

Understanding farmer motivations: Very Small and Small farms

Final report: Appendix: Literature Review

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Contents

1	OVERVIEW	1
2	INTRODUCTION	5
3	BACKGROUND TO UNDERSTANDING BEHAVIOUR IN FARMING	7
3.1	STRUCTURAL CHARACTERISTICS – BUSINESS FORM	7
3.2	STRUCTURAL CHARACTERISTICS – FARM/AGRICULTURAL HOUSEHOLDS	9
3.3	STRUCTURAL CHARACTERISTICS – FAMILY FARMING	12
4	HOUSEHOLD BEHAVIOUR THEORY AND A MODEL OF THE DECISION-MAKING PROCESS	15
4.1	HOUSEHOLD BEHAVIOUR	15
4.2	A MODEL OF THE DECISION-MAKING PROCESS	17
5	MOTIVATIONS – VALUES AND GOALS BEHIND BEHAVIOUR	23
6	HOUSEHOLDS OPERATING VS&S FARMS – INCOME SOURCES, PLURIACTIVITY AND OTHER CHARACTERISTICS	27
6.1	VERY SMALL FARMS IN WALES (FROM ANSELL <i>ET AL.</i> , 1991)	30
7	THE ECONOMIC, ENVIRONMENTAL AND SOCIAL ROLES OF HOUSEHOLDS OPERATING VS&S FARMS 33	
7.1	ECONOMIC ROLE	33
7.2	SOCIAL ROLE	34
7.3	ENVIRONMENTAL ROLE	36
8	EXPECTED AND ACTUAL OBSERVED RESPONSES BY FARM HOUSEHOLDS TO POLICY SIGNALS	39
8.1	RESPONSES TO ECONOMIC PRESSURES	39
8.1.1	<i>Background theory</i>	39
8.1.2	<i>Evidence of actual responses in the face of major financial pressure</i>	41
8.2	INNOVATIVE BEHAVIOUR AS A RESPONSE	45
8.3	RESPONSE TO POLICY SCHEMES	47
9	SEGMENTATION AND TYPOLOGIES OF FARMER BEHAVIOUR, ESPECIALLY IN THE UK, AND ANY INFORMATION ON THEIR USE IN ANTICIPATING BEHAVIOURAL RESPONSES	50
9.1	THE USDA FARM TYPOLOGY	50
9.2	SHUCKSMITH AND HERRIMAN (2002) – GRAMPIANS, SCOTLAND	51
9.3	REHMAN <i>ET AL.</i> (2008) ENGLAND	53
9.4	DEFRA/PIKE (2008) - ENGLAND	55
9.5	SUTHERLAND <i>ET AL.</i> , 2019, NON-COMMERCIAL FARMS IN SCOTLAND	56
9.6	LEE-WOOLF <i>ET AL.</i> , THE WALES ATTITUDINAL SEGMENTATION MODEL	58
10	REVIEW OF THE USE OF SCENARIOS IN EXPLORING THE LIKELY IMPACT OF BREXIT	63
10.1	USE OF SCENARIOS FOR WALES	71
10.1.1	<i>AHDB assessment of the impact of leaving the EU on four Welsh farm types</i>	71
10.1.2	<i>Wales Centre for Public Policy: implications of Brexit in Wales</i>	74
10.1.3	<i>Economic and Social Research Council: Brexit – how will UK agriculture fare?</i>	78
10.1.4	<i>Welsh Government EU exit scenario planning</i>	80
11	BIBLIOGRAPHY	83

Understanding farmer motivations

Draft Final Report

The Welsh Government contracted IHS Markit to help provide an understanding of individual motivations and decision-making processes taking place within those farming households economically defined as very small and small. This Appendix to the Final Report presents our in-depth literature review. The main author of this literature review is Professor Berkeley Hill (Imperial College London) with contributions by Dr Dylan Bradley (IHS Markit).

1 Overview

The purpose of this literature review is to help service the aims and objectives of this research project. The aims are to:

- Help understanding of individual motivations and decision-making processes taking place within those farming households economically defined as very small & small (VS&S).
- Assess the effects individual motivations and decisions will have on intentions for action given the possible scenarios for trade and proposed changes to farm support mechanisms.
- investigate the extent to which those farming households economically defined as VS&S are linked to and support their communities and larger farms.

A particular internal objective is to enable the questions to be used in this project's survey of VS&S farms to be selected and refined.

Agriculture in Wales, as in the whole UK, is operated predominantly by households as unincorporated businesses (household-firms), and this will be particularly the case among VS&S farms. Even with larger businesses, where the businesses nominally taking a corporate legal form is more common, from a functional standpoint these family companies typically act as unincorporated household firms would be expected to do, their business form being largely a taxation convenience or one to spread ownership among family members. It can therefore be expected that the behaviour of VS&S farms will be better explained by models based on the household than on the simple theory of the firm. The centrality of understanding the behaviour of the farm household is thus important to policy making and implementation, something also acknowledged in the USA.

Studies of farm responses have often adopted the notion of the 'principal decision maker', though this appears outmoded. More recent research indicates that farmers in Wales are not usually lone decision makers, and often consider the impact of their decisions on their family even if family members are not directly involved in decision making. Thus, it is important to consider how the farm works as a family unit and the stresses and strains of running such an enterprise, where there are often multiple sources of employment and associated demands being made. An implication for the present research is that in the survey of VS&S farms, questions need to be asked about the nature of the household and how the various members influence decisions.

Various projects in the literature have used the Theory of Planned Behaviour (TPB) in research aimed to explain behavioural responses and to influence them. TPB assumes that an individual's behaviour is influenced by three determinants, namely beliefs about:

- the likely outcomes of behaviour;
- societal norms; and,
- an individual's control over the outcomes of a behaviour.

Taken together, these beliefs influence an individual's intention to adopt that behaviour. The implication for this current research is that questions in the survey of VS&S farms should cover these beliefs; the literature contains suitable examples.

A broad understanding of the values held by farmers and the goals and objectives behind decisions is essential in explaining why the agricultural industry behaves as it does in response to economic and policy stimuli. Various

farming styles or orientations can be identified which demonstrate that motives, in addition to that of generating income, can be important in shaping behaviour. Taking part in farming activities is a major source of (intrinsic) satisfaction, and family succession can be important where successors are identified. The implication for the current research is that the questions to VS&S farms should cover orientation (and succession).

Literature on the characteristics of VS&S farms, especially in Wales, has found them to be very heterogeneous, both in their origins and in their current range of activities and income sources. Surveys have found that they have ranged from traditional family smallholdings yielding a modest living for their occupiers, through farms which were merely side-lines or convenient residential bases for their occupiers, whose main livelihood was non-agricultural, to units purchased with outside resources and run for the purpose of indulging a vision or a philosophy. There seems to be a conflict between, on the one hand, a general intention that the small farm makes money and, on the other, the reality of dependency on other income sources. Rather dated evidence suggested that Welsh very small farms tended to be characterised by a lack of change, with many occupiers being of long standing and unlikely to see the farm as a way of progressing to something larger. The implication for the current project is that its survey questions should be capable of capturing the heterogeneity found among VS&S farms.

Evidence in the literature on the economic, social and environmental roles of the VS&S farms is mixed and hides complex patterns. In terms of employment, small farms on average used smaller amounts of labour per farm, but higher levels per 100 hectares. Though farmers undoubtedly contribute to social capital, there is not clear evidence about whether in today's conditions there is any relationship with farm size. The empirical evidence on the relationship with the environment is again complex. Smaller farms (<50 ha) were more likely than larger farms (>200 ha) to have zero stock of conservation capital (39% versus 23%), but it was the very small farms that had highest concentration of high conservation stock parcels. However, this varied by landscape type, suggesting that location and landscape factors are important in determining conservation value, as well as farm size. Overall, the loss of small farms is associated with fewer people on the land and fewer to play formal or informal roles in communities. The environmental implications would depend very much on what replaces small farms and it would be just as dangerous to assume that all large farms are environmentally damaging as it would to assume that all small farms are environmentally beneficial. The implication for this project is that questions need to be included in the survey of VS&S farms that probe their economic, social and environmental roles.

The behavioural responses to past economic crises, which may hold the key to those that may flow from income pressures associated with Brexit and the withdrawal of direct payments under a national agricultural policy, show great diversity and need to include factors that go beyond the simple business model of the profit maximising firm. Farmers' and farm households' actions may be viewed as the outcome of interplay between the individual's own "disposition-to-act" (the product of socialisation and interaction), the farm household's material resources (size of farm, capital, labour skills, cultural capital, position in the life cycle, tenure) and external structures (relative prices, policy, labour market opportunities, social and cultural norms, etc.). As such, on the ground a wide variety of responses may be encountered, including some (such as expanding output) that may be counterintuitive. Non-response will be the behaviour of some, though this seems to be less common once the changes in circumstance appear permanent. Various typologies have been generated that reflect different behaviours. There is also a gap between the intended response and the actual response. The implication for the current project is that the questions put to VS&S farm occupiers should cater for the wide varieties of response seen in previous studies and the extensive range of factors that have been observed as influencing behaviour.

Innovation can be seen as one possible response to the spur of income pressure, though lower incomes will also squeeze the resources required to undertake the investment often associated with innovation. Analysis of the process of awareness of innovation opportunities and stages leading to adoption is well-established. Individual farmers appear to display broadly consistent behaviour over time (for example, as an innovator or laggard). The

implication for the present study is that questions to VS&S farms should include how they view innovation as a response strategy and which methods of knowledge transfer are most used to obtain information.

When considering behavioural responses to policy schemes, there appear to be three main elements in the change process, each with its own set of factors affecting them:

- how policy interventions are communicated to farmers;
- the willingness of farmers to change; and,
- the capacity (or ability) of farmers to change.

These elements are shared with how farmers become aware of innovations, mentally accept them as desirable, and finally adopt them (dealt with above). The implication for this research project is that innovation and planned behavioural responses to policy initiatives can probably be dealt with using one set of questions.

The importance of a segmentation framework is in using a deeper understanding of who farmers are, what they do, what they think and feel, and how they respond to policies in order to help policy makers articulate messages and design long-lasting solutions. Segmentation can help with:

- promoting awareness and understanding;
- tailoring (and not a “one size fits all” approach); and,
- recognising why people behave differently.

Several examples are examined in detail, almost all of which use statistical techniques to brigade answers to questions on behaviour (actual or intended) in response to particular circumstances, including changes to policy implementation mechanisms. For some of these examples the actual questions applied are available. Each analysis produced its own set of clusters, to which in most cases descriptive labels have been applied (the exception being the Wales attitudinal segmentation model where neutral labels are purposely chosen). The implication for the current research project is how to benefit from these previous studies in terms of their methodologies, questions put to farmers and their households. There appears a good argument for at least adopting the key nine questions from the Welsh attitudinal segmentation model that formed the basis of segmentation so that its cluster groupings can be applied to the sample of VS&S farms surveyed to provide a degree of comparability with other surveys using the same questions. This does not prevent alternative analyses being explored.

The final section of this literature review considers a specific issue, the use of scenarios in exploring the likely impact of Brexit; the use of scenarios formed a key element in the research methodology specified by the Welsh Government. In summary, the years immediately before Brexit, over thirty significant ex-ante studies on the potential impact on UK agriculture were produced by and for various organisations with diverse, but often overlapping, sets of interests. Important among them were representatives of consumer interests; farmers and horticulturalists and their unions; firms elsewhere in the food chain; government and politicians concerned not only with all of these but also with a wide range of other impacts, such as on the UK’s trade position, its broader economy, the provision of public goods and changes in the social capital of rural communities.

These studies were published mostly between 2015 and 2019. They displayed a diversity of approaches and generated a range of results. In the present context it has to be noted that all but eight made use of multiple scenarios; these form a useful device in the absence of hard evidence on how the four main impact factors

(national agricultural policy, trade arrangements between the UK and EU, labour migration control, and the post-Brexit regulatory burden) would play out in reality. How these scenarios were specified, such as which impact factors were covered, the details of each factor, and the future date to which they were linked, were critical to the outcomes. Rather than second-guess the actual situation that would result when the UK left the EU and its CAP, for which they had no reliable guide, many of the studies used scenarios aimed at illustrating extreme positions (boundary situations) which could then be used to prepare the agricultural industry for best- or worse-case outcomes. With the passing of time, and uncertainties being narrowed or reduced (especially as proposals for national agricultural support have been set out in legislation, at least for England), the scenarios have tended to shift away from boundary positions and move nearer to expectations, and to be fewer in number. Results in terms of income per farm are set out for Wales as found in the most prominent studies. The implication for the current research project is that the income generated from the farm is sensitive to the scenario chosen. However, these assessments are static and ignore the abilities of operators to adjust their farming over time. Furthermore, they also exclude other ways that farm households may respond, such as in their off-farm activities or decisions to exit the industry, either by leasing their land to other farmers, or more permanently by retiring. Many of these responses will depend on factors that operate at the household or family level. The UK formally left the European Union (EU) on 31 January 2020 and entered a transition period in which the UK remained *de facto* a member of the EU Single Market and subject to the EU's common policies, including the Common Agricultural Policy (CAP). This transition period ended on 31 December 2020, From 1 January 2021 the EU embarked on a new trading relationship as defined under the EU-UK Trade and Cooperation Agreement reached on 24 December 2020. From 1 January 2021 agriculture in Wales, which is a devolved responsibility in the UK, has been subject to a national agricultural policy designed and operated by the Welsh Government; this has replaced the CAP.

2 Introduction

This review of literature has to be seen within the context of the aims and objectives of this particular piece of research for the Welsh Government. It is designed to set out what is already known about farmer motivations and to inform the design of the questionnaire to be used in the survey. According to the technical specification used by the Welsh Government the aim of this research is to:

- Help [provide an understanding of] individual motivations and decision-making processes taking place within those farming households economically defined as very small & small.
- Assess the effects individual motivations and decisions will have on intentions for action given the possible scenarios for trade and proposed changes to farm support mechanisms.
- Investigate the extent to which those farming households economically defined as very small & small linked to and support their communities and larger farms and whether this differs from other businesses and activities.

At this point the trading arrangements with the EU and other countries are unclear. [The Welsh Government] proposes the use of a set of agreed scenarios which would incorporate the most up to date evidence available at time of research.

The objectives of the research are:

- To provide future land use policy development with an insight into what factors are likely to influence those farming households that are economically defined as small and very small and how it will affect their decision-making processes. This should include any indication of likely behaviours and possible actions.
- Using the most up to-date evidence on future trading arrangements as a basis, assess the potential impact of different ongoing trade agreements to the economic contribution from farming.
- To collect additional information on very small farms such as figures concerning farm ownership/tenure/succession and also use the Wales Agricultural Industry Segmentation Model (WAISM) questions to assess their decision making.

Thus, this literature review of motivations and likely behaviours has to be put in the context of changes associated with Brexit. Without wishing to anticipate the details of results of later sections that use scenarios, it is nevertheless clear that changes of particular concern to the Welsh Government are likely to be those that (a) bring negative pressures on incomes from farming; and, (b) provide farm operators with opportunities to participate in schemes designed to enhance the environment and/or provide other public goods in rural areas in various ways.

The need for policymakers to know more about farmers' behaviour was well articulated by Collier *et al.* (2010) when considering how better understanding within Defra of behaviours and how to influence them could contribute to the development of more effective policies. This also indicated that there is a distinction between an ability to understand behaviours and the ability to influence them, a division that is apparent in the literature. In many ways understanding how to influence behaviour is the more straightforward task. Indeed, in some areas of government policy, such as health care, understanding how to influence behaviour seems to have been mainstreamed (see PHE (2019, 2020), which are based on expertise at the Centre for Behavioural Change, at University College London). Given the wealth of studies and publications on extension in agriculture, including

on the channels of communication, types of message and the need to match with the target type of farmer, much information exists on what to do and what to avoid when trying to shape their responses.

Blackstock *et al.* (2010) note that the literature on influencing farmer behaviour has to synthesise three different areas:

- psychological and institutional theories of behaviour;
- approaches to the delivery of advice; and,
- heterogeneous farming cultures.

While the focus in this project is on understanding farmer behaviour (rather than attempting to influence it) among the occupiers of very small and small (VS&S) farms, this is still a complex task that sits at the nexus of theoretical and empirical behaviour studies, the motives and goals of individual decision-makers, the role of households, the economic and non-economic outputs from the household-firms, segmentation studies, and more.

However, before considering behaviour it is necessary to clarify the basic unit whose behaviour is being examined. Though behaviour is something exhibited by individuals, the effective unit that shapes what happens on farms is broader, and extends to other household members who have, formally or informally, some input to decision-making. Therefore, it is logical to start this review of literature by considering the broader unit which, for most farms, will be the household of the operator.

3 Background to understanding behaviour in farming

3.1 Structural characteristics – business form

An important but often neglected characteristic of the agricultural industry is the legal form its farm businesses take. This both reflects, *inter alia*, the priorities and preferences of its operators, and helps shape their behavioural responses to changing circumstances and policy incentives. Compared with many other types of business activity (for example, manufacturing) farm businesses are typically small in terms of labour force, turnover and incomes (though not necessarily so when measured by capital because of the market value of owned land) and adopt the simplest of business forms, predominantly sole proprietorships and partnerships with unlimited liability. These forms mean there is no meaningful distinction between personal and business assets or debts, and incomes are subject to personal taxation systems. This carries implications for understanding motivations and decision making. Harrison's seminal work in this areas is now very dated (Harrison 1965, 1975, Harrison and Tranter, 1989), but factors such as tax legislation that shapes business structure tend to change only slowly (OECD, 2005, 2020), as also do demographics and land tenure laws, so there is reason to believe that the findings of these researchers remain relevant today.

Later work in England's South West region (Winter and Lobley, 2016) confirmed a considerable body of evidence that suggests that family events and processes such as births, marriage, ageing, succession and retirement can trigger change and restructuring in agricultural businesses. In terms of small family farms, there is a well-known association between small farm size and a lack of a successor which will make it harder for the older generation to step back if there is no one else to do the work.

Harrison (1975) used a large-scale survey in England and found that, for 1969, overall, 67% were proprietorships, 27% partnerships and private companies while only 0.8% were public companies and a further 0.6% had other business forms (e.g. remand schools and similar institutions). For the smallest farms (below 50 acres, 20 hectares) sole proprietorships accounted for over four-fifths (81%), partnerships 15%, private companies 3% and other forms 1%. The link between business form and size of farm was clear, with proprietorships restricted very largely to the smaller units, partnerships tending to be employed more for larger sized businesses and (private) companies being associated with the largest of all (1,000 acres, 405 hectares and over). The tendency for companies to be larger than other farm business forms was reflected in the fact that, although they accounted for only 4.2% of farms, they took up 11.9% of the area of crops and grassland, employed 14.5% of total assets and earned 12% of total income.

It is important to note that, taxation apart, there is little difference between partnerships and private companies in the way that they function. Harrison found that corporate form was hardly ever employed to recruit either management or risk capital into the industry that could not have been equally well recruited by a partnership. They were mostly formed at time when the advantages in terms of taxation of income were relatively great and capital gains tax legislation on all asset disposals, including those associated with setting up a company, had not yet been introduced. Even when changes in business structure do occur, a distinction has to be made between the *de jure* shifts (such as when farm businesses choose to switch from partnership to company form for taxation and related personal reasons) and the *de facto* situation, which may be unaltered if the company that replaces the partnership is wholly owned by the same family members.

It was quite the exception to find a farm with more than two principals; indeed, proprietorships and two-principal partnerships accounted for 90.7% of all farm businesses and in less than 1% of farm businesses did control extend beyond four principals. Family farming in the sense of business ownership and control was overwhelmingly dominant, and no less than 97.5% of farms proved to be genuinely family businesses in the sense that all the principals were closely related by blood or marriage. In the few cases where someone from outside the family was a principal it was often the firm's accountant, secretary or legal advisor. The few cases where unrelated

principals had entered into some form of partnership (occasionally, even, after having advertised through the national press in search of someone) served only to emphasise that the role of the family was central to a proper understanding of farming's financial structure.

The situation seems to have hardly changed. At one stage the EU Farm Structure Survey (FSS) (Eurostat, 2018) asked questions about whether the holder was a 'natural person', meaning a sole proprietor or partnership, or a 'legal person', meaning a company or other legal entity. In 2010 'natural persons' accounted for 97% of holdings, though more recent FSS seem not to have asked this question. However, the 2016 FSS did ask about the family or non-family nature of the labour force, information from which can be taken to imply business structure (Eurostat, 2018). In the UK, farms with no family labour force constituted 4.1% of the total (the figure for the EU overall was 23.2%); such farms would include those run by public companies and other impersonal forms (public sector, etc.). Quite how the operators of private companies answered the question is a little uncertain; from a legal perspective, salaried directors would be treated as employees and therefore not (unpaid) family labour, though some may have interpreted their status as being self-employed because they owned the company that employed them. The 2016 FSS also found that on 3% of holdings the manager ran the operations on behalf of an organisation.

Specific information for Wales comes from the survey of farm households by the Welsh Rural Observatory (WRO, 2010) that formed part of a project the aims of which were: to identify farming household income streams; assess the extent of diversification and multiple jobs; assess household resilience with regard to CAP reform; explore possible responses to CAP reform; and explore behavioural attitudes. More broadly, the project was to provide evidence to allow the Welsh Government to monitor the impact of its policies and inform the implementation of the Rural Development Plan (RDP). Information collected include data on household size, family workforce on the farm, diversified activities and succession, all of which can form a background to the 2021 survey of VS&S farms which forms part of this current study. This survey found that farms it described as family owned accounted for 74% of the total, the proportion being somewhat higher for Very Small farms (83%) and a little higher than the all-farms average for the Small farms (76%). The other categories were labelled rented and mixed, suggesting that the analysis was based on land ownership rather than ownership of the business. Taking an alternative approach, less than 2% of farms had no family members working on the farm, and this probably illustrates situations where the business structure made the question inappropriate because the business was not operated by a family. Despite this rather grey area, the domination of the family ownership of the business in Wales, especially at the small end of the size spectrum, is not put into doubt.

In the USA, developments in agricultural structure have presented an increasing challenge to agricultural statisticians, especially among the larger businesses, but even there in 1997 sole proprietorships accounted for 86% of all farms, and partnerships a further 7-8% (Vogel and Johnson, 2000).

But the upshot is that, even now, *family ownership (of unincorporated businesses, or of private companies), is the overwhelmingly dominant business form. These are very much under the control of the individuals and households that own them.*

A related line of development has been the interest by statistical authorities in developing income statistics based on complete real units (particularly complete household firms). In contrast the present systems of official EU agricultural statistics at both aggregate or microeconomic levels are based on fictional units (farm business/holding and Local Kind of Activity Unit respectively) for which data have to be carved out from the accounts of real units by excluding elements deemed to not involve agricultural resources, a process that can be arbitrary. A consequence is that agriculture is treated differently from other parts of the economy, leading to problems in integrating results with National Accounts. In the EU, Eurostat was a leader in producing statistics based on agricultural household units, though this project ran into difficulties in the early 2000s because of

problems in obtaining basic data and opposition from established systems at microeconomic and industry levels (Farm Accountancy Data Network, and the aggregate Economic Accounts for Agriculture respectively). The European Court of Auditors has been critical of the lack of progress by the European Commission in developing statistics based on farm households for servicing the objectives of the Common Agricultural Policy (ECA 2004 and 2016). For a discussion of the issues and experimental results see Eurostat (1995 and 2002) and Hill (1982, 1987, 1994 and 2012a). In the USA there has been concern for several decades with providing household-based information as a way of countering obsolescence in official statistics (see AAEA, 1972; Ahearn *et al.*, 1993; Mishra *et al.*, 2002). The data system there permits income measures to be generated on a farm household basis (Schertz, 1982; Offutt, 2002a; USDA, 2006; Hill, 2012). At an international level the FAO (1996) has proposed that the system of aggregate economic accounts for the agricultural sector is based on the household-firm unit, and the UNECE and FAO have published an agreed methodology for microeconomic statistics on agricultural household incomes (UNECE, 2007; FAO, 2011).

3.2 Structural characteristics – farm/agricultural households

The Specification for this project for the Welsh Government makes it clear that the basic unit of analysis should be the household, rather than the farm business, an approach that is appropriate when it is known that the occupiers of Very Small and Small Farms (VS&S) often have sources of income additional to the profit generated by agricultural activity on their holdings. Consequently, the behavioural responses of these households will need to take account of more than just what is happening to their farming business.

The concept of the ‘household’ has both economic and social dimensions. While here we are initially concerned with the economic, when moving to consider the motivations of behaviour of VS&S farms it will be important to acknowledge that the ties that keep farm households together as economic units, and which connect single households with other farmers and with the farming community, will bring social factors to bear on decisions too. Economic aims and social aims will be held in some subjective balance. Barthez (1994) saw farm households as being involved in a ‘double game’ of, on one side, economics of the business and, on the other, the dynamics of the family/household which, inter alia, involved the gradual shift of control and influence between generations.

Work in England’s South West region (Winter and Lobley, 2016) confirmed a considerable body of evidence that suggests that family events and processes such as births, marriage, ageing, succession and retirement can trigger change and restructuring in agricultural businesses. In terms of small family farms, there is a well-known association between small farm size and a lack of a successor which will make it harder for the older generation to step back if there is no one else to do the work.

A useful start is the definition of a household that forms part of Eurostat’s methodology for its agricultural household sector statistics (Eurostat, 1995), which was adopted in the FAO Handbook on statistics on agricultural household incomes (FAO, 2011). This is based on what appears in the System of National Accounts (SNA) and the European System of Accounts (ESA).

The ESA (third edition, 1995) defines the households sector (S.14) as follows:

- The households sector (S.14) covers individuals or groups of individuals as consumers and possibly also as entrepreneurs producing market goods and non-financial and financial services (market producers) provided that, in the latter case, the corresponding activities are not those of separate entities treated as quasi-corporations.
- Households as consumers may be defined as small groups of persons who share the same living accommodation, who pool some, or all, of their income and wealth and who consume certain types of

goods and services collectively, mainly housing and food. The criteria of the existence of family or emotional ties may be added.

- The principal resources of these units are derived from the compensation of employees, property income, transfers from other sectors or the receipts from the disposal of market products or the imputed receipts from output of products for own final consumption.

The households sector includes:

- Individuals or groups of individuals whose principal function is consumption.
- Sole proprietorships and partnerships without independent legal status - other than those treated as quasi-corporations - which are market producers.

The ESA definition of the households sector also includes some units which do not form part of the coverage of household budget surveys and would not normally be considered as private households. Examples include both communal living units (such as hostels and monasteries) and other institutions such as universities.

Even within the former there are both connotations of both consumption and production, especially in agriculture where the great majority of farm businesses are operated by households. The resources flowing towards households, including their incomes from economic activities, is a principle element in determining their consumption possibilities. In practice, their disposable income is often taken as a useful indicator of their ability to consume, including whether or not they fall below some minimum below which they are deemed to be in poverty (Hill, 2012). Agricultural policy in Europe has been dominated for many years with the aim of providing the agricultural population with a 'fair standard of living' (stated explicitly in the objectives of the EU's Common Agricultural Policy), though neither the agricultural population, nor the fair standard of living have never been defined in a precise way in policy documents. Furthermore, reform of that policy has been constrained by concerns about how changes might cause some sections of the industry to suffer standards that could be seen as less than 'fair'. Thus, it is important to be clear how statistics interpret and operationalise the term 'household' and some of the practical issues encountered.

Both Eurostat (1995, 2002) and the FAO (2011) have offered guidance on the definition of a household appropriate for use in an agricultural context. There are two main approaches:

- The single dwelling unit (people who live under the same roof, and also share at least some meals), a form of definition typically adopted by household budget surveys whose main interest is in establishing cost-of-living indices.
- The single budget approach, comprising the individuals who pool income and expenditure, typically comprising couples, parents and dependent children.

Single-person households exist under both approaches. Problems are encountered in large family units where several generations may live in the same building but incomes are kept separate; a single dwelling may comprise more than one single-budget household, such as when a sibling or grown-up offspring remains at home but it financially independent.

Different ways of determining whether a household is an agricultural one are encountered. Eurostat initially designated them in the '*narrow*' sense as households where the main income of the entire household came from self-employment (independent activity) in agriculture. Later, for practical reasons, this was changed to where the head of the household (normally the individual with the largest income) had self-employment in agriculture as

his/her main income source. Also largely for practical reasons, Member States of the EU have often adopted a 'fiscal household' unit, which would exclude from the core group any financially independent adults who are taxed separately.

An alternative '**broad**' approach to what is an agricultural household is to include all those where any household member has some self-employment from agriculture. This was in essence the approach taken by Defra (2016) when measuring household income on farms in the England section of the Farm Business Survey (a series that terminated in the 2014-2015 accounting year). This defined a household as a single person or group of people living at the same address as their only or main residence, who either share one meal a day together or share the living accommodation. To be included in these statistics a household must contain at least one person who received drawings from the farm business or who took a share of the profit from the business.

Results that compare numbers of households and their income levels achieved by using the narrow and broad definitions find that, depending on country, the narrow approach can exclude substantial numbers of households and be confined to farm businesses that are atypical of farming in the country as a whole (Eurostat, 2002). For practical reasons, the 'broad' approach often only considers the incomes accruing to the 'core' household (of farmer, spouse and dependents; a 'broad' agricultural household thus becomes one where there is any income from self-employment income from agriculture (implied income from the rental value of the farmhouse is usually not included as a criterion, though some countries include it when measuring income). Thus, in Wales the households of all the operators of VS&S farms would be included in the 'broad' definition of an agricultural household, but very few in the 'narrow' definition. In the USA, where an attempt is made when assessing farm household income to include any adults in addition to the farmer and spouse (siblings, parents or adult children who happen to reside in the farmhouse) it is acknowledged that coverage of them is not complete (FAO, 2012).

The main purpose for making measurement at the household level is to enable comparisons to be drawn between agricultural households and other households (Hill, 2012), or between different types of agricultural household (where farming is the main income source, where it is a minor income source, by main type of farming, etc.) in terms of disposable income, consumption spending or saving. However, in many countries farm households tend to be larger than non-farm households. Thus a conversion is needed for them to be comparable. Coefficients are used to allow children to be expressed in adult-equivalents, and the figures chosen vary between countries to reflect inter alia the age at which teenagers are assumed to become financially independent (see Eurostat, 2002 for an account of what happens in EU Member States). In some contexts, particularly when comparing expenditure levels, studies have preferred to use comparisons between families of a standard composition, such as two adults and two children.

Agricultural statistics (including the EU Farm Structure Survey) have usually assumed that there is one identifiable holder per agricultural holding, and metrics such as age band or educational qualifications are attached to this person (FAO, 2012). However, this no longer fits modern agricultural structure, except perhaps on the smallest farms. On many larger farm businesses there can be more than one household where self-employment in farming is the main income source, so there is more than one agricultural household according to Eurostat/FAO definition (such as those of partners in the business). Some of these multi-household farms will be in the process of transfer of assets between generations, as junior partners/directors assume greater roles in the management and older farmers prepare for partial or complete retirement from the business. Defra found, when using a three-year constant sample of the FBS in England to assess household income in England, that in 2014/15 two-thirds (67%) of farm businesses had only one household associated with the farm, 29% had two, and a further 4% had three or more (Defra, 2016). For reasons of practicality, income measurement was confined to the

household of the ‘principal farmer’ (not other households), though both farmer, spouse and other household members were covered.

For the purpose of measuring income therefore, agricultural households can be defined in various ways and the borders of membership can be drawn differently according to circumstance. *A ‘broad’ definition, used in Eurostat’s agricultural household income statistics, and the FAO methodological handbook encompasses all households where there is any self-employment income, whereas a ‘narrow’ definition confines it to where farming is the main source of the head of household.* Defra took a similar ‘broad’ approach in its FBS-derived household income statistics, though only the household of the principal farmer had its income measured. VS&S farms in Wales will have households that lay within the ‘broad’ definition, but are unlikely to be within the ‘narrow’ one because of the presence of income from other sources.

3.3 Structural characteristics – family farming

The notion of the ‘family farm’ is an ambiguous but potent concept in UK and EU agriculture. As has already been demonstrated, in the ownership sense almost all farms in the UK and Wales can be described as ‘family farms’. This would include not only VS&S units but also very large businesses with substantial tracts of farmed land.

Gasson and Errington (1993) take an ‘ideal type’ approach, this term implying a hypothetical construct ‘formed by emphasising aspects of behaviour that can be observed in real life’. ‘Ideal’ in this context means ‘pure’ or ‘abstract’ rather than ‘perfect’. They choose six elements to describe their definition of a ‘family farm’:

- Business ownership is combined with managerial control in the hands of business principals.
- These principals are related by kinship or marriage.
- Family members (including these business principals) provide capital to the business.
- Family members (including business principals) do farm work.
- Business ownership and managerial control are transferred between the generations with the passage of time.
- The family lives on the farm.

It follows that ownership of the land is not a criterion for being a family farm, and in England (but less so in Wales) tenanted land has been common. Neither is smallness of farm size. In other EU Member States larger tenanted farms, run with hired labour in addition to any family members, would not be regarded as part of the ‘family model’ that is favoured under the CAP.

Another structural approach to classifying a farm as a ‘family farm’ is to assess how important the farm household’s own labour is to the farm’s operation. This approach was pioneered by Hill and Brookes (1993) using data from the Farm Accountancy Data Network (FADN), which in the UK will exclude those too small to be covered by the UK’s Farm Business Survey (which fall into the Very Small group covered by the present project). The original analysis found that in the UK farms where the family provided 95% or more of the labour input represented 41% of UK numbers (but 70% in the then EU). In a somewhat different approach, Eurostat (2019) showed that, of the 184,000 holdings in the UK in the 2016 Farm Structure Survey (which has a broader coverage than the FADN), 90% were family farms in the sense that the family was the only source of labour (79%) or it contributed up to 50% of the labour input (the other 11%). This way of underlining the importance of the farm household assumes, of course, that on any farm there is only one household that contributes unpaid

(unwaged) labour; in the UK this may not hold, especially on the larger farms, but this assumption is not critical and can be relaxed if adequate data are available (see below). It does nothing to undermine the general conclusion on the importance of the farm household as the focus of management and control.

Research by the present authors for the Welsh Government on the social contribution of farming (Agra CEAS Consulting, 2018; Hill and Bradley, 2019) indicated that the ancient legal framework of Wales and its social conventions have underlined the contribution made by farms owned and run by families in Wales. While these farms tend to be small (by UK standards) their type of farming has encouraged co-operation ('coagration') in activities such as the gathering of sheep, shearing, etc., a factor that has built social networks and social capital that benefits not only farmers and their families, but also the wider rural community.

In 2013, UK family farms, in the sense that family (non-waged) labour contributed 50% or more of the labour input, accounted for 92% of agricultural holdings (Eurostat, 2018). There is nothing in the literature to suggest that the pattern in Wales would be very different from the family-dominated picture found in England or the UK overall. Indeed, the role taken by family members in the operation of Welsh farms may be higher. The WRO survey of farm households in Wales (WRO, 2010) found that the operation of Welsh farms was heavily dominated by the farm family. Almost half (46%) had two family members working; 24% had one family member; and 20% had three family members. Smaller proportions of the total surveyed had four, five or six working family members and there were individual cases of farms with seven, eight and nine working family members. Less than 2% had none (taken above to mean farms operated by legal entities rather than natural persons). The large majority of farms did not employ any full-time non-family labour (90%) or any part-timers (87%) or casual labour (68%). However, working on the farm does not necessarily imply that they have a role in decision-taking or entrepreneurial responsibility.

Cross-sectional approaches are likely to understate the importance of continuity provided by a population of households to farming which often extends beyond the career of single generations. Data from a survey of small-scale farming in the South West of England (Winter and Lobley, 2016) pointed to the longevity of farming families, alongside considerable farm business change in recent years. On average, farming families in the survey had been farming either the same farm or in the general vicinity for 105 years. Only 8% were new entrants in the strictest sense of being the first member of their family to enter farming and who had not personally farmed anywhere else. A detailed case study of a single west country parish spanning a period of seventy-five years revealed a complex pattern of change with the consolidation of land in the hands of large farmers and the number of farms declining by a half, alongside some new farm formations and fragmentation of land holdings. This confirmed earlier work which emphasised the stability of family farms as the main institutional units in the countryside at the same time as ever more complex land occupancy and management arrangements and a greater diversity of ways of 'being a farmer'.

The family nature of agriculture is particularly evident in the passing of the business from one generation to the next. The mechanisms for doing so differ between EU Member States, though it is common to find fiscal assistance being offered by national taxation systems for the assumption of the farm business by younger relatives, though this is less overt in the UK than in some other EU Member States (van de Veen *et al.*, 2002, OECD, 2005b). Hennessey (2014) has reviewed the various tools used to support family farms. Major structural and land use changes appear to happen at the stage of transfer (Potter and Lobley, 1992); the lack of a successor willing to take over a small farm as a primary occupation is a prime trigger in land disposal, and this may carry environmental implications. Any link between the existing structure and the provision of social attributes could similarly be at its most fragile at this transition stage, though there is little evidence of this. On the other hand, succession is the point at which some family members with established careers outside farming return to run the business, often on a part-time basis. Though they may bring with them behaviour patterns learned when active

elsewhere, there is also likely to be a residue of family tradition on which to build and sustain; some may be more concerned with contributing to the local community than the farmers they replace.

In summary, agriculture in Wales, as in the whole UK, is operated predominantly by households, and this will be particularly the case among VS&S farms. Even with larger businesses, where the businesses nominally taking a corporate legal form is more common, from a functional standpoint these family companies typically act as unincorporated household firms would be expected to do, their business form being largely a taxation convenience of one to spread ownership among family members. ***It can therefore be expected that the behaviour of VS&S farms will be better explained by models based on the household than on the simple theory of the firm.*** The centrality of understanding the behaviour of the farm household is thus important to policy making and implementation, something also acknowledged in the USA (for example, Offutt, 2002a; 2002b).

4 Household behaviour theory and a model of the decision-making process

If, as seems clear, farms operated by households dominate the sector, and probably particularly those belonging to the VS&S group, it is advisable to touch on the theoretical basis by which their behaviour and motives can be assessed. At any one time, households will be found at all stages of the family cycle and businesses will be in at various points in their historical trajectory – the two will be linked, but not in a simple way. Because of the close connection between household and business, what happens on the farm is a reflection of both economic factors and personal preferences, aims and values.

4.1 Household behaviour

Becker (1976) was responsible for creating renewed interest in the economics of households in general. Nakajima (1986) saw the farm household as comprising a trinity of three entities:

- a) **The farm-firm** - concerned with the normal decisions of factor allocation with the conventional objective of profit maximisation. A small extension of this, which does not change its essential nature, is to allow the firm to have both agricultural and non-agricultural enterprises, so that choices have to be made between using resources within the farm businesses and in other uses.
- b) **The labourer's household**, concerned with providing labour to the farm-firm and/or to the off-farm labour market. The economic problem is how to allocate the household's limited amount of time between spending time on income-earning activities and on leisure, the aim being to maximise utility.
- c) **The consumer's household** - concerned with the provision of consumption items (housing and food) direct from the farm.

Because of this mix, as Phimister (1993) has put it,

“Specifically, in any period the household must decide upon both the level of output and labour input, the level of family labour supply, the level of investment and the level of consumption. Finally, it must also decide ultimately upon the level of the bequest to be passed to the next generation. It is the potential for interactions between these decisions...which forms the basis for the case for treating farm households as a distinct type of economic actor.”

In other words, an approach is needed in which the household is the unit of investigation, covering all its resources and their uses. Hill (2012) cites several examples where what is happening on the farm (land use and investment) is affected by off-farm income flows, and the viability of the farm as an enduring unit is determined by a combination of farm and non-farm factors. (Pluriactivity is given greater treatment below.) This is a major theme of the study of agricultural household modelling and family economics edited by Caillavet *et al.*, (1994).

In their study of the farm family business, Gasson and Errington (1994) (see also Gasson *et al.*, 1988) point to the common assumption that the values and goals of the individual self-nominated in surveys and official statistics as the principal-farmer are those of the farm family. This may well not be the case. The authors cite examples where farmer and spouse differ, and this can happen even within formal farmer-and-spouse partnerships. Other family members will often have rather different sets of values and goals reflecting inter alia their age, education and employment possibilities. In such circumstances the entrepreneur's role will be, in addition to reaching a compromise between his own conflicting objectives (profit, preferences for lifestyle, enjoyment of the intrinsic farming activities, etc.), to arbitrate between competing sets of family members, or have to cope with the fallout of their conflicts.

The Welsh Rural Observatory specifically researched the decision-making process in agricultural households (WRO, 2011). As outlined above, family members were often involved in the business, with at least 50% of respondents operating as a husband and wife partnership. Nevertheless, there was a significant proportion of farm businesses that were solely run by men, with wives who did not seem to be involved beyond trying to support them as a housewife. These wives seemed quite nervous of talking on behalf of their husbands. Consequently, it is important to appreciate how farming (and associated rural life) is still very gendered and elitist.

Research has focused on the single farmer as the decision-maker (Ward and Lowe, 1994; Wilson, 1996; Battershill and Gilg, 1997; Austin *et al.*, 1998; Flett *et al.*, 2004) whose characteristics, attitudes, aims and objectives shape those decisions. However, this approach is outmoded. Evidence suggests the concept of the principal decision-maker does not hold true and other family members are also involved in the decision-making process, particularly on large farms (to varying degrees) (Errington, 1986; Marsden, 1984; Marsden *et al.* (1989), but the process and its implications for policy and targeting messages are not well-understood. Dwyer *et al.* (2007) state that more research needs to be done into the processes of family decision-making.

Nevertheless, it remains convenient to focus on ‘principal decision-makers’ who are defined as individuals responsible for making the majority of decisions about the running of a farm, either alone or in conjunction with others (Lee-Woolf *et al.*, 2014). This source found that nearly three quarters of respondents made most decisions relating to their holding in conjunction with others. This is perhaps not surprising given that the majority of respondents reported that their husband, wife or partner works on the farm with them. However, relationships between these issues and farm size existed; respondents representing ‘very small – spare time’ holdings tended not to draw upon knowledge and opinion of other family members. This source also noted that joint decision making within families could be seen as a strength or a weakness, depending on circumstances. Strength came because families can draw from a wider range of skills and knowledge than individuals, whereas others saw it as an obstacle to progress if consensus could not be easily reached between family members.

Whether or not family members are formally part of the decision-making group, it was clear that the family had a strong influence, with an importance that ranked highly alongside the role of peers. Respondents were often interviewed as a family group and the dynamics of that were evident in discussions about decision making. Interestingly, women were often more aware about the need to diversify and to consider environmental issues. They also wanted to find out more information and have a voice for the farm. For example, it was often the women who were keen for an interviewer to visit so that they could share experiences and contribute to this report (it is acknowledged that the interviewer in the Lee-Woolf study was also female, and hence this would also affect the dynamics of the situation). The role of wives, and their need to acquire business skills was underlined, not just as secretaries and administrators, but as partners who are often fully involved in business decisions (see also Gasson 1992).

It was evident in the WRO (2011) study that succession within the family had a huge influence upon decision making about the farm as a business. Succession was also a key issue in the discussions about conservation work on the farm, and presented as the main reason to ensure the future viability of the land. The survey attached to the Welsh segmentation study found a somewhat more nuanced response (Lee-Woolf, 2014); over half of respondents indicated that they had a firm plan in place to pass their holding onto someone else and nearly three quarters agreed that it is important that their holding continues to be managed within their family, though there were signs that some farmers may have found it difficult to identify a suitable person to pass their farm on to among the next generation. Cross-tabulations showed that the issue of succession did not tend to be relevant to respondents representing ‘very small – spare time’ holdings, a finding that was echoed by the qualitative research findings. This probably reflects the lower role of inheritance as a way in which the holding was acquired.

A final point to take from the family dynamics was the push and pull of different working demands on the farming household, with only the very largest farms able to sustain family members in full employment. On at least a third of farms the respondents had to work two jobs, with hours adding up to much more than normal full-time working.

In summary, studies of farm responses have often adapted the notion of the ‘principal decision maker’, though this appears outmoded. More recently, research indicates that *farmers in Wales are not usually lone decision makers, and often consider the impact of their decisions on their family even if family members are not directly involved in decision making*. Thus, when attempting to influence decision making it is important that communications should be aimed at a diverse group, including wives and even children. It is also important to consider how the farm works as a family unit and the stresses and strains of running such an enterprise, where there are often multiple sources of employment and associated demands being made. An implication for the present research is that in the survey of VS&S farms, questions are asked about the nature of the household and how the various members influence decisions.

4.2 A model of the decision-making process

As well as looking at the farm household model it is convenient in this section to review a model of the decision-making process. This can be considered as an application of behaviour science that draws on a range of disciplines and sub-disciplines, including psychology, social psychology, and behaviour analysis. Rehman *et al.* (2008) set out the theoretical approach to decision making in the context of studying farmers’ responses to changes in the CAP; a more recent account (undertaken for the AHDB) is given in Rose *et al.* (2018). The Theory of Planned Behaviour (TpB) was developed by Ajzen (1991 and 2005) and is an extension of the Theory of Reasoned Action (TORA) originally proposed by Ajzen and Fishbein (1980); both provide the conceptual framework for exploring farmers’ attitudes and intentions. Theory of Planned Behaviour postulates that behavioural intention is determined by a combination of attitudes towards the outcomes of the behaviour, perception of the views of others towards the behaviour (subjective norm), and the degree of control one thinks one has over a decision to carry out the behaviour (perceived behavioural control).

According to the theory of reasoned action (TORA), if people evaluate the suggested behaviour as positive (attitude), and if they think their ‘significant others’ want them to perform the behaviour (subjective norm), this results in a higher intention (motivations) and they are more likely to do so. A high correlation of attitudes and subjective norms to behavioural intention, and subsequently to behaviour, has been confirmed in many studies (mentioned in Rehman *et al.* (2008). However, the results of some studies also show that, because of circumstantial limitations, behavioural intention does not always lead to actual behaviour; this is because behavioural intention cannot be the exclusive determinant of behaviour where an individual's control over the behaviour is incomplete. Ajzen introduced the theory of planned behaviour (TpB) by adding a new component, "perceived behavioural control" (see Figure 1). This refers to the degree to which a person believes that they control any given behaviour.

The theory of planned behaviour suggests that people are much more likely to intend to enact certain behaviours when they feel that they can enact them successfully.

Increased perceived behavioural control is a mix of two dimensions: self-efficacy and controllability. Self-efficacy refers to the level of difficulty that is required to perform the behaviour, or one's belief in their own ability to succeed in performing the behaviour. Controllability refers to the outside factors, and one's belief that they personally have control over the performance of the behaviour, or if it is controlled by externally, uncontrollable factors. If a person has high perceived behavioural control, then they have an increased confidence that they are capable of performing the specific behaviour successfully. The theory has since been improved and renamed the reasoned action approach.

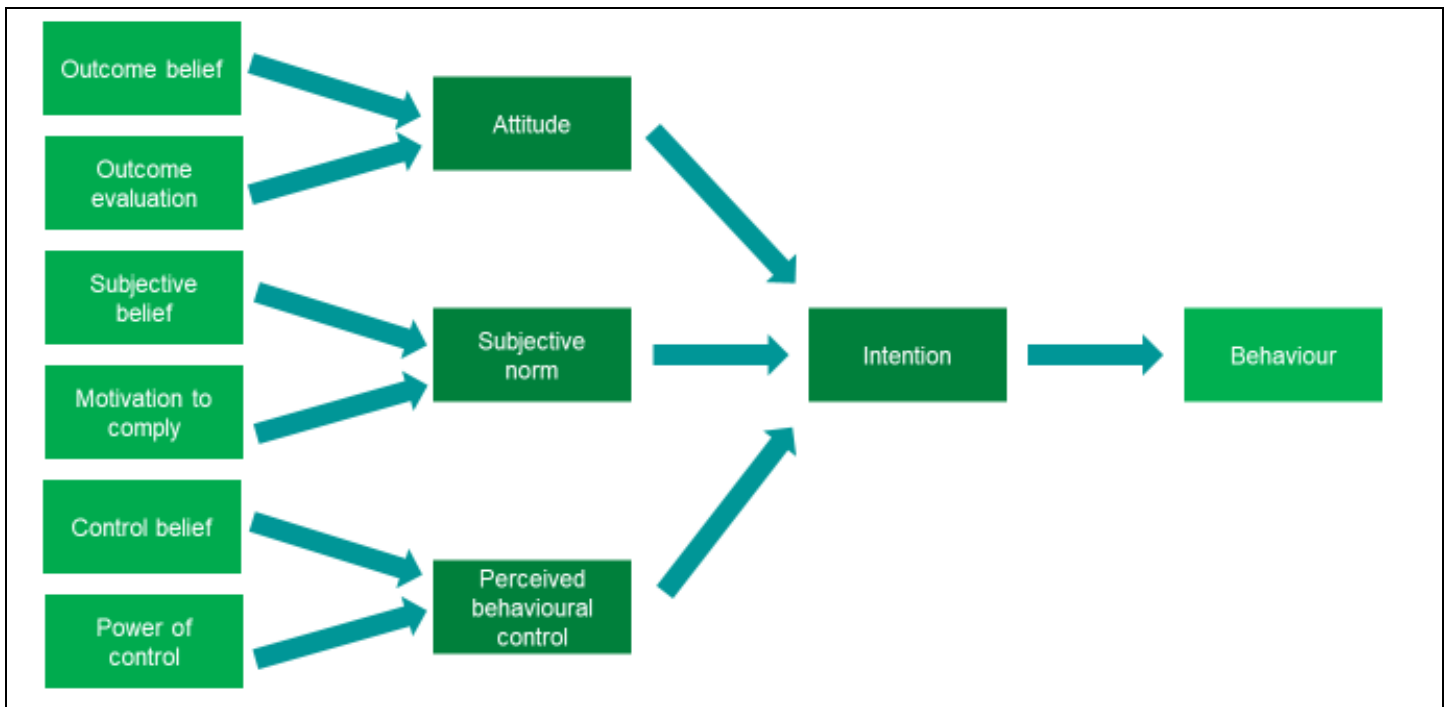


Figure 1: Diagrammatic version of Theory of Planned Behaviour

Source: Adapted from Rehman *et al.* (2008).

This model formed the basis of the questions that were asked by Rehman *et al.* (2008) of a survey of farmers and a typology developed from it (see below).

Another version of the Theory of Planned Behaviour is given in Annex 1 of Collier *et al.* (2010), a study designed to bring together evidence and expertise within Defra to explain farmer behaviour. It asserts that over the last few decades there have been countless “theories of behaviour” which have been tailored for the academic literature, adapted for policy or used within the discussion of catalysing change. The simple, robust and easily adapted models forming the basis of the Theory of Planned Behaviours (TpB) and Theory of Reasoned Action (TORA) are, perhaps, the most relevant for thinking about policy and the linking of underlying psychological issues. These two models discuss, in relatively simple terms, the main internal or external social influences on behaviours (habit, social norms), etc. In attempting to describe something as detailed and variable as behaviours it is easy to over-complicate, ending up with complex systems that are too difficult to embed into policy design and delivery.

Joining TORA and TpB can provide a conceptual framework for exploring attitudes and intentions where a particular behaviour is a function of attitudes, the extent to which the views of others matter (social factors), past behaviours and the degree to which it is actually possible. Social factors (norms) have been seen as particularly relevant to influencing farmers’ environmental behaviour (Vanclay, 2000). Intention is facilitated by external (government) measures and incentives to undertake the desired action. Figure 2 (from Annex 1 of Collier *et al.*, 2010) describes the general approach which identifies four basic components of behaviour – attitudes, social norms, habits (internal factors) and external factors (including cost and policy interventions).

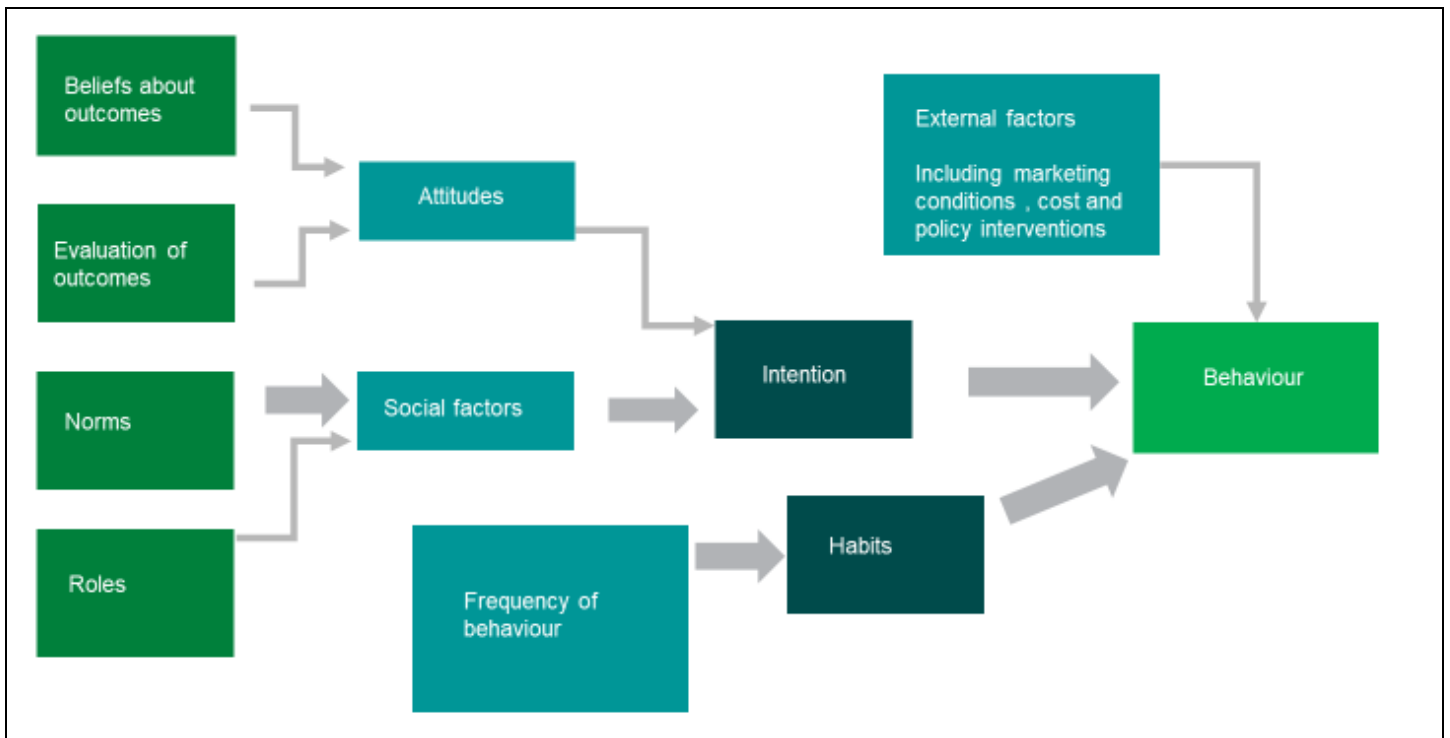


Figure 2: Theory of behaviour

Source: Adapted from Collier *et al.* (2010). Model adapted from Theory of Reasoned Action and Theory of Planned Behaviour.

According to Collier *et al.* (2010) this model appears to fit well with the broader approach of behavioural economics. A relevant diagram, Figure 3, is from Prendergast and Foley (2008) in work from the Social Market Foundation (SMF). Like Figure 2, there are three main components (internal, external and social factors) and these are assessed individually in terms of intervention options. The diagram clearly shows where traditional market-based interventions have operated (primarily on external factors) and the clear recognition of the role of cognition (framing / emotions, personal capacity and accounting for heuristics / biases) adds an important new dimension.

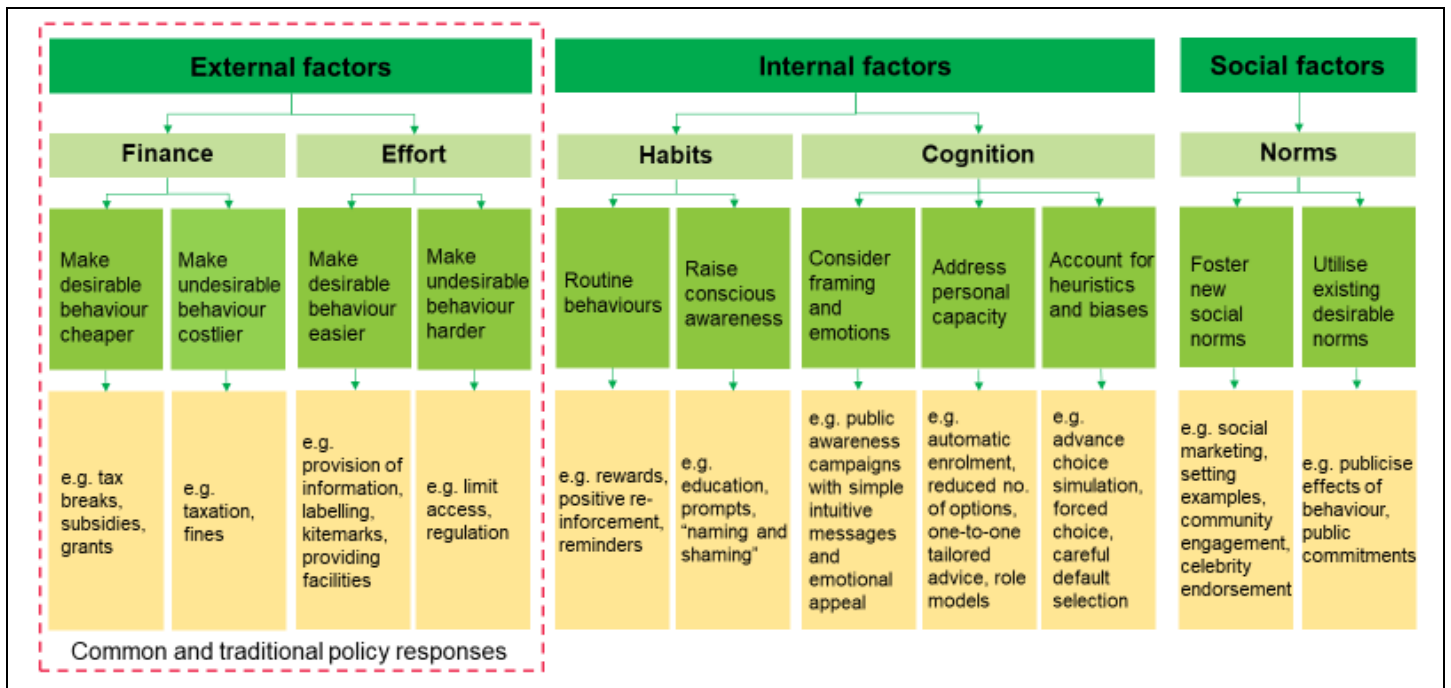


Figure 3: SMF behavioural economics approach

Source: Adapted from Prendergast and Foley (2008).

A further description of these theoretical models appears in Dwyer *et al* (2007). The authors point out that the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975 – later superseded by the Theory of Planned Behaviour, (TPB), Ajzen and Madden, 1986) focuses more on predicting behaviour than on how to influence behaviour. Another group of ‘persuasion theories’ deals with the issue of how behaviour can be altered by changing the beliefs underlying attitudes (Petty *et al.*, 1992). This can be useful for exploring empirical observations, for example, why trusted sources of information are more likely to induce positive behavioural change on farms than non-trusted sources. Influential paradigms of persuasion are so-called “dual-process models” (Crano and Prislin, 2006) and arguably the most widely accepted of these is the Elaboration Likelihood Model (ELM) (Petty and Cacioppo, 1986). These models contend that there are two pathways to changing people’s attitudes. If receivers are able and motivated they will systematically analyse persuasive messages and if the message is well reasoned, data based and logical, it will succeed. This will produce long-term attitude change and is more likely to result in behavioural change. Within these models it is attributes of the source (source characteristics) and message (message characteristics), in concert with motivation and ability to process information (recipient characteristics), that combine to determine whether attitude change is induced. The ELM further suggests that these factors can work by different processes in different situations, and that the process employed (whether central or peripheral) is critical in terms of understanding the consequences of the new attitude (Petty *et al.*, 1992).

Another version, contained in OECD (2012), covers much of the same theoretical ground, including a closely similar diagram for TPB, and points out that it can be used to predict behaviour and explore the underlying motivations for adopting a particular behaviour. It states that TPB assumes that an individual's behaviour is influenced by three determinants:

- beliefs about the likely outcomes of behaviour (attitude toward behaviour);

- beliefs about societal norms (subjective norms); and,
- beliefs about an individual's control over the outcomes of a behaviour (perceived behavioural control).

In the aggregate, these beliefs influence an individual's intention to adopt that behaviour.

In OECD (2012), the TPB is also expressed mathematically as follows. According to Artikov *et al.* (2006) and Hu *et al.* (2006), who adopt TPB to analyse influence factors of climate forecasts on farmer decisions, TBP can be elucidated as follows:

$$A \sim I = f(\textit{Attitude}, \textit{Social norms}, \textit{Perceived control})$$

where A is action, I is intention, and f is a function of the causal factors on intention and action.

- **Attitude.** Farmers who believe that the use of climate information has a high probability of helping them increase their profits, and who value increased profits, would be more likely to use that climate information.
- **Social norm.** Social norms can be considered as a person's perception of the social pressure to behave in a particular way.
- **Perceived behavioural control.** Perceived behavioural control reflects an individual's various beliefs about personal access to or control over various resources and factors and the extent to which various factors will constrain or facilitate his/her ability to perform the action.

Their results quantify the relative importance of attitude, social norm, perceived behavioural control, and financial capability in explaining the influence of climate information, and short-term and long-term forecasts on agronomic, crop insurance, and crop marketing decisions. The decision analysis in their paper addresses this challenge by combining economics, public policy, and the insights from other social sciences.

Most recently, Sok *et al.* (2020) give a highly authoritative account of the TPB (the list of authors contains key players in its development) and review the ways it has been used in multiple studies (124) that have researched farmer behaviour since 2000. Among the findings are that:

- Some studies that mention TPB do not in fact use it as the basis of their scientific approach or do so in only a superficial way. The purpose seems to provide a degree of perceived seriousness on the part of the researcher.
- Behavioural, normative and control beliefs provide the basis for attitude, but the TPB does not specify the origins of beliefs about any particular behaviour.
- TPB does suggest that various background factors may play a role. Potentially influential background factors are properties of the individual or the social group, such as gender, age, education, personality traits, values, risk-taking propensity, intelligence, sensation seeking, religion, culture, and so forth (Fishbein and Ajzen, 2010).

- There is a quite strict set of conditions that have to be fulfilled if the TPB framework is to be used as the core methodology for exploring farmer behaviours.

In summary, various projects have used the Theory of Planned Behaviour in research aimed to explain behavioural responses and to devise ways of influencing them. TPB assumes that an individual's behaviour is influenced by three determinants: beliefs about (i) the likely outcomes of behaviour (ii) societal norms and (iii) an individual's control over the outcomes of a behaviour. In the aggregate, these beliefs influence an individual's intention to adopt that behaviour. The implication for this current research is that questions in the survey of VS&S farms should cover these beliefs and background factors; the literature contains suitable examples.

5 Motivations – values and goals behind behaviour

A broad understanding of the values held by farmers and the goals and objectives behind decisions is essential in explaining why the agricultural industry arranges itself in the manner that it does or responds to economic and policy stimuli in the observed manner. Such understanding is a necessary precursor for studies that focus on the actual or predicted responses that farmers make to policy instruments and signals (for example, see Rehman *et al.*, 2008).

Although definitions vary in the literature (Hallam *et al.*, 2012), there is broad agreement that “values” are relatively enduring cognitive structures which underlie the choices and decisions that individuals make in various aspects of their lives. Seminal empirical research by Gasson (1973) in the 1970s established the values and goals (shorter-term ends or states in which the individual desires to be or things he wishes to accomplish) found on samples of farmers who ranked a set of value statements. Individual farmers will have their own sets of values and goals which will determine the attitudes they take towards their farms; this attitude can be called ‘orientation’. Gasson found four basic types of orientation (called ‘styles’ in other, later publications, see below) with associated values and goals, as follows:

- **Instrumental** – making a satisfactory income; safeguarding the income for the future; expanding the business; providing congenial working conditions.
- **Social** – gaining recognition and prestige; belonging to the farming community; continuing the family tradition; working with other members of the family; maintaining good relationships with workers.
- **Expressive** – feeling pride of ownership; gaining self-respect for doing a worthwhile job; exercising special abilities and aptitudes; the chance to be creative and original; meeting a challenge, achieving an objective, personal growth of character.
- **Intrinsic** – enjoyment of work tasks; preference for a healthy outdoor farming life; purposeful activity, value in hard work; independence – freedom from supervision and to organise time; control in a variety of situations.

The classification does not attempt to be absolute. For example, working with family members (given under the ‘social’ heading can also be a means of securing family income for the future (instrumental) and or the early buying of land to give pride of ownership (expressive). At any one time, an individual is likely to view his farm as performing a role in all four groups simultaneously, and the balance will shift according to changes in factors such as age, presence of a successor etc.

Gasson found that, overall, it is the intrinsic and expressive motivations that were dominant (at least at the time of the survey) – the enjoyment of the very process of farming and of the associated independence, and the challenge it presents. Instrumental and social motivations were of a lower order of importance. Of relevance in the present context, differences emerged between small and large scale farmers, with the smaller placing ever more emphasis on intrinsic aspects, particularly on the independence they enjoyed, whereas larger farmers, although still basically intrinsically motivated, attached more importance to the commercial aspects of farming than did the small farmers. However, the pattern was not simple. Some social values were rated more highly by small farmers (working close to home and family) and others by larger farmers (belonging to the farming community). Small farmers above certain income levels appeared to be interested in maximising satisfaction rather than money income, though there may have been an element of circularity in their thinking; the low rating of high incomes by small farmers may have been a reflection of their inability to generate much income from farming because of size limitations, leading to their disparaging such levels.

Gasson's work underlines the importance of non-economic values in agriculture. Hill and Ray (1987) used the findings to comment on observed phenomena such as relatively poor performance of UK schemes to encourage farmer retirement (where pension to replace income forgone failed to compensate for loss of the non-monetary enjoyment of farming activity) and, in contrast, the greater-than-expected enthusiastic take up of the farm improvement scheme of 1957 that gave grants for investments that farmers wished to do anyway so that they could be technologically up-to-date, especially if they had a successor who could benefit.

As noted by Garforth and Rehman (2006), subsequent studies have recognised the complexity of farmers' goals and values and that dividing them into behavioural types on the assumption of simple profit maximising behaviour is increasingly difficult to sustain. Among these, McGregor *et al.* (1996 – mentioned in OECD, 2012) identify that farmers' decisions are influenced by:

- objectives and goals in farming;
- attitude towards the traditional/ethical approach to farming;
- stress and the ability to cope with stress, satisfaction with and optimism about farming, attitudes to legislation;
- risk-taking, autonomy, management attitudes; conservation attitudes;
- quality and quantity of information;
- who is involved in the decision-making process;
- the individual's ability to solve problems; and,
- aspects of their personality.

In 2006, Garforth and Rehman modelled farmers' attitudes and responses to the introduction of the Single Payment Scheme in England. They concluded that economic drivers are not necessarily paramount for all farmers: environmental, family, lifestyle and stewardship motives are equally, and sometimes more, important. These non-economic drivers are long-term goals, while the economic drivers reflect shorter-term objectives (Garforth and Rehman, 2006). Similarly, Parminter and Perkins (1997) emphasised the need, when shaping schemes that implement environmental policy, to adopt a strategy that works with the multiple goals that farmers have.

Research in Scotland by Willock *et al.* (1999a, 1999b) investigated individual differences in farmers' attitudes, objectives, and farming behaviour, and associations between these individual differences and farmers' personality traits. This study found that farmer objectives (successful business goals, conservation, quality of life, status and off-farm goals) acted as mediators between attitudes and behaviour. Openness in farming (willingness to entertain the ideas of others, and to learn about innovations in farming practice) influenced quality of life objectives and had a direct influence on environmentally-oriented farming behaviour. The influence of farm size was largely independent of psychological factors.

An empirical study and analysis of findings from farm practice surveys in the USA, that parallels Gasson's orientation typology, generated a model showing three main types of farmer (Chouinard *et al.*, 2008):

- ***A pure profit-maximising farmer***, motivated only by income and wealth effects of farming, and indifferent to whether the farm is generating positive or negative environmental effects.
- A farmer who ***values environmental effects only to the extent that they provide direct personal benefits***, such as recreational opportunities, or a good view.
- A farmer who is additionally motivated by the social utility from their ***stewardship actions***. This type is equivalent to the true steward, who is willing to forgo personal profits in the interests of conservation.

The authors noted that in reality, there is likely to be a continuum, rather than the three clear farmer types. However, the types are useful to test whether some farmers might be prepared to make personal sacrifices with no apparent personal reward. The evidence suggests that stewardship farmers have a stated willingness to forgo profits for conservation. Not all farmers stated a willingness to forgo profits, but the amounts stated by those who were willing to trade profits for conservation activities were at reasonable levels for the size of the farm in question.

Dwyer *et al.* (2007) point out the importance of understanding the notion of farming styles, inherent in Gasson's approach to orientation (also Hallam *et al.* 2012). A style is defined as a 'pattern of beliefs, motives and attitudes about farming that is manifest in particular patterns of behaviour'. Styles are 'created through socio-cultural dynamics and structural forces' and reflect not only the characteristics of individual farmers, but also include the cultural constructions and value-systems of heterogeneous groups within agriculture (known as 'agri-cultures'), and how these shape the strategies taken with respect to market, policy, environmental and technological drivers. Van der Ploeg (1989; 1993; 1994) and others developed Hofstee's (1946) notions of 'farming styles' to explain heterogeneity in agricultural practices with reference to the social relations in which farmers are rooted, and through which particular ideas and knowledges (e.g. of best practice) are reproduced. Van der Ploeg and Leeuwis (1993) expound the styles as real, tangible and discretely identifiable, but Howden *et al.* (2000) and Vanclay *et al.* (1998; 2006) suggest that styles are rarely so distinct and are more usefully conceptualised as heuristic 'ideal types' that farmers draw on as part of a 'cultural repertoire' when constructing their farm practices, suggesting that the notion may help explain diversity without representing or describing actual differences on the ground.

Different sub-cultural groups in agriculture differ in how they construct and contest particular farming practices as good, best, right, and so on (Holloway, 2002; Brown, 2006), as well as how such notions constitute agricultural identities, for example, by displaying the hallmarks of a 'good farmer' (Burton, 2004a).

Dwyer *et al.*, (2007) emphasise the importance of matching communications to the different styles of farmer. The following categories are mentioned:

- Older, traditional farmers.
- Older, innovative farmers.
- New innovators.
- Large agro-business managers.
- Part time / hobby farmers.

There is an obvious overlap between these style groups, based primarily on information on motives and goals, and the results of segmentation exercises, based either on expert judgements or, more usually, statistical analysis of data collected from samples of farms, which are the subject of a later section in this review.

It is possible that, as with crofting in Scotland, that VS&S farms in Wales contains distinct 'agri-cultures', identification of which would be important to understanding their behaviour (for a study of non-commercial farms in Scotland, see Sutherland *et al.*, 2019). Hence the present research project might consider developing a typology based on data collected. The later section on segmentation studies list several examples that might be taken as models.

Though much of the debate about farmer motivations and behaviour mentioned above has been in the context of economic pressures, stimuli and responses, Brown *et al.* (2020) have emphasised the importance when studying the behaviour and reaction of farmers in relation to agri-environment schemes of going beyond economic and structural characteristics and of including social and attitudinal factors.

In summary, a broad understanding of the values held by farmers and the goals and objectives behind decisions is essential in explaining why the agricultural industry behaves as it does. Various farming styles or orientations can be identified which demonstrate that motives in addition to that of generating income can be important in shaping behaviour. Taking part in farming activities is a major source of satisfaction, and family success can be important where successors are identified. The implication for the current research is that the questions to VS&S farms should be broad and cover orientation and related socio-economic factors.

6 Households operating VS&S farms – income sources, pluriactivity and other characteristics

Many VS&S farms will be operated by households where there are other sources of income (and wealth), so their observed behaviour and attitudes will reflect more than just what happens on the farm. Where income also comes from earnings from economic activities (dependent as wages or independent as self-employment income) the farmers are described as pluriactive and as having an Other Gainful Activity (OGA). Although the term ‘part-time farmer’ is often used in this context, it is a misnomer as, strictly, this applied only to time spent being less than of conventional full-time work (in Wales in 2016 there were 21,339 farmers, partners, directors and spouses spending less than 39 hours per week on farm work, compared with 18,564 regarded as fulltime (Welsh Government 2019)). Some people with a farm can in practice combine farming with a job off the farm that is nominally full-time, and some farmers who claim to be full-time on the farm can also have off-farm occupations, such as businesses that can be managed without constant personal presence. Time spent and income dependency only have a rather loose relationship.

None of this is new, and there is a large international literature on pluriactivity at individual or household level. Indeed, according to Fuller (1991) “full-time farming is the aberration in modern farming history and multiple job-holding is the norm.” It can arise in various ways and, while some pluriactive households will have been formerly fully-dependent on the farm, but compelled by economic pressure to develop other income sources, this probably accounts for only a minority. It can also be a way into agriculture or represent a steady state because of the economic, environmental, amenity and social attributes it brings (Gasson, 1988). It can also happen without conscious decision-taking, such as by inheritance. Income from non-agricultural activities can affect the level and stability of the household income of farmers and, in the longer term, impact on viability of the farm as an independent unit.

Pluriactivity is closely associated conceptually with diversification of income sources. In conventional terminology, as used by Defra, farm diversification means non-agricultural work of an entrepreneurial nature, on or off the farm, but utilising farm resources (Defra, 2018). Ilbery (1991) saw diversification (in a study area of the England Midlands) as a relatively recent phenomenon driven by income pressures, but this seems to be at least in part the result of definitions. For example, contracting in a formal or informal way between farmers, a form of diversification in most studies, has long historical roots.

What is more certain is that diversification, defined in Defra’s way, has to be seen as normal. In 2016-17, 64% of farm businesses (FBS) engaged in such activities (up from 51% in 2009/10) earning an average of £17,000 (among those with these activities). However, it is important to look beyond the restrictions inherent in Defra’s approach, as this ignores the use of household resources, particularly its labour, in off-farm economic activities, such as in employment or self-employment in activities belonging to other economic sectors. Defra (2016) found for England that, overall, 32% of household income in 2014/15 came from outside the farm business, was earned largely by the farmer and spouse, and was more stable than the rewards from farming; half came from ‘unearned’ sources such as investments or pensions.

For Wales Bateman and Ray (1994), using a survey of 427 farm households, established the significance of income from off the farm to farm households. Whilst primary agriculture retained its position as the main income, only a minority of households did not have a supplemental source of income. Indeed, these ‘other sources’ could be financially very important. Off-farm employment was the most significant type and had been a major growth area. A degree of differentiation was apparent between farmer, spouse and other family members and the type of income-generating activity. There were many internal and external factors influencing the potential for off-farm income, and the motives for taking this work appeared far broader than just the generation of income.

Pluriactivity can bring resilience. In the late 19th century the Royal Commission appointed to examine the hardship caused to certain large sections of British agriculture in the depression of 1879-1896 noted that the attraction of combining farming with another occupation was chiefly for the resulting security, but it was not uncommon for the arrangement to be “extremely profitable”. The Report cited the New Forest where smallholders were said to have three sources of livelihood: their farming; common rights to pasture and the collection of fuel and turf; and, small businesses such as dealing in small goods and stock. Elsewhere, types of work combined with farming included fishing, retailing, road haulage, wholesale distribution, factory work, mining, and banking. A century later Harrison (1975) came up with a similar diverse list included managing directors of nationally known businesses; merchant bankers; stockbrokers; architects; doctors; photographers; racehorse owners and trainers; welfare workers; sign writers; automobile engineers; van and lorry drivers; and, shopkeepers and salesmen. Harrison also noted that there was almost no occupation that could not be found combined with farming, and many of these bore no link with agriculture. In Wales an equally diverse set of combinations is likely. However, when measured on a household basis, spouses working in the public sector (schoolteachers, nurses, etc.) seem particularly frequent.

At the time of the 19th century agricultural depression, entrants from other occupations were blamed for rising rents. As a Mr Channing remarked, “Further, there have been, and still are, all over England and notably in Scotland, considerable numbers of men, some of whom know nothing of farming, others next to nothing, who have made money in other callings, and deliberately take farms because they prefer a country life, and without much anxiety as to commercial results”. Residence, amenity and the ability to control one’s environment remain significant today (see the typology of farms below). Similarly, ‘hobby’ or ‘lifestyle’ farmers are still blamed for some of the economic difficulties faced by those who claim to be ‘professional’ or ‘commercial’ or ‘active’ farmers.

Harrison (1975) found that, while an element of pluriactivity was present throughout the range of farm sizes in England, it was relatively more important among small farms. Currently about half of the total household income of small farms in the Wales FBS comes from non-farm sources, a little above the all-farms average (Welsh Government, 2019). Very Small farms are not covered in the FBS, but the proportion of income from non-farm sources would be expected to be higher.

Specific information about the occupiers of VS farms, though rather dated, comes from a four-year study funded by MAFF that purposely focused on businesses below the FBS threshold (Ansell *et al.*, 1988, 1989, 1990, 1991, of which the last acts as a summary). It was undertaken in two stages of two years each (1986 and 1987; 1988 and 1989), with an identical sample possible for each pair of years, and covered all four constituent parts of the UK (though only England and Wales in the last year). Samples were drawn from lists of holdings provided by MAFF (for the first pair of years using a 1% random sample and in the second pair a 2% sample from the annual June census) and surveys were carried out by staff from the FBS provincial centres by visits in person, using a simplified survey-type approach to data collection. The sample size in 1986 was 475 and in 1988 it was 1,212; identical samples for the pair of years were about one tenth smaller (1,111 for 1988+1989). Net Farm Income (NFI) was calculated for each farm using the (then) normal FBS conventions of attributing a benefit value to the farm house, assuming all farms were tenanted and were free of debts (by imputing a rent for owned land and a wage cost for unpaid family labour, in addition to that of the farmer and spouse) and ignoring interest costs on borrowing.

The purpose of the work (given in Ansell *et al.*, 1991) initially was to:

- provide detailed information about the farming activities being practised;
- measure the levels of profitability being generated by these activities; and,

- identify non-farming employment and to measure the income generated by it.

In addition, during the second year of each of the two samples surveyed, two further objectives were added:

- measure and explain the extent of change reflected in the results obtained from an identical sample in each pair of years; and,
- after a relationship had been established between fieldworker and farmer in each of the 'first' years of the survey, to provide an insight into the motives and outlook of the people involved on these farms. In this way, what started off as essentially an economic survey, took on, in addition, a socio-economic flavour, reflecting the important human element of a study of this kind.

The overall results for the UK were summarised in the 1991 publication, and a digest is of relevance to this research project. Those specific to Wales are dealt with below:

- There is wide variation in individual circumstances and motives for farming on this scale, though there is a distinct lack of variability in the general financial outcome for most of those involved.
- Over the four years the picture remained virtually unchanged on these 'very small farms', with low agricultural investment levels, low intensity farming and low (almost non-existent) farming incomes.
- In England, the average Net Farm Income on these farms in 1988 was a mere £300, falling to £200 in 1989. Off-farm income for the identical sample averaged £12,500 in 1988, rising to £13,500 in 1989. In Wales the trends were the same but started from a lower base, with the 1988 on-farm deficit of -£200 falling to -£400 a year later, but the off-farm income rising from £7,900 to £8,700 in 1989.
- With the on and off-farm labour of farmer and spouse continuing to be almost equally divided, both in England (about 1,200 hours in each direction) and Wales (about 1,000 hours), the disproportionate rewards to the two types of work, evident over the previous three years, remained the case in 1989.
- A persistent question is why small farmers continued in agriculture when they achieved such small financial rewards for considerable expenditure of effort. The last phase of the study attempted to throw light on this question. The picture that emerges is of a group of people who were keen to engage in farming on their own account, and who established themselves on a smallholding, often many years ago, but who have failed to progress beyond this first step on the farming ladder. Farming as a commercial activity, pursued for profit was the most frequent reason given for remaining in the sector with the proportion providing this answer ranging between 41% (pigs and poultry) and 67% (cropping holdings) across England and Wales. Residential consideration was the next most important category for most types of holding, about 30% citing it as the most important factor. Most respondents did not foresee any major changes in their way of life in the years ahead and saw no particular difficulties in continuing their present activities. The disharmony between the declared commercial intentions and the poor financial return, plus the reluctance to change, indicates that non-monetary factors are important in shaping farmer behaviour, though the authors did not comment in detail about what these factors might be.
- There was no dramatic improvement of incomes on small farms in 1989. The highest level of Net Farm Income was achieved on dairy farms (£2,197) and pigs and poultry (£1,669). Net Farm Incomes on LFA and Lowland livestock farms were negative. Most of the income earned by small farmers (and their spouses) came from off the farm. Farm income accounted for 10% or less of total occupier's income for most farm types. The exception was dairying where farm income accounted for about 40% of total income.

6.1 Very small farms in Wales (from Ansell *et al.*, 1991)

As this study was conducted separately in each FBS province, it is possible to extract information provided by the Provincial Centre in Wales (then the University College of Wales, Aberystwyth, where the Local Co-ordinator and Author was T. N. Jenkins).

The counties covered were Clwyd, Dyfed, Gwent, Gwynedd, Mid-Glamorgan, Powys, South Glamorgan and West Glamorgan. In 1986 the (random) sample size was 80, with an average farm size (in 1987) of 13.0 ha (UAA). The second phase sample in 1988 was much larger, at 247, though the average size of survey holdings (in 1989) was a little smaller, at 11.1 ha (UAA).

The 1986 survey in Wales reflected the three main farming types found in Wales, namely: dairying; hill and upland livestock rearing; and, lowland livestock rearing. The very small farms found were categorised into four main types of 'business':

- those where the standard of living was low and where there was an element of struggle in making ends meet financially;
- those where the occupiers (often pensioners) were somewhat better off, but by no means well off;
- those where a combination of activities, on and off the farm gave rise to an adequate living; and finally,
- those where farming was overtly a leisure activity coupled with a relatively prosperous living derived from other sources.

On the basis of the first two years of this project, the Welsh report concluded that the small farm sector was generally not a first rung on the farming ladder, nor a pleasurable retreat for the prosperous. It was sometimes a place where those at the end of their careers could indulge a hobby or continue a tradition. It was also an alternative for those for whom the non-agricultural sector did not provide an adequate living, either in quantitative or qualitative terms.

Results for the first two years (1986-1987) were quite similar. In strict financial terms the average net farm income for the two years taken together was, according to the identical sample, £642, with 1986 about £300 below this figure and 1987 £300 above. Non-farm income was very similar in each of the two years, averaging £5,378. Together with Northern Ireland this was one of the two lowest average figures recorded in the survey with an equally low off-farm labour-use of around 900 hours per year.

Interesting social features to emerge from the first two years' survey in Wales included the fact that of the 72 farmers encountered, no less than 55 were born and bred in their local communities and only 12 were recent newcomers to the area who did not already have local connections. Although some two-thirds of the farmers regarded generating a significant income from their holdings as an important objective when they took over, and the highest proportion in the survey (56%) continued to regard it as such, the financial evidence (whilst not obviously worse than elsewhere) does not suggest particular success. Between 1986 and 1987 on nearly half of the holdings, farming activities - both in terms of area farmed and farming intensity - had remained unchanged, and on many of the others, activities had actually been reduced. Against a background of several insurmountable constraints (including size, health and labour shortage) future intentions were centred largely around maintaining the present situation when retirement is imminent.

Moving to the second phase of this study (1988 and 1989) the local author from Aberystwyth reported an effective sample of 247. Again, sampling was restricted to three farm types, as deduced from the data available

for Welsh farms on the 1987 June census returns: dairying - farms on which dairying was practised in significant measure, irrespective of location; LFA livestock - farms rearing sheep and/or cattle and situated within the severely disadvantaged or the disadvantaged less favoured areas and hence eligible for hill livestock compensatory allowances; and, lowland livestock - farms rearing sheep and/or cattle outside the less favoured areas.

The nature of the small farm sector in Wales made it inevitable that livestock enterprises formed the dominant proportion (over 80%) of output, and livestock subsidies contributed around 17% of livestock output. The calculation of Net Farm Income in this survey was made along standard FBS lines, i.e. benefit values were attributed to farmhouses, commercial values placed on unpaid family labour, rental values assessed for owner-occupied farm, and any interest charges paid on farm borrowing were excluded. To the extent, therefore, that farms are rent free and labour is unpaid, the average negative net income of £276 per farm, recorded for the whole Welsh sample, was not a barrier to continuing activity (as it often underestimated the cash income available). The distribution of NFIs ranged from losses to profits of over £1,000 per farm, but with three-quarters of the sample lying within the relatively narrow range of -£2,500 to +£2,500.

A major feature of the very small farm sector in Wales was its diversity, and generalisations concerning the nature of the farms found there are accordingly difficult to make. The farms visited in the course of the survey ranged from traditional family smallholdings yielding a modest living for their occupiers, to units purchased with outside resources and run for the purpose of indulging a vision or a philosophy. In the middle, and probably most typical, were farms which were merely sidelines or convenient bases for their occupiers whose main livelihood was non-agricultural.

The author pointed out that the main feature of the comparison was, in fact, the lack of change, probably due, it was suggested, 'to the lack of any great exposure to commercial pressures and to an ingrained conservatism in agricultural activities'. It would be surprising if, even with a near tripling in the size of the sample, such well entrenched features of the Welsh rural scene were, in the space of two years, to show any marked change - and the later evidence for 1988 and 1989 supported that view. If anything (although the two two-year samples cannot strictly be compared), the situation had deteriorated. The average Net Farm Incomes recorded for the identical sample in 1986 and 1987 were £330 and £954 respectively. In 1988 and 1989, the figures reflected losses of -£215 and -£356; hardly any change at all between those two latest years. Minimal change was also reflected in the incomes from non-farming sources with an average, in 1988 of £7,949 and in 1989 of £8,751. This pattern of 'no change' continued in terms of hours worked on and off the farm, with between 1,000 and 1,100 hours worked on the farm and between 900 and 950 hours worked off the farm in both years.

Ansell *et al.* (1991) comment that perhaps nowhere else in the UK did such a static situation exist, no doubt leading the local author to his conclusion at the half-way stage of this study (which still stood at the end) that 'the general picture, therefore, to emerge from this Centre cannot be said to be a dynamic one - the majority of (very small) farmers giving the impression of passivity, traditionalism and an acceptance of low living standards in order to continue an undemanding lifestyle'.

More recently a survey of Welsh farm households by the Welsh Rural Observatory (WRO, 2010) found that 41% had non-farming as well as farming incomes, with 39% of very small farms seeing off-farm income as the most important source of income. Often this was work that was associated with farming, for example, contracting, driving, building sheds, whilst women were engaged in a range of additional activities including education, retailing, catering or admin. A small proportion of farms also ran B&B's for visitors (as compared with the same label applied to sheep husbandry) or leased land. Whilst it is often argued in the literature that such diversification is a positive thing, in Wales the WRO also pointed out that the difficulties existed through working such long hours, particularly given the commitment that animal husbandry takes. Many farmers argued that their

need to work off the farm was compromising their ability to manage their stock properly, and did not see that it was sensible for them to be encouraged to work in such a way.

In summary of this section, literature on VS&S farms, especially in Wales, has found them to be very heterogeneous, both in their origins and in their current range of activities and income sources. Surveys have found that they have ranged from traditional family smallholdings yielding a modest living for their occupiers, through farms which were merely sidelines or convenient residential bases for their occupiers whose main livelihood was non-agricultural, to units purchased with outside resources and run for the purpose of indulging a vision or a philosophy. There seems to be a conflict between, on the one hand, a general intention that the small farm makes money and, on the other, the reality of dependency on other income sources. Rather dated evidence suggested that Welsh very small farms tended to be characterised by a lack of change, with many occupiers being of long standing and unlikely to see the farm as a way of progressing to something larger. The implication for the current project is that its survey questions should be capable of capturing the heterogeneity found among VS&S farms.

7 The economic, environmental and social roles of households operating VS&S farms

Agriculture as an industry largely comprising unincorporated businesses operated by households undoubtedly performs economic, environmental and social roles. The issue here is the part played by the VS&S farms within this picture.

There is a common perception that changes in the existing structure (such as might follow Brexit), especially a reduction in the number of small independent farms, carry a range of negative implications that are as yet not fully appreciated. Small farms are seen as playing an important role in supporting rural employment and generating incomes, in providing a point of entry to the industry, and fostering entrepreneurship. They are believed to strengthen social networks, maintain the social fabric of rural areas and thus contribute to the objective of balanced territorial development. They are assumed to be important in conserving environment features and the stock of 'environmental capital' (a misnomer for environmental resources). They have been attributed with cultural significance as a repository of the Welsh language (Agra CEAS Consulting, 2018). While some of these claims are undoubtedly valid, others take the form of family farm 'myths' that are not necessarily supported by empirical evidence (Matthews, 2013).

A word of caution is perhaps necessary. Though Grando *et al.* (2020) take a high-level international view, how VS&S farms came into existence differs between countries, and the roles they currently play seem to reflect their contexts and histories. The manner in which the current VS&S farms in Wales came into being (the agronomic, cultural and legal influences are touched on in Agra CEAS Consulting, 2018) is not necessarily shared by other countries. For example, in Australia (Hollier and Reid, 2007), the smallest farms seem to have arisen from relatively recent population pressures and greater demand for rural residential housing from households that predominantly had other sources of income, with the increasing number of small farms in some regional areas influencing community values and providing new opportunities for community growth. The authors comment that the social, economic and environmental parts played by small lifestyle farms in Australia are complex, generally untested and often subjective in nature. In contrast, in several eastern EU Member States very small farms will have arisen historically through close association with large-scale collectivised units (though this varies between countries). Even within the UK there may be differences between constituent countries in terms of histories, social norms, legal frameworks and land tenure arrangements (for example crofting in Scotland) that suggest that, while there will be similarities of a general nature, motives and behavioural responses may well be at variance from those experienced in Wales. Context can be important.

7.1 Economic role

Debates about the roles of small farms have often failed to make clear distinction between size of business and family operation. It is often assumed that all family farms are small farms, but, depending on how a 'family farm' is defined, this is clearly not necessarily so. As has already been established, farm businesses arranged as companies, wholly or predominantly by members of the same family, can be large in terms of capital value, turnover and/or land occupied. The poor distinction is apparent from the contents of the publications from the Centre for Agricultural Strategy that focused on the small end of the size spectrum (e.g. Tranter, 1983; Carruthers and Miller, 1996).

In these, Furness, (1983, 1996), with good access to official statistics, showed that very small farms (with business size <4 ESU) were relatively more important in Wales than in other parts of Great Britain (13.4% of holding numbers in 1982, compared with 4.8% in England and 7.0% in Scotland). Furness (1983) points to the relative stability of holding numbers in the VS group, which he later describes as typically not being full-time businesses (implying their operators have other sources of income), but falls in the 4.0 to 15.9 ESU group, which

seem to be under the greater income pressure. Furness (1996) describes the absorption of small farms by the larger ones as the result of low incomes leading to low investment and failure to modernise and keep abreast of regulation, with consequences for competitiveness. Those small farms that remained independent were likely to descend into the Very Small economic size group, dependent on other sources of household income to sustain them.

It has been argued that “the approximate measure of rural community well-being is and should still be employment” (Midmore and Dirks, 2003:3). This is because employment, or more precisely, paid employment, is the most important means of achieving other ends. In terms of direct employment, evidence from the SW Farm Survey in England (Winter and Lobley, 2016) indicated that the 1,070 respondents supplying employment data employed 3,164.75 FTEs (including family labour and those working in diversified enterprises). On average, small farms of less than 50 ha employed just over 2.0 FTEs compared to the largest farms employing 5.25 FTEs. However, significantly it is smaller farms that employed more labour per unit area; mean and median employment per 100 ha was greater on smaller farms (< 50 and <100 ha) compared to larger farms. This employment benefit, noticeable on mainstream farms, was even more apparent on smaller less conventional alternative farms.

In their submission to the call for evidence, Funding Enlightened Agriculture discussed the concept of a micro-dairy, which was seen to offer multiple benefits, including employment creation. Similarly, evidence from the Landworkers’ Alliance based on a survey of 70 farmers operating farms of 20 ha and less also pointed to “the labour intensive nature of farms in the survey, especially those with a horticultural element, means that more people are employed per hectare than is typical for most traditional farming activities (Redman 2015, p188). While family labour was the main input, holdings as small as 1 ha were providing a livelihood for up to three full time equivalents.”

Winters and Lobley (2016) also reported stakeholders who argued that the contribution to employment associated with small farms was not confined to direct on-farm employment but that the great many small farmers who have diversified provide a network of services to the community for example as contractors or repairers of machinery. Similarly, without a dense population of small farmers it becomes harder to find tractor drivers, middle managers and dairy staff.

A different but significant perspective emerged from submissions that claimed that because of the challenges faced by small farms they have to do things differently and have a strong motivation to innovate.

7.2 Social role

In reviewing the social role of VS&S farms it is worth distinguishing between the role played in the rural community, in the farming community, and for the farmer and his family.

Furness (1996) concluded with the comment that ‘small and very small farmers are a major section of rural society, and together they are three times as numerous as those in the larger business groups’. This raises the question of whether, apart from their numerical importance, VS&S farms contribute anything unique or disproportionate which Brexit might threaten.

Winter and Lobley (2016) draw attention to the wealth of written material expounding the social and moral virtues of agriculture, and in particular of the small farm. There is an element of agricultural fundamentalism that is more myth than reality (see for example Denman, 1981). As has already been noted when discussing the ‘family farm’ the strength of political support is in sharp contrast with the depth of empirical evidence (Hill 1993, 2012a, 2012b).

In 2018, Agra CEAS Consulting undertook a study for the Welsh Government on the social contributions of agriculture, with a view to assessing what the impact of Brexit might entail (Agra CEAS Consulting, 2018). The study involved both a literature review, searching for evidence, and interviews with stakeholders. Its main conclusions are:

- The perception of many stakeholders, taken from discussions, and from literature, is that agriculture, through its farming households, does make direct contributions to various aspects of social capital and thus to the functioning of society in rural areas and the well-being of residents there. The main forms these contributions take are to: social networking; community cohesion; social capacity and resilience; and culture (including the Welsh language). In addition, the creation of jobs and incomes by agriculture will have a social dimension.
- The overwhelming assumption is that these direct social contributions have a beneficial impact on well-being, through facilitating the transmission of public goods and lowering transaction costs. However, negative aspects can be found and are acknowledged (such as underlining social divisions between the farming sub-community and other households).
- The perception in the literature and among stakeholders is that, while the focus may be on what happens within the farming community (including the benefits from cooperation in tasks such as sheep gathering), there are also impacts that extend more broadly to other members of the rural population. It is felt that the tradition of mutual support between farming households flavours the way that village communities operate.
- The perception is that the part played by farming households greatly exceeds their current numerical importance. Factors contributing to this include their ownership of land and machinery capable of use for the community (in addition to within farming), their relative permanence as residents, and the position within local organisations and governance that this often leads to.
- There is some evidence that traditional roles within the rural community have changed, and generally reduced.

However, important in the present context that focuses on VS&S farms:

- Within the general assertion that social contributions from agriculture exist in Wales, no clear picture emerged of the perceived relationship between farming types or farm size and social contributions. The historical literature tended to describe the situation anecdotally, rather than to analyse differences between sizes and types of farm.
- It was sometimes assumed that contributions were concentrated among small family-operated farms rather than among large farm businesses, but discussions with stakeholders cast doubt on this. Interestingly, Lee-Woolf (2014) found that respondents representing ‘very small-spare time’ holdings tended to ‘strongly disagree’ that talking to other farmers was an important source of information and advice, suggesting relatively poor social networking. This is supported by feedback from focus group participants who explained they were not as well integrated into traditional farming networks as they could be.
- Small farms today will tend to be operated on a part-time basis to make them viable, with the spouse and even the main farmer having an off-farm job, perhaps even a full-time one. This pressure will work against them having much spare time for running village organisations, though developments in communications technology may assist in maintaining social networks. Small farms that are primarily residential lifestyle choices and supported by pensions or other off-farm incomes may afford more

opportunity for activities in the community, and these will be little affected by what is happening to the prosperity of farming. Large commercial farms face different pressures but will also have greater resources and probably more business skills to benefit their local communities.

One aspect of the social role of agriculture that was not given weight in the Agra CEAS Consulting (2018) study was what being small farmers does for the individuals themselves, though it has to be remembered that many combine the farm with some other (and maybe several) occupation. Studies of pluriactivity reveal a mixture of reasons why this came into being and what operators currently get from it, including being able to mix with a broader range of social contacts yet remaining part of the farming community.

The picture is not uniformly favourable. According to Lobley *et al.* (2005) farmers' changing place in the community has had profound social implications. They documented cases of stress, illness and negative impacts on interpersonal relationships. Furthermore, Lobley *et al.* (2002) suggested that such withdrawal from the community can lead to a downward spiral of depression. Stress, illness and difficulties within interpersonal relationships have obvious implications for the farm business. Conversely, according to Meert *et al.* (2005), social interaction and farmers' integration into social networks are significant factors in farmers' decisions to establish new diversified enterprises, i.e. farmers' lack of social interaction, as reported by a number of commentators, across a range of contexts (Lobley *et al.*, 2002; Lobley *et al.*, 2005; Burton *et al.*, 2005; Appleby *et al.*, 2005), has implications for farmers' propensity to establish new enterprises as well as direct implications for their own well-being. Thus, the 'social', is inseparable from the economic.

In short, simple assumptions about the social role of VS&S farms should be avoided.

7.3 Environmental role

According to Winter and Lobley (2016) the studies by Potter and Lobley (1992, 1993) and subsequently Lobley (1997, 2000) provide the most comprehensive discussion of the environmental contributions of small farms in a British context. Caution has to be exercised, because farm size in this work is usually measured in land area (hectares), whereas elsewhere in this literature review economic size is used. As long ago as 1975 it was pointed out (Britton and Hill, 1975) that the two measures of size (area or Standard Man Days at the time) should not be confused as partial productivity indicators important for monitoring the environment (such as output per unit of land area) could have a different pattern according to which size measure was being used. In terms of stocking density, Britton and Hill (1975) found that "small businesses [measured in SMD] evidently use their land rather less intensively than large businesses; they include, for instance, many beef and sheep farms which have relatively small numbers of livestock on a rather extensive acreage" (Britton and Hill, 1975: 26). In turn, this has been taken as evidence that small farms operate more extensive systems which are therefore more environmentally friendly (see Lobley, 1997).

Winter and Lobley (2016) recognise that the conservation case for small farms is often based on a belief that their operators are somehow inherently more sensitive to the environment and therefore provide the best way to organise and manage the land, but it might also be because they are conservationist 'by default' – they lack the means to intensify production in the way a larger, more prosperous farmer might. Alternatively, they may be conservationist 'by association' because they tend to be of a type that is environmentally sensitive or rich in conservation assets anyway (Potter and Lobley, 1993: 271).

Thus it is necessary to establish evidence that environmental performance or quality is related to farm size. Secondly, if so, what are the underlying reasons?

Statements provided as evidence to Winter and Lobley (2016) confirmed the perception that small farmers were more inclined to farm in a manner that is environmentally friendly, including the following:

- they seemed more willing to look at their environmental impact and more willing to assign areas of the farm to wildlife;
- they tended to be more sensitive to the land they occupy and farm in a way which more fits the landscape;
- small farms will often be less intensive in their use of the land and be more sustainable for the environment;
- they act as magnets for wildlife that exists at low population densities on their larger neighbours; and,
- they monitor wildlife that exists invisibly on larger areas.

The available empirical evidence suggested a more complex situation. Drawing on a survey of 504 British farmers in 1993, Lobley (1997, 2000) used the concept of conservation capital (a measure of the area of deciduous woodland, semi-natural vegetation and extensive grass) to demonstrate that, while smaller farms (<50 ha) were more likely than larger farms (>200 ha) to have zero stock of conservation capital (39% versus 23%), by separating the small from the very small, the latter, whilst still containing a significant proportion of zero stock parcels (33%), emerged as having the highest concentration of high conservation stock parcels across the sample (50%). Whilst this suggests very small farms (<20 ha) were of high conservation value, they represented a much smaller proportion of the total land area, so only accounted for 10% of the stock conservation capital in the survey. In contrast, the largest farms (200 ha or more) account for 59%.

However, this distribution varied by landscape type, suggesting that location and landscape factors are important in determining conservation value, as well as farm size. Lobley drew a balanced conclusion about the value of small farms to the environment, suggesting “there is some support for the assumption of conservation interest by association” and “in some locations (notably pastoral landscapes) they [small farms] are responsible for a significant proportion of conservation capital, and their loss could expose land of conservation value to potentially environmentally damaging structural change” (Lobley, 2000: 601). He acknowledged that whilst small farms only managed a small proportion of the land, they nonetheless played a fundamental role in the collective provision of rural environment services.

More recent work tends to support Potter and Lobley’s findings. Using the Agri-Environmental Footprint Index in combination with Farm Business Survey data for arable, lowland livestock and upland livestock farms, Westbury *et al.* (2011) found that farm size (measured in terms of land area) had no significant effect on AFI values calculated for arable and upland livestock farms. However, on lowland livestock holdings, farm size had a significant effect on AFI ($p < 0.001$); with a significant increase in environmental performance with [greater] farm size. Westbury *et al.* (2011) attribute this positive relationship to larger holdings using significantly less energy per hectare than smaller holdings, as well as having greater land use diversity, and using less water use per hectare compared to their smaller counterparts.

According to Winter and Lobley (2016), research into other environmental implications of farm size is limited, despite large bodies of literature pertaining to the contamination or degradation of the environment and surrounding ecosystems, e.g. damage to soil, leaching, runoff, and eutrophication, and despite a longstanding anecdotal belief that it is large farms that are most damaging to the environment (Heffernan and Green, 1986).

More recently, Ingram (2008) generated information on the relationship between farm size and sustainable soil managements. Specifically, the issue of farm size (measured in terms of acreage) emerged in the context of

farmers' use of manures as part of the nutrient budget for the farm. Ingram observed how small farms failed to see manure as an asset. In contrast, bigger farms were "more disciplined about accounting for manure, measuring its value as part of their nutritional programme and using more sophisticated spreading machinery" (p. 221).

In their interpretation of evidence on the economic, social and environmental roles of the small farm, Winter and Lobley (2016) point to the consequences of a decline in their numbers. The loss of small farms, it is argued, is associated with fewer people on the land and fewer to play formal or informal roles in communities, although there is evidence that farmers have already withdrawn from various community roles. Further declines in the number of small farms probably would mean fewer local suppliers of food and other services. The environmental implications would depend very much on what replaces small farms and it would be just as dangerous to assume that all large farms are environmentally damaging as it would to assume that all small farms are environmentally beneficial.

In summary, evidence on the economic, social and environmental roles of the VS&S farms is mixed and hides complex patterns. In terms of employment, small farms on average used smaller amounts of labour per farm but higher levels per 100 hectares. Though farmers undoubtedly contribute to social capital, there is not clear evidence about whether in today's conditions there is any relationship with farm size. The empirical evidence on the relationship with the environment is again complex; smaller farms (<50 ha) were more likely than larger farms (>200 ha) to have zero stock of conservation capital (39% versus 23%), but it was the very small farms that had highest concentration of high conservation stock parcels. However, this varied by landscape type, suggesting that location and landscape factors are important in determining conservation value, as well as farm size. Overall, the loss of small farms is associated with fewer people on the land and fewer to play formal or informal roles in communities. The environmental implications would depend very much on what replaces small farms and it would be just as dangerous to assume that all large farms are environmentally damaging as it would to assume that all small farms are environmentally beneficial.

The implication for this project is that questions need to be included in the survey of VS&S farms that probe their economic, social and environmental roles.

8 Expected and actual observed responses by farm households to policy signals

The way that farmers respond to economic and other type of policy signals can provide valuable information on what drives that response. Some consistency across several signals can be expected when responses of individual farmers and/or their households are shaped by socio-economic factors such as farmer age, education, or presence of likely successors. The literature contains numerous studies that collectively shed light on the behaviour of farms, including those belonging to the VS&S groups.

At the outset of this Literature Review on understanding behaviour it was explained that behaviour needs to be contextualised. The specification of the current research makes it clear that this is provided by the prospect of the impact of Brexit on farming in Wales, in particular on the VS&S farm sector. Without wishing to anticipate that part of this research which uses scenarios to model the impact of post-Brexit conditions on Welsh small farms, it is nevertheless clear from existing studies (mentioned in the final section of this literature review) that two main changes are likely to occur and to which farmers will need to respond. These are:

- Behavioural responses in farm economics resulting from changes in prices of farm commodities and costs, plus the phasing out, in part or in total, of direct payments.
- Behavioural responses to opportunities provided by agri-environment and similar schemes that reward farm operators for providing public goods.

8.1 Responses to economic pressures

8.1.1 Background theory

The elementary Theory of the Firm as applied to agriculture (summarised in Chavas (2001) or Hill (2014)) provides the theoretical framework to optimising the various marginal relationships between inputs and outputs, between variable inputs and between multiple outputs, all in pursuit of profit maximisation. Thus it is quite easy to predict the direction of change in production when, for example, the market price of a farm commodity, such as sheep meat, falls, though the extent of changes will reflect the underlying production function and are harder to estimate quantitatively, particularly when production involves a delay and risks are present. This theory also distinguishes between fixed and variable costs and time periods (longer periods involving more costs that are non-fixed) and the possibility, with time, of changing the scale of production or even transferring resources from agriculture to other sectors. At any particular scale of fixed factors there will be some level of output prices that will allow production to continue in the short-term while not covering all costs, though there will be a lower level at which even variable costs are not covered, at which point production will be terminated by the rational entrepreneur.

When considering what happens on farms in the face of economic pressures it is useful to bear in mind the difference between behavioural responses that form part of a farm's resilience, in the sense that its operators are in a position to withstand shocks and periods of depressed incomes, and its responses that form part of its adaptation to what appears to its operators to be a permanent change in the economic, technical or regulatory conditions in which it operates. Not all writers make this distinction. For example, Darnhofer (2014) uses the term resilience to encompass buffer, adaptive and transformative capability.

There seem to be different sets of factors at work in resilience and adaptation. For example, resilience would be affected by the farm operator's degree of income dependence on the farm's income generating ability, with those

with substantial off-farm income and treating their farms primarily as hobby farms (or mainly as residences providing a lifestyle) being largely insulated from the economics of agricultural production and therefore distanced from Brexit's impact on farm incomes. Similarly, large financial reserves or easy access to credit could provide a buffer. In contrast, farms with no other sources of income or access to reserves, or where heavy debt servicing costs have to be met, would be far more sensitive to changes in the profitability of farming.

Factors associated with the longer-term process of adapting would include the ability to secure (or release) land, the education and skills of the farmer and family members (human capital), access to advice (both technical and on risk management) necessary to make enterprise changes or other major investments, and access to capital for investment. Additional factors outside the farm itself would include business and employment opportunities in the broader economy when considering partial or complete exit from farming (Goetz and Debertin, 2001; Errington & Tranter (1991)). Darnhofer *et al.* (2016) point to the necessity of social capital in the form of relationships (networks) that contribute to the smooth operation of farming and marketing actions and assist adjustment in the local economy. Blandford and Hill (2006) when reviewing international evidence concluded that the ability of farmers to make adaptive changes in their farm businesses is often under-estimated by policy makers. Rose *et al.* (2018), in an internationally comprehensive literature review of the determinants of farmer behaviour (and how behaviour can be influenced), brigaded them into the following broad groups:

- **Personal factors**, such as age, gender, education level, experience, attitudes (including to risk), beliefs, and emotional prevalence.
- **Business factors**, such as farm size, tenure, cashflow, staff numbers, succession plans, and profitability. Some of these factors modified other determinants of behaviour; for example, bigger farms with higher incomes can make it easier to adopt new innovations.
- **Social networks**. Studies found that the opinions of family, friends, peers, and trusted advisors were highly influential on farmer decision-making behaviour, also helping to delineate what 'normal' farm management looked like (social norms, derived from the theory of planned behaviour). The opinions of trusted people could affect farmer behaviour through the provision of formal or informal advice, or through the means of social pressure.
- **Perceived behavioural control**. Feeling in control of decision-making (derived from the Theory of Planned Behaviour (TPB)) refers either to the perceived level of autonomy over decision-making that a farmer feels he/she has, but also the perceived ease of implementing a particular behaviour (self-efficacy). If a farmer feels that they are being told what to do, rather than being in control, or feels that they do not have the skills, knowledge, or practical conditions to implement a management practice, it is unlikely that the action will be carried out.
- **The presence of rewards**, such as increased incomes or other incentives. Mention is also made of the desire to avoid negative outcomes.
- **Access to reliable information**, a factor that overlaps with the use of advisors and peer networks mentioned above, though other channels can be effective in shaping behaviour.

In the context of the present study focusing on VS&S farms, understanding the motives behind behaviour obviously belongs to the first group (personal factors). However, there are many other influences at work. Thus, our survey of VS&S farms needs to be capable of collecting data on a wide range of determinants of behaviour if the role of motives is to be adequately explored.

8.1.2 Evidence of actual responses in the face of major financial pressure

There are a few studies that indicate the sort of responses that could be expected from Welsh farmers if Brexit resulted in downward pressure on their incomes (though these are clearly inappropriate for sectors where increased profitability may result). In particular there is a series of studies from the Centre for Agricultural Strategy (CAS) at the University of Reading (Errington and Tranter (1991), Giles, (1990), Harrison and Tranter (1989), Harrison and Tranter (1994), Gasson *et al.* (1998). These involved surveys of English farmers carried out in 1986, 1990 and 1997.

The first of this series (Harrison and Tranter, 1989) related to the responses at the farm level in 1986/87 to a financial crisis affecting agriculture caused not by a cut in direct payments (which were not part of policy at the time), but by reduced market returns. It used a large postal survey (n=1,276) and demonstrated that:

- actual responses can differ from ones that are reported as intended;
- responses at the farm level differed widely;
- non-response ('carry on as before') was a characteristic of a large minority of planned reactions (29%);
- planned expansion of output as a way of coping with the income crisis was the intention of almost half of respondents (in contrast with what might be expected from simple economic theory);
- between a third and a quarter had reduced the amounts of inputs used, reduced machinery costs and reduced labour costs;
- few farmers were planning to retire or to take up some form of part-time farming; and,
- one in five was planning to expand the farmed area.

Harrison and Tranter point out that the survey revealed a remarkable lack of large-scale disruptive restructuring in either broad management or more narrowly financial terms.

Errington and Tranter (1991) could be seen as an updating and extension of the Harrison and Tranter study with a subsequent survey (1990) that corresponded to a later stage in the financial crisis affecting agriculture (in terms of aggregate income this reached its lowest point in 1991, followed by a rapid recovery). By this stage, many farmers had progressed from the initial adjustments to more radical actions. Though the types of responses were very similar to that found in the earlier work, the share of farmers that intended to 'carry on as before' was much lower (3.5% in contrast to 28.6%); this indicates that persistence of the signal that change is necessary will increase the perception that farm-level adjustment should be made.

Gasson *et al.* (1989) found that responses to the financial uncertainties and fluctuating farm incomes of the 1990s were very much in line with those to the recessions of the 1980s, which strengthened confidence in the earlier findings. Nearly half the respondents claimed to be just carrying on as before, and this also applied to the farmers

judged to be under high financial pressure, where 44% stated they were carrying on as before. Among the rest, commonest responses were to:

- increase output from existing enterprises;
- cut out less profitable enterprises;
- reduce inputs and machinery and labour costs;
- increase the area farmed in order to spread costs; and,
- to take financial advice.

Thus, farmers were more inclined to improve the productivity of existing enterprises than to attempt the more radical steps of introducing new enterprises, diversifying the farm business or looking for alternative employment (this may be related to skill sets and the availability of necessary land types, machinery, etc.). The farmers who were proactive, in the sense that they increased output, cut labour and machinery costs, enlarged their farms and took financial advice in the 1990s, tended to be the younger and better qualified operators with the larger businesses. Having the farmer or another family member take off-farm employment was associated with smaller farms and younger, better qualified farmers. Perhaps surprisingly, little difference was found among most of the responses between those judged to be under high or low financial pressure. Though those under high pressure were more likely to reduce inputs or cut machinery costs, they were no more likely to cut labour costs, expand production from existing enterprises, cut out unprofitable enterprises, or start a non-agricultural enterprise. Detailed explanations were not explored in Gasson *et al.* (1989), but maybe the key was that the former type of cost reductions seem to be relatively easy to implement whereas the latter actions might encounter more substantial constraints. For example, shedding a worker could incur social costs where there was a close personal relationship with the farmer, enterprise adjustment might run into technical problems of crop rotation or resource occupational mobility, and diversification could expose skills gaps within the farm family. Those under high financial pressure were more likely to extend the repayment period on loans and to have family members (but not themselves) take other employment, though they were no more likely to have sold assets (including land) to reduce debts.

It is also instructive to look at the responses farmers made to the collapse in their incomes resulting from the Foot and Mouth Disease (FMD) crisis in 2001. Franks *et al.* (2003) report on a survey of farm households in Cumbria (England) which showed that FMD caused a 60% fall in revenue from traditional farm enterprises, a 17% reduction in earnings from diversified activities and a 15% fall in salaries from off-farm employment. Costs also fell by 32%, leaving a net shortfall of £41,840. When analysed by farms which had had stock culled and those that had not, the net shortfall was £51,516 and £15,235, respectively. (There were also psychological and social costs, detailed in other research (for example, Scottish Government, 2003), especially associated with the slaughter of livestock and sense of isolation resulting from movement restrictions.) Despite these losses, all but one farmer in the Cumbria sample intended to continue farming and restock, signalling short-term resilience. However, many also recognised the need to rebalance, declaring intentions to carry fewer stock and more enrolment in agri-environment schemes, more diversified enterprises and more work off-farm (though the last was less popular than on-farm diversification despite being less affected by FMD).

Whether these intentions were reflected in actions was beyond the scope of the research. The authors noted that an increasing proportion of farm households would benefit from any switch in agricultural subsidies to support rural development and the provision of public-good benefits and the countryside—upon which so much of Cumbria's service sector depended. Though the income impact of FMD was probably recognised as a hiatus

rather than a permanent shift (unlike Brexit), the dominance of carrying on as before is clear, though where a need to adjust was recognised it was in the general direction that economic theory would indicate.

Lobley *et al.* (2002, 2005) looked at changes associated with reforms to the CAP and, in particular, the introduction of the Single Payment System in six locations in England, spread across upland and lowland farming and arable, and in remote and less remote regions. The 2002 report introduced the concept of a restructuring spectrum in order to capture the variety of ways in which farmers were deploying and re-deploying the assets at their disposal, encompassing a number of categories of restructuring response, ranging from those making little or no change (minor change and static businesses) through to those diversifying their income base (agricultural integrators, on-farm diversifiers, off-farm diversifiers) and those surviving by consuming capital assets (capital consumers). For the 2005 report, farms visited as part of 2002 report were revisited. The main impression from the 2005 survey was one of consolidation of existing trends rather than the development of any significant new trends or the shake-out of farmers or land. That said, there was a continuing, marginal decline in the number of dairy farms (falling from 21% to 17% of the same sample of farms between 2001/02 and 2005) and an increase in the proportion of very small lifestyle farms (rising from 17% to 20%). At an aggregate level, the trend of labour shedding had continued and there had been some substitution of salaried non-family labour for family labour.

The position of the 2005 sample of farmers on the restructuring spectrum was analysed to give an illustration of the types of restructuring undertaken in the recent past (previous five years) and intentions for the near future (next five years). The dominant type of restructuring in the recent past continued to be farm focused, traditional restructuring (cost cutting, expansion, switches between agricultural enterprises), accounting for 37% of all recorded instances of restructuring (compared to 46% of the 2002 sample). A significant minority of farmers (25%) were re-orientating their business through up/down stream integration with the wider agricultural sector or through on- or off-farm diversification. Overall, there was little sense of significant movement between categories of restructuring, with 50% of the 2005 sample following the same trajectory as in 2001/02. Where there had been movement between categories it was largely between traditional restructuring and the minor change or static categories. ***Thus, the picture was one of relative stability at the individual farm level, and avoidance of radical change in the trajectory of the farm business.*** This seems a reasonable assumption in terms of response to (then) future pressure for change, though Lobley *et al.* (2005) felt it likely that there would be a small increase in the numbers of on- and off-farm diversifiers and a proportionally similar increase in the number of 'static' businesses attempting to absorb market trends or policy changes by 'standing still', typically by reducing household consumption and accepting a declining standard of living.

Where disengagement from mainstream agriculture was taking place, this proceeded along a number of pathways and, at the time of the research, seemed rarely to lead to complete farm businesses being given up. Alongside a continuing, if unspectacular, move to diversify the income streams coming into the farm household, ***the increasing incidence of retirement and lifestyle holdings meant that a growing proportion of agricultural land was no longer being farmed by those who actually occupied it.*** The rise of contract farming and other land rental and letting arrangements, was partly explained by reluctance on the part of many disengaging and retiring farmers to actually give up their farms, even in the face of declining returns and policy uncertainty. Lobley *et al.* comment that the effect of the then uncertainty surrounding the SPS and market conditions more generally had been to ***delay widespread change rather than hasten its implementation.*** So far as farmers themselves were concerned, few appeared to be planning to leave the industry in the next five years, with 60% reporting that they still expected to be managing their current farms in five years' time (this proportion rose to 76% if those planning to retire in favour of a successor were included). Only 6% currently planned to sell their farm, while a further 6%

planned to retire or semi-retire and let their land. There were hints that this strategy sometimes carried high personal costs.

More recently Lobley and Butler (2010) analysed the response to CAP reform amongst farmers in the South West and suggested that there may be a relationship between strategic plans for the future and farm size. They identified a number of distinct groupings of farmers (expanders, withdrawers, managerialists, consolidators and disillusionists). The largest group – consolidators – were characterised by a high dependency on agricultural income, small farm size and a low incidence of diversification. The consolidators were less active than the expanders and managerialists and appeared to be attempting to absorb the impacts of CAP reform without making significant changes to their farming practices. Many of the farmers in this group were older and comparatively least satisfied with their lives. Lobley and Butler (2010) suggested that this is where much of the movement of land occupancy would occur in the longer-term. Winter and Lobley (2016), with a focus on the ability of the small farm to survive, commented that, broadly speaking, farmers faced with declining economic fortunes can either focus on a farming solution, combined with tightening their belts, or redeploy resources away from agricultural production, which may involve leaving farming altogether by selling or letting their land. In reality, farmers may vacillate between periods of off-farm work (generating income) interspersed with a focus on the farm.

The notion of a typology of farmers making different responses was also used by Shucksmith and Herrmann (2002), who also pointed to the need, when explaining farmer behaviour, to move beyond the simple business model and embrace all the other factors that influence farm households. Farmers' and farm households' actions may be viewed as the outcome of interplay between the individual's own "disposition-to-act" (the product of socialisation and interaction), the farm household's material resources (size of farm, capital, labour skills, cultural capital, position in the life cycle, tenure) and external structures (relative prices, policy, labour market opportunities, social and cultural norms, etc.).

Building on the Europe-wide programme on "Rural Change in Europe: Farm Households and Pluriactivity", coordinated by the Arkleton Trust (see Bryden *et al.* 1993), a typology of response patterns was identified by Shucksmith and Herrmann that specifically related to a sample in the Cairngorms, a mountainous LFA region. The types revealed by clustering techniques were 'hobby farmers' (8%), 'pluriactive successors' (15%), 'struggling monoactives' (31%), 'contented monoactives' (26%), 'potential diversifiers' (17%) and 'agribusinessmen' (5%). Each had behaved differently in the past and, moreover, might be expected to diverge increasingly in their future behaviour. For example, the struggling monoactives did not wish their children to succeed them and most would give up the 'struggle' of farming themselves if their returns fell far enough. In contrast, contented monoactives indicated that they would seek to expand their farm businesses in order to survive, while potential diversifiers would explore new options instead. If these expectations are realistic, then it is possible to discuss how structural change might proceed if agricultural support is reduced and returns from farming fall. But in the context of Brexit, it is clear that a diversity of responses is likely among the farming community.

The heterogeneity of strategic responses to the need for change among UK farmers seems to be part of an EU pattern, and probably a universal one in OECD countries. Weltin *et al.* (2017) used a survey of 2,154 farms from eleven European regions to identify responses to two scenarios; a continuation ('baseline') and the removal of any market intervention ('No CAP'). The focus was on the willingness to diversify. A factor and cluster analysis found six farm types, a typology that proved valid across all case studies, though single types occurred more frequently under specific site conditions. The six farm types showed strong variations in the stated future diversification behaviour. Young farm households with organic production were most likely to diversify activities, particularly on-farm, whereas intensive livestock farms, those already diversified, and part-time farm households were least likely to apply this strategy. Results further showed that, under hypothetical conditions of

termination of CAP support, an increasing share of farmers – across all types – would apply income diversification, mainly off-farm, as a survival strategy.

In summary, the behavioural responses to past economic crises, which may hold the key to those that may flow from income pressures associated with Brexit and the withdrawal of direct payments under a national agricultural policy, show great diversity and need to include factors that go beyond the simple business model of the profit maximising firm. Farmers' and farm households' actions may be viewed as the outcome of interplay between the individual's own "disposition-to-act" (the product of socialisation and interaction), the farm household's material resources (size of farm, capital, labour skills, cultural capital, position in the life cycle, tenure) and external structures (relative prices, policy, labour market opportunities, social and cultural norms, etc.). As such, on the ground a wide variety of responses may be encountered, including some (such as expanding output) that may be counterintuitive. Non-response may be the behaviour of some, though this seems to be smaller once the changes in circumstance appear more permanent. Various typologies have been generated that reflect different behaviours. There is also a gap between the intended response and the actual response. The implication for the current project is that the questions put to VS&S farm occupiers should cater for the wide varieties of response seen in previous studies and the extensive range of factors that have been observed as influencing behaviour.

8.2 Innovative behaviour as a response

Innovation can be seen as a specific form of behavioural response. Rose *et al.* (2018) identify innovation as the second most frequently cited type of change in studies of response, with farmers reacting in different ways in the diffusion process. A case can be made that income pressures can increase the spur to innovation, but also that lower incomes restrict the ability of farmers to fund investments that are often necessary or to be able to accommodate the risks that innovation brings.

A thorough review of the extant literature reviews was carried out by Gasson as part of a study commissioned by MAFF on determining factors in on-farm innovation in UK agriculture (Gasson and Hill, 1996). The background was concern within MAFF that the scientific information that was being generated by public spending on the research community was not being reflected in developments at farm level, and that this was a particular problem in certain sectors. Following the literature review, case studies were examined on the process of innovation in various policy areas important to MAFF. These were the beef and sheep sector (where poor innovation seemed endemic), arable crops, horticulture (where there was particularly good exchange of knowledge between scientists and prominent farmers and growers), environmental protection and animal welfare. Since Gasson's work there have been other reviews of the literature as part of research projects (e.g. CCRI/Macaulay, 2007; Wilson *et al.*, 2013), but the prime features are robust and enduring.

In brief, several key observations may be made:

- The process of innovation at the farm level (which is two-way exchange of knowledge) has a number of recognised stages, the names of which may differ between studies. These correspond with (a) awareness of problems and of the existence of possible solutions; (b) mental acceptance of these innovations; and, (c) actual adoption (implementation). These stages spread through the farming industry in sequence over time and follow a pattern that is approximately sigmoid, though the delay between the stages, the precise shape of the curves and how long they extend over time reflect a number of factors, mentioned below.
- For adoption to take place there must be a perceived benefit (such as increased income, more stable income, reduced managerial load, better working conditions, etc.) and the "bottom line" will be influential in shaping uptake. It may be that awareness of some innovations is never turned into adoption, at least for some farmers, or economic circumstances may need to change before this happens (such as a rise in labour costs triggering innovations that substitute capital for labour). Non-adoption is not necessarily

indicative of failure to make farmers aware of innovations or of misjudgements of the opportunities that they offer. Vanclay and Lawrence (1994) conclude that most “barriers” have a rational basis and can be categorised as: conflicting information; risk; implementation costs and capital outlay; intellectual outlay; loss of flexibility; complexity; and, incompatibility with other aspects of farm management and farm and personal objectives. It follows that such factors have to be taken on board by advisory services (such as clarity of message, where this is appropriate, and assisting farmers to balance conflicting objectives when devising development plans).

- The rate of adoption (though not necessarily of awareness) will reflect the characteristics of the innovation, in particular the demands on capital and management skills and their risk characteristics.
- Farm operators differ widely in their rates of awareness, mental acceptance and adoption of innovations. This reflects (a) the circumstances of the farm business, which in turn depends on characteristics including farming system, level of indebtedness, level of profitability, farm size (larger ones typically being able to absorb more easily the additional risks of innovation); and, (b) the personal characteristics of the farm decision-makers, including psychological factors such as attitude to risk, willingness to network, personal aims and objectives and values, stage of family cycle, age, degree of formal education and so on. Knickel *et al.* (2009) draw attention to the need for advisory services to be aware of such personal factors; furthermore, the advisory institutions can become barriers to innovation if they fail to recognise that the needs of farmers and of society change over time.
- Consequently, at any one time farmers will display a distribution of innovation behaviour that approximates to a normal distribution, with innovators and early adopters at one extremity, and laggards at the other, separated by the majority who can also be divided into earlier and later adopters, i.e. early majority and late majority (laggards can be defined as those falling behind the mean adoption time by 1 Standard Deviation in the distribution, early adopters anticipating it by 1 SD, and innovators anticipating it by 2 SD). There is usually a degree of consistency in innovative behaviour across a range of innovations (it is unlikely that an individual operator will be an innovator for some and a laggard for others), so that farmers may be stratified (segmented) according to their general response to innovations.
- It has been long recognised by studies that different persistent behaviour patterns at the farm operator level are associated with particular sets of socio-economic characteristics. For example, Jones (1972) drew on several British studies to associate the spectrum from innovators to laggards with three variables: personal characteristics; salient values; and, personal relationships and communication behaviour. To take only the extremes, innovators’ typical personal characteristics were: high social status; largest and most specialist operation; wealthy; often young; well educated; and, often experienced in non-farming environments. In terms of their values and relationships, innovators were typically: venturesome and willing to accept risk. In contrast, laggards had lowest social status; smallest operations; lowest income; and were often oldest. Their values were “traditional”; orientated towards the past; avoid risks; little if any opinion leadership; and almost isolated socially.
- Of particular relevance to any study of responsiveness to policy signals was the finding on communications behaviour. It is worth presenting Jones’ full spectrum on this characteristic:
 - > **Innovators** – Closest contact with scientific information sources; interaction with other innovators; relatively greatest use of impersonal information.
 - > **Early adopters** – Greatest contact with local change agents (including extension or advisory services, commercial technical advisors, etc.); competent users of mass media.

- > **Early majority** – Considerable contact with change agents and early adopters; receive mass media.
 - > **Late majority** – Interaction with peers who are mainly early or late majority; less use of mass media.
 - > **Laggards** – Neighbours, friends and relatives with similar values are main information source; suspicious of change agents.
- Though the studies that formed the basis of Jones’ work were carried out long before the internet was developed, his analysis underlines the importance of the general principle of choosing the appropriate channel of communication. For example, if the target group comprises farmers who might be characterised as “laggards”, impersonal methods of communication are unlikely to impact on them; personal communication using trusted sources (typically neighbours, friends and relatives) are more likely to be successful.
 - Within the agricultural industry there are several “agri-cultures” which are likely to overlap the typology described above. Each will have its own concept of “good farming”, and attempts to influence behaviour will need to target not only the individuals but their culture too (Hallam *et al.*, 2012). Segmentation models (such as that of Garforth and Rehman (2006) developed for Defra (Wilson *et al.*, 2013) and the segmentation explored by the Welsh Government (Lee-Woolf, 2014) can be helpful in focusing on which agri-cultures are of interest to policy-makers and on whom communications are to be concentrated. Segmentation models are considered in more detail in a later section of this literature review.
 - While not disputing the importance of farmer-to-farmer communications, especially for certain target groups, Gasson’s 1996 review of innovation literature warns against reliance on the “trickle down” effect, whereby progressive farmers are assumed to act as exemplars to others. “The “trickle-down” effect assumes a homogeneous population, whereas farming populations are likely to be heterogeneous in respect to access to resources, group norms, stage of life cycle, etc. It assumes that the message is transmitted more or less intact, whereas in practice it is likely to be distorted in its passage. The adoption process also assumes that the innovation is equally applicable to all farming situations and will benefit potential adopters, overlooking the need to adapt innovations to individual circumstances.

From the pattern of awareness and adoption described above, it follows that, at any one time, some farmers will be well behind the leaders in terms of the adoption of innovation. An OECD study has drawn attention to this gap as a cause of the disparities of economic performance that characterises farming in many countries: “It implies that promoting the adoption of existing best practice and improving the resource allocation can lead to a significant improvement in the sector performance...” (Kimura and Le Thi, 2013).

To summarise, innovation can be seen as one possible response to the spur of income pressure, though lower incomes will also squeeze the resources required to undertake the investment often associated with innovation. Analysis of the process of awareness of innovation opportunities and stages leading to adoption is well-established. Individual farmers appear to display broadly consistent behaviour over time (for example, as an innovator or laggard). The implication for the present study is that questions to VS&S farms should include how they view innovation as a response strategy.

8.3 Response to policy schemes

Multiple studies exist that examine the response of farmers to schemes designed to steer their behaviour in directions favoured by policymakers, particularly those of an environmental nature. Others have looked at the responses to reforms of policy, in particular to changes in the CAP.

In connection with environmental schemes, Dwyer *et al.*, (2007) focus on three elements in the change process and the factors affecting each:

- how policy interventions are communicated to farmers
- the willingness of farmers to change
- the capacity of farmers to change

The emphasis is on improving the ability of policy interventions to influence outcomes. Clearly an improved understanding of farmer behaviour will enable each of these three components to work more effectively. Some interesting pieces of information relating to farm size emerge under all three headings. For example, an unwillingness to engage with change agents such as advisory services may be most often associated with small farms in isolated areas, but this can also be found among larger ones that seem to be more self-sufficient businesses. Similarly, operators of larger dairy farms may have little time available for social networking; this is a major source of information among smaller farms but is clearly bounded by resource constraints.

In the context of influencing behaviour with respect to water quality, Blackstock *et al.*, (2010) consider how both traditional and neglected areas of literature (including that from rural social scientists) can help the understanding of collective and individual voluntary behaviour.

Mills *et al.* (2016) establish that the United Kingdom's approach to encouraging environmentally positive behaviour has been three-pronged, through voluntarism, incentives and regulation, and that the balance between the approaches has fluctuated over time. Whilst financial incentives and regulatory approaches have been effective in achieving some environmental management behavioural change amongst farmers, ultimately these can be viewed as transient drivers without long-term sustainability.

Increasingly, there is interest in 'nudging' managers towards voluntary environmentally friendly actions. This approach requires a good understanding of farmers' willingness and ability to take up environmental activities and the influences on farmer behavioural change. Data came from 60 qualitative farmer interviews undertaken for a research project into farmers' willingness and ability to undertake environmental management, particularly focusing on social psychological insights. It also explored farmers' level of engagement with advice and support networks that foster a genuine interest, responsibility and a sense of personal and social norm to sustain high quality environmental outcomes. Two conceptual frameworks were presented for exploring the complex set of inter-relationships that can influence farmers' willingness to undertake environmental management practices. The research findings show how an in-depth understanding of farmer's willingness and ability to adopt environmental management practices and their existing level of engagement with advice and support are necessary to develop appropriate engagement approaches to achieve sustained and durable environmental management.

Further afield, though described as being relevant to post-Brexit policy in the UK, Knook *et al.* (2020) have studied the voluntary uptake of water quality practices. Working in countries that are relatively lightly regulated on environmental issues (Australia and New Zealand) and where actions aimed at environmental improvement are dependent primarily on voluntary actions by farmers, meeting and field days were used to identify the factors that influence farmer decision-making. They developed a typology for categorising farmers according to the factors that influenced their decision-making. They found that certainty around policy and of the effectiveness of practices was essential.

Studies carried out to assess the response to policy changes which have involved segmentation exercises (for example Rehman *et al.* (2008) and Defra / Pike (2008)) are dealt with in the following section.

To summarise, in considering behavioural responses to policy schemes, there appear to be three main elements in the change process, each with its own set of factors affecting them (i) how policy interventions are communicated to farmers; (ii) the willingness of farmers to change; and, (iii) the capacity (or ability) of farmers to change. These elements are shared with how farmers become aware of innovations mentally accept them as desirable, and finally adopt them (dealt with above). The implication for this research project is that innovation and planned behavioural responses to policy initiatives can probably be dealt with using one set of questions.

9 Segmentation and typologies of farmer behaviour, especially in the UK, and any information on their use in anticipating behavioural responses

Only a small intellectual step need be taken between classifying motives and goals to a typology of farmer behaviour that can be useful in explaining observed responses to stimuli and assessing likely reactions to novel ones in the form of policy initiatives and schemes.

According to Hallam *et al.* (2012) the importance of a segmentation framework is in using a deeper understanding of who farmers are, what they do, what they think and feel, and how they respond to policies in order to help policy makers to articulate messages and design long-lasting solutions. Segmentation can help with:

- promoting awareness and understanding;
- tailoring (and not a “one size fits all” approach); and,
- recognising why people behave differently (Wilson *et al.*, 2011).

There is evidence (Barnes *et al.*, 2016) of a strong link at farm level between past responses to policy reform and intentions with regard to future ones (though, as noted above, intentions may not be borne out in reality). This suggests that a segmentation typology based on past behaviour would be a useful tool in assessing how farmers could be expected to react to a similar shift in conditions associated with Brexit. Working with a survey of 1,764 livestock-based holdings in Scotland, it was found that the majority of farmers sought no changes in their business up to 2020, though intentions were more sensitive to reductions in payments than to possible increases. Under a payment decrease scenario, intentions were in line with economic expectations; the number of farmers stating they would exit the industry more than doubled from 4% to 9% and around half the respondents stated they would decrease both herd size and intensity if payments were to decrease. Response to past reform was found to be a significant predictor of intention to change. So too was the identification of a successor within the farm household. The authors concluded that future studies of farmer intentions should include some of these variables (such as past responses, presence of a successor) to explain change. This temporal consistency is in line with that found in farmers’ innovation behaviour cited previously.

Two approaches to constructing a typology are encountered. The first method is based on expert judgement which would reflect policy requirements; the second is to derive categories from statistical analysis of past behaviour or responses to questioning (Sutherland *et al.*, 2019). The latter approach now dominates in agricultural policy analysis.

9.1 The USDA farm typology

The best-known example of the former is the original typology of farms made by the USDA. According to staff at the ERS, the USDA’s original farm types were selected not by statistical analysis, but according to what was considered by experts as likely to be the most policy-relevant (Offutt, personal communication). Later statistical techniques were used to confirm and refine categories. The farm typology focuses on the “family farm,” or any farm where the majority of the business is owned by the operator and individuals related to the operator, including relatives who do not live in the operator’s household (Hoppe and MacDonald, 2013). The USDA defines a farm as any place that produced and sold—or normally would have produced and sold—at least \$1,000 of agricultural products during a given year. Today the typology breaks down family farms (those where the majority of the business is owned by the operator or individuals related to the operator, with family trusts, etc. taken into this

category) by economic size, measured in Gross Cash Farm Income (GCFI) (formerly by value of output), small ones being below \$350,000 GCFI. These are further broken down into:

- **retirement farms** (where the operator declares his main occupation in terms of time is retired);
- **off-farm occupation farms**, where the majority of occupier's time is spent on the off-farm activity. These were formerly termed residential/lifestyle farms;
- **farming-occupation farms**: low-sales (less than \$150,000 GCFI); and,
- **moderate-sales farms**: \$150,000-\$349,999 GCFI.

Beyond the small farms there are:

mid-size family farms, with \$350,000-\$999,999 GCFI; and,

large-scale family farms, with \$1,000,000 or more GCFI.

Before progressing further into typologies, a word of caution is needed. According to a research project on farmer behaviour undertaken by the Welsh Rural Observatory (WRO, 2011), it was evident that divisive categories such as agricultural producer, agri-business person, diversifier, and lifestyle / hobbyist, did not accurately reflect the inter-relations in respondents' priorities. This complexity had been addressed in previous analyses by Burton and Wilson (2006) who argued that instead of fixed 'typologies' it is more effective to consider multiple identities stacked in different orders at different times. Specifically, they stated that farmers can be seen as a blend of agricultural producer / agri-business person / conservationist / diversifier; and that these identities are maintained simultaneously, with the most suitable identity appropriated when the right situation arises. This is akin to the mix of orientations observed by Gasson (1973) in the values of individual farmers.

9.2 Shucksmith and Herriman (2002) – Grampians, Scotland

With that in mind, the literature has multiple examples of typologies based on the analysis of responses to survey questions. For example, Shucksmith and Herriman (2002) use data collected from a sample of 300 farms in the Grampians area of Scotland over a widely spaced period to establish a typology for use in projecting divergent farm behaviour.

- **The Hobby Farmers** – 15 cases (8%). Hobby farmers tended to have small farms with an average of less than 4 ESUs. Most acquired their farms through purchase, and therefore may be considered “incomers”. About 40% still had debts. Their agricultural income was very low, amounting to only 4% of total income. About 60% had an off-farm job, while some others were already retired and receiving social transfers. Hardly any had a farming background or agricultural training, but almost all had non-agricultural training of a high level. Most defined themselves by their off-farm profession with few regarding themselves as farmers. Even for those without an off-farm job, farming was often unimportant in their identity because they only took up farming late in their careers. They enjoyed farming as an escape from their off-farm activities or for its own sake, being close to nature and adopting a rural lifestyle. For them, policy was irrelevant, both because farming was only a hobby and because they were ineligible for support. If returns from farming fell, more than 80% said they would carry on regardless. They farmed for intrinsic reasons and for pleasure. Surprisingly, half the hobby farmers considered family succession important, usually in the hope of their children gaining similar fulfilment from farming.
- **The Pluriactive Successors** – 29 cases (15%). This group also had small farms with an average of 5.3 ESUs. Most had inherited their farms. Their percentage of agricultural income was higher (18%)

although their farms were only slightly bigger. Many more of them, 97%, had an off-farm job. The principal feature that distinguished this group from the first was that the great majority, 96%, had a farming background. Furthermore, both their agricultural and their non-agricultural training were very low; panel interviews suggested an antipathy towards education among this group. Despite their greater pluriactivity, their identity as farmers was much stronger, with only 34% not considering themselves farmers. It seems these farmers inherited both their farm, their farming identity, and the necessity to be pluriactive to earn a living. The interviews revealed that such farmers tended to combine farming with off-farm activities, partly because they felt obliged to follow the family's tradition in farming, but also because of the lack of alternative local labour market opportunities. In other words, this group lacked choice: they could not make a living from farming, but farming was in their blood. Their commitment may not survive the present generation, however, since only 40% wished their children to succeed them. Many had cut their farm business size over the study period and, if farm incomes were to fall, some 43% expected to stop farming, and 41% said they would continue farming exactly as before. The only way in which policy would impinge on such farm households would be through alterations to the level or basis of LFA payments, as occurred shortly after the fieldwork ended.

The other clusters were, on average, associated with farms larger than the VS&S group, so are treated lightly here.

- ***Struggling monoactives*** – 60 cases (31%). The largest cluster, containing nearly a third of all farmers. These had medium-sized farms of about 21 ESUs. Agricultural income was only a moderate proportion (60%) of their total income, but very few had an off-farm job or non-agricultural enterprise. The remaining income tended to come from social transfers (pensions) or from another family member's employment. Most (95%) had a farming background, and very few had purchased their farm, but only a small minority had received any agricultural training, and even fewer any non-agricultural training. Given this, their farming identity was surprisingly low: fewer than half would become a farmer again, and most of this modal group (63%) did not want their children to succeed them. Their use of policies for modernisation was low. Generally, they were adamant that they would not alter their farming practices, *let alone* diversify into new activities, whatever happened. Farming appeared to be more a struggle than a pleasure.
- ***Contented monoactives*** – 51 cases (26%). These farmers operated large farms with an average of 38 ESUs, and were almost twice as prosperous as the group of struggling mono-actives. Few had acquired their holdings by purchase. With almost 90% of their income deriving from agriculture, hardly any had an off-farm job. Most had a farming background, and had received a high level of agricultural training but no non-agricultural training. Consequently, their farming identity was the highest of any group; 86% would become a farmer again, and only 7% had thought of giving up farming. Doing anything else was unthinkable, and because of their contentment they wished their children to follow them. More than 75% considered family succession important. They made notable use of aids for modernisation, especially in the years immediately following farm acquisition. Their decisions and investments were very conformist, as their uptake of predominantly productivist measures showed. As they were generally averse to experimentation (only 6% favoured this), it is likely that they will resist new policies which seek to steer them into courses unfamiliar to, or at odds with, their basic values. However, their management techniques were modern, and their farm size had been increased in line with their strong belief that they must “expand or get out”.
- ***Potential Diversifiers*** (seeking alternatives) – 33 cases (17%). In some respects, this group resembled the previous one, but acquisition by purchase was much more common. Agricultural income was less important to their total, fewer (77%) had a farming background and many more (36%) had non-agricultural qualifications, thus being better prepared to develop alternative options and with a greater

potential for occupational mobility. These farmers invested more in both agricultural and non-agricultural items, and made more use of policy schemes. Crucially, 37% said they would take up or increase other gainful activities if returns from farming were to fall. Such a strategy might be interpreted by others as disengagement, but for these farmers, it would be a positive move to capture new opportunities. These farmers tended to see their farms essentially as a collection of resources that could be deployed and redeployed in search of maximum profit. It was this willingness to take risks and their confidence to do so which crucially marked them out from other groups.

- **The Agribusinessmen** – 9 cases (5%). Finally, there was a small group of 9 farmers with very large farms. While they had no off-farm jobs, only two-thirds of their household income came from agriculture. All but one had a farming background and no non-agricultural training, but their level of agricultural education was by far the highest (71%). They had very modern management systems, and invested heavily, both agriculturally and non-agriculturally. They made full use of all kinds of policy schemes. Resources were to be mobilised and redeployed in pursuit of further accumulation, whenever an opportunity arose, either in a conventional or a novel sphere. If farm incomes fell, the majority (60%) said they would increase other gainful activities. Their comparatively low proportion of agricultural income reflected their entrepreneurial approach.

9.3 Rehman *et al.* (2008) England

Rehman *et al.* (2008) in the context of assessing farmers' response to CAP reform asked farmers to score a set of 19 questions on what they were trying to achieve as a farmer, covering issues that related to the farm business, lifestyle, family and personal career. A nine-point scale was used from “not at all important” to “most important” for the potential achievements below:

1. Produce the best quality output on my farm
2. Be the best farmer I can be
3. Contribute to the farm in order to achieve something
4. Reduce workload and improve quality of life
5. Diversify my business by investing both on-farm and off-farm
6. Concentrate on farm work and not be side-tracked by outside activities
7. Be sensitive to the environmental impacts of farming by reducing input use on my farm
8. Do everything to be environmentally aware
9. Have my family work with me
10. Buy more land
11. Rent/contract more land
12. Avoid borrowing money
13. Reduce debts

14. Make more time to spend on activities away from the farm
15. Increase my 'net worth'
16. Keep my ordinary business borrowing and mortgages below 50% of my farm 'net worth'
17. Invest part of my profits for retirement
18. Save for children's education
19. Make farm investments that will pay for themselves quickly

The research came up with the following five types:

- The **family orientation** type: these scored highly on environmental aspects and such farmers tended to be very sensitive to environmental issues. Considerations such as “stewardship”, “working alongside family” and “passing on viable business to the next generation” received priority over other factors and this group tended to be content with the institutional and communal outlook on farming and they did not feel neglected.
- The **business orientation/entrepreneur** behavioural type recorded high scores in several of the factors that determined their success in business. This group viewed farming as a business and approached it professionally, scoring highly on “quality of achievement”, “expansion”, “investment”, “debt avoidance” and “staff management”. The members of this group however felt that they had been marginalised despite doing a worthwhile job in the community, leading to dissatisfaction with the present state of affairs.
- The group labelled **enthusiast/hobbyists** suggests that to such farmers farming is a hobby activity, with the main occupation being something different. This group had high scores on “diversification” combined with low scores on “profit” and the financial aspects. The simultaneously high scores on “quality of life” and “leisure” indicate that farmers were more concerned about reducing workload and spending more quality time with family and friends away from the farm. Such farmers farmed because of the intrinsic values attached to farming as reflected in the “job satisfaction” factor. Not being full-time farmers, they did not record a high score on “independence”.
- Fourthly, the **lifestyler** behavioural orientation scored highly on “family standard of life”, suggesting that the objective for being in farming was to increase family income to maintain and/or increase “family’s standard of living”. At the same time there are high scores for “quality of life” and “leisure”, indicating that such farmers balanced high income with reduced workload and quality time with family and friends. This group scored highly also on future “security / investment” and “staff management”. A low level of job satisfaction was expressed and there was an awareness of and a concern for the uncertainty associated with farming. A high score for “marginalisation” might suggest that this group felt let down by the government and society at large.
- Fifth and last, the **independent/small farmer** group also recorded high scores on “family standard of living”, but unlike the lifestyler group, low scores for “quality of life” and “leisure” contrasted with the high scores for “job satisfaction” and “independence”, indicating the emotive value of farming and the intrinsic nature of these influences. This group was rather indifferent to “profit” and “financial” aspects, reinforcing the impression that their reasons for farming were more intrinsic rather than instrumental. Interestingly though, this group did not feel marginalised.

9.4 Defra/Pike (2008) - England

Defra's approach to segmentation (Defra/Pike, 2008) involved two surveys and analysis exercises. The first used a postal survey (n=683) carried out by ADAS within its 'Farmers' Voice' survey and in relation to attitudes and intentions towards the Single Farm Payment. Factors were extracted from 25 objectives and 28 value statements and analysed using clustering and Principal Component Analysis. Five farmer types emerged, each with certain characteristics, which can affect the response to the SFP.

- Family orientation
- Business / entrepreneur
- Enthusiast / hobbyist
- Lifestyler
- Independent / small

Pike (2008) also notes that social capital exerts an influence on farmer behaviour.

A second piece of work that built on the first, undertaken by Continental Research, was less linked to the particular policy change and more aimed at segmentation. It used a telephone survey of 750 farmers (from the Defra database of registered holdings) with a selection of 17 objective and value questions which earlier research had identified as significant predictors and most influential in assigning respondents to segments. A five-group farmer segmentation model was built up with the following chief characteristics:

- **Custodians** (23% of the sample). Farming is their preferred lifestyle, and gives them a good quality of life. The farm allows them to spend time with their families. They would be happy if their children wanted to inherit the farm. Most profit is reinvested in the farm. They are proud to be farmers, supporting the tradition and protecting the countryside.
- **Lifestyle choice** (6%). Farming is not their main source of income; often it is a hobby. Entrance into farming happened through marriage or a conscious personal decision, sometimes late in life. They prefer traditional farming practices; see farming as a source of joy, and of a balanced lifestyle. They do not place much emphasis on succession, expansion or investment in the farm.
- **Pragmatists** (22%). They were well balanced between enjoyment from farming, money making and satisfaction from life. The majority were born into farming and run the farm in partnership with family members. However, issues of succession are not that important to them. They value the experience of previous generations, but are open to new farming techniques, and are in harmony with the environment. They do not care about making huge profits, but want to stay in business and are willing to diversify/adjust their practices rather than quit farming.
- **Modern family businesses** (41%). The majority were born into farming and hope their children will continue the family tradition. They enjoy the fact that farming gives them independence and get satisfaction from passing their farming knowledge on to their children. They prefer practical work to administration, but are comfortable with paper work. They search for opportunities to expand and increase profit.
- **Challenged enterprises** (7%). They are likely to struggle the most financially, with hard work and long hours taking their toll on life satisfaction. They are in farming because of obligation, rather than personal

choice. They feel isolated from the farming community, lack support and social life. High costs, resource constraints and low profits make them pessimistic about the future of the business.

The authors point out that the boundaries between the groups were fuzzy rather than sharp. They conclude that the results carry implication for policy interventions because of the diversity in terms of attitudes, motivations and likely behaviours, and for the method of communications with the different groups. (In Wales Farming Connect is well versed with the need to match communications techniques to the different types of farmer it wishes to address.)

Important in the present context, the segments were similar when profiled by farm size, (English) region and farming type. However, it is not clear whether the sample extended into the Very Small size group.

Wilson *et al.* (2014) used a similar approach with 750 FBS co-operators in England. The same categories were employed, though the distribution was quite different from that of the Defra work, as shown below (Defra results in brackets).

- Custodians: 14.0% (23%)
- Lifestyle choice: 7.2% (6%)
- Pragmatists: 53.3% (22%)
- Modern family business: 21.1% (41%)
- Challenged enterprises: 4.4% (7%)

A notable difference between the two sets of results is the relatively greater importance of the pragmatists in the Wilson *et al.* (2014) analysis (based on a sample from the FBS rather than the general population) and the small number in the group of modern family businesses. The share of the custodians group is also lower in the FBS sample. It is possible that there is selection bias by behaviour type in the FBS sample as this is not something controlled in sample selection. If so, there might be implications for correctly understanding the overall performance of the farming sector if different behavioural types respond very differently to future policy support.

According to the authors, the analysis of the physical, financial and managerial attributes associated with each segmentation group concurred with a priori expectations, offering potential advantages to policy makers in targeting policy design and delivery messages to accord with the objectives of particular segments. However, the researchers articulated reservations. Whilst a proportion of co-operators clearly identified with a particular segmentation group, other co-operators found the process of self-identity segmentation to be both challenging and lacking perceived practical relevance. Given the challenges encountered, the researcher warned policy makers seeking to use the segmentation approach to enhance the design and implementation of policies that they must be aware of the need for caution when attempting to “segment” the farming and horticultural population.

9.5 Sutherland *et al.*, 2019, non-commercial farms in Scotland

A particularly interesting segmentation approach was applied in Scotland, with the focus on farms that were, by their own declaration, non-commercial farms (NCFs) (Sutherland *et al.*, 2019). These will tend to be VS&S farms, so the research is of relevance to this present study, especially in what emerges about values and goals and response patterns. However, an element of non-commercial approach to farming can be found across the farm size spectrum, including some very large estates, and these may be unique to Scotland, together with the crofts found in certain counties there. While the analysis does not directly focus on behaviour, motives and goals, the resulting typology can be highly suggestive of what drives that behaviour. The authors were particularly

interested in the diversity found among NCFs, and saw the utility of the typology as being of two forms: ‘predictive utility’, which is the extent to which the characteristics of landholder types are consistent with previous research and associated theories; and, ‘critical utility’, which is the usefulness of a typology for allowing program designers to influence the behaviour of the cohort (for example owing to differing motivations and capabilities (see Emtage *et al.*, 2007)).

A telephone survey was conducted using a sample of 10,000 holdings selected from the Scottish agricultural census; this source was used with the purpose of covering farms that did not receive agricultural subsidies or farm business payments, many of which were likely to be NCFs. The survey yielded 2,416 responses, of which 16.6% self-identified as NCFs. The questionnaire was composed of three main sections: demographic, socio-economic and attitudinal characteristics of the farmer; farm changes since 2005, and influences on these; and intentions for the farm up to 2020. In addition to the expected age, education, status as an owner or manager, the demographic questions asked for self-identification (as full-time farmer, part-time farmer, hobby farmer, businessman, or manager) and whether the farm had been inherited or not. The questionnaire addressed a range of attitudinal statements and identity categories, profit orientation, perceived economic prospects and farming and land-based activities (e.g. commodity production, farm diversification by type of activity, access to information). The data set contained both categorical (e.g. diversified or not) and quantitative variables (scale, crops, horses, sheep or cattle, pigs or poultry or livestock). A two-step methodology was applied that comprised a Multiple Correspondence Analysis (MCA) followed by a Hierarchical Ascendant Clustering (HAC).

A total of 2,380 respondents were retained for the analysis. Amongst them, non-commercial farmers (NCF) were those farmers who had an agriculture or natural resource-related business or holding but operate it on a non-profit basis. In total, 395 NCF were identified in the data set (i.e. 16.6% of the sample that was surveyed). Together, NCF owned or managed 82,359 ha of the land of the surveyed sample, some 13% of the total area surveyed. By definition, NCF do not expect to sustain their livelihoods from operating their farming business or holding since they either expect to break even or to make loss when running it. Nevertheless, 18% of the NCF considered themselves to be full-time farmers. Of these, the majority (79%) expected to break even and 11% to make losses. Around 38% of NCF considered themselves to be hobby farmers and 30% considered themselves to be part-time farmers. This indicates that there were self-identified hobby farmers who sought to make a profit from their farms, but also, more commonly, that there were farmers who did not self-identify as hobby farmers but nevertheless did not expect to make a profit.

Analysis showed women were more likely to farm NCFs than was characteristic of commercial farming (38% in the NCF group against 15% of the CF group), but NCF were still mostly operated by men (62% of the NCF group). NCF also tended to be more highly educated than commercial farmers. In terms of land tenure, a higher proportion of NCF were tenant farmers. Nevertheless, for both groups the majority owned their farms. NCF were also more likely to be new entrants to farming, evident in the amount of time they had been involved in farming. NCFs were more likely to have inherited their farm and were more likely to be over 65 years than the commercial farms.

To better understand the different approaches within ‘non-commercial farming’ the researchers developed a typology, differentiating between six types of NCF on the basis of holding size, engagement in diversification or nonfarming activities, and the types of commodities produced (e.g. crops and/or different types of animals).

- **Type 1: ‘Specialist smallholdings’** (N = 10) were very small or small. Some 40% engaged in diversification. They had no crops, but specialised in pigs, poultry and livestock beyond recreational scale.

- **Type 2: ‘Agricultural residences’** (N = 136) were very small, 30% were diversified land holdings. They did not engage in either crop or animal production.
- **Type 3: ‘Horsiculture holdings’** (N = 57) were very small holdings which had horses on either a recreational (up to 5 horses) or a commercial scale (more than 5 horses, suggestive of horse breeding or livery). They did not engage in crop production, but about one-third engaged in small-scale cattle and sheep and some 40% had pigs, poultry or other livestock.
- **Type 4: ‘Mixed smallholdings’** (N = 111) were either very small or small holdings that did not engage in diversification. They engaged in cattle and sheep farming on either a recreational scale (45%) or commercial scale (38%). They also engaged in pigs, poultry or other livestock production on a recreational scale (43%). As such, they produced traditional croft commodities, but only 27% were located on officially designated ‘croft’ land. They did not have either crops or horses.
- **Type 5: ‘Amenity livestock farms’** (N = 53) were between 50 and 200 hectares in size. They engaged in cattle and sheep farming on a commercial scale and 30% of them had more than 10 hectares of crops.
- **Type 6: ‘Large farms/Estates’** (N = 28) were more than 200 hectares in size and engaged in cattle and sheep farming on a commercial scale; almost half (46%) were diversified.

The authors noted that:

- Agricultural residences (36%) were the most common type of NCF identified in the analysis. This is a type which appeared largely inactive, with only 10% reporting livestock, and 28% reporting a small amount of crops. The largest cohorts of crofters (32%) and farmers over the age of 65 (40%) fall within this type.
- The second most common type of NCF was mixed smallholdings. This type most clearly fits the image of smallholding identified in the literature (e.g. Holloway 2001; Wilbur 2014), comprising a variety of livestock production and in 13% of cases crop production. This cohort included the second highest percentage of crofters (27%) and were the most likely to tenant some or all their land (44%).
- Horsiculture holdings formed the third largest category of NCF identified (14%). They were the most distinctive of the types, characterised largely by the absence of crops and presence of horses, with 44% also involved in diversification. This diversification can reasonably be expected to include livery and other horse-related services. Horsiculture holdings were also notable for the high percentage of female-led farms (54%).

The remaining two types of NCF were beyond small scale that dominates the concerns of the present study.

Rather surprisingly, a distinctive ‘retirement holding’ was not identified in the typology of NCFs, in contrast to other UK-based farming typologies (e.g. Bowler *et al.* 1996; Shucksmith and Herrmann, 2002). Farmers over the age of 65 were present in all of the types identified. This suggests that farmers who retire and continue to farm non-commercially do so at a range of scales and continue to produce a range of commodities.

9.6 Lee-Woolf *et al.*, The Wales attitudinal segmentation model

In Wales, a rather different approach to segmentation has been set out by Lee-Woolf *et al.* (2014) in a report for the Welsh Government. The aim was to develop a segmentation model of Welsh farm holdings, based on the attitudes, values and beliefs of those managing them, which would enable the government to [better] determine

the impact of CAP reform on different types of farm holdings, and to target communications and policy measures more effectively. The work took two years and started in 2013.

Preliminary research identified attitudinal factors that influence decision-making on farms. These were grouped into a series of themes:

Theme	Overview
Farming profession and lifestyle	Encompasses the extent that farming is perceived as a job rather than a lifestyle choice; perceived levels of autonomy in decision-making; levels of enjoyment and satisfaction associated with farming.
Business and finance	Includes perceived importance of business skills and administrative processes required to manage a farm; importance placed on making a profit from farming; the desire to expand and/or diversify farming operations.
Adaptability and innovation	Incorporates willingness to change; perceived control over the future; propensity to use new information, skills or technology to improve the running of a farm.
Government and policy	Includes levels of trust in government; perceived reliance on farming subsidies; attitudes towards farming regulation and government-funded environmental schemes.
Networks and support	Comprises the role of social networks in decision-making; the nature and extent of external sources of information and advice; willingness to collaborate with other farmers.
Role of family	Includes the use of resources (in terms of knowledge and skills) held by family members; the role of succession; the influence of multi-party decision-making on family farms.

A questionnaire was constructed that contained:

- Two introductory questions (preferred language, and whether the unit was perceived as a farm, a smallholding or some other form, such as a hobby unit).
- 42 Likert-style questions covering the five attitudinal themes.
- demographic questions (including sources of income, involvement of the family with the farm, age, education, etc.).

The questionnaire survey results provided an overview of key attitudes held by those managing farm holdings in Wales, in relation to these themes. The findings reveal that farmers' attitudes vary widely in relation to numerous issues, which has implications for those looking to design policy interventions and/or communications programmes to support the industry. For example, under the 'business & finance' theme, survey respondents reported different levels of competence when completing paperwork associated with the running of their farm holding. This finding suggests that some farmers are likely to find administrative requirements associated with regulation and policy more of a burden than others and, therefore, may require additional support to meet these requirements.

Simple top-level analysis of answers from the sample (n=1,807) provides interesting information (Annex 4 of the report), such as number of family members who had worked on the farm (in the least year, and excluding the farmer, 50% had one other family member, 26% had two and 14% had three) in a reference period and the extent

of higher-level education (20% had a higher education qualification relating to agriculture, and 31% had a non-agricultural one). Further analysis of the survey results indicate that certain demographic characteristics tended to be associated with particular sets of attitudes – especially farm size, farm type and age of respondent. For example, the results suggest that those managing larger holdings (unlike many representing smaller holdings) tended to be more commercially-orientated than the overall sample. As such, they tended to feel it is important that their holding is resilient to changes in market prices; they are likely to plan their farming activities in advance; they tend to be considering expanding their farming operations going forward; and, they tend to describe their farm as a business rather than a lifestyle choice.

The survey results emphasised the importance of considering how the attitudes, values and beliefs of those managing farm holdings go on to influence farming practices. While some attitudinal drivers are important to the majority of those managing farm holdings, others are more relevant to some groups of farmers than others. Meanwhile, certain attitudes are associated with particular demographic sub-groups, which provides another layer of complexity to the attitudinal motivations and barriers driving decision-making on farms. Overall, these findings support the rationale for developing an attitudinal segmentation model of the Welsh farming sector.

The focus on attitude and behavioural characteristics of the farmer led to segmentation (cluster analysis) based on the answers to nine questions covering the themes identified and extracted from the complete list (see below). Several of these questions related to the way the farmer saw collaboration with other farmers and socialising with them, and other considered sources of advice and information. As far as the final report is concerned, no analysis is presented according to the size of farm, though various examples of cross-tabulations indicated that this was feasible.

No.	Theme	Question wording
Q3	Networks and support	On a scale of 1-5 (where 1 is 'not at all important' and 5 is 'very important'), how important is talking to other farmers as a source of information and advice for you personally?
Q11	Adaptability and innovation	On a scale of 1 to 5 (where 1 is 'not at all interested' and 5 is 'extremely interested'), how interested are you in accessing information or advice about farming on the internet?
<i>To what extent do you agree or disagree with the following statements:</i>		
Q13	Business and finance	'Achieving a good quality of life is more important to me than maximising income from my [insert farm/smallholding]'
Q14	Government and policy	'All farms should strive to be as environmentally sustainable as possible'
Q15	Business and finance	'Collaborating with other farmers improves the running of a farm'
Q22	Networks and support	'I always make time to socialise with other farmers'
Q24	Adaptability and innovation	I am always looking to learn new skills and knowledge that I can apply to my [insert farm/smallholding]'
Q26	Adaptability and innovation	'I am keen to apply new technology on my [insert farm/smallholding] as it becomes available'

No.	Theme	Question wording
Q32	Government and policy	'I am happy to take advice about managing the natural environment on my [insert farm/smallholding]'

On the basis of the nine key questions, a typology of five attitudinal segments were formed using standard statistical techniques. Unlike in England, where the types were given names that reflect the nature of the attitudes, for Wales a neutral approach was taken, the clusters being designated C-Y-M-R-U. An overview of their nature is given below, and later in the Report a set of pen portraits give more detail; these were developed using focus groups made up of farms selected from each cluster in turn.

Cluster	Overview
C	Tend to be younger and tend to have had another job off farm in the last year.
Y	Tend to mirror the overall sample in terms of their demographic characteristics.
M	Tend to be older and tend to manage smaller sized farms, which they describe as a 'smallholding' rather than a 'farm'.
R	Tend to represent larger sized holdings, as well as 'LFA grazing' holdings. They are unlikely to have had another job off farm in the recent past, or to hold higher education qualifications unrelated to farming.
U	Tend to represent 'dairy' holdings and larger sized holdings. They also tend to be younger than the overall sample and they are likely to hold higher education qualifications related to farming.

It is worth noting that the most numerous segments are C (35%) and M (23%), the others varying between 11% and 18%.

A tool developed from this analysis, and one important in the present context, was the 'segment calculator', an algorithm which allocates single or multiple respondents to one of the five clusters in the segmentation model. The segment calculator is presented as a user-friendly, excel-based tool and was operationalised as an Excel document. It invites users to enter responses given to the nine input questions in order to predict which segment a respondent(s) falls into. The calculator has a high level of predictive power; allocating respondents to the correct segment 93% of the time.

A main purpose of the attitudinal segmentation model was primarily as a tool to help the Welsh Government understand how CAP reform would impact on different types of farm holdings in Wales. The research contributed to this objective in several ways:

- Firstly, it improved understanding of key attitudes that influence decision-making on farms across the industry as a whole, through the conduct of a nationally representative survey of farm holdings, by farm type and size.
- The study provided a more sophisticated means of understanding the attitudes driving decision-making on different types of farm holdings, through the development of an attitudinal segmentation model.

- It provided an illustrative example of how the model could be used to assess willingness and ability of different farmers to adapt to policy changes, as a result of a scenario-testing exercise.
- The segmentation model also facilitates the targeting of communications and policy measures more effectively. In particular, the segment pen portraits can help policy teams consider how to:
- Design policies and interventions that recognise the diversity of attitudes, values and beliefs held by those managing farm holdings in Wales, including a tendency of some segments to resist change.
- Develop strategies to support farmers who are less able to adapt to policy changes (and target resources where problems are most likely to occur).
- Use appropriate messaging and communications channels to engage with different types of farmers.
- Prioritise farmer engagement, according to the likely willingness and ability of different farmers to respond to key policies.
- Build on the positive response to the ‘sustainable food production’ scenario which places emphasis and value on farming, while doing so within environmental boundaries.

The model does not prescribe which policies or interventions would best suit each segment; rather it acts as a frame for developing and appraising different options in the context of what it reveals about the segments.

In conclusion, the importance of a segmentation framework is in using a deeper understanding of who farmers are, what they do, what they think and feel, and how they respond to policies in order to help policy makers to articulate messages and design long-lasting solutions. Segmentation can help with (i) promoting awareness and understanding; (ii) tailoring (and not a “one size fits all” approach); and, (iii) recognising why people behave differently. Several examples are examined in detail, almost all of which use statistical techniques to bridge answers to questions on behaviour (actual or intended) in response to particular circumstances, including changes to policy implementation mechanisms. For some of these examples, the actual questions applied are available. Each analysis produced its own set of clusters, to which in most cases descriptive labels have been applied (the exception being the Wales attitudinal segmentation model where neutral labels are purposely chosen). The implication for the current research project is how to benefit from these previous studies in terms of their methodologies, questions put to farmers and their households. There appears a good argument for at least adopting the key nine questions from the Welsh attitudinal segmentation model that formed the basis of segmentation so that its cluster groupings can be applied to the sample of VS&S farm surveyed to provide a degree of comparability with other surveys using the same questions. This does not prevent alternative analyses being explored.

10 Review of the use of scenarios in exploring the likely impact of Brexit

The final section of the literature review for this project on understanding the behaviour of farm households, with its focus on VS&S farms, considers a specific issue, the use of scenarios in exploring the likely impact of Brexit. In the years immediately before Brexit, over thirty significant ex-ante studies on the potential impact on UK agriculture were produced by and for various organisations with diverse but often overlapping sets of interests. Signally among them were representatives of consumer interests; farmers and horticulturalists and their unions; firms elsewhere in the food chain; government and politicians concerned not only with all of these but also with a wide range of other impacts, such as on the UK's trade position, its broader economy, the provision of public goods and changes in the social capital of rural communities (Hill, 2021 in press). These were published, mostly between 2015 and 2019, some before and some after the referendum of June 2016. They displayed a diversity of approaches and generated a range of results. Not all contained original quantitative work, and in particular reports by Parliamentary Select Committees dealing with Brexit often depended on existing material, though the Committee system allowed for a degree of public scrutiny and follow-up of points of interest. Alongside these studies and reports were comments and analyses on websites by academics, often based on published results.

These studies are listed in Table 1, together with their main characteristics. The main focus for most of them has been what is likely to happen to the incomes of farm businesses and the agricultural sector more broadly, though others are more interested in food prices or land use patterns.

In the present context it has to be noted that all but eight have made use of multiple scenarios. These form a useful device in the absence of hard evidence on how the four main impact factors (see below) would play out in reality. How these scenarios were specified, such as which impact factors were covered, the details of each factor, and the future date to which they were linked, were critical to the outcomes. Rather than second-guess the actual situation that would result when the UK left the EU and its CAP, for which they had no reliable guide, many of the studies used scenarios aimed at illustrating extreme positions (boundary situations) which could then be used to prepare the agricultural industry for best- or worse-case outcomes. With the passing of time, and uncertainties being narrowed or reduced, the scenarios have tended to shift away from boundary positions and move nearer to expectations.

These studies (with their scenarios that varied in number from 2 to 9) differed in several ways.

(i) Sector coverage. While some took an industry-wide view, others disaggregated this into major sectors, at least when considering the impact of Brexit on commodity prices. However, some have also examined the implications of Brexit for specific sub-sectors; of note here are the various papers produced by the AHDB.

(ii) Geographical coverage. While most studies provided a UK-level analysis, some focused on England, the country accounting for most agricultural activity and the widest spread of farming types. Several dealt specifically with Wales or Scotland or Northern Ireland, either exclusively (for example Wales in Bradley, 2017, Dwyer, 2017) or as part of disaggregation of the UK into its constituent countries (for example, Hubbard *et al.* (2019)).

(iii) Coverage and specification of impact factors. In the studies, four main factors were seen to be at work. Not many studies dealt with them all, and some focused on only one. These four were:

- The shape of *post-Brexit domestic agricultural policy*, in particular anticipations of what will happen to CAP direct income payments made to farm businesses and, secondly, the extent to which payment for

environmental public goods can be taken as income (rather than being used to defray additional costs or to compensate for income forgone).

- The **outcome of trade negotiations** in the Brexit process that can be expected to impact on market prices received by UK farmers, and which carry implications for trade with the rest of the world.
- The **availability and cost of migrant labour** which, because of market linkages, can be expected to also affect the cost of UK labour.
- Any change in **the regulatory burden** on farmers as a result of leaving the EU.

(iv) **Sophistication of approach.** Differences between studies were found in each of the impact factors:

- **Trade models:** when assessing impact of changes of trading arrangements associated with Brexit on the market prices of farm commodities, several studies used sophisticated aggregate models, some used simpler gravity trade models, and others took a more qualitative approach using basic economic theory.
- **Farm models:** when assessing the impact of changes of commodity prices or levels of direct income support on the incomes of farm businesses, almost all used a static model based on the cost structure of a sample of farms for single years, or a run of years, taken from the UK's Farm Business Survey (FBS). Static models take the existing accounts and vary individual elements to see the effect on income, everything else being assumed to remain the same. In reality, of course farm operators will adjust over time, though incorporating this adjustment capability in impact assessments faces technical problems. Nevertheless, an attempt to do this in a qualitative way is found in Bradley and Hill (2017 and 2019), and dynamic linear programming (using the ScotFarm Model) forms part of the Newcastle University approach (Chapter 5 of Hubbard *et al.*, 2019).

The relevance of the earlier studies has been diminished by the passing of time and lessening of uncertainty of the conditions that will apply now that the UK has formally left the EU and the CAP will cease to apply after the transition period (expected to end 31 December, 2020). A domestic policy will replace it (or, more strictly, there will be four national policies, one each for England, Wales, Scotland, and Northern Ireland).

By early 2019, circumstances had changed, pointing to a need to update previous studies on the impact of Brexit, including the scenarios (Bradley and Hill, 2019).

- First, it had become clear that the regulatory environment is unlikely to change significantly, as the demands of markets in the UK and in export markets (in particular in the EU) will remain closely aligned with the present, at least for the time-being; as will workers' rights, environmental and animal welfare considerations. Consequently, changes in costs faced by UK producers in meeting regulations are unlikely to be lowered and can then, for practical purposes, be ignored when assessing the impact of Brexit on UK producers.
- Second, Ministerial statements and the contents of the 2017-19 Agriculture Bill (and of the closely similar successor Bill published in 2020 which has already passed most of its Parliamentary stages and is likely to pass into law before the end of 2020) that will shape future agricultural policy in England make it clear that direct income payments will be phased out by 2027. However, in the first year of national policy (2022), which sees the first stage of reduction, what is lost from this type of support will be added to land management schemes, keeping the total amount of public support unchanged (although this may have a redistributive effect between sectors and therefore also regions). Beyond 2022, and especially beyond the life of the present Parliament (due to end in 2024), things may be different, though it is possible to get an

impression of what happens to incomes if direct payments are completely withdrawn (see below). As agriculture is a devolved responsibility, patterns of domestic agricultural support in the other countries of the UK may differ from that seen in England (see House of Commons Library (2020) for what is the currently known intentions of Wales, Scotland and Northern Ireland).

- Third, concerning access to labour from EU-27 countries, the UK government indicated, as part of its preparation for leaving the EU, that a Seasonal Agricultural Workers Scheme (SAWS) will be introduced for migrants entering the UK on a seasonal basis to work in agriculture. In February 2020 numbers were increased from 2,500 to 10,000 in response to sector comments. If the volume of labour covered by these schemes is adequate to match the numbers that farmers require (which on initial numbers, seemed unlikely), costs of casual labour to UK farmers would be expected not to rise as a direct consequence of Brexit. Such schemes would not apply to non-UK regular labour, access to which would be restricted, with what Bradley and Hill (2019) estimate is a resultant increase of 50% in the cost of this category of labour.
- Fourth, depending the outcomes of negotiations during 2020, trade arrangements can be expected to range from good access for the UK to the EU market in the event of a Free Trade Agreement (FTA), through more distant relationships, such as one similar to that between the EU and Canada to, at the other extreme in the absence of a UK-EU FTA, the application by the UK of the tariffs to agricultural imports that Defra announced in mid-March 2019 but already replaced in May 2020 by ones that effectively replicates the EU's CET but with small adjustments and simplifications, for example to convert Euros to Sterling.

Thus, when devising scenarios as part of their 2019 Updating Study (further updated for 2020 to take account of the tariff changes), the only factor that Bradley and Hill (2019) allowed to vary was the trade relationship; domestic policy and labour costs, though different from the status quo, remained the same across the scenarios.

Thus, only two scenarios were required to set boundaries of the likely possibilities resulting from the UK's exit from the EU. The first (UK-EU FTA) represented essentially a 'Business as Usual' option where, under the FTA trading relations remain as close to the status quo as is possible given that the UK will no longer be part of the EU's Single Market. The second scenario (WTO: UK import tariffs) implied that the UK unilaterally applies its 2019 (or 2020) tariffs on imports of agricultural commodities (and fertilisers), including those from the EU. The EU however, treats the UK as a third-country in trading terms, applying its current World Trade Organisation (WTO) Most Favoured Nation (MFN) tariffs.

Table 1: Features of ex-ante Brexit studies

Reference	Scenarios	Trade effects on agriculture discussed/quantified	Direct payments micro-models	Sectoral	General message
Baldock <i>et al.</i> (2017) (LUPG)	Not as understood in other studies	No	No	Adopted from Berkum <i>et al.</i> (2016)	Outlines plausible policy developments. Emphasis on land use issues, and no attempt to independently model farm incomes
Berkum <i>et al.</i> (2016)	9 (3 trade & 3 Direct Payment levels)	Yes and quantified (AGMEMOD model)	Yes	Yes	Scenarios produce a range of outcomes
Bootle (2015)	2 (of 7)	Yes	No	No	Agriculture not treated specifically
Bradley (2017) (for the AHDB)	3	Yes, and quantified (simple gravity trade model)	Yes	Yes	Results for Scotland and Wales. For most farming types impact of changes in direct payments more important than trade impacts. Labour cost changes important to some types and trade relationship particularly important for the sheep sector
Bradley (2018a) (for the AHDB)	3	Yes, and quantified (simple gravity trade model)	Yes	Yes	Results for the Lake District National Park. Impact of changes in direct payments more important than trade impacts, although trade impacts important in relation to the sheep sector
Bradley (2018b) (for the NFU)	3	Yes, and quantified (simple gravity trade model)	Yes	Yes	Results for the poultry (broiler) and egg sectors. Labour cost changes very

Reference	Scenarios	Trade effects on agriculture discussed/quantified	Direct payments micro-models	Sectoral	General message
					important in these sectors which are less impacted by changes in direct payments
Bradley and Hill (2017) (for the AHDB)	3	Yes, and quantified (simple gravity trade model)	Yes	Yes	Results for England. For most farming types impact of changes in direct payments more important than trade impacts. Labour cost changes important to some types
Bradley and Hill (2019)	2	Yes, and quantified (simple gravity trade model)	Yes	Yes	Results for England initially. Focus on 2022, when only the first year of projected reduction of direct payments has taken place, being switched to Pillar 2-type support.
British Retail Consortium (2017)	2 implied	Yes	No	No	Covers food consumers, but no mention of agriculture
Buckwell (2016) (for Worshipful Company of Farmers)	2 implied	Yes	Yes (adopts Informa (2015) analysis)	No	Trade effects can be expected to affect prices, as will levels of Direct Payments affect income
Choi <i>et al.</i> (2020)	4	Yes, and quantified using CAPRI model	No	By commodity but not by farm type	Also covers impacts on EU-27 and welfare impact on consumers and producers
Cumulus Consultants (2017) (for the RSPB)	2 (but with variations of output and input prices)	Yes	Yes	Four farm types	Focus on environmental impacts
Davis <i>et al.</i> (2017) (funded by the UK's agriculture departments)	3	Yes and quantified (FAPRI model)	No	Yes	Very similar impacts on prices to Bradley and Hill (2017)

Reference	Scenarios	Trade effects on agriculture discussed/quantified	Direct payments micro-models	Sectoral	General message
Defra (2016)	None	No	Yes	Yes	Only considers cuts in Direct Payments and their impacts on income distribution
Dwyer (2018) (Wales Centre for Public Policy)	4	Yes, not quantified	No	Yes, but not quantified	Relates to Wales only. Discussion of impacts largely qualitative and not modelled
FAPRI (2009)	2	Yes and quantified (FAPRI No model)		Yes	Relates to changes outside Brexit, but similar scenarios
Haverty, M. (2017) (NIMEA / Anderson Centre)	2	Yes and quantified (GTAP)	Yes	Relates only to beef and sheep meat in Northern Ireland	A WTO trading scenario would be manageable for the Northern Ireland beef sector, but difficult for the sheep sector. Both sectors would be badly affected by an open-door trading policy. Cuts to domestic support in combination with either trade scenario would have significant negative consequences for the Northern Ireland livestock sector
House of Commons (2016)	None	Yes	No	No	Identifies areas of uncertainty and of opportunity
House of Lords (2016)	None	No	No	No	Considers possible UK-EU trading relationship in general terms
House of Lords (2017a)	None	Yes	No	No	Considers impacts of tariffs, touches on immigrant labour

Reference	Scenarios	Trade effects on agriculture discussed/quantified	Direct payments micro-models	Sectoral	General message
House of Lords (2017b)	None	Yes	No	No	Attention given to migrant labour and regulation
Hubbard <i>et al.</i> (2018) and (2019) (sponsored by ESRC and UK government agriculture departments)	Yes, 6 (3 trade each with and without domestic subsidies)	Incorporates FAPRI (2017 – see below)	Yes	Yes, and by country	The project assesses the impacts of various UK agricultural policy scenarios following Brexit by integrating economic modelling approaches at aggregate, sector and farm levels.
Informa (2015) (analysis by Bradley, D.)	3	Yes	Yes	Yes	Differential impacts across farming types
Informa (2016) (analysis by Bradley, D.)		Yes	Yes	Yes	Differential impacts across farming types
Informa (2017) (analysis by Bradley, D.)	3	Yes	Yes	Yes	Updated differential farm-level impacts from Informa (2016)
Lang and Schoen (2016) (for the Food Research Collaboration)	5	No	No	No	Some focus on commodity details
Packer, R. (2017) (for the Centre for Policy Studies)	None	Yes	No	No	UK prices could rise or fall, depending on outcome of trade negotiations
Patterson (2017) (UK2020 Foundation)	None	Yes	No	No	Focus on opportunities. Migrant labour and regulations mentioned
Rabobank (2017)	3	Yes	No	No	Changes in prices received by UK farmers and shifts in production suggested

Reference	Scenarios	Trade effects on agriculture discussed/quantified	Direct payments micro-models	Sectoral	General message
Swinbank (2017) (UK Trade Observatory)	None	Yes	No	No	Commodity prices could rise or fall dependent on trade arrangements
Welsh Government (2018)	5	Yes	No	Yes	Highlights difficulties for some sectors and advantages/opportunities for others
Yorkshire Agricultural Society (2016)	5	Yes	No	Yes	Focus on other factors – labour and devolved administrations

10.1 Use of scenarios for Wales

While most of the studies on the impact of leaving the EU are at the UK level, four are either focused on Wales or present results for Wales separate to those for the UK as a whole (for further details see Agra CEAS Consulting (2018) and its Annex). These are:

- Bradley (2017) for the AHDB;
- Dwyer (2018) for the Wales Centre for Public Policy;
- Hubbard *et al.* (2018) funded by the Economic and Social Research Council (ESRC); and,
- Welsh Government (2018) paper from the Energy, Planning and Rural Affairs' Evidence and Scenarios Roundtable Sub-Working Group.

These studies are reviewed in detail in the following sub-sections.

10.1.1 AHDB assessment of the impact of leaving the EU on four Welsh farm types

Bradley (2017) extended the work of Bradley and Hill (2017), which had examined the impact of three potential post-EU scenarios on Farm Business Income (FBI) using Farm Business Survey (FBS) data in England in a farm-level micro-economic model, to cover the following farm types in Wales, again using FBS data produced specifically by the Welsh Government:

- Severely Disadvantaged Area (SDA) sheep;
- Less Favoured Area (LFA) sheep and beef (excluding specialist sheep in the SDA);
- lowland sheep and beef (i.e. non-LFA); and,
- dairy.

The scenarios were specified as shown in Table 2 and were intended to encompass the possible outcomes from the negotiations; they were not intended as predictions of likely outcomes. It is important to bear in mind that the scenarios represent combinations of different variables. Differences between the results by scenario are therefore driven by all the variables, not just the trade variable to which the scenario names most clearly relate.

Table 2: The AHDB scenarios

	S1: Evolution	S2: Unilateral liberalisation	S3: Fortress UK
Public support	Pillar I and Pillar II support retained at current levels	Pillar I support removed, payments under Pillar II increased to equal 50% of current overall support	Pillar I support removed, payments under Pillar II increased to equal 25% of current overall support
Labour	No change to labour access	Non-UK regular labour restricted to 50% of current level	Non-UK regular and seasonal labour restricted to 50% of current level
Trade relationship with the EU	Comprehensive Free Trade Agreement (FTA) enabling tariff-free trade between the UK and the EU. Increase of 5% in trade friction costs	No trade deal agreed between the UK and the EU. UK unilaterally reduces import tariffs to 0% for all agricultural	No trade deal agreed between the UK and the EU. Increase of 8% in trade friction costs

	S1: Evolution	S2: Unilateral liberalisation	S3: Fortress UK
		products. Increase of 8% in trade friction costs	
Trade relationship with the rest of the world	WTO rules apply. UK retains access to existing Tariff Rate Quotas and agrees FTAs with third countries have such arrangements with the EU	WTO rules apply. UK unilaterally reduces import tariffs to 0% for all agricultural products. Increase of 8% in trade friction costs where imports from the EU are replaced	WTO rules apply. Increase of 8% in trade friction costs where imports from the EU are replaced
Regulatory environment	No changes to costs	5% decrease in costs of seeds, fertilisers, crop protection, other crop costs, veterinary fees and medicines, plus other livestock costs	No changes to costs

The quantitative results obtained represent the first-order impact, that is the impact before adjustments to enterprise mix and stocking densities, as well as dynamic impacts as demand adjusts and supply chains are reconfigured. These subsequent adjustments will mitigate the impacts to a certain extent over time.

Under *Scenario 1: Evolution*, FBI decreases marginally for SDA sheep farms as trade friction costs decrease the competitiveness of sheep exports (Figure 4), but increases marginally for grazing farms in the LFA and lowland grazing farms where beef output increases as imports become more expensive by more than sheep output declines (Figure 5 and Figure 6 respectively); the increase in FBI for dairy farms is more substantial as import costs increase substantially and there is a large import requirement which allows domestic prices to increase (Figure 7).

Scenario 2: Unilateral liberalisation, has a more significant impact with FBI on LFA grazing farms becoming negative as sheep and beef prices collapse (Figure 5); FBI remains positive, although much diminished, on SDA sheep farms as increased Pillar II payments mitigate against falls in output (Figure 4). The lower reliance on sheep helps to protect the fall in FBI for lowland grazing farms (Figure 6). FBI is much better protected on dairy farms under this scenario than it is for the other farm types (Figure 7).

Scenario 3: Fortress UK, would be the worst outcome for sheep farms in the SDA as substantial falls in output are exacerbated by the reduction in overall public support (Figure 4). LFA grazing farms and lowland grazing farms would be better off under this scenario than they would be under Scenario 2 as large increases in beef output would, to some extent, compensate for large declines in sheep output, FBI would though be slightly negative in the LFA (Figure 5) and around a third of the baseline in the lowland (Figure 6). FBI on dairy farms would increase substantially under this scenario as producers would be protected from imports by WTO tariffs which would allow UK prices to increase (Figure 7).

In summary, this work shows that:

- The impact of leaving the EU would be different for different farm types.
- Farms with a reliance on output from sheep enterprises will be more affected than those with a reliance on beef.
- FBI on dairy farms could increase substantially under Scenarios 1 and 3.

Another way of looking at the likely outcome is that Scenario 2: Unilateral liberalisation, would be the most challenging in Wales with the exception of sheep farmers in the SDA who would be more negatively affected under Scenario 3: Fortress UK; Scenarios 2 and 3 in general would be difficult for the Welsh red meat sectors. The most efficient farms, i.e. those with the highest ratio of output to inputs, would be best protected under all scenarios and across all farm types; there is a stronger relationship between efficiency and scale in SDA sheep and LFA grazing farms meaning that for these farm types, larger farms will also be better protected than medium and small farms.

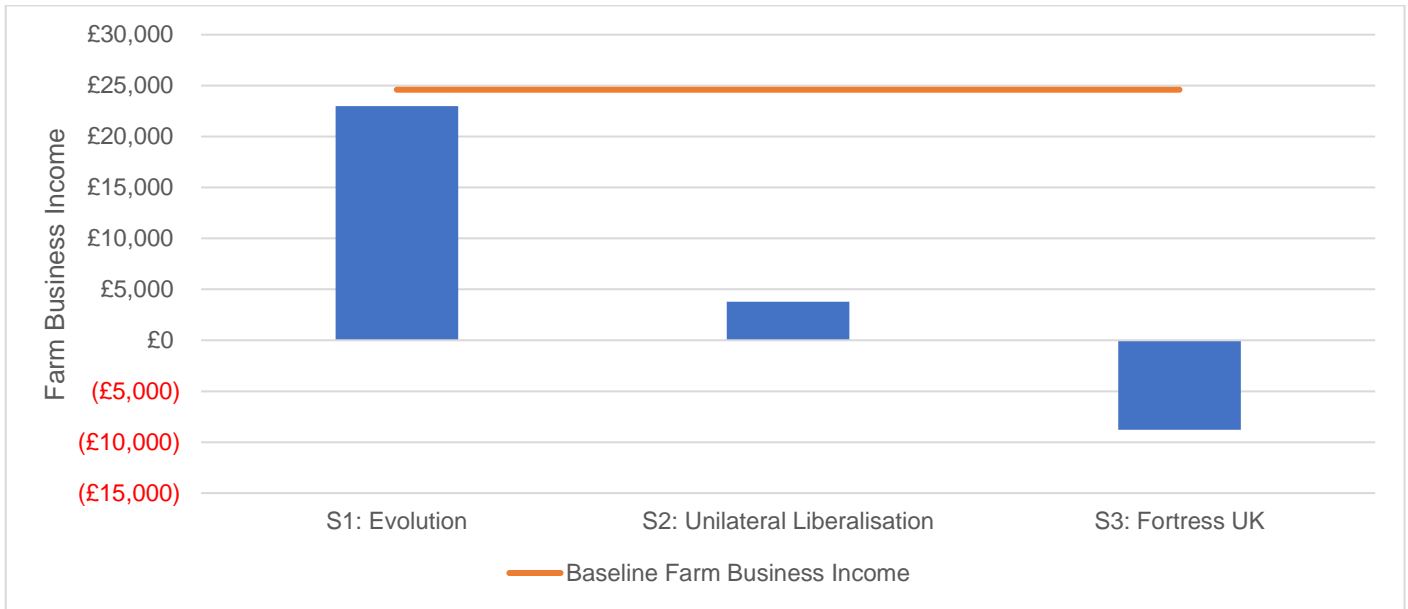


Figure 4: Impacts of scenarios on Farm Business Income: SDA sheep in Wales

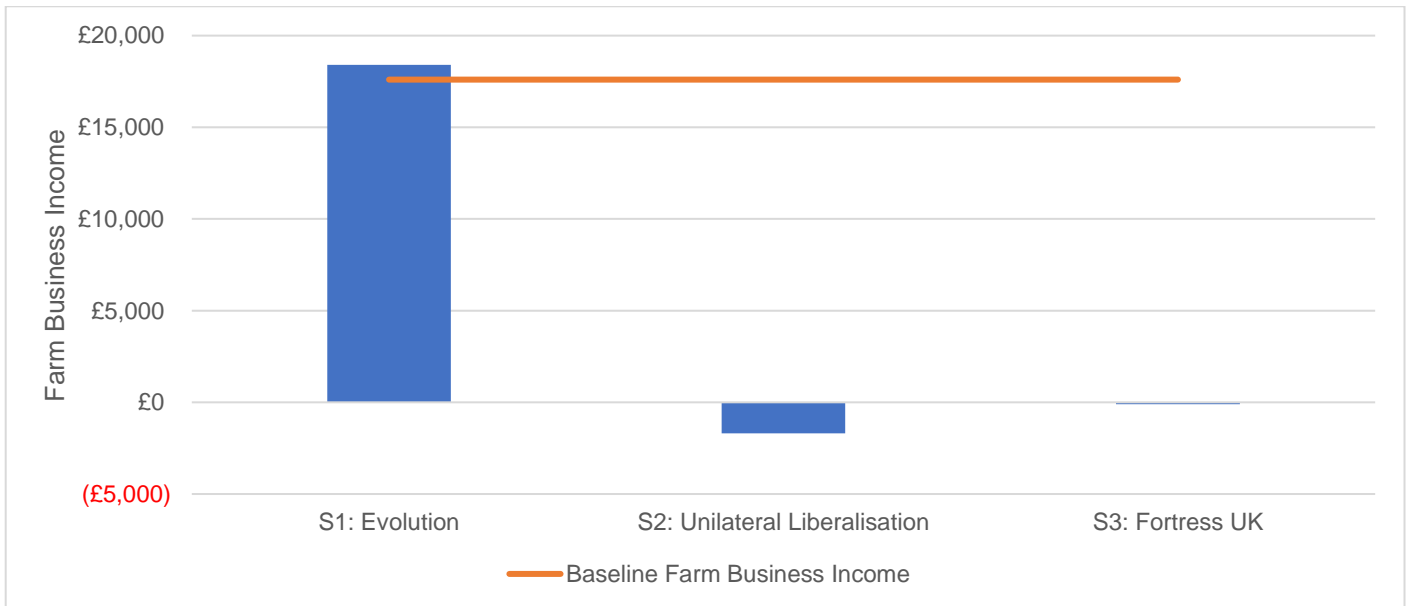


Figure 5: Impacts of scenarios on Farm Business Income: LFA grazing in Wales

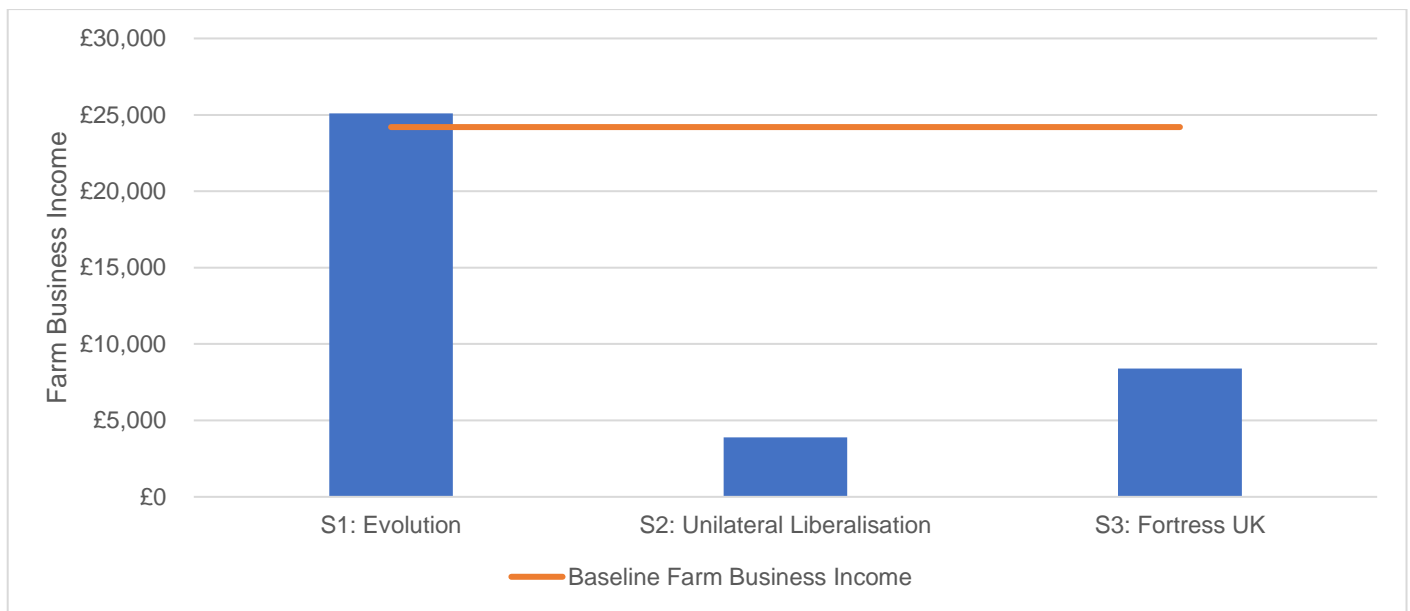


Figure 6: Impacts of scenarios on Farm Business Income: lowland grazing in Wales

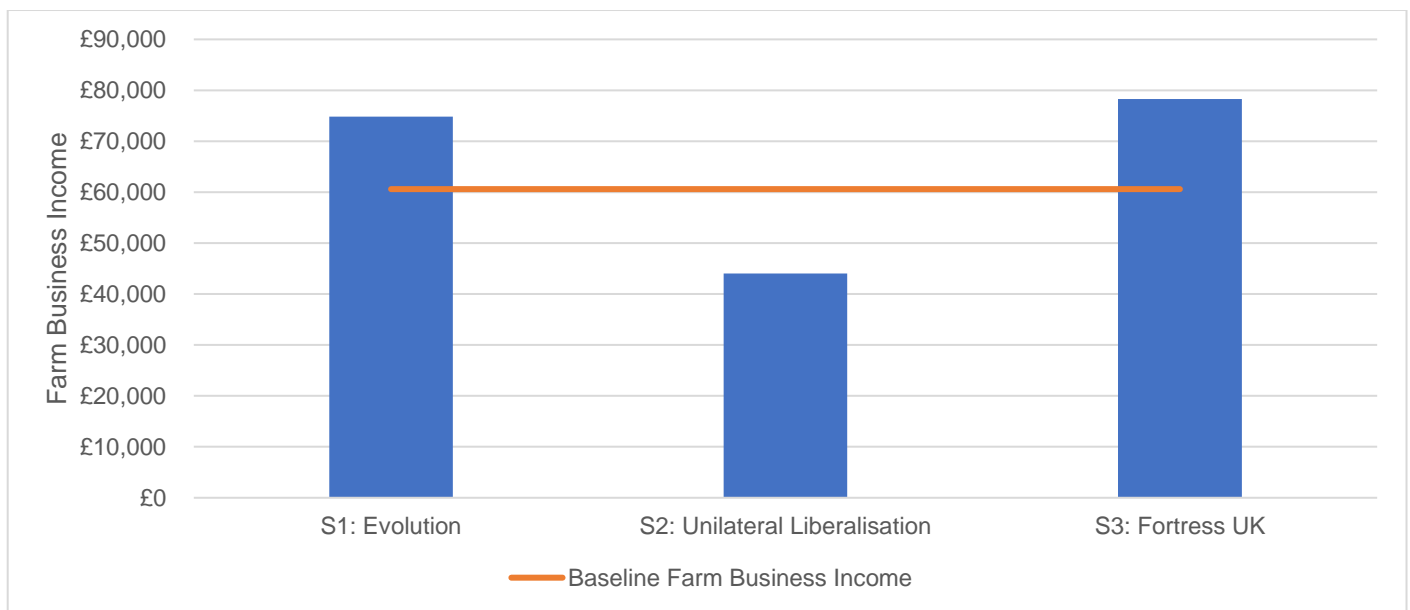


Figure 7: Impacts of scenarios on Farm Business Income: dairy in Wales

10.1.2 Wales Centre for Public Policy: implications of Brexit in Wales

Dwyer (2018) considered the impact of leaving the EU with reference to (i) trade; (ii) domestic support policy/funding; and, (iii) the post-leaving governance model and general economic situation. These variables were used to construct four scenarios as reproduced in Table 3. Dwyer’s second scenario is similar to the Evolution scenario in Bradley (2017) and her third scenario has similarities to Bradley’s Unilateral Liberalisation scenario; there is no equivalent of Bradley’s Fortress UK scenario.

Table 3: Scenarios used in Dwyer (2018)

Scenario	Trade outcome for UK-EU trade	Domestic agri-rural support outcome	Outcome for UK-other trade	Regulatory outcome
1	Little change for 5-10 years	Significant reduction (60%)	No change	No change
2	Little change for 5-10 years	Maintained at current levels	No change	No change
3	Tariffs, reducing trade both ways	Significant reduction (60%)	New deals, cheaper imports	Relaxing of some standards
4	Tariffs, reducing trade both ways	Maintained at current levels	New deals, cheaper imports	Relaxing of some standards

Dwyer provides a qualitative consideration of the likely outcome of each scenario in terms of farming sector impacts; rural economy and community impacts; rural environment outcomes; food chain outcomes; key determinants of local adaptation; and, regional patterns. A summary of the elements which are of greatest interest to the present study are presented in Table 4. (note that some of the scenario descriptions do not appear exactly to match the scenarios set out in (Table 3).

Dwyer (2018) notes that there is likely to be a decline in sheep production under all the scenarios. Given the regional distribution of sheep in Wales this implies a greater impact in the north and west; the south and east will be less affected.

Table 4: Summary of scenario impacts (Dwyer, 2018)

	Farming sector	Rural economy and community outcomes	Regional patterns
Scenario 1: FTA with EU, gradually with others, support cut by 60%	<ul style="list-style-type: none"> • Most beef and sheep farms become economically unviable • Dairy and other sectors OK • EU imports will remain more competitive in the horticultural sector 	<ul style="list-style-type: none"> • Widespread restructuring of livestock sectors due to insolvency will result in fewer and larger farms • Health and social needs for farms in crisis • Decline in rural family/working populations • Fewer jobs in rural communities, decline in young families (at least in short-term) • Dairy, pigs/poultry and horticulture more stable in south and east Wales • Expansion in forestry and leisure offers medium-term scope for job creation in services/ leisure but risks to tourism from neglected land 	<ul style="list-style-type: none"> • Central and north Wales will be more negatively affected than south • Likely movement of upland into other uses including forestry, where there is pre-existing infrastructure (e.g. near existing forest areas) in north, mid and west Wales
Scenario 2: free EU/UK trade, same support level as now	<ul style="list-style-type: none"> • Depends upon types of aid, but if the same as currently, continued slow farm enlargement in hills, some dairying growth in south and west Wales, and continued growth in diversification and non-farm work among farm families 	<ul style="list-style-type: none"> • Continued slow growth in jobs and incomes, helped by continuing rural development aids to farms, SMEs and micro-business start-ups • Possible boost to tourism if Sterling remains low in value vis-à-vis EU and wider market currencies 	<ul style="list-style-type: none"> • No significant change from current patterns and trends
Scenario 3: tariffs on EU/UK agri-products, then freer trade with others, domestic support cut by 60%	<ul style="list-style-type: none"> • Most beef and sheep farms unviable, as markets for sheepmeat collapse • Shift in profit away from grazing livestock to horticulture, novel, niche or high-value products (wine) 	<ul style="list-style-type: none"> • Big shift in rural economy, new land uses replace farming: leisure, tourism, forestry, and energy – also land abandonment and village decline in remote areas • More market opportunities for niche/ high value products near main processing centres leading to population growth 	<ul style="list-style-type: none"> • Worse impacts on farms in north and centre than in south, with some increased pressure on land, especially in the south, north-east and borders, for a variety of new products and uses • More forestry/ tourism in mid and north-west Wales.
Scenario 4: tariffs, same support level	<ul style="list-style-type: none"> • Market for UK sheepmeat exports collapses, but continuing subsidy ensures more farms survive than in Scenarios 1 and 3, potential to re-orientate 	<ul style="list-style-type: none"> • This is a scenario with some features of 3, but with the big change in market signals cushioned by continuing farm and rural development support • The hardest hit farm sector is sheep, so all areas with specialist sheep farms 	<ul style="list-style-type: none"> • The highest land and communities in Wales in the north and central belt could see super-extensification and widespread agri-rural decline • Elsewhere, change less dramatic, growth in lowland dairying and (e.g.

Farming sector	Rural economy and community outcomes	Regional patterns
<ul style="list-style-type: none"> • More Welsh beef is consumed in the UK • More opportunities in horticulture, dairy, etc. 	<p>would see the greatest changes while beef output may stabilise and other sectors can be expected to grow</p>	<p>intensive) beef with very mixed impacts depending upon the production systems favoured by the food chain</p>

10.1.3 Economic and Social Research Council: Brexit – how will UK agriculture fare?

Hubbard *et al.* (2018) reports on their (at the time ongoing) ESRC-funded project “*How might UK agriculture thrive or survive?*”. This work examined the possible macro-, sector- and farm-level effects of post-leaving the EU scenarios. To do this, projections from macro-sector models (CGE and UK-FAPRI) were linked to a series of farm models based on Farm Business Survey data from the constituent countries of the UK.

The scenarios examined focus on variants of trade relationships and domestic agricultural policy; the impact of restrictions on migrant labour and the Sterling/Euro and Sterling/Dollar exchange rate were assessed through sensitivity analysis. The trade scenarios examined are the same as those used in Bradley (2017), namely:

- **Scenario 1: UK-EU Free Trade Agreement.** UK/EU tariffs set at 0%; UK adopts the EU Common External Tariffs for the rest of the world (RoW); UK maintains share of EU Tariff Rate Quotas (TRQs) applying to RoW imports; trade friction costs of 5% (livestock) and 2% (crops) on UK-EU trade flows.
- **Scenario 2: Unilateral Trade Liberalisation.** Elimination of all UK import tariffs for EU and RoW; trade friction costs of 10% (livestock) and 5% (crops) on imports, trade friction costs and WTO tariffs on UK exports.
- **Scenario 3: World Trade Organisation tariffs.** UK trade with EU and RoW on WTO Most Favoured Nation tariffs; UK share of current EU TRQs with RoW; trade friction costs of 8% (livestock) and 4% (crops) on UK-EU trade flows.

Two domestic policy scenarios were used: (i) Direct Payments retained and no change to Pillar II support; (ii) Direct Payments phased out over a five-year period (2020-2025) with Pillar II support remaining unchanged. Each of the policy variants was applied to the trade scenarios to produce a matrix of six scenarios. One scenario therefore matches the *Evolution scenario* in Bradley (2017), but the other variants are slightly different as they do not include the impact of restrictions in migrant labour and the overall amount of domestic support is different; two scenarios are though very similar to those used in Bradley (2017).

The key findings are that domestic producer prices would fall markedly for all products, but especially for sheep and beef under the *Unilateral Trade Liberalisation* scenario. Domestic prices would drift upwards under the *WTO scenario*; there would be only marginal changes under the FTA scenario driven by the trade friction costs.

As Figure 8 shows, Farm Business Income (FBI) in Wales would be broadly the same as under the baseline under the *FTA scenario* with no change to domestic support and would increase under the *WTO scenario* with no change to domestic support. In both cases, the removal of Direct Payments would reduce FBI; under the FTA scenario this reduction would have a dramatic consequence on FBI, although under the WTO scenario FBI would be approximately the same as it would be under the baseline. The Unilateral Trade Liberalisation scenario would reduce FBI to marginal levels if Direct Payments were retained, but FBI would become negative under this scenario if Direct Payments were to be phased out.

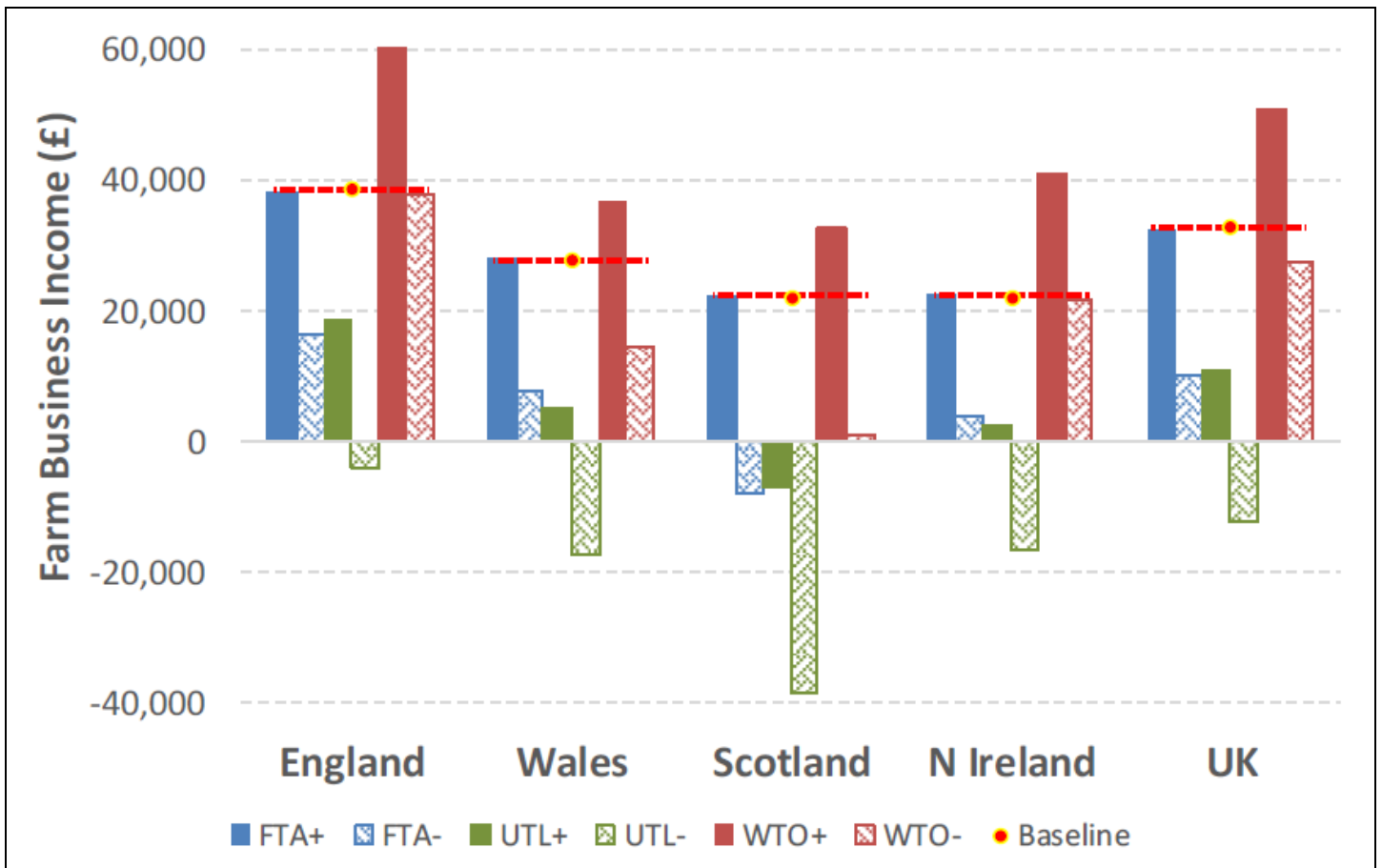


Figure 8: Estimated average Farm Business Income in the UK by country and scenario (2026)

Source: Hubbard *et al.* (2018).

The impact by farm type is shown at the UK level in Figure 9. The key points to note for Wales are the negative impacts under the Unilateral Trade Liberalisation scenario, especially in the beef and sheep sectors, exacerbated by the removal of Direct Payments, and the very substantial positive impacts in the dairy sector under the WTO scenario. The FTA scenario, in combination with the removal of Direct Payments, also results in a sharp decline in FBI, more so in the sheep sector where FBI becomes negative and less so in the dairy sector.

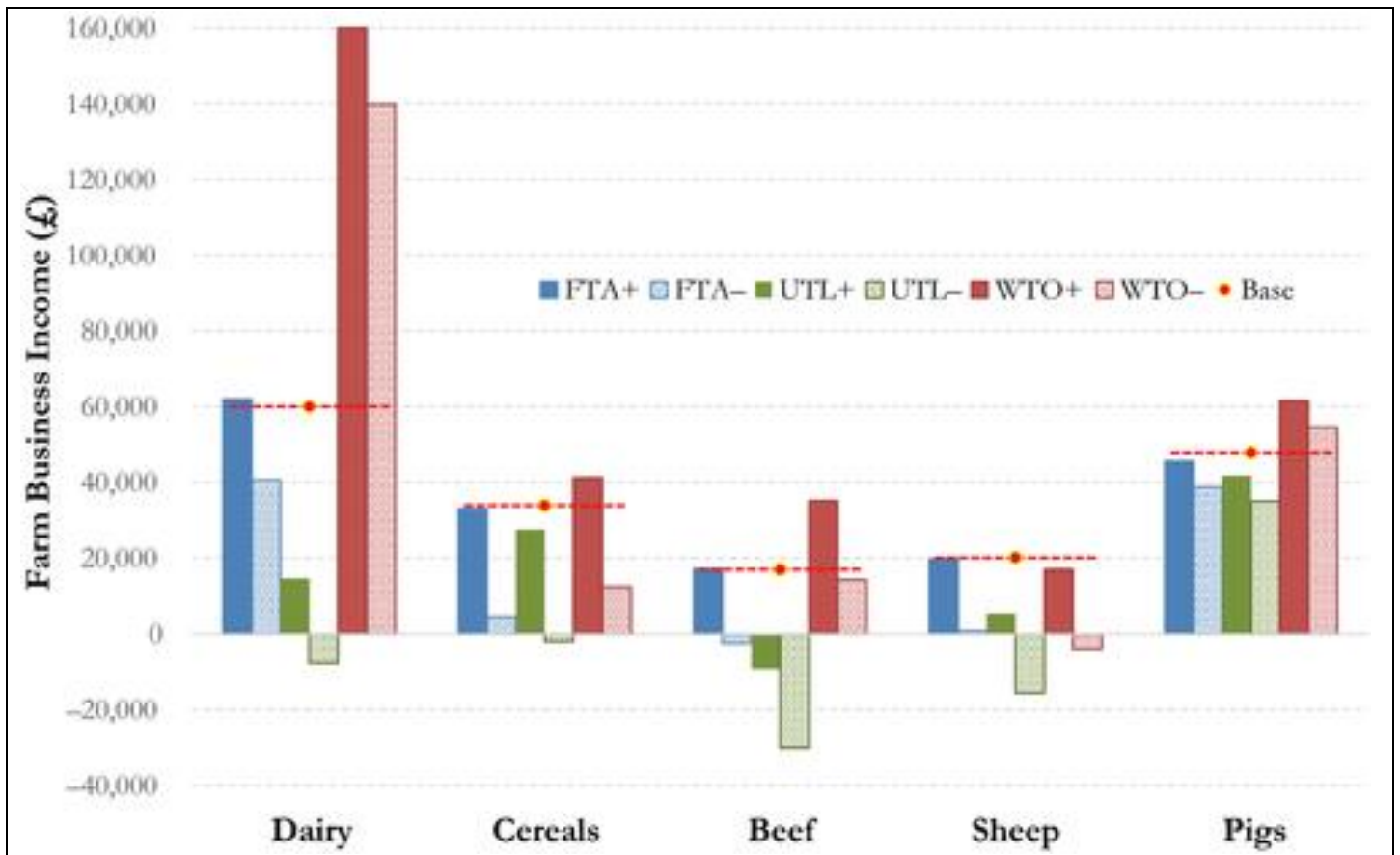


Figure 9: Estimated average Farm Business Income in the UK by farm type and scenario (2026)

Source: Hubbard *et al.* (2018).

10.1.4 Welsh Government EU exit scenario planning

Welsh Government (2018) considered the impact of five post-leaving the EU scenarios which are based around (i) no deal with the EU on trade; (ii) a trade deal with the EU; and, (iii) a multilateral trade deal. The first two scenarios were split into variants according to whether domestic support remains as it is currently or is determined by the Barnett Formula. This gives the following five scenarios:

- Scenario 1: No deal with funding
- Scenario 2: No deal without funding
- Scenario 3: EU deal with funding
- Scenario 4: EU deal without funding
- Scenario 5: Multilateral trade with funding

Other factors (limits on immigration, access to the UK market by key competitors and regulatory standards) vary across the scenarios. Welsh Government's third scenario is comparable to the Evolution scenario in Bradley (2017) (although treatment of immigrant labour is different) and the fifth scenario is similar to Bradley's

Unilateral Liberalisation scenario, although the costs of regulation are not reduced. Scenario 2 is close to Bradley's Fortress UK scenario.

As with Dwyer (2017), the analysis under each scenario is qualitative, although was informed by Davis *et al.* (2017), Bradley and Hill (2017) and Cumulus Consultants (2017). Likely impacts are considered in aggregate and then by sector (for consistency with the other analysis, only the main sectors of lamb, beef and dairy are reviewed here).

Lamb sector

Given the importance of exports to the EU, the lamb sector would be severely affected should there be no deal with the EU; tariffs over 20% are thought likely to cause severe pressure or market collapse. This would probably lead to some forced restructuring of businesses and knock-on effects on the non-farming rural economy. Fewer and larger farms would be expected as "ranching" increases and if land values fell, land abandonment and afforestation would be expected. Lowland farms may switch into dairy or arable. A reduction in domestic funding would exacerbate these impacts.

An EU deal would result in little change to the *status quo* for the sheep sector.

A multilateral free trade deal with countries such as Australia, Canada, New Zealand and the USA would not provide an export route replacement for the EU. Increased lamb imports from Australia and New Zealand would have a severe negative impact on the sector in Wales as they are very price competitive.

Beef sector

No deal would cause considerable disruption to the beef trade, but tariffs on imports might provide an opportunity for import substitution and the development of a premium brand. Some farm restructuring would be expected with extensive, low input systems with large herds replacing small family farms.

Although an EU deal would provide similar operating conditions to currently, non-tariff trade-friction costs may make multiple border crossings uneconomic which would impact on the "beef carousel" trade. Suckler cow beef is likely to continue to decline unless supported by domestic support.

The impact on the beef sector under a multilateral free trade deal would depend on which countries were involved. A wholesale opening of the UK market to Australia, New Zealand, South America and USA would have a depressing effect on domestic prices with only the most competitive domestic producers being able to compete.

Dairy sector

The imposition of WTO tariffs would shield domestic producers from imports allowing import replacement and higher domestic prices for producers. However, there are also significant exports of dairy products which would become uncompetitive.

An EU deal would leave operating conditions similar to the current situation, although the additional trade friction costs may result in some renationalisation of processing capacity (in both UK and EU markets), subject to the ability to trade raw milk.

Multilateral free trade deals with Australia, Canada, New Zealand and the USA are likely to favour imports rather than exports and an economic downturn is expected in the Wales dairy sector.

In conclusion, the final section of the literature review for this project on understanding the behaviour of farm households, with its focus on VS&S farms, considers a specific issue, the use of scenarios in exploring the likely impact of Brexit. The use of scenarios formed a key element in the research methodology specified by the Welsh Government

In summary, in the years immediately before Brexit, over thirty significant ex-ante studies on the potential impact on UK agriculture were produced by and for various organisations with diverse, but often overlapping, sets of interests. Important among them were representatives of consumer interests; farmers and horticulturalists and their unions; firms elsewhere in the food chain; government and politicians concerned not only with all of these but also with a wide range of other impacts, such as on the UK's trade position, its broader economy, the provision of public goods and changes in the social capital of rural communities (Hill, 2021 in press). These were published, mostly between 2015 and 2019, some before and some after the referendum of June 2016. They displayed a diversity of approaches and generated a range of results. In the present context it has to be noted that all but eight have made use of multiple scenarios. These form a useful device in the absence of hard evidence on how the four main impact factors (see below) would play out in reality. How these scenarios were specified, such as which impact factors were covered, the details of each factor, and the future date to which they were linked, were critical to the outcomes. Rather than second-guess the actual situation that would result when the UK left the EU and its CAP, for which they had no reliable guide, many of the studies used scenarios aimed at illustrating extreme positions (boundary situations) which could then be used to prepare the agricultural industry for best- or worse-case outcomes. With the passing of time, and uncertainties being narrowed or reduced (especially as proposals for national agricultural support have been set out in legislation, at least for England), the scenarios have tended to shift away from boundary positions and move nearer to expectations, and be fewer in number. Results in terms of income per farm are set out for Wales as found in the most prominent studies. The implication for the current research project is that the income generated from the farm is sensitive to the scenario chosen. However, these assessments are static and ignore the abilities of operators to adjust their farming over time. Furthermore, they also exclude other ways that farm households may respond, such as in their off-farm activities or decisions to exit the industry, either by leasing their land to other farmers or more permanently by retiring. Many of these responses will depend on factors that operate at the household or family level.

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