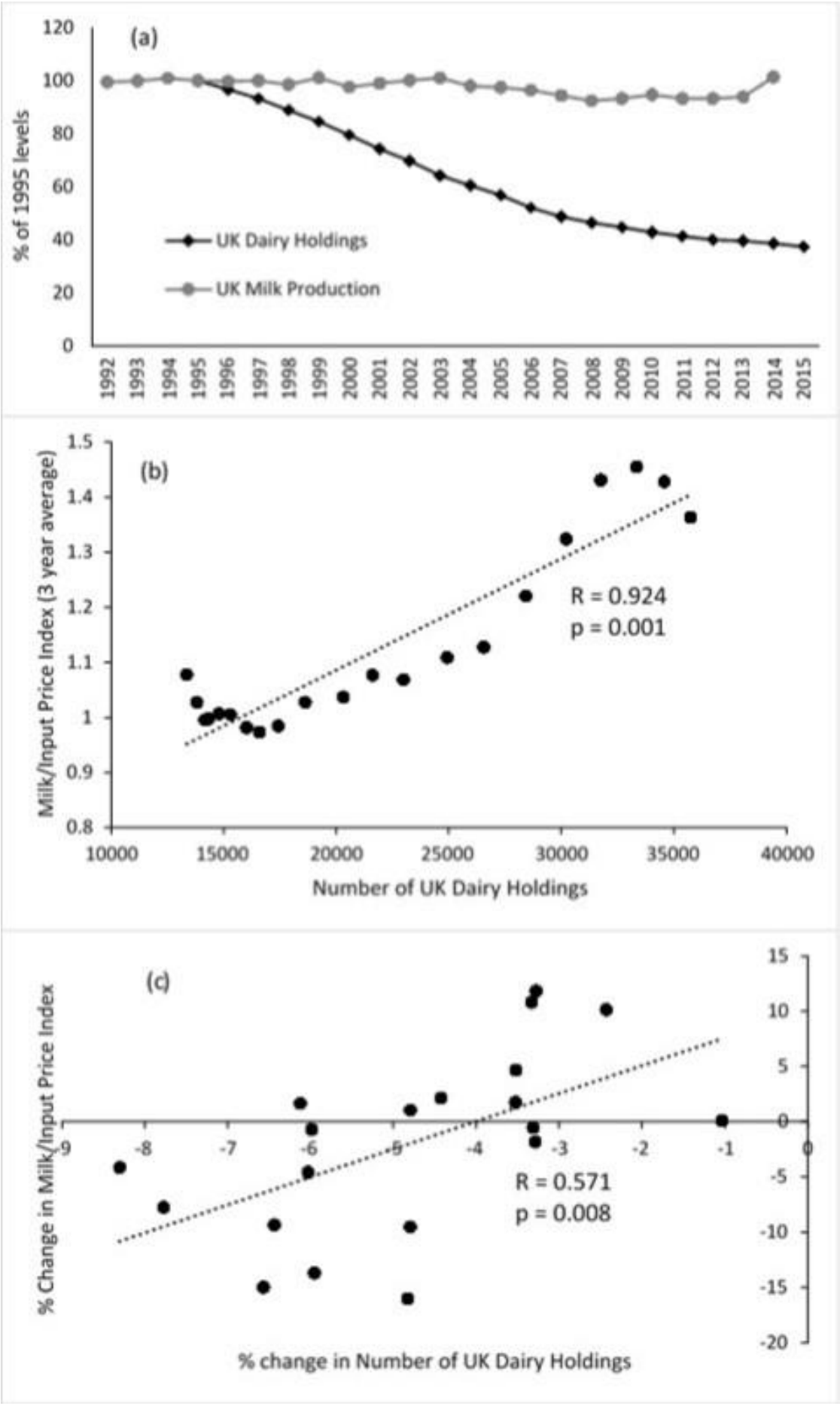
Through the Uruguay Round of the GATT, which began in 1986, increasing pressure was exerted on the EU to implement reform of its protectionist policies and subsidies that were seen to be distorting and destabilising global markets. This lengthy round of negotiations reached a conclusion in 1994 as the Council of Agricultural Ministers submitted to these pressures and instigated the MacSharry reforms of the CAP in 1992, which represented a commitment towards liberalization and the redirecting of payments, for example, towards set-aside land. In the UK, this represented a catalyst for the long-discussed redressing of some of the national market structures that predated its EU membership, the Milk Marketing Board representing a well-documented example of change.

The Milk Marketing Board of England and Wales (MMBEW) was established in the 1930s at the majority vote of the membership of the National Farmers Union in response to volatility and price collapse after 1930, and in addition to providing price stabilization it acted as a driver of modernisation and improved standards in dairy production systems. Whilst the push for improved standards and moves towards bulk collection arguably drove the premature selling off of some small family farms, who couldn't justify needed investment in their farm infrastructure, the MMBEW largely acted to protect smaller and more geographically isolated producers owing to its commitment to the collection of milk at standardized prices, i.e. not penalising those from whom collection is less efficient (Winter, 1984).

When the MMBEW was disbanded in 1994 into a number of voluntary cooperatives, many small farmers initially volunteered themselves into the Milk Marque quota-holding producers' cooperative, in spite of competitive contracts from private dairy processors. Whilst larger commercial farm could negotiate a premium with these private contracts, smaller farms remained somewhat protected from market variance through Milk Marque (Franks, 2001). But as the cooperative itself lost large producers it became less competitive in a freer market and gradually Milk Marque prices slipped relative to other contracts.

Liberalization of UK markets, although clearly not complete as CAP subsidies have continued to represent a significant intervention, has exposed farmers to market fluctuation. This has been felt particularly acutely in farm gate milk prices. These prices have largely displayed a consistent rising trend since 2000, but experienced a dramatic downturn in 2014 owing in large part to the market shock that the Russian import ban on EU products represented; a market crisis that has been highlighted by the NFU and campaign groups such as Farmers for Action. This exposure to market price represents to many a driver for improving efficiency and reducing input costs, but abilities to ride waves of price change are inevitably uneven, and those with limited disposable capital (i.e. livestock) and limited access to credit, which are predominantly characteristic of small family farms, face particular challenges in coping during times of price troughs.

Figure 1a shows a consistent downward trend in the number of dairy smallholdings over the period 1995- 2015, which has not been reflected in a downward trend in total milk production, illustrating the growth in average farm size over this period. The number of dairy holdings over this period has been correlated with the milk/input price ratio (figure 1b), which has shown a similar, but less even decline over the period. In fact, a close correlation between the annual change in UK dairy holdings and the change in the milk/input price index experienced in the previous year (figure 1c), suggests a particular responsiveness in dairy holdings to market change. Across the farming sector, the loss of small farms has constituted a disproportionately high proportion of the overall decline in households.


(a)
% of 1995 levels
UK Dairy Holdings
UK Milk Production
(b)
Milk/Input Price Index (3 year average)
R = 0.924
p = 0.001
Number of UK Dairy Holdings
(c)
% Change in Milk/Input Price Index
R = 0.571
p = 0.008
% change in Number of UK Dairy Holdings

1

[Figure 1: (a) Trends in total dairy production and number of UK dairy holdings, as a percentage of 1995 levels over the period 1992-2015 (Data sources: DEFRA Statistics); (b) Plot of the number of UK dairy holdings against a 3-year average milk price/input cost ratio (centred on the year previous to that represented by the dairy holdings number. Data derived from DEFRA statistics and the AHDB for the period 1992-2015; (c) Plot of the annual change in the number of UK dairy holdings against the % change in the milk price/input cost ratio (from the average of the previous three years) experienced in previous year.]

A sustained increase in the cost of farm inputs since the mid-1980s is consistent with the profitability challenges that a number of interviewed Dales farmers identified over this period, and since 2013, the rapid drop in farm gate milk prices has been more severe than the associated reduction in farm input costs. The sentiment of farmers in the Yorkshire Dales, elicited at a time of a particular steep downward trend in milk prices (from a peak in November 2013 through to a trough in November 2016), reflected a concern over the particular vulnerability of small dairy farms exposed to the fluctuations of milk and input costs. Many expressed discontent with the impacts of market liberalization and a keenness for a return to price protection, that some felt that Brexit may have the potential to deliver:

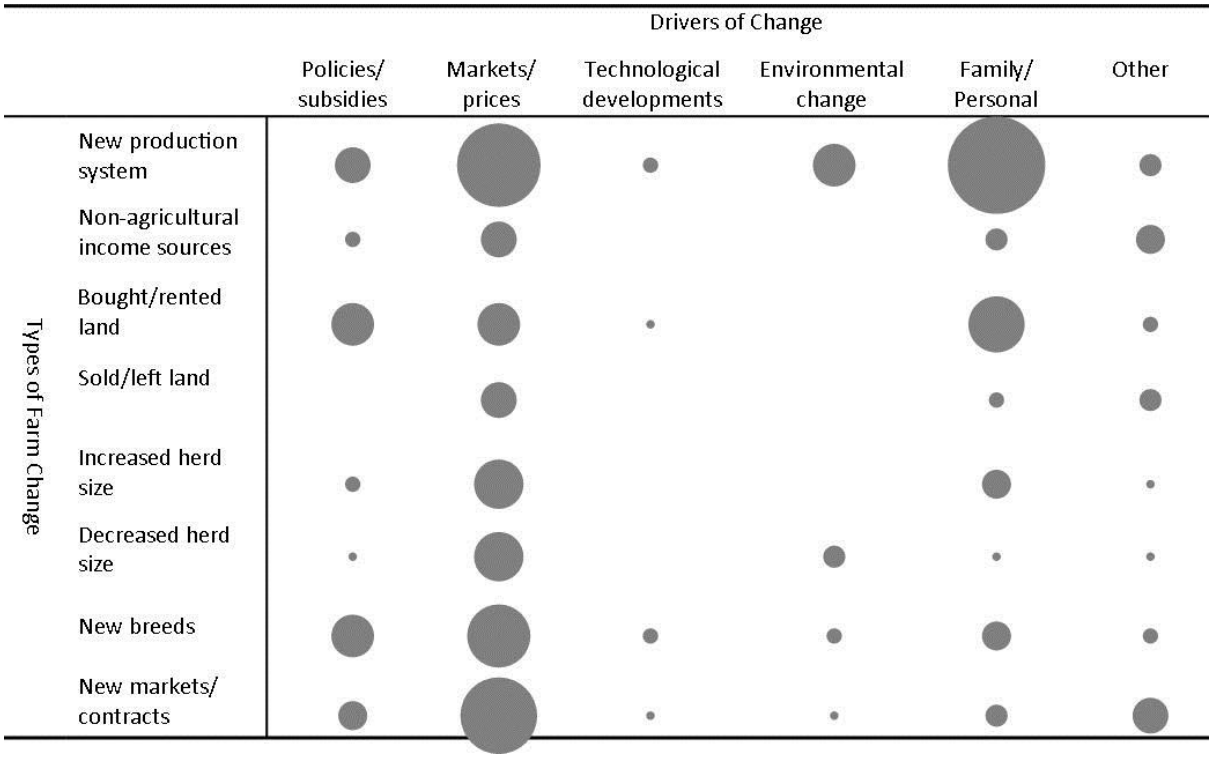
> *"It was a huge boom or bust cycle in the dairy industry in the 1930s, that's why they made the Milk Marketing Board, they'll need to reinvent it or there'll be no dairying left, or there'll be one farm with 2 million cows"*

Many farmers point to volatility in the milk market and the economics of production as a direct driver of change in the recent history of their farm, and this was most commonly associated with a change in production system, often from dairy to beef and/or sheep farming and the seeking of new, and often, as one participant described them, *"[not] better, but less bad"* production contracts (e.g. with commercial dairies) (Figure 2). In this context of market liberalisation, innovation and increased efficiency of production can be stimulated, but for small producers in more marginal production environments (typically family farms in the UK), and often with less capacity to invest in farm infrastructure, staying competitive and resilient to market change has proved challenging.

There are however some examples of cases where contractual arrangements with retailers or processors in supply chains that commit buyers to fair prices have been a catalyst for investment and increased efficiency in production that have sustained the competitiveness of dairy on family farms.

> *"The [fair milk] contract has given us the confidence to progress, not to produce more, but to become more efficient"*

Such arrangements, as in the case that this quote refers to of a producer contract with a northwest retailer, may be born out a social responsibility a commitment of the retailer to supporting the local rural economy. Such localised supply chains may offer some protection from the fluctuations of global market.



[Figure 2: Representation of the changes and associated drivers of change indicated by farmers across oral history interviews. The size of circles indicates relative frequency of the coupled response.]

De-Coupling of Subsidies and the Single Farm Payment

It was a mid-term Review of the Agenda in 2002 that instigated a more fundamental decoupling of subsidies from agricultural production, as this reform had been stalled in the process of developing Agenda 2000 itself, largely due to budgetary concerns by finance ministers and heads of government. The package of reforms put forward by Commissioner Fischler that resulted from the mid-term review, outlined that decoupling strategies would be nationally designed and determined, and it was argued that such change would allow 'farmers to fully benefit from market opportunities in supplying the products that consumers demand' (EC, IP/02/1026, 2002). In the UK, the Single Farm Payment replaced livestock 'headage' payments in 2003. The reform was perhaps the most fundamental in the history of the UK's involvement in CAP to that point, and its unprecedented nature meant that it was associated with some uncertainty about the sectoral response and concerns about the potential for an exodus from farming and the abandonment of marginal land (Swinbank and Daugbjerg, 2006, Tranter et al., 2007, Lobley and Butler, 2010). Based on their own survey of farmers in SW England, Loblely and Butler (2010) argue that "market signals may become a more powerful driver of farmer behaviour than CAP instruments, in which case the 2003 reforms will have proved successful in providing farmers the freedom to farm without coupled subsidies… though, only a minority of farmers seem both well placed and well-disposed to exploit such opportunities." (p. 347)

For tenant farmers and those that relied on sending their stock to wintering land owned by others, this change in subsidy structure presented particular challenges, as one Dales beef and sheep farmer explained:

> *"It probably altered our business structure big time because we were playing a numbers game with sheep, we were sending them to these other parcels of land on to wintering land and drawing subsidy on 1200 sheep at £20 apiece, whatever that works out at, we suddenly went to area payment where the guy who owned the wintering land, the subsidy went to him, so he had no incentive to keep the wintering sheep, the people with the other land cottoned on to the idea that, 'hang on we don't need to do any work here, we can have the money for just filling the form in', and so our income stream from subsidies declined big time. Probably halved. We always said in 2001 that we'd never have any money again."*

Significantly for some in the livestock sector, the reform of subsidies coincided with the Foot and Mouth disease (FMD) outbreak in 2001, which resulted in complete loss of stock for many farmers in the Yorkshire Dales, as it did across the UK. It was seen by some as an almost convenient coincidence that allowed for the kind of destocking that been much discussed around Agenda 2000:

> *"They had talked about reducing stock before Foot and Mouth, and I think Foot and Mouth was seen as an opportunity to change the way that British farming was done really"*

For those that remained with stock, the restrictions on trade that came into force and persisted beyond the Foot and Mouth epidemic, left farmers struggling to manage stock numbers and highly exposed once trading began again, owing to their urgent need to destock.

> *"We weren't in a position to demand a higher price. It was coming in to winter, we couldn't keep them. There were no markets open so you were just at the mercy of whoever turned up and whatever they wanted to pay. People would come saying they wanted them and then suddenly turn around and say they didn't. Because they had found them cheaper somewhere else."*

Although change in subsidy does not emerge as a dominant driver of change in practice amongst the participants in the Dales (figure 1), for some, the combined effect of a decoupling that exposed farmers to the potential for market shocks in stock price, and the low price and market volatility that accompanied the Foot and Mouth outbreak, instigated a move to a change in production systems:

> *"The change in subsidies was probably the turning point with going from sheep numbers, because although the sheep weren't making the profit in their own right, as breeding animals, we were still able to claim the £30-£40 per sheep, which was the profit in them effectively, so now we are in a scenario where you don't want that density of stocking of sheep, we're learning all the time that the more extensively we farm them the more profitable they were … although it looks like the lamb price is going to drop by 20 quid, it looks like we are going to make a profit on them, the business has become more resilient by reducing input costs and stocks."*

Rural development and agri-environment schemes

Under the RDR, member states were to draw up geographically appropriate rural development plans for 'improving the competiveness of farming and forestry'; 'improving the environment and countryside'; and 'diversifying the rural economy and improving the quality of life', the three principles of the new Pillar 2 of the CAP. These would incorporate existing stewardship schemes and new rural development funds, voluntarily modulated from Pillar 1. The original Environmentally Sensitive Areas (ESA) schemes of 1987 were applicable to farmers and land owners in designated regions of the UK where it was felt that a concerted effort was needed to prevent the degradation of landscape character (Morris and Potter, 1995, Lobley and Potter, 1998). The addition of the Countryside Stewardship Scheme (CSS) in 1991 had extended the reach of incentives to improve the ecological sensitivity of agricultural practices beyond these particularly high value locations. With the restructuring of CAP subsidies through Pillar 2 the UK Environmental Stewardship Scheme was introduced which, through its Entry, Organic, and Higher-level routes, compensates farmers for implementing a variety of environmental best practices, such as managing hedgerow, maintaining permanent grassland, retaining water course buffer strips, conserving skylark nesting sites, and much more, on the condition of meeting the requirements of a flexible points-based model.

Additionally, in the first Rural Development Programme for England (RDPE) established under the Ministry for Agriculture, Fisheries and Food (MAFF), which covered the period 2000 to 2006, new schemes to support sustainable agricultural use of upland and less favoured areas, and promote rural enterprise were introduced. The Rural Enterprise Scheme was designed to "encourage farmers to diversify their farm businesses in order to improve their economic viability, particularly in rural areas which have experienced most difficulty in adjusting to agriculture's decline" (MAFF, 2000), with a focus on entering diverse product and production markets, such as keeping sheep and goats for milk and cheese, or livestock such as wild boar or alpacas. The LEADER (Liaison Entre Actions de Développement de l'Économie Rurale) programme, which had existed since the early 1990s as a way of channelling rural development funding through bottom-up, local area based mechanisms, became incorporated within the second phase of the RDPE. In the Yorkshire Dales, LEADER is managed by a Local Action Group directed by the Yorkshire Dales Millennium Trust and has the specified aim of "build[ing] a sustainable community and economy that capitalises on the area's environment, landscape, culture and heritage". In some cases these funds have been directed towards supporting and modernising family farm operations (one interviewee had received funds to purchase a weed wiper and soil aerator equipment for example), and in others they have integrated agriculture and agricultural heritage within tourism and education projects, supporting farmers to diversify and utilise their land for these purposes.

The impact of agri-environment schemes in the UK to date have been inconclusive. Whilst some studies suggest positive associations between farmland biodiversity, most often measured by bird species populations, and boundary management activities, including in Yorkshire and the North West (Davey et al., 2010a), these have not been universal. Whilst there have been positive indicators for Corn Bunting and Common Starling nationwide (Perkins et al., 2011, Davey et al., 2010b), this hasn't been the case for other species (Davey et al., 2010b, Baker et al., 2012). Interviewed farmers had had mixed experiences of the entry, higher-level, and countryside stewardship schemes:

> *"On the allotment it [countryside stewardship] didn't work too well for us. The stocking rules were too restrictive. In fact at the start of the scheme we had lapwings and curlews nesting up*

there, and by the end they weren't there anymore. The curlews were still there but the lapwings had disappeared"

There has been some criticism that entry-level stewardship schemes have done little to encourage sustainable intensification (Kassam et al., 2011) or significant change in practice (Whittingham, 2007), with farmers pursuing stewardship options that are most achievable or require least adjustment of status quo practice , and that are 'not ideal for achieving the desired outcomes' (Natural England, 2009: 6). However, there was evidence of Dales farmers having not only reoriented their practices (particularly those qualifying for higher level stewardship), but having pursued stewardship actions above and beyond funding requirements:

"What I do here in terms of my species richness, and that includes the meadows, I do more than what is required, firstly, because I think that in the event, which is going to happen, of these [stewardship] schemes becoming more competitive, I want to have a resource that is attractive, secondly because it is something that I find interesting and, thirdly, because I am a small farm and I have to do something different… it might not be politically valued at the moment, but five years down the line the politics might change."

However, frustration over the bureaucratic aspects of funding and the complexity, incompatibilities, and propensity for change in the varied funding sources and schemes was expressed:

"The Countryside Stewardship Scheme ran until 2013 and I felt comfortable with that, I thought we were achieving something. It was bringing me an income from the less productive parts of the farm… We had someone from Natural England come to look at the hay meadows, and he invited us to join the higher level stewardship scheme. So we went through all the process of putting an application in, and they did a soil sample, and found the phosphate levels were too high… they wouldn't allow people in to higher level stewardship if their phosphate indexes were high so... so we're in limbo with this now. Our most environmentally sound land we don't get any payments on it, we didn't get into the entry level scheme because it was too late. They weren't taking any more applications."

"I have been told I must forego nearly one year's Natural England funding to qualify for the new Countryside Stewardship Scheme on the 1st of January 2018… purely for technical administrative reasons due to the 1st of January Start Date for the new Countryside Stewardship Scheme… During the 11 month break period, I will be disqualified from Natural England management funding, capital grants and Educational Access funding."

Whilst the LEADER methodology for funding represents a strong commitment towards bottom-up design and planning of rural development, the extent to which such programmes have drawn on local knowledge in their conception and delivery has in some cases been limited. One farmer described the developing plans for creating a wetland habitat via the removal of flood banks on the river that ran through land that he owned. He described a consultancy meeting about the proposal, in which it became clear that the proposed actions were founded on misunderstandings about local hydrology and drainage, as well as the use and value of the land:

'The consultant told us 'it'll probably only flood once every one to one and half years', at this point, [anonymous] who farms opposite, who I've known since we were both in nappies said ' I had a hole in the banking on my land and it went through it five times between November and March'… If he'd taken time to speak to farmers who are getting their feet wet down there on a daily basis, they could have given loads and loads of local knowledge about how it worked and when it was wet and when it wasn't and how quickly the water went down… they had fundamentally misunderstood how it works'

Discussion

The description of agricultural market liberalization, the decoupling of subsidies from production, and the directing of funds towards a broad package of rural development presented above, draws in particular on experience of these changes within the context of the Yorkshire Dales; a location in which there is a framed landscape of significant heritage value a range of production systems, tenure agreements, and farm sizes. In doing so, it reveals some of the potential for differing resilience to market fluctuation and differing opportunities for taking advantage of rural payment schemes across farming households and situations. The impacts of agricultural policy change have been felt unevenly across sectors and geographies (as shown by the impact of liberalization on small dairy farms) and generic approaches may be ineffective in achieving targeted functions for the landscape (as shown by the impact of agri-environment schemes on farmland birds).

In the post-Brexit era, further market liberalization and a shift in subsidies towards green conditionality and broader rural development, are trends most analysts suggest are likely to continue, but the design and process around this rural development funding, and the place of environmental stewardship schemes within it, in particular, remains uncertain. The opportunity that a restructuring of agriculture and rural development support represents for learning from the experiences of the past is significant. We draw out some interrelated lessons from the experience of the Yorkshire Dales here.

The first is the importance of tailoring policy around agricultural system priorities, and that these priorities may derive from a variety of geographically dispersed stakeholders. Family farming may be a valued part of landscape heritage; particular species or land covers may perform particular ecosystem functions in different locations; market resilience and economic prosperity may be associated with different metrics and thresholds for different enterprises; different production systems require different degrees of flexibility in access to land and mobilisation of stock; land sparing and land sharing may be differently appropriate in different landscapes; and bureaucracy and paperwork burdens may be less sustainable for some households and businesses than others. Systems approaches to the conceptualisation of agricultural activity (Collinson, 1987, Dixon, 2000, Darnhofer et al., 2012) and the multi-faceted role of agriculture within rural environments (Smit and Brklacich, 1989, Bowler et al., 2002, Robinson, 2008) recognise the contextual and multiple interactions that take place between socio-economic and environmental processes, from farm inputs and land management decisions to natural resource extractions and commodity flows. Such approaches have served to highlight system complexity and the varied and dispersed nature of stakes in and priorities for agricultural systems.

Defining sustainability priorities for an agricultural system is complicated, as debates around a changing CAP have highlighted. Definitions of who and what agriculture is for have been at the centre of debate, a contest of multiple sustainabilities that have been framed in opposition to each other. Questions about the economic sustainability of direct subsidies are inextricable from the priorities of securing food access and availability and safeguarding the livelihoods of family farmers. The environmental sustainability of food production has been called into question by the reports (and the scientific evidence base that underpins them) and campaigns of organisations, such as the RSPB, who have highlighted the decline of farmland bird populations, with significant policy impact. Subsequent recommendations around the setting aside of ecologically sensitive areas have been particularly contested because of their inevitable association with direct production trade-offs. Recognising and engaging with trade-offs in the multiple priorities that exist for agriculture and rural development is an important challenge, in the UK as it is in complex agri-food systems around the world. This complexity is only exacerbated by the combined impacts of changing climates, population pressures, land and water scarcity, biodiversity loss, and changing diets (Godfray et al., 2010, Poppy et al., 2014). Multiple wins concepts such as sustainable intensification can act to mask the reality that agricultural and rural development strategies, even where they are developed at local scales, can be associated with winners and losers (Whitfield et al., 2015) – a point that has been more broadly in relation to international sustainable development strategies (Raworth, 2012, Stafford-Smith et al., 2016). A sustainable strategy may be one in which trade-offs are managed and unacceptable levels of compromise avoided, rather than win-win solutions implemented.

The second lesson relates to the important role to be played by evidence – information on processes of change, systematically collected and analysed that can inform values and debate – in addressing trade-offs. Data on trends in farmland bird populations and interrogation of hypothesised drivers of change through statistical analysis and trial site observations, represent an important means to informing and validating campaigns for agricultural change and evaluating appropriate policy responses. Analysis of the effectiveness of agri-environment schemes in bringing about sustainable land use, as set out in the Foresight report on land use futures (Foresight, 2010), have been a driver of reorienting of schemes towards more competitive schemes and the suite of more localised rural development schemes. Cases of politicised evidence are not uncommon in contested agriculture. In a review of bovine tuberculosis control, David King, Chief Science advisor to UK Government, in 2007, recommended the removal of badgers as part of a strategy to control the disease. Dispute over the academic integrity of the report played out across articles published in Nature in November 2007 in which the recommendations of the King report were described as 'likely to encourage speculation that his report was written to please the farmers' (Nature, 2007). Others controversies in UK agriculture – the use of neonicotinoid pesticides, GM crops, the BSE crisis – have been similarly associated with claims of political bias within contested policy debate. Policy controversies may be particularly problematic in cases where policy narratives are supported and legitimized by evidence that is presented in a 'disembodied way, without reference to the associated contextual particularities and conditions' (Stirling and Scoones, 2009: 5).

'Opening up' (Stirling, 2008) deliberative processes of rural development planning to multiple perspectives will, in many cases, require research that is carefully designed to elicit the voices of less-often-heard stakeholders, of which small family farmers have been a prime example. Drawing on local knowledge in defining and implementing agricultural development can be complicated (Pretty, 2011), but highly valuable. Farming systems research, for this reason, has become synonymous with

participatory research (Chambers, 1994, Sands, 1986, Scoones and Thompson, 1994). In the case of the wetlands project mentioned above, through the consultation process, and the input of local farmers and land managers, the plans for creating the wetland bird habitat were fundamentally changed, and a more heterogeneous and geographically sensitive strategy of converting smaller patches of less productive land into habitats was co-developed.

Whilst recognising the challenges that the UK exit from the EU and the common agricultural market represents, we acknowledge too the opportunity for agricultural policy to be further oriented around achieving multifaceted and locally appropriate sustainability objectives – the potential to pursue market strategies that will help small family farms to become more resilient to market fluctuations in those locations where they represent an integral part of the landscape heritage, increasing land security for tenant farmers, investing in targeted rural services, designing agri-environment schemes that reflect localised ecosystem properties and functions, and reducing administrative burdens – in a post-Brexit era. We recognise too that achieving sustainable agricultural and rural development futures may involve engagement with trade-offs, seeking out the perspectives and priorities of those less often heard voices and those that might lose out as a result of policy change, and implemented safeguards against unacceptable levels of compromise. In this respect, a trend towards decentralization and bottom-up approaches to developing and delivering rural and agricultural development in the UK should be a central principle of future policy reform, and the evidence to underpin decentralised change should be interdisciplinary, drawing on multiple perspectives and local knowledges, the value of which, the research presented here as attempted to demonstrate.

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