

Scotland's Rural College

Beyond 'hobby farming': towards a typology of non-commercial farming

Sutherland, Lee-Ann; Barlagne, Carla; Barnes, AP

Published in:
Agriculture and Human Values

DOI:
[10.1007/s10460-019-09930-5](https://doi.org/10.1007/s10460-019-09930-5)

Print publication: 01/09/2019

Document Version
Publisher's PDF, also known as Version of record

[Link to publication](#)

Citation for published version (APA):
Sutherland, L-A., Barlagne, C., & Barnes, AP. (2019). Beyond 'hobby farming': towards a typology of non-commercial farming. *Agriculture and Human Values*, 36(3), 475-493. <https://doi.org/10.1007/s10460-019-09930-5>

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.



Beyond 'Hobby Farming': towards a typology of non-commercial farming

Lee-Ann Sutherland¹ · Carla Barlagne¹ · Andrew P. Barnes²

Accepted: 26 February 2019
© The Author(s) 2019

Abstract

In this paper we develop a typology of 'non-commercial' approaches to farming, based on a survey of a representative sample of farmers in Scotland, United Kingdom. In total, 395 (16.6% of the sample) farmers indicated that they do not seek to make a profit on their farms. We estimate that these non-commercial approaches to farming are utilised on at least 13% of agricultural land in Scotland. As such, non-commercial farming (NCF) is not a marginal practice, nor are NCF limited to small-scale 'hobby' farms: NCF exist across the scale of agricultural holding sizes and are operated by a wide range of socio-demographic cohorts. We identify 6 types of NCF: agricultural residences, specialist smallholdings, horsiculture holdings, mixed smallholdings, amenity mixed farms, and large farms or estates. These types were differentiated primarily by the scale of farm size, presence of diversification activities and types of animal present. The analysis demonstrates a number of emergent patterns of land management: *de facto* land abandonment, transition towards 'horsiculture', and management differences between retiring and new entrant NCF. We argue that the types identified reflect a number of intersecting issues in contemporary agrarian transitions, particularly the aging farmer population; generational renewal; and gendered implications of agricultural restructuring.

Keywords Smallholding · Estates · Crofting · Multifunctionality · Female farmers

Introduction

The personal and social appeal of farming activities in the global West has been widely accepted in rural studies since Gasson's (1973) seminal paper, in which she outlined the multiple motives for farming as an occupation. These included instrumental, social, expressive and intrinsic aspects of farming activities and management. Gasson and Errington's (1993) subsequent work drew attention to

the diversity of farming structures, a direction also pursued by the Arkleton researchers working on pluriactivity in the 1980s and 1990s (Fuller 1990). Through this research, Munton et al. (1989) identified varied forms of part-time farming, including survival, capital accumulation and hobby farming approaches. Recent work has identified the social status associated with being a farmer (Burton 2004; Sutherland and Darnhofer 2012; Riley 2016), and the recreational appeal of interacting with livestock (Holloway 2001, 2002). The increasing marginality of profitable family-scale farming, in combination with countercultural movements to address the negative externalities of intensive production methods, have also yielded highly differentiated approaches to farm management.

In this paper, we develop a typology of non-commercial farms (NCF), in order to improve understanding of the magnitude, differentiation and impact of this cohort of farmers on agricultural land management. To date, quantitative farm typologies in the UK have routinely identified hobby farmers as a single, minority cohort (e.g. Bowler et al. 1996; Shucksmith and Hermann 2002; Pike 2008). Non-commercially oriented farms are typically viewed as small-scale

✉ Lee-Ann Sutherland
lee-ann.sutherland@hutton.ac.uk

Carla Barlagne
carla.barlagne@hutton.ac.uk

Andrew P. Barnes
andrew.barnes@sruc.ac.uk

¹ Social, Economic and Geographical Sciences Group, The James Hutton Institute, Craigiebuckler, Aberdeen AB15 8QH, UK

² Rural Economy, Environment & Society, Scotland's Rural College (SRUC), Peter Wilson Building, Kings Buildings, West Mains Road, Edinburgh EH9 3JG, Scotland, UK

and part-time (ibid, see also Munton et al. 1989). In contrast, in the United States, farms are differentiated by the USDA (2015) largely on the basis of cash income; the lowest earners are differentiated into ‘retirement farms’, ‘off farm occupation farms’ and ‘farm-occupation farms’, recognising that retired farmers continue to operate farms at a reduced level of intensity, and that there are a cohort of farms where the operators have a primary occupation other than farming. Retirement farms (29%) and off-farm occupation farms (38.5%) together form the majority of farms in the agricultural census. Indeed, Sorice et al. (2012) found that some 39% of their Texan study sample population (of 767 farmers), operate their farms solely for lifestyle reasons.

Typology development is a well-established means of describing heterogeneity amongst land managers (Sutherland et al. 2011). A typology approach enables the design and implementation of interventions and policies that are tailored to the specificities of different and distinct characteristics (Lopez-Ridaura et al. 2018; Tuttonell 2014). Distinctions between commercial and NCF are well recognised in both social and natural science publications. For example, Snoeck et al. (2009) and Fiebig et al. (2009) utilise the term NCF in their analyses of poultry disease response, to differentiate backyard holdings from commercial farms. Within the social science literature, terms such as ‘smallholder’ and ‘back-to-the-lander’ are more common, but do not necessarily denote lack of commercial orientation. Lewis Holloway produced a series of papers in England in the early 2000s addressing smallholdings (Holloway 2000, 2001, 2002). He identified ‘smallholders’ as farmers who produce commodities with the intent to make a living on a small-scale farm, as distinct from ‘hobby farmers’, who produce commodities as a lifestyle choice (Holloway 2002). Bohnet (2008) in her qualitative typology of Australian farmers similarly differentiated ‘lifestyle farmers’ from ‘hobby farmers’—the former as those who seek to make a living and the latter as those who operate their farms solely as a recreational activity. Sutherland (2012) also distinguished between pluriactive successors and diversified farmers as non-commercial farmers – in her cases, household income was primarily generated from off-farm employment or on-farm diversification (respectively).

Work on ‘back-to-the-land movements’ also recognises that strong idealistic orientations towards land management, which counter traditional profit and production-oriented agriculture (e.g. Halfacree’s 2006, 2007, 2010 UK work; Wilbur’s 2014 work in Italy), instead emphasising self-provisioning. At a larger scale, the recent transition from commercial to recreational ranching in the American West has been described by Gosnell et al. (2005). Heley (2010) similarly identified a ‘new squirarchy’ emergent in the English countryside—households who acquired large holdings

in order to pursue hunting and fishing. NCF are thus not limited to small-scale or retirement activities, and appear across the global West.

In this paper, we argue that NCF sit at the nexus of a number of current, critical challenges for the agricultural sector. The European Commission’s (2016) ‘A strategic approach to EU Agricultural research and innovation’ paper identifies three major challenges faced by EU agriculture: food security, environment and climate change, and growth and jobs in rural territories. NCF can be expected to be less production-oriented than commercial farmers, thus offering a smaller contribution to food production; however, NCF may be well placed to address other aspects of food security such as access and stability. In contrast, NCF may be better placed to provide the public goods increasingly expected from agriculture (particularly in relation to the environment and climate change). For example, Wilson (2008) argued that hobby farmers are more likely to provide environmental benefits from their land, proposing that farmers who are free of the need to seek profits would therefore produce environmental gains by default. Macgregor and Stockdale (1994) similarly contend that estate owners’ propensity for low input land use is consistent with conservancy aims. However, Klepeis et al. (2009) demonstrated that lack of knowledge of farming approaches can lead to the proliferation of weeds on recreational holdings. Fiebig et al. (2009) demonstrated that NCF are more likely to engage in high risk disease transmission behaviours. NCF thus clearly behave differently from commercial farmers, but the relative impacts of NCF are difficult to determine.

In terms of contributing to economic growth in rural areas, research considering gentrification of agriculture suggests that NCF may invest their personal resources into upgrading farm buildings and housing stock (i.e. thus representing an investment of external capital into the local area, Sutherland 2012; Sutherland, in press), which can be expected to benefit the local economy. However, there is broad consensus in the amenity migration literature that large-scale commercial farms in scenically attractive regions are unable to compete with the purchasing power of prospective migrants, and that these migrants are overwhelmingly ex-urban, wealthy middle-class households seeking comfortable lifestyles in idyllic locations (Argent et al. 2014). NCF approaches can thus limit opportunities for commercial farm expansion and new entrants to the sector.

The aims of the paper are as follows:

- to identify the distinguishing characteristics of NCF in Scotland
- to assess how the emergent types of NCF compare to the types identified in the literature

- to analyse the place of NCF within contemporary agrarian transitions

We first present the context for NCF in Scotland, following with a description of the research method: a survey of 2380 Scottish farmers which assessed their current farm practices and future intentions. Descriptive statistics comparing NCF with commercial farmers are followed by the typology. We proceed to a discussion of the key findings and conclude with policy implications and directions for future research.

The context for non-commercial farming in Scotland: Estates, crofts and intergenerational tenancies

Scotland is particularly suited to the analysis of non-commercial farming (NCF), because of its policy focus on land reform. The Scottish Government is seeking to “remove the land-based barriers to the sustainable development of rural communities” (Land Reform Review Group 2014, p. 24), through wide ranging legislative reform, particularly of land holding laws. These reforms are aimed at balancing public and private interests, to enable more people to have a stake in ownership and management of land (*ibid*). At present, Scotland has one of the most concentrated land ownership structures in the world (Wightman 2013; Peacock 2018).

Contemporary land reform is set within Scotland's heritage of large-scale (largely 'sporting' i.e. fishing, grouse shooting and deer stalking) estates, which can range from tens to hundreds of thousands of hectares of land. Agricultural land on these estates has traditionally been 'tenanted' (through long term, inheritable rental agreements). The break-up of estates following the First World War in many cases led to sales of land to sitting tenants, creating a new cohort of owner-occupiers, which increased throughout the twentieth century. By the time of data collection for this study (2013), about three quarters of agricultural land in Scotland was owner-operated. New legislation introduced in the 1990s enabled the formation of limited duration (as opposed to secure 'inheritable') tenancies (see McKee 2013). The important point for this paper is that a range of tenancy options exist, from inheritable multi-generation tenancies, to tenancies of 1, 5, 10 and 15 year durations. It is thus possible to inherit the right to rent a farm on a long-term basis.

The legacy of estates is conjoined to the land holding form of 'crofting'. Colloquially known as a 'small piece of land entirely surrounded by legislation' (Shucksmith and Rønningen 2011), crofts are small-scale, tenanted properties historically tied to estates in the highlands and islands of Scotland (i.e. remote regions). A series of legislative reforms

since the 1880s have provided crofters with security of tenure and led to the establishment of a substantial cohort of owner-occupiers (Scottish Crofting Federation 2016). A series of reforms over the past decade have sought to ensure that land is maintained in good condition, crofts are occupied and speculation curbed¹ (see Sutherland et al. 2014). Crofting is a legal designation, restricted to highland and island areas of Scotland. Crofts traditionally produce a mix of livestock, most commonly grazing animals (cattle and sheep). Crofts may be owner occupied or tenanted, enjoying the same rights to intergenerational transfer as tenanted farms.

The broader policy context is also important to the socio-economic context for NCFs. Like the rest of the European Union, the primary subsidies for farmers come through the Common Agricultural Policy. At the time of the data collection, this was in the form of the Single Farm Payment (SFP). Unlike England, which opted for an area-based payment in the 2005 reforms, Scotland based its SFP calculations on the production of the farms in question during the 2002/2003 reference period (i.e. 'historic payments' where subsidies were determined on the basis of previous entitlements). The survey was undertaken in part to assess the potential impacts of transition to an area-based payment system, which was introduced in 2015. It is important to note that the 2005 reforms decoupled subsidies from production (i.e. the SFP is received on the basis of production during the reference period); retention of control of the land and maintenance in good condition were the requirements (i.e. not production) to continue to receive this subsidy. This has led in some cases to 'slipper farming' (Poling 2012; BBC News 2016), whereby land owners receive subsidies but do not produce agricultural goods. The structure of these subsidies also enables older farmers to retire without leaving their farms, collecting subsidies as a form of pension. Farmers can thus transition to NCF as a form of semi-retirement (a transition strategy identified by Bowler et al. 1996; Shucksmith and Hermann 2002). Similarly, it is also possible to utilise a farm primarily as a residence, and still receive subsidies.

The subject of NCF raises the question of the profitability of Scottish farming in general. Business income from farming fluctuates and varies by commodity group. For example, in 2017, the Scottish Government (2018) reported an average farm income of £26,400 (including subsidies)—a substantial increase from the £12,800 average in 2016. Even so, the Scottish Government's analysis suggests that in commercial terms, the average farm production operates at a loss: profits are achieved through other sources of income (particularly subsidies). For the 2016/2017 financial year,

¹ Crofts in visually attractive locales can be popular as second homes.

the Scottish Government reported that without subsidies, the average farm business would have lost approximately £14,900. However, the Scottish Government also estimates that the average farm is worth £1.3 million. Most farmers thus make quite a minimal return on a substantial capital investment, if they make a return at all. The question in the survey addressed whether farmers sought to make a profit or break even on their holdings; it did not ask whether these goals were actually achieved.

Typology development

There are two primary approaches to typology development: expert-based typologies and statistical typologies. Expert based-typologies rely on expert knowledge; whilst reducing the costs of forming typologies, these approaches can suffer from lack of precision (Landais 1996). Alternatively, statistical typologies enable farm classification without as many *a priori* assumptions. Quantitative approaches to typologies are consequently dependant on the coverage through variable selection used to build up the classification (Landais 1996; Madry et al. 2013; Blazy et al. 2009; Iraizoz et al. 2007; Lopez-Ridaura et al. 2018; Tittone 2014). Our approach combines the strength of both types of typologies by conducting the analysis on a statistically representative sample of holdings and using expert knowledge from the academic literature to select the classifying variables and their modalities. Hypotheses were formulated on the factors that differentiated between holdings on the basis of the existing literature about NCF and previous experience of the research team on the topic (e.g. Sutherland et al. 2014, 2017).

In order to inform typology development, a number of potential differentiating characteristics of NCF compared to commercial farms were identified by the research team.

- *Identity*: Qualitative studies of hobby farming and small-holding typically rely on self-identification. Smallholders, for example, do not typically see themselves as hobby farmers; indeed, identification as a hobby farmer can be considered offensive (Sutherland in press). Within the cohort of NCF identified for this study, self-identification was not found to be a consistent differentiating characteristic—self-identified hobby farmers existed across the range of scales and land production types. It was therefore utilised as a descriptor, rather than a differentiating characteristic in the typology development.
- *Scale*: As discussed in the introduction, NCF are typically considered small-scale. This is a criterion utilised in Shucksmith and Hermann's (2002) typology, and the non-profit orientation of most smallholders was identified in Holloway's (2001) work. Wilson (2008) similarly

comments that most hobby farmers are small scale. However, it is also clear that NCF can exist across the range of scales, particularly evident in the UK's new squirarchy (Heley 2010) and recreational ranch owners in the American West (Gosnell et al. 2007). Although scale in terms of acreage clearly emerged as a defining characteristic of the typology, this was not true of the number of employees (which indicates size of business). Acreage was thus utilised as a differentiating characteristic in the typology, but numbers of employees was utilised as a descriptor.

- *Level of Diversification*: It is expected that (some) diversified farms will have sufficient income that they do not need to undertake commercial agricultural production. The literature on farm diversification demonstrates that diversification can be undertaken either to accumulate wealth, or simply as a survival strategy (Evans and Ilbery 1993; Meert et al. 2005; López-i-Gelats et al. 2011). Diversification activities here include: processing and retailing, tourism and recreation, forestry, agricultural services, renewable energy or other non-farming activities. Diversification did not emerge as a differentiating characteristic and was thus utilised as a descriptor.
- *Presence of livestock*: The appeal of working with animals is well documented in the hobby farming literature (e.g. Holloway 2001). Working with animals is typically part of the appeal of NCF. Sutherland et al. (2014) found increases in recreational-scale pig and poultry production on Scottish small-holdings. The determination of commercial-scale herd and flock size are somewhat arbitrary; by definition, the NCF under consideration are not aiming to produce commercially. However, the authors felt it was important to distinguish between commodity production that appeared to be recreational in scale, in comparison to commodity production which would appear commercial to an outside observer. Sutherland et al. (2014) utilised more than 50 pigs or and more than 1000 birds as evidence of commercial-scale in Scotland. In this present study, lower thresholds were set, on the basis of required labour: up to 10 cattle or 10 pigs, up to 50 sheep and up to 100 poultry. The presence of different numbers of livestock was utilised as a differentiating characteristic.
- *Presence of Horses*: The equine industry in the UK plays a major role in the rural industry: it is the second biggest employer in the rural environment after agriculture (Nix 2013). A recent estimate from Horse Scotland identified 100,000 equines in 2014 (Horse Scotland 2012). Sutherland et al. (2014) documented a 56% increase in horse numbers in Scotland between 2001 and 2011. Horse numbers increased across the range of farm sizes and in every region in Scotland. The rise in horse numbers was attributed to the rise of the 'experience economy' by the

Henley Centre (2004) in a report for the British Horse Association and Defra. Experience economy concepts identify broader cultural transitions from consumption of commodities, goods, and services, to the search for experiences (Pine II and Gilmour 2011).

- *Land use and crop production*: Sutherland et al.'s (2014) analysis of census figures also found evidence of *de facto* land abandonment—some 40% of farmers with less than 10 hectares of land reported no commodity production or labour. Although this could reflect issues in the dataset (e.g. multiple holdings, informal rentals, communal grazing), they contended that there may indeed be a substantive number of properties which make no productive use of their land resource. Qualitative research in Scotland has suggested that *de facto* land abandonment is indeed occurring in some regions (Sutherland *in press*).

The data were generated from a spatially and sectorally representative telephone survey of 10,000 holdings in Scotland conducted in the summer of 2013. These holdings were chosen on the basis of the Scottish agricultural census, which is the most comprehensive data source for agricultural land management in Scotland. Other Scottish studies (e.g. Guillem et al. 2012) have drawn on Integrated Administration and Control System (IACS) data, which is more detailed. However, IACS omits holdings not registered to receive subsidies or farm business payments, many of which are likely to represent NCF. The census is thus the most appropriate dataset available for the research. The original sample of 10,000 farms was stratified by region and size to enable a representative response reflective of the regional and size distribution of agricultural land use.

The survey yielded 2416 responses, of which 36 individuals were discarded from the analysis because of missing values. The analysis was thus performed on a sample of 2380 responses, out of which 16.6% self-identified as NCF farms. Survey responses were then joined to the data collected on the associated holdings by the June Agricultural Census (JAC) of 2013, in order to augment the data set. The holding code, a unique identifier of the land holdings was used to match the two data sets. This data source gives national level coverage and detailed holding information, thus enabling stratification.

The primary purpose of the 2013 survey was to assess structural changes on Scottish farms. Participants were asked about their business trajectories, with respect to their response to 2005 CAP reforms, and to identify planned future changes under proposed subsidy reforms of the CAP. 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. 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, access to information) (see Barnes et al. 2016; Sutherland et al. 2016; Hopkins et al. 2017).

We firstly compared non-commercial and commercial farms to understand the main characteristics of the two cohorts. We focused the analysis on understanding the use NCF make of the land asset, the relative importance of diversification and on-farm activities as well as their combination of productive activities.

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) (refer to Table 1). In order to use both types of variables in the typology as well as to reflect the intensity in which NCF engage in particular activities (no engagement, engagement on a recreational scale, and engagement on a commercial scale), we transformed the quantitative variables of interest into categorical variables based on threshold values of the quantitative variables as described in Cornillon et al. (2012). Those threshold values were determined from expertise of the research team and are reflected in the distinction made between engagement in an activity on a recreational or a commercial scale (cf. Table 1). We then applied a two-step methodology that comprised a Multiple Correspondence Analysis (MCA) followed by a Hierarchical Ascendant Clustering (HAC).

The MCA establishes the resemblance between individuals on the basis of categories of qualitative data and highlights profiles of individuals. It also makes explicit links between variables and makes it possible to study the links between modalities of the variables (Cornillon et al. 2012). Next it eliminates the noise in the data by reducing its complexity. The data can then be treated through with a HAC algorithm that enables the grouping of individuals (here holdings) based on their proximity, or resemblance, on an aggregation criteria, i.e. the Ward criteria Blazy et al. 2009; Hair et al. 2016; Marques et al. 2016). Individuals are grouped so that both the homogeneity within the group and the heterogeneity between groups are maximized. The variables that were retained for the analysis and their modalities are described in Table 1.

The typology resulted from an iterative process whereby the results of the cluster analysis were compared with the reality of the target as hypothesized by the authors (based on definitions of smallholding, hobby farming, horsiculture and recreational farming in the academic literature). The HAC analysis produces a dendrogram that results from the progressive agglomeration of individuals that share a similar set of properties. The number of clusters was determined visually, by looking at the dendrogram and the cut was defined at a level that ensured maximum intraclass homogeneity and maximum interclass heterogeneity.

Table 1 Definition of variables used to develop a typology of non-commercial farms in Scotland

Variable	Definition	Modalities	Units
Scale	Size class	Very small: < 10 Small: 10–50 Medium: 50–200 Large farms or Estates: > 200	Ha
Diversification	Proportion of farms engaged in diversification activities	Yes No	–
Crops	Proportion of farms engaged in crop farming	No crops Up to 10 More than 10	Ha
Horses	Proportion of farms with horses	No horses Personal use: up to 5 Commercial use: more than 5	Units
Sheep or cattle	Proportion of farms engaged in sheep or cattle production	No cattle or sheep Recreational scale: up to 10 cattle or 50 sheep Commercial scale: more than 10 cattle or 50 sheep	Units
Pigs or poultry or livestock	Proportion of farms engaged in pigs or poultry or other livestock farming	No pigs or poultry or livestock Recreational scale: up to 10 pigs or 100 poultry or 20 other livestock Commercial scale: more than 10 pigs or 100 poultry or 20 other livestock	Units

Threshold values of the modalities were defined by the research team

Descriptive statistics were then produced to characterise the different types and tests were performed to explore relationships between categorical variables as well as differences between groups. The Chi square was used to test whether two categorical variables were significantly associated (Pallant 2016) while the Kruskal–Wallis test was performed to assess whether measures or quantities were significantly different across types of farmers (Pallant 2016). The Fischer's exact test was used where Chi square assumptions (of sufficient expected count cells) could not be met by the data (Pallant 2016). Data handling, analysis and graphing were performed in R version 3.3.1 (R Development Core Team 2016) using the FactoMineR (Le Sebastien and Husson 2008), flashClust (Langfelder and Horvath 2012) and plyr (Wickham 2011) analysis packages.

Findings

Characterising non-commercial farmers

A total of 2,380 respondents were retained for the analysis. They represent the surveyed sample utilised in this paper. Amongst them, non-commercial farmers (NCF) are those

farmers who have 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, see Table 2).

Together, NCF own or manage 82,359 ha of the land of the surveyed sample i.e. 13% of the total area of the surveyed sample. By definition, NCF do not expect to sustain their livelihoods while operating their farming business or holding since they either expect to break even or to make loss when running it. Comparing responses to those of self-identification as a farmer (determined by the answer to the question: 'Do you consider yourself to be...?') (cf Table 3), the results show that 18% of the NCF consider themselves to be full time farmers. Of these the

Table 2 Survey responses to the question: Is this enterprise operated for profit?

Survey responses options	Number of respondents	Proportion (%)
No—but it is important that it break even	284	11.9
No—we expect to make a loss	111	4.7
Yes	1985	83.4

Table 3 Self-identification of the non-commercial farmers (% of respondents)

Group of interest	Non-commercial farmers	Commercial farmers	Surveyed sample
Business person	1.3	0.7	0.8
Full time farmer	18.0	73.3	64.1
Part time farmer	29.6	18.8	20.6
Hobby farmer	38.0	1.3	7.4
Manager	9.1	5.4	6.0
Other	4.1	0.5	1.1

majority (79%) expected to break even and 11% to make losses. Around 38% of NCF consider themselves to be hobby farmers and 30% consider themselves to be part-time farmers. This indicates that there are self-identified

hobby farmers who seek to make a profit from their farms, but also, more commonly, that there are farmers who do not self-identify as hobby farmers but nevertheless do not expect to make a profit from their agricultural production.

Table 4 shows the main socio-economic characteristics of the non-commercial farmers (NCF) compared to the commercial farmers (CF) cohort. Overall, women are more likely to farm NCFs than is characteristic of commercial farming (38% in the NCF group against 15% of the CF group) but NCF are still mostly operated by men (62% of the NCF group Table 4). NCF also tend to be more highly educated than commercial farmers.

In terms of land tenure, a higher proportion of NCF are tenant farmers, compared to commercial farmers. Nevertheless, for both groups the majority do own their farms. NCF are also more likely to be new entrants to farming, evident in the amount of time they have been involved in a farming

Table 4 Socio-demographic characteristics of commercial and non-commercial farmers compared to the surveyed sample (% of respondents)

Factor	Category of interest	Non-commercial farmers	Commercial farmers	Surveyed sample
Gender	Female	38.0	15.3	19.2
	Male	62.0	84.7	80.8
Age	< 35	3.1	5.5	5.1
	36–44	11.8	10.0	10.3
	45–54	25.5	28.9	28.3
	55–64	26.2	31.6	30.6
	Over 65	33.4	24.1	25.7
Education	College	28.4	35.0	33.9
	School	42.8	46.0	45.9
	University or higher	28.8	18.4	20.2
Status	Manager	4.8	3.9	4
	Owner	60.8	62.3	62
	Tenant	27.6	20.0	21.3
	Tenant and owner	12.7	13.9	12.7
Time involved in the holding	Less than 5 years	10.1	4.1	5.1
	Around 5–10 years	16.1	5.0	6.9
	Around 10–20 years	20.2	13.9	14.9
	More than 20 years	53.6	77.1	73
Employ	None	81.0	44.3	50.6
	One to three	17.3	46.5	41.4
	Four to ten	1.4	8.1	7
	More than ten	0.2	1.2	1
Self-identification	Business person	1.2	0.8	0.8
	Full time farmer	18.0	73.3	63.8
	Hobby farmer	38.0	1.3	7.6
	Manager	8.9	5.4	6
	Other	3.8	0.5	1.1
	Part time farmer	30.0	18.9	20.8
Inherited	No	56.7	30.5	35
	Yes	43.3	69.5	65

Table 5 Proportion of non-commercial and commercial farmers operating non-farming enterprises on farm (%)

Group of interest	Non-commercial farmers	Commercial farmers	Surveyed sample
Retail	1.9	2.0	1.9
Tourism	5.8	8.9	8.3
Forestry	6.7	3.9	4.3
Agricultural services	2.9	2.2	2.3
Renewable	4.3	7.7	7.1
Equine	3.8	2.0	2.3
Other	9.9	9.3	9.4

activity. If we take into account the finding that NCF are less likely than commercial farmers to have inherited their farm, it suggests that a substantial cohort within NCF results from a voluntary act to acquire land to fulfil a specific lifestyle or set of values. There is another cohort who may have inherited tenancies and opted to pursue farming on a part-time or non-commercial basis (consistent with Sutherland 2012). It is also likely that a subset of new entrants to farming to not aim to make a profit in the first few years of operation.

NCF are also more likely to be aged over 65 than CF. Looking at the amount of time respondents have been involved in farming reveals that 88% of the NCF aged over 65 have been involved in farming for more than 10 years and 71% for more than 20 years. This suggests that these farmers may have transitioned to NCF as a form of semi-retirement. As described in the context section, the eligibility criteria for the major state agricultural subsidies (the Single Farm Payment) at the time of the survey did not require farmers to produce agricultural commodities on their land; this subsidy thus can act as a form of pension.

Although NCF do not make a profit on their activity, a small proportion of them (17%) employ 1 to 3 people. These employees are primarily in three of the six identified types of NCF (described in the following section).

As would be expected, NCF are not heavily subsidy reliant as CF. Some 40% of the NCF reported receiving the Single Farm Payment, but this represented more than half of the income from the enterprise for only 11% of respondents. In addition, 27% of the NCF received other government subsidies but only a marginal number (2%) saw these as significant. The capital value of the farm business has increased for nearly half of the NCF group, most likely reflecting the increased value of agricultural land over the period of study, but potentially also reflecting investments made. NCF are generally positive about the economic prospects of their households: 46% of the NCF considered the economic prospects of their household to be fair while and 39% of them considered them to be from good to excellent.

A small proportion of NCF operate non-farming enterprises (i.e. diversification). Those proportions are similar to those of the commercial farmers (Table 5). This suggests that NCF primarily use their land recreationally or as a place to live rather than a way to generate income from non-farming sources. Results also show that forestry and horses are associated with amenity lifestyles. NCF are more likely to be organic or be in conversion to organic status than CF, but the proportion nevertheless remains low. Literature on back-to-the-land movements (e.g. Halfacree 2007; Wilbur 2014) demonstrates the personal appeal of alternative agricultural approaches. However, the cost of certification may be prohibitive, particularly for farms where profit is not a motive (Sutherland 2011).

A typology of non-commercial farms

To better understand the different approaches within 'non-commercial farming' (NCF), the researchers developed a typology, differentiating between six types of NCF on the basis of holding size, engagement in diversification or non-farming activities and the types of commodities produced (e.g. crops and/or different types of animals) (see Table 6).

The number of types was determined by an iterative process between observation of the dendrogram and expertise of the research team regarding the number and characteristics of the different types (see Cornillon et al. 2012). The first natural cut of the tree (that provided the maximum intra group homogeneity and intergroup heterogeneity) led to three groups but this did not provide enough discriminatory power between the different types of farmers. The second natural cut (at 0.06 on the dendrogram, see Fig. 1) ensured maximum intra group homogeneity and intergroup heterogeneity as well as sufficient explanatory power of the typology, leading to 6 groups (Table 6).

Type 1: 'Specialist smallholdings' (N=10) are very small or small. Some 40% engage in diversification. They have no crops, but have specialised in pigs, poultry and livestock beyond recreational scale.

Type 2: 'Agricultural residences' (N=136) are very small, 30% are diversified land holdings. They do not engage in either crop or animal production.

Type 3: 'Horsiculture holdings' (N=57) are very small holdings which have horses on either a recreational (up to 5 horses) or a commercial scale (more than 5 horses, suggestive of horse breeding or livery). They do not engage in crop production but about one-third engage in small-scale cattle and sheep and some 40% have pigs, poultry or other livestock.

Type 4: 'Mixed smallholdings' (N=111) are either very small or small holdings that do not engage in diversification. They engage in cattle and sheep farming on either a recreational scale (45.0%) or commercial scale (38%). They

Table 6 Typology of the non-commercial farmers

Factor	Category of interest	Specialist small holdings	Agricultural residences	Horsiculture holdings N	Mixed small-holdings	Amenity livestock farms	Large farms/ Estates	p	Test (notes)
Gender	Female	20.0	42.6	54.4	35.1	28.3	25.0	0.009	$X^2(2, n=395)=9.5098$
	Male	80.0	57.4	45.6	64.9	71.7	75.0		
Age	< 35	0.0	3.7	3.5	2.7	1.9	3.6	0.003	$X^2(5, n=395)=17.618$
	36–44	0.0	11.8	12.3	9.9	9.4	25.0		
	45–54	20.0	23.5	29.8	27.0	30.2	17.9		
	55–64	50.0	21.3	24.6	33.3	28.3	25.0		
	Over 65	30.0	39.7	29.8	27.0	30.2	28.6		
Educational achievement	School	50.0	44.9	36.8	38.7	49.1	21.4	0.031	$X^2(3, n=395)=8.8525$
	College	40.0	20.6	29.8	33.3	39.6	28.6		
	University or higher	10.0	34.6	33.3	27.9	11.3	50.0		
Status in relation to land	Manager	10.0	1.5	1.8	1.8	5.7	35.7	0.013	$X^2(4, n=395)=12.755$
	Owner	80.0	68.4	82.5	54.1	62.3	35.7		
	Tenant	10.0	27.2	1.8	37.8	20.8	25.0		
	Tenant and owner	0.0	2.9	14.0	6.3	11.3	3.6		
Time involved in holding	< 5 years	10.0	9.6	8.8	9.0	11.3	21.4	0.054	$X^2(4, n=395)=9.3041$
	5–10 years	40.0	18.4	17.5	19.8	1.9	14.3		
	10–20 years	10.0	20.6	31.6	22.5	11.3	14.3		
	> 20 years	40.0	51.5	42.1	48.6	75.5	50.0		
Employed staff	None	60.0	90.5	91.2	85.6	66.0	32.1	0.000	$X^2(4, n=395)=24.554$
	1–3	40.0	8.8	8.8	14.4	32.1	53.6		
	4–10	0.0	0.7	0.0	0.0	1.9	10.7		
	> 10	0.0	0.0	0.0	0.0	0.0	3.6		
Inherited the holding	No	70.0	56.6	89.5	53.2	43.4	42.9	0.009	$X^2(2, n=395)=9.506$
	Yes	30.0	43.4	10.5	46.8	56.6	57.1		
Self-identity	Business person	0.0	2.2	0.0	1.8	0.0	0.0	0.004	$X^2(6, n=395)=18.899$
	Full time farmer	10.0	8.1	3.5	18.0	54.7	28.6		
	Part time farmer	30.0	29.4	26.3	30.6	34.0	25.0		
	Hobby farmer	50.0	41.2	54.4	46.8	7.5	7.1		
	Manager	10.0	11.8	12.3	0.9	3.8	32.1		
	Other	0.0	7.4	3.5	1.8	0.0	7.1		
Proportion of crofters		20.0	32.4	10.5	27.0	5.7	17.9	0.197	$X^2(1, n=395)=1.6643$
	N	10	136	57	111	53	28		

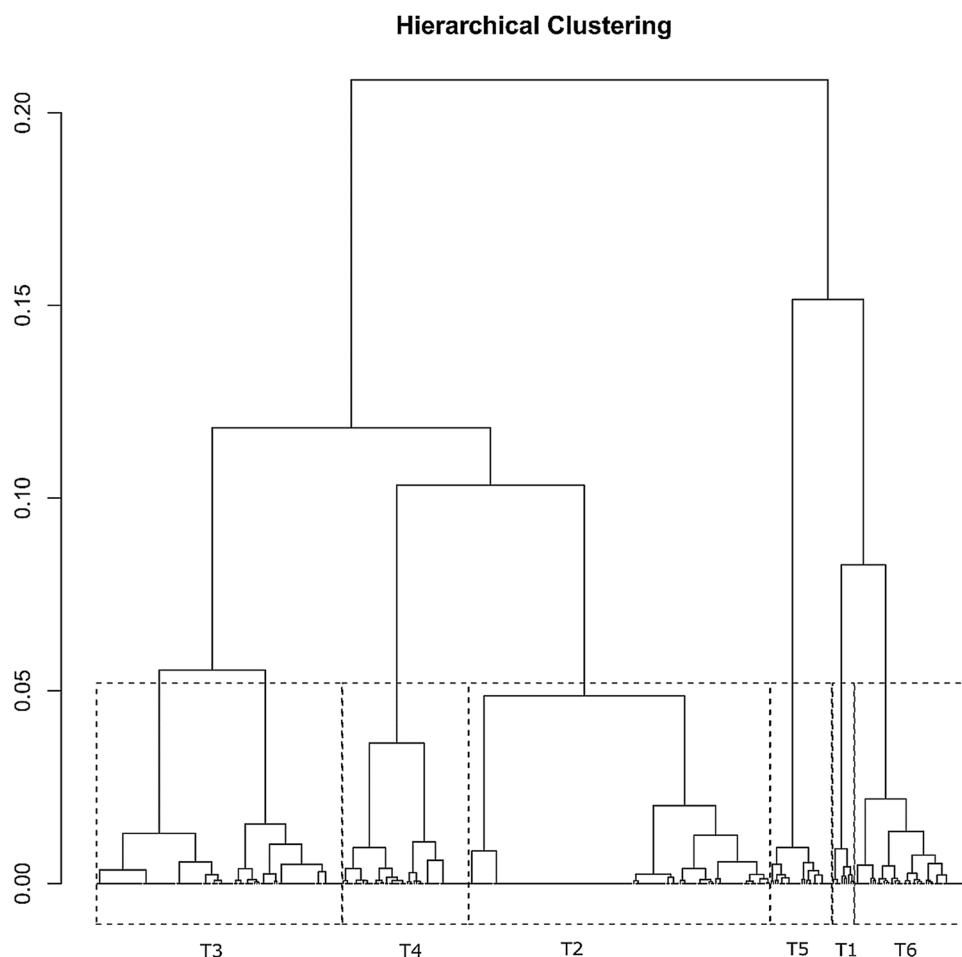
Proportions are displayed, discriminative variables *

Bold p values indicate significance at the 0.05 level

also engage in pigs, poultry or other livestock production on a recreational scale (43%). As such, they produce traditional croft commodities, but only 27.0% are located on

officially designated 'croft' land. They do not have either crops or horses.

Fig. 1 Dendrogram of hierarchical clustering performed on the outputs of the MCA for all the variables. To obtain an optimal explanatory power of the typology, the tree was set at 0.06 so that within-cluster homogeneity and between-clusters heterogeneity were maximal while at the same time allowing a number of clusters that represented and explained the diversity in the sample. The clusters are labelled as follows: *T1* specialist smallholdings, *T2* agricultural residences, *T3* horsiculture farms, *T4* mixed smallholdings, *T5* amenity livestock farms, *T6* large farms/estates



Type 5: (N=53) ‘Amenity livestock farms’ are between 50 and 200 hectares in size. They engage in cattle and sheep farming on a commercial scale and 30.0% of them have more than 10 hectares of crops.

Type 6: ‘Large farms/Estates’ (N=28) are more than 200 hectares in size and engage in cattle and sheep farming on a commercial scale; almost half (46%) are diversified.

Characteristics of the six types.

Descriptive statistics were calculated for the six types of NCF to understand more about the respondents’ characteristics. The exact Fisher test that was performed on the categorical variable ‘Type’ and the descriptive variables revealed that type is linked to all of them except age (p values inferior to 0.05 for all the variables but the age with a p-value of 0.669) therefore indicating that the types are significantly associated to the descriptive variables. Next, the Kruskal–Wallis test revealed significant differences across farmers’ types for all but two variables (time involved in the holding and proportion of crofters). Both results highlight the unicity of the types. Cross comparison of the types reveals that the gender balance is in favour of men in the Specialist Smallholdings, Mixed Smallholdings, Amenity Livestock Farms and Large Farms and Estates. Male and

female-led farms are more evenly distributed between the Agricultural Residences and the Horsiculture Holdings types (for detailed information about the socio-demographic characteristics of each group, refer to Table 6).

More than 70% of the respondents in the first four types self-identified as part time or hobby farmers. On a bigger scale, the last two groups, included a higher proportion of self-identified full-time farmers (55 and 29% for the Amenity Livestock Farms and Large Farms and Estates respectively) and managers (4 and 32% for the Amenity Livestock farms and Large Farms and Estates respectively).

Young people tend to be under-represented in NCF with the highest proportion of people under 44 in the Large Farms and Estates type (29%). Large Farms and Estates is also the type that includes the highest proportion of respondents who declared themselves to be farm managers (32%). Together, the two statistics suggest that about 30% of Large Farms and Estates are run by professional managers of working age. Agricultural Residences have the highest number of farmers over the age of 65; however, a substantial cohort of all six types are of retirement age, demonstrating that retired farmers do not have a uniform pattern of downscaling.

Table 7 Economic prospects of the household

Factor	Category of interest	Specialist small-holdings N = 10	Agricultural residences N = 136	Horticulture holdings N = 57	Mixed small-holdings' N = 111	Amenity livestock farms N = 53	Large farms/ Estates N = 28	p	Test (notes)
Capital value of your farm business since 2005	Decreased	20.0	7.4	7.0	17.1	5.7	14.3	0.051	$X^2(2, n = 395) = 5.9521$
	Increased	50.0	43.4	59.6	40.5	58.5	57.1		
	Stayed the same	30.0	49.3	33.3	42.3	35.8	28.6		
Current economic position of your household	Bad	0.0	7.4	5.3	0.9	1.9	0.0	0.002	$X^2(4, n = 395) = 17.205$
	Poor	30.0	5.9	7.0	15.3	24.5	10.7		
	Fair	50.0	44.9	54.4	60.4	52.8	64.3		
	Good	20.0	32.4	28.1	23.4	20.8	17.9		
	Excellent	0.0	9.6	5.3	0.0	0.0	7.1		
Household economic prospects for the next five years	Bad	10.0	4.4	3.5	0.9	0.0	0.0	0.002	$X^2(4, n = 395) = 17.464$
	Poor	20.0	9.6	5.3	18.0	13.2	17.9		
	Fair	30.0	44.1	43.9	45.0	54.7	50.0		
	Good	30.0	33.1	40.4	33.3	30.2	28.6		
	Excellent	10.0	8.8	7.0	2.7	1.9	3.6		
N		10	136	57	111	53	28		

Differences between types were tested with the Kruskal–Wallis test. The p value and the test statistics are indicated. Bold p values indicate significance at the 0.05 level.

Table 8 Share of the Single Farm Payment in the income of the holding

Subsidy income	Type category of interest	Specialist small-holdings	Agricultural residences	Horticulture holdings	Mixed small-holdings	Amenity live-stock farms	Large farms/ Estates	p	Test (notes)
Percentage of the holding income from the Single Farm Payment	Zero	60.0	81.6	91.2	51.4	15.1	32.1	0.016	$\chi^2(4, n = 395) = 12.198$
	Less than 25 pct	20.0	8.1	3.5	27.0	32.1	25.0		
	Around 25–50 pct	20.0	4.4	1.8	11.7	30.2	25.0		
	Around 50–75 pct	0.0	4.4	1.8	4.5	15.1	7.1		
From 2005, this income has...	Over 75pct	0.0	1.5	1.8	5.4	7.5	10.7	0.001	$\chi^2(2, n = 395) = 13.154$
	Decreased	10.0	5.9	7.0	15.3	13.2	28.6		
	Increased	10.0	2.2	0.0	0.9	5.7	3.6		
	Stayed the same	80.0	91.9	93.0	83.8	81.1	67.9		
	N	10	136	57	111	53	28		

Differences between types were tested with the Kruskal–Wallis test. The p value and the test statistics are indicated
 Bold p values indicate significance at the 0.05 level

Educational achievement is quite distinct between groups. Specialist Smallholdings and Amenity Livestock Farms have the highest proportion of people with school degrees while Large Farms and Estates have the highest proportion of people with a university degree or higher. As these holdings are more likely to be professionally managed, this most likely reflects the training of their managers.

In terms of status in relation to land, informants tended to be owners of their holding (i.e. more than 50% of the respondents in the different groups with a maximum of 80% in the Specialist Smallholding type). The exception was for the Large Farms and Estates, which is to be expected given the higher percentage of managers.

Interestingly, Specialist Small Holdings, Amenity Livestock Farms and Large Farms and Estates involve hired labour; close to or more than a third of the respondents in each group declared that they employed from 1 to 3 people (40%, 32% and 54% respectively). Albeit a smaller proportion of the Mixed Smallholdings employs from 1 to 3 people, they potentially generate as many employment opportunities as the Large Farms and Estates since they represent 28% of the sample (against 7% for the Large Farms and Estates).

When it comes to inheritance of the holding, types with the smallest size of holdings have the highest proportion of respondents who did not inherit the holding. More than half of the respondents in the Amenity Livestock Farms and the Large Farms and Estates types indicated that they had inherited their holdings. This suggests that formerly commercial holdings may have become non-commercial upon inheritance; it is also possible that these holdings have been held non-commercially for multiple generations.

Overall, the age structure of the sample as well as the status in relation to the land tends suggests that NCF would be people (not necessarily from a rural area) who decide to buy a small piece of land and farm it as a lifestyle choice after a period of paid employment. Similarly, the high proportion of people who consider themselves to be hobby farmers or part time farmers implies that the people owning those holdings and being agriculturally active on them as either a lifestyle or while having a complementary off-farm activity. To some extent, NCF generate employment in rural areas but the ageing population as well as the fact that the proportion of respondents who have been involved in the holding more than 20 years raises the question of the generational renewal of this population of farmers.

Economic prospects of the household

The Fisher Exact test revealed that there was a strong relationship between the types and both the capital value of the farm business and the economic position the household (p values of 0.044 and 0.001) but no significant relationship could be established between the types and the economic

prospects of the household (p value = 0.188) (see Table 7). Next, the Kruskal–Wallis test revealed significant differences across farmers' types regarding the current economic position of the household and the economic prospects for the household over the next 5 years (cf. 8). Close to or more than 50% of the different groups declared the current economic position of their household to be only fair. This suggests that these individuals do not see themselves as wealthy. Two groups seem to face poorer economic conditions and have declared the current economic position of their household to be poor: the Specialist Smallholdings (30%) and the amenity livestock farms (25%). However, close to or more than 20% of the respondents in all the types declared the current economic position of their household to be 'good'; this proportion reaches 33% for the Agricultural Residences type. Interestingly, respondents foresee some room for improvement of the economic situation of their households in the future, as a higher proportion of the different types describe the economic prospects for their household to be 'good' over the next five years (min of 29% of for the Large Farms and Estates and maximum of 40% for the agricultural residences).

Share of the Single Farm Payment in the income of the holding

The Fisher exact test revealed that there is a strong relationship between the types and both the percentage of the holding income from Single Farm Payment and the evolution of this income over time (p values of 0.000 and 0.005 respectively). The Kruskal–Wallis test also revealed significant differences between farm types (Table 8).

Most of the respondents in the first four types did not receive the Single Farm Payment (the primary agricultural subsidy). However, this payment contributes up to 50% of the farm income for 40% of the Specialist Smallholdings, 39% of the Mixed Smallholdings, 62% of the Amenity Livestock farms and 50% of the Large farms and Estates.

Discussion

In this paper we have identified six types of non-commercial farmer (NCF), utilising a combination of expert and statistical analysis. The purpose of the paper was not to develop a definitive typology, but to demonstrate the heterogeneity of NCF, in order to better understand the role they play in contemporary agrarian transitions. Emtage et al. (2007) draw on Hair et al. (1998) to identify two criteria for evaluating the utility of a typology: "predictive validity" and "critical utility". Predictive validity is the extent to which the characteristics of landholder types are consistent with previous research and associated theories. Critical utility is

the usefulness of a typology for allowing program designers and others who would intervene in the system to influence the behaviour of the cohort (e.g. owing to differing motivations and capabilities, see Emtage et al. 2007, p. 483). In this section, we first describe the fit of study findings with literature on recreational approaches to agriculture, and then assess the implications for influencing behaviour change. We conclude with a discussion of limitations and options for future research.

Comparison to types

Agricultural residences (36%) were the most common type of NCF identified in the analysis. This is a type which appears 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. This is consistent with a study by Sutherland et al. (2014), which found that 44% of holdings under 10 ha in Scotland reported no livestock or labour. A qualitative study by Sutherland (in press) found that this type of holding can either be purchased specifically as a residence, or transition to inactive use over the life course of the owner. This present study suggests that there is substantive *de facto* land abandonment occurring on small-scale holdings in Scotland. This is particularly notable in crofting areas, where recent legislative reforms have aimed to address issues of land abandonment and absentee ownership.

The second most common type 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%). Tenants pay rent for their land—it is unlikely that a landlord would choose a new tenant who does not have a viable business case. The non-commercial orientation of tenanted farms thus suggests that these holdings underwent transition from commercial to non-commercial at some point in their history: either through downscaling of production by the farmer or inheritance by offspring not interested or able to establish a viable commercial operation. Tenancies and small-scale farms have traditionally represented a means of entering the farming sector, as the cost of purchasing land is prohibitive to newcomers. However, over half of this type appears to have purchased their land. Agricultural residences and mixed smallholdings can thus be seen as blocking the traditional entry points for commercially oriented newcomers (i.e. small-scale farms), while simultaneously representing non-commercial newcomers to farming. Recent European analyses (e.g. Zagata et al. 2017; EIP Agri 2016) consistently

demonstrate that access to land is the largest barrier to new entrants to farming.

Horsiculture holdings form the third largest category of NCF identified (14%). They are 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. A study by Sutherland et al. (2014) analysed agricultural census statistics in Scotland to demonstrate that horse numbers in Scotland had increased by 56% from 2000 to 2011 across all holding sizes (i.e. not limited to small-scale holdings). A report for the British Horse Association (Henley 2004) argued that the increase in horse numbers in the UK reflected a transition towards the ‘experience economy’—increased consumer incomes in combination with increased investment in leisure activities. Similar trends have been found in Sweden (Hammer et al. 2017) and Germany (Zasada et al. 2013), where horses are replacing livestock in peri-urban locales. In Scotland, this cohort also appears to represent the wealthiest type identified: land owners (97%) who did not inherit their land (90%); this cohort also have the highest rating of current and future economic prospects. As such, these appear to represent wealthy newcomers to the countryside.

Horsiculture holdings are also notable for the high percentage of female-led farms (54%). The link between female-led farms and horsiculture is well recognised in Nordic countries (e.g. Finland—Andersson and Lehtola 2011; Sweden—Hammer et al. 2017) but is not substantively discussed in recent UK-based academic literature. For example, Holloway’s (2001, 2002) work on human/animal interactions in smallholding focuses entirely on livestock. Halfacree (2006, 2007) similarly does not identify horses in his study sample of back-to-the-landers. The omission of this type from UK farming typologies (e.g. Bowler et al. 1996; Shucksmith and Hermann 2002; Pike 2008) may reflect the lack of agricultural production on the land, but this cohort are clearly occupying agricultural holdings, representing an important transition process. This topic requires further research.

Women in general were more likely to be identified as the farmer on NCF than commercial farms in the study. Relatively little is known about female-led farms. Literature on women in agriculture tends to emphasise the role of women within farm families (e.g. Contzen and Forney 2017; Shortall 2014; Bock 2004). Indeed, within the EU, official statistics record women primarily as the farm holder’s spouse (European Union Agricultural Economic Briefs 2012). There is a small American literature addressing women who are identified as the main operators of their farms. For example, Trauger et al. (2010) describe how women are less likely to be seen as ‘authentic’ farmers. Ball (2014) found that women are becoming more commonly

identified as the primary farmer because of the increased demand for niche products (women are more likely to lead 'alternative' farming approaches, which are also typically smaller-scale), decreasing average farm size and great societal acceptance of women as farmers. A major study of women in agriculture in Scotland found that access to land was a major barrier to women, owing to the tradition of passing farms intact from father to son (Shortall et al. 2017); in order to access land, women typically have to purchase land and/or acquire it through their spouse, thus leading to smaller-scale holdings. The higher percentage of female-led farms amongst smallholdings in this present study is thus consistent with this report, and indeed Ball (2014) research. The distinction is that the farms in the present study are non-commercial. Women are clearly interested in leading holdings, but are disproportionately choosing to do so recreationally. The reasons for this require further investigation.

Amenity livestock farmers were the fourth largest cohort. These farms were characterised by the presence of commercial scale cattle and/or sheep (87%), medium farm size (50–200 ha, 87%) and small amount of diversification (17%). Some 55% considered themselves to be full-time farmers and 34.0% employ staff; 74% own all or part of their holding. These are substantial farms, producing Scottish agriculture's traditional commodities of beef and lamb. Only 13% describe their economic prospects as poor, suggesting that the vast majority of this type are comfortable in their lifestyle. Their status suggests sufficient off-farm income or personal wealth that they do not need to make a profit, thus enabling them to continue to farm in a traditional way.

Large farms and estates appeared fifth in the typology, demonstrating their continued role within Scottish agriculture. Land reforms in recent years have led to more estates farming land themselves through contractors and employees (McKee et al. 2018); consistent with this literature, some 67.9% employee staff. Almost half of this cohort is diversified. However, the typology did not include a distinct cohort of diversified farms. Shucksmith and Hermann (2002) and Sutherland (2012) both identify a cohort of 'pluriactive successors' who inherited farms and the need or desire to maintain off-farm employment. In this present study, diversification was most common at the extremes of farm size, both large and small. This is consistent with the broader literature on diversification, which suggests that larger holdings are more likely to diversify, as they are able to leverage or release resources to invest in substantive non-farming activities (Ilbery and Bowler 1993; McNally 2001; Maye et al. 2009; Sutherland et al. 2016). Diversification is also recognised as particularly important to small-scale farming, particularly for new entrants who are seeking to achieve profits from small-scale production (Sutherland 2015). However, in this present case, study findings suggest that both large and small farms may be generating sufficient income from

their diversification activities that they do not need to farm commercially.

A distinctive 'retirement holding' was not identified in the typology, 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.

System intervention

The typology identifies a number of issues relating to contemporary land use, as well as the potential difficulty in influencing particular NCF types. Indeed, Pannell and Wilkinsen (2009) argue that it is more cost-effective to target commercial farmers, owing to the higher transaction costs associated with reaching lifestyle land holders. Whilst NCF have traditionally existed on the periphery (if at all) of agricultural policy, when aggregated their influence on land use can be significant. Subsidies—the traditional lever for behaviour change on farms—are unlikely to factor significantly for small-scale NCF, although it is notable that they are received by the majority of the largest NCF (i.e. Amenity Livestock Farms and Large Farms and Estates). The historic nature of subsidy payments may indeed have been facilitating these types of NCF, offering a *de facto* pension and support for recreational land use. The progression to the area-based payment—where the amount of land largely determines payment rates—by definition, will disproportionately benefit larger-scale holdings.

NCF are also embedded in a larger policy landscape (e.g. taxation, fiscal policies and credit). Consequently, wider fiscal and regulatory interventions may be more influential towards influencing activity within these types, such as taxation incentives for smallholders to adopt particular activities or, conversely, limiting thresholds for intergenerational transfer of land to encourage partitioning of land for greater opportunities for entry into the sector. Though not directly affected by CAP reforms, this aligns with recent programmes at European level for encouraging new entrants. The European Commission has developed targeted support to enable new entrant farmers, with member states estimating that they will spend some €2.6 billion on payments to young farmers between 2014 and 2020 (see Zagata et al. 2017). However, this represents a small fraction of the total direct payments received by European farmers.

Findings also demonstrate the importance of inheritance to NCF. While the vast majority of horsiculture farms and specialist smallholdings are not inherited, between 40 and 60% of farms in the other types have been inherited, suggesting that NCF are in part an outcome of succession. Agricultural land transferred between generations currently benefits

from inheritance tax breaks designed to enable commercial farm succession (Sutherland 2012). In light of the potential number of NCF benefitting from these taxation practices, the utility of these measures for achieving public benefit should be revisited.

Limitations

The paper has a number of limitations. First, the percentage of NCF identified in the study sample is likely to be somewhat lower than the statistics indicate. As stated in the "Typology development", this reflects the lower representation of small-scale farmers in the survey. It is also likely that the self-identification of NCF also led to under-representation. Given the importance of operating a profitable farming business to obtain prestige within farming communities (Sutherland 2013; Sutherland and Darnhofer 2012; Riley 2016), the sample thus consists of individuals who are comfortable stating that they do not seek to make a profit. In her 2012 paper, Sutherland found examples of formerly commercial farmers who did not want to know if their farming activities were profitable (for fear of discovering that they were not).

Qualitative studies of lifestyle and recreational approaches to farming typically include motivations beyond profit orientation in the analysis. In this dataset, it is not possible to assess why the study sample did not seek to operate commercial farms. It is also impossible to distinguish between 'back-to-the-landers' (defined in the literature as counter-cultural) and peri-urban gentrifiers. Similarly, although it is evident from the literature that NCF can be the outcome of a transition process, it is not possible to distinguish between farmers who actively chose NCF upon entrance, and those who progressed towards NCF over a period of years.

Regional variations could also be usefully evaluated in future research. This was not possible in the present study owing to the relatively small sample of NCF, in comparison to the level of regional differentiation in Scotland. Proximity to urban centres is identified in the literature as an important enabler for particular kinds of NCF. Further assessment of the location of the different types of holdings would yield useful findings on how NCF are located relative to land capability.

Conclusion

To date, agricultural policy and compliance frameworks have tended to ignore the role of NCF in land use and provision of public goods. In this paper we have demonstrated that NCF form an important but highly differentiated cohort within Scottish agriculture, occupying at least 13% of the

land base. Similar levels of diversity can be expected in other contexts, where related issues of land and subsidy access, retirement, gender dynamics, profitability and the cultural appeal of farming are influencing agrarian transitions.

Findings confirm recent qualitative research that NCF are not necessarily small (Heley 2010; Sutherland 2012). In the UK, the scale of an NCF is limited primarily by the financial resources of the prospective farmer. Whereas access to resources (particularly land) is a major barrier to most new entrants to farming in Europe (EIP Agri 2016) and North America (Calo and De Master 2017), the cultural heritage of landed gentry and the relaxed land sale laws in the UK make it possible for highly resourced individuals to acquire any amount of agricultural land for recreational purposes. This arguably blocks land access to households which do not have substantial off-farm income or wealth, representing an important social justice issue. At the same time, ongoing subsidy access, limited pension provisions and the strong cultural appeal of remaining a farmer (Riley 2016) make the transition from commercial to non-commercial farming in retirement an appealing option. While substantive attention has been paid in the EU to the decoupling of agricultural subsidies from agricultural production, the structural implications of de-coupling agricultural amenities (e.g. the opportunity to experience the social, expressive and intrinsic aspects of farming identified by Gasson 1973) from commercial production has received considerably less critical attention. This is an important topic for future research.

The findings also draw attention to female-led farms. To date, most of the European literature on the role of women in agriculture focuses on household-level dynamics. Research findings raise questions around the gendered implications of current agrarian transitions, particularly the nature of the 'choice' women are making to lead recreational small-scale holdings, if commercial farming is not a realistic prospect. Ongoing subsidy access for existing (sometimes retired) farmers may also be disproportionately limiting opportunities for women to enter the sector. Although the high percentage of female-led horsiculture farms (where financial prospects are largely positive), suggests an active choice, the poor financial prospects identified by the Specialist Smallholdings and the Amenity Livestock Farm cohort suggests that both men and women in these types may instead feel trapped in an unprofitable situation. Further qualitative research into NCF could usefully elucidate these issues.

Larger-scale NCF reported stronger financial prospects, but were also more likely to be receiving state subsidies. EU subsidies are justified on the basis of public goods provision, rather than commercial commodity production, but the intent is to ensure farmers a reasonable living while they maintain rural areas and landscapes (EU 2019). Subsidising NCF at any scale is controversial. However, the high percentage of NCF not receiving public supports suggests

that some may be producing environmental amenities at little cost to the tax payer. Alternatively, the *de facto* land abandonment identified in the study raises questions around the multiple benefits which could otherwise be realised on NCF land. The Scottish Government is actively seeking to reduce land concentration through land reform, targeting abandoned and neglected land, but steps taken to date have focused primarily on large-scale holdings. Further nuancing the dynamics and diversity of NCF and their role in the agricultural sector is important for providing an informed voice in policy and land reform debates.

Acknowledgements The research presented in this paper was funded by the Rural & Environment Science & Analytical Services (RESAS) Division of the Scottish Government, through the 2011–2016 and 2016–2021 RESAS Strategic Research Programmes. The views expressed in this paper are those of the authors and not those of the Scottish Government or RESAS. We would like to thank all participants in the telephone survey; Iain Brown, Dave Miller, Douglas Wardell-Johnson, Marie Castellazzi, and Willie Towers at the James Hutton Institute for providing advice and resources for the wider research project; and Jonathan Hopkins and Anke Fischer (James Hutton Institute) for detailed and helpful comments on an earlier draft of the paper. We also wish to thank the editor and an anonymous reviewer for their constructive feedback.

Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

References

- Andersson, K., and M. Lehtola. 2011. Regulating the new equine industry in Finland. Wicked problems, governance models and gendered power structures. *Sociologia Ruralis* 51: 387–403.
- Argent, N., M. Tonts, R. Jones, and J. Holmes. 2014. The Amenity Principle, Internal Migration, and Rural Development in Australia. *Annals of the Association of American Geographers* 104: 305–318.
- Ball, J. A. 2014. She works hard for the money: Women in Kansas agriculture. *Agriculture and Human Values* 31: 593–605.
- Barnes, A., L.-A. Sutherland, L. Toma, K. Matthews, and S. Thomson. 2016. The effect of the Common Agricultural Policy reforms on intentions towards food production: Evidence from livestock farmers. *Land Use Policy* 50: 548–558.
- BBC News. 2016. Aberdeenshire farm owner tops UK farm subsidy list. <http://www.bbc.co.uk/news/uk-scotland-north-east-orkney-shetland-37503895>. Accessed 16 July, 2018.
- Blazy, J.-M., H. Ozier-Lafontaine, T. Doré, A. Thomas, and J. Wery. 2009. A methodological framework that accounts for farm diversity in the prototyping of crop management systems. Application to banana-based systems in Guadeloupe. *Agricultural Systems* 101: 30–41.
- Bock, B. 2004. Fitting in and multi-tasking: Dutch farm women's strategies in rural entrepreneurship. *Sociologia Ruralis* 44: 245–260.
- Bohnet, I. 2008. Assessing retrospective and prospective landscape change through the development of social profiles of landholders: A tool for improving land use planning and policy formulation. *Landscape and Urban Planning* 88: 1–11.
- Bowler, I., G. Clark, A. Crockett, B. Ilbery, and A. Shaw. 1996. The development of alternative farm enterprises: A study of family labour farms in the northern Pennines of England. *Journal of Rural Studies* 12: 285–295.
- Burton, R. J. F. 2004. Seeing through the 'good farmer's' eyes: Towards developing an understanding of the social symbolic value of 'productivist' behaviour. *Sociologia Ruralis* 44: 195–215.
- Calo, A., and K.T. De Master. 2017. After the incubator: Factors impeding land access along the path from farmworker to proprietor. *Journal of Agriculture, Food Systems, and Community Development* 6: 111–127.
- Contzen, S., and J. Forney. 2017. Family farming and gendered division of labour on the move: a typology of farming-family configurations. *Agriculture and Human Values* 34: 27–40.
- Cornillon, P.-A., A. Guyader, F. Husson, N. Jégou, J. Josse, M. Kloareg, É. Matzner-Løber and L. Rouvière. 2012. Statistiques avec R. Rennes: Presse Universitaires de Rennes.
- EIP-Agri (2016) New entrants into farming: lessons to foster innovation and entrepreneurship. Final Report. European Commission, 40p. https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/eipagri_new_entrants_final_report_2016_en.pdf. Accessed 15 Nov 2018.
- Emtage, N., J. Herbohn, and S. Harrison. 2007. Landholder profiling and typologies for natural resource-management policy and program support: Potential and constraints. *Environmental Management* 40: 481–492.
- European Commission. 2016. A strategic approach to EU agricultural research and innovation. Final Paper. <https://ec.europa.eu/programmes/horizon2020/en/news/final-paper-strategic-approach-eu-agricultural-research-and-innovation>. Accessed 16 July 2018.
- European Union (EU). 2019. The common agricultural policy at a glance. Agricultural policy supports farmers and ensures Europe's food security. https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance_en. Accessed 13 Feb 2019.
- European Union Agricultural Economic Briefs. 2012. Women in EU Agriculture and rural areas: Hard work, low profile. Brief No 7. June 2012. http://ec.europa.eu/agriculture/rural-area-economics/briefs/pdf/07_en.pdf. Accessed 16 July 2016.
- Evans, N. J., and B. W. Ilbery. 1993. The pluriactivity, part-time farming, and farm diversification debate. *Environment and Planning A: Economy and Space* 25: 945–959.
- Fiebig, L., T. Smieszek, J. Saurina, J. Hattendorf, and J. Zinsstag. 2009. Contracts between poultry farms, their spatial dimension and their relevance for avian influenza preparedness. *Geospatial Health* 4: 79–95.
- Fuller, A. M. 1990. From part-time farming to pluriactivity: a decade of change in rural Europe. *Journal of Rural Studies* 6: 361–373.
- Gasson, R. 1973. Goals and values of farmers. *Journal of Agricultural Economics* 24: 521–542.
- Gasson, R., and A. J. Errington. 1993. The farm family business. Wallingford: CAB International.
- Gosnell, H., J. H. Haggerty, and W. R. Travis. 2005. Ranchland ownership dynamics in the Rocky Mountain West. *Society and Natural Resources* 19: 743–758.
- Gosnell, H., J. H. Haggerty, and P. A. Byorth. 2007. Ranch ownership change and new approaches to water resource management in Southwestern Montana: Implications for fisheries. *JAWRA Journal of the American Water Resources Association* 43: 990–1003.
- Guillem, E. E., A. P. Barnes, M. D. A. Rounsevell, and A. Renwick. 2012. Refining perception-based farmer typologies with the analysis of past census data. *Journal of Environmental Management* 110: 226–235.

- Hair, J. F., R. E. Anderson, R. L. Tatham, and W. C. Black. 1998. *Multivariate data analysis with readings*. Englewood Cliffs, NJ: Prentice Hall Press.
- Hair, J., R. Anderson, B. Black, and B. Babin. 2016. *Multivariate data analysis*. London: Pearson Education.
- Halfacree, K. 2006. From dropping out to leading on? British counter-cultural back-to-the-land in a changing rurality. *Progress in Human Geography* 30: 309–336.
- Halfacree, K. 2007. Back-to-the-land in the twenty-first century - Making connections with rurality. *Tijdschrift Voor Economische En Sociale Geografie* 98: 3–8.
- Halfacree, K. 2010. Reading rural consumption practices for difference: bolt-holes, castles and life-rafts. *Culture Unbound* 2: 241–263.
- Hammer, M., M. Bonow, and M. Petersson. 2017. The role of horse keeping in transforming peri-urban landscapes: A case study from metropolitan Stockholm, Sweden. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography* 71: 146–158.
- Heley, J. 2010. The new squirearchy and emergent cultures of the new middle classes in rural areas. *Journal of Rural Studies* 26: 321–331.
- Henley Centre. 2004. A report of research on the horse industry in Great Britain. Commissioned by the Department for Environment, Food and Rural Affairs and the British Horse Industry Confederation, with the National Assembly for Wales and the Scottish Executive. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69259/pb9255-bhic-report-040318.pdf Accessed 16 July 2018.
- Holloway, L. 2000. 'Hell on earth and paradise all at the same time': The production of smallholding space in the British countryside. *Area* 32: 307–315.
- Holloway, L. 2001. Pets and protein: Placing domestic livestock on hobby-farms in England and Wales. *Journal of Rural Studies* 17: 293–307.
- Holloway, L. 2002. Smallholding, hobby-farming, and commercial farming: ethical identities and the production of farming spaces. *Environment and Planning A* 34: 2055–2070.
- Hopkins, J., L.-A. Sutherland, M.-H. Ehlers, K. Matthews, A. Barnes, and L. Toma. 2017. Scottish farmers' intentions to afforest land in the context of farm diversification. *Forest Policy and Economics* 78: 122–132.
- Horse Scotland. 2012. Enabling and Developing a World Class System for Scottish Equestrianism, Strategic Plan 2013–2016. <http://www.horsescotland.org/media/1193/strategic-plan.pdf>. Accessed 13 February 2019.
- Ilbery, B. W., and I. R. Bowler. 1993. The farm diversification grant scheme: Adoption and nonadoption in England and Wales. *Environment and Planning C: Governance and Policy* 11: 161–170.
- Iraizoz, B., M. Gorton, and S. Davidova. 2007. Segmenting farms for analysing agricultural trajectories: A case study of the Navarra region in Spain. *Agricultural Systems* 93: 143–169.
- Klepeis, P., N. Gill, and L. Chisholm. 2009. Emerging amenity landscapes: Invasive weeds and land subdivision in rural Australia. *Land Use Policy* 26: 380–392.
- Land Reform Review Group. 2014. The land of Scotland and the common good. Report of the land reform review group. The Scottish Government, 263 p. Accessed 13 Feb 2019.
- Landais, E. 1996. Typologie d'exploitations agricoles. Nouvelles questions, nouvelles méthodes. *Economie Rurale* 236: 3–15.
- Langfelder, P., and S. Horvath. 2012. Fast R functions for robust correlations and hierarchical clustering. *Journal of Statistical Software* 46: 1–17.
- Le Sebastien, J. J., and F. Husson. 2008. FactoMineR: An R package for multivariate analysis. *Journal of Statistical Software* 25: 1–18.
- López-i-Gelats F, Milán MJ, Bartolomé J. 2011. Is farming enough in mountain areas? Farm diversification in the Pyrenees. *Land Use Policy* 28: 783–791. <https://doi.org/10.1016/j.landusepol.2011.01.005>
- Lopez-Ridaura, S., R. Frelat, M. T. van Wijk, D. Valbuena, T. J. Krupnik, and M. L. Jat. 2018. Climate smart agriculture, farm household typologies and food security: An ex-ante assessment from Eastern India. *Agricultural Systems* 159: 57–68.
- MacGregor, B. D., and A. Stockdale. 1994. Land use change on Scottish highland estates. *Journal of Rural Studies* 10: 301–309.
- Madry, W., Y. Mena, B. Roszkowska-Madra, D. Gozdowski, R. Hryniewski, and J. Castel. 2013. An overview of farming system typology methodologies and its use in the study of pasture-based farming system: a review. *Spanish Journal of Agricultural Research* 1: 316–326.
- Marques, A. R., J. S. F. Neto, and F. Ferreira. 2016. Hierarchical clustering and partitioning to characterize shrimp grow-out farms in northeast Brazil. *Aquaculture* 463: 106–112.
- Maye, D., B. Ilbery, and D. Watts. 2009. Farm diversification, tenancy and CAP reform: Results from a survey of tenant farmers in England. *Journal of Rural Studies* 25: 333–342.
- McKee, A. J. 2013. The laird and the community. In *Lairds, land and sustainability. Scottish perspectives on upland management*, eds. J. Glass, M. F. Price, C. Warren, and A. McKee., 108–138. Edinburgh: Edinburgh University Press.
- McKee, A. J., L.-A. Sutherland, J. Hopkins, S. Flanagan, and A. Rickett. 2018. Increasing the availability of farmland for new entrants to agriculture in Scotland. Report for the Scottish Land Commission. <https://landcommission.gov.scot/wp-content/uploads/2018/05/McKee-et-al.-Final-report-to-SLC-Increasing-land-availability-for-new-entrants-2.5.2018.pdf>. Accessed 16 July 2018.
- McNally, S. 2001. Farm diversification in England and Wales - what can we learn from the farm business survey? *Journal of Rural Studies* 17: 247–257.
- Meert, H., G. Van Huylenbroeck, T. Vernimmen, M. Bourgeois, and E. van Hecke. 2005. Farm household survival strategies and diversification on marginal farms. *Journal of Rural Studies* 21: 81–97.
- Munton, R. J., S. J. Whatmore, and T. K. Marsden. 1989. Part-time farming and its implications for the rural landscape: A preliminary analysis. *Environment and Planning A: Economy and Space* 21: 523–536.
- Nix, J. 2013. *Farm Management Pocket Book*. Leicestershire: Agro Business Consultants.
- Pallant, J. 2016. *SPSS Survival Manual: A Step by Step Guide to Data Analysis using IBM SPSS*. Berkshire, England: Open University Press.
- Pannell, D. J., and R. Wilkinson. 2009. Policy mechanism choice for environmental management by non-commercial "lifestyle" rural landholders. *Ecological Economics* 68: 2679–2687.
- Peacock, P. 2018. Land for the many, not the few? Limitations on the scale of land ownership. A discussion paper. Scottish Land Commission. <https://landcommission.gov.scot/wp-content/uploads/2018/03/Land-Lines-Land-Ownership-Peter-Peacock-March-2018.pdf>. Accessed 13 Feb 2019
- Pike, T. 2008. Understanding behaviours in a farming context: Bringing theoretical and applied evidence together from across Defra and highlighting policy relevance and implications for future research. Defra Agricultural Change and Environment Observatory Discussion Paper. <http://webarchive.nationalarchives.gov.uk/2013022210253/http://www.defra.gov.uk/statistics/files/defra-stats-foodfarm-enviro-obs-research-behaviour-aceoper-nov08.pdf>. Accessed 13 February 2019.
- Pine, I. I., B. J., and J. H. Gilmore. 2011. *The Experience Economy, Updated Edition*. Boston: Harvard Business School Press.
- Poling, S. 2012. Slipper farmers' harvest money. BBC News, Scotland. <https://www.bbc.co.uk/news/uk-scotland-17250106> Accessed 13 February 2019.

- R Development Core Team. 2016. R: A language and environment for statistical computing. R Foundation for Statistical Computing. <https://www.R-project.org/>. Accessed 13 February 2019.
- Riley, M. 2016. Still Being the 'Good Farmer': (Non-) retirement and the preservation of farming identities in older age. *Sociologia Ruralis* 56: 96–115.
- Scottish Crofting Federation. 2012. Crofting FAQ's. <http://www.crofting.scotland.gov.uk/faq>. Accessed 13 February 2019.
- Scottish Government. 2018. Estimates on average farm business income. <http://www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/Publications/FBI> Accessed 16 July 2018.
- Shortall, S. 2014. Farming, identity and well-being: managing changing gender roles within Western European farm families. *Anthropological Notebooks* 20: 67–81.
- Shortall, S., L.-A. Sutherland, A. J. McKee, and J. Hopkins. 2017. Women in Farming and the Agriculture Sector. Final report for the Environment and Forestry Directorate, Rural and Environmental Science and Analytical Services (RESAS) Division, Scottish Government. Scottish Government Riaghaltas na h-Alba gov.scot Social Research.
- Shucksmith, M., and V. Herrmann. 2002. Future changes in British agriculture: Projecting divergent farm household behaviour. *Journal of Agricultural Economics* 53: 37–50.
- Shucksmith, M., and K. Ronningen. 2011. The Uplands after neoliberalism? - The role of the small farm in rural sustainability. *Journal of Rural Studies* 27: 275–287.
- Snoeck, C. J., M. F. Ducatez, A. A. Owoade, O. O. Faleke, B. R. Alkali, M. C. Tahita, Z. Tarnagda, B. J. Ouedraogo, I. Maikano, P. O. Mbah, J. R. Kremer, and C. P. Muller. 2009. Newcastle disease virus in West Africa: new virulent strains identified in non-commercial farms. *Archives of Virology* 154: 47–54.
- Sorice, M. G., U. P. Kreuter, B. P. Wilcox, and W. E. Fox III. 2012. Classifying land-ownership motivations in central, Texas, USA: A first step in understanding drivers of large-scale land cover change. *Journal of Arid Environments* 80: 56–64.
- Sutherland L.-A. 2011. "Effectively organic": Environmental gains on conventional farms through the market? *Land Use Policy* 28: 815–824. <https://doi.org/10.1016/j.landusepol.2011.01.009>
- Sutherland, L.-A. 2012. Return of the gentleman farmer?: Conceptualising gentrification in UK agriculture. *Journal of Rural Studies* 28: 568–576.
- Sutherland, L.-A. 2013. Can organic farmers be 'good farmers'? Adding the 'taste of necessity' to the conventionalization debate. *Agriculture and Human Values*: 30: 429–441.
- Sutherland, L.-A. 2015. EIP Agri Focus Group New entrants into farming: Lessons to foster innovation and entrepreneurship. Starting paper. https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/fg14_new_entrants_starting_paper_2015_en.pdf. Accessed 16 July 2018.
- Sutherland, L.-A. 2018. Agriculture and inequalities: Gentrification in a Scottish parish. *Journal of Rural Studies*. <https://doi.org/10.1016/j.jrurstud.2018.09.009>.
- Sutherland, L.-A., and I. Darnhofer. 2012. Of organic farmers and 'good farmers': Changing habitus in rural England. *Journal of Rural Studies* 28: 232–240.
- Sutherland, L.-A., A. Barnes, G. McCrum, K. Blackstock, and L. Toma. 2011. Towards a cross-sectoral analysis of land use decision-making in Scotland. *Landscape and Urban Planning* 100: 1–10. <https://doi.org/10.1016/j.landurbplan.2010.10.005>.
- Sutherland, L.-A., K. Matthews, K. Buchan, and D. Miller. 2014. Beyond crofting: Assessing change on Scotland's small-scale holdings. *Scottish Geographical Journal* 130: 223–242.
- Sutherland, L.-A., L. Toma, A. Barnes, K. Matthews, and J. Hopkins. 2016. Agri-environmental diversification: Linking environmental, forestry and renewable energy engagement on Scottish farms. *Journal of Rural Studies* 47, Part A: 10–20.
- Sutherland, L.-A., J. Hopkins, L. Toma, A. Barnes, and K. Matthews. 2017. Adaptation, resilience and CAP reform: A comparison of crofts and livestock farms in Scotland. *Scottish Geographical Journal* 133: 192–213.
- Tittonell, P. 2014. Livelihood strategies, resilience and transformability in African agroecosystems. *Agricultural Systems* 126: 3–14.
- Trauger, A., C. Sachs, M. Barbercheck, K. Brasier, and N. E. Kiernan. 2010. 'Our market is our community': Women farmers and civic agriculture in Pennsylvania, USA. *Agriculture and Human Values* 27: 43–55.
- United States Department of Agriculture (USDA). 2015. 2012 Census of agriculture: Farm typology volume 2 subject series part 10. https://www.agcensus.usda.gov/Publications/2012/Online_Resourcess/Typology/typology13.pdf. Accessed 16 July 2018.
- Wickham, H. 2011. The split-apply-combine strategy for data analysis. *Journal of Statistical Software* 40: 1–29.
- Wightman, A. 2013. *The Poor Had No Lawyers: Who Owns Scotland (And How They Got it)*. Third ed. Edinburgh, UK: Brilln Ltd.
- Wilbur, A. 2014. Cultivating back-to-the-landers: Networks of knowledge in Rural Northern Italy. *Sociologia Ruralis* 54: 167–185.
- Wilson, G. A. 2008. From 'weak' to 'strong' multifunctionality: Conceptualising farm-level multifunctional transitional pathways. *Journal of Rural Studies* 24: 367–383.
- Zagata, L., J. Hrabak, M. Lostak, T. Ratering, L.-A. Sutherland, and A. J. McKee. 2017. Research for AGRI-Committee—Young farmers—policy implementation after the 2013 CAP reform. Directorate-General for Internal Policies. Policy Department for Structural and Cohesion Policies. Agriculture and Rural Development. <http://www.europarl.europa.eu/committees/en/supporting-analyses-search.html>.
- Zasada, I., R. Berges, J. Hilgendorf, and A. Piorr. 2013. Horsekeeping and the peri-urban development in the Berlin Metropolitan Region. *Journal of Land Use Science* 8: 199–214.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Lee-Ann Sutherland PhD, is a Research Leader at the James Hutton Institute. She has a background in European agrarian development, human-environment relations, and farm-level decision-making. Her current work on gentrification processes in agricultural restructuring is a progression of my research on land manager relationships with the agri-environment. She is involved in several European Commission-funded research projects focusing on agricultural structural adjustment and associated knowledge systems.

Carla Barlagne PhD, is an agricultural and rural economist at the James Hutton Institute. She has a background in food systems analysis, innovation uptake and development, and human-environment relations in socio-ecological systems. Her current research investigates diversification strategies and resilience in rural economies. Understanding and enhancing social innovation in the agricultural and forestry sector as well exploring the link between the management of agrobiodiversity and the resilience of food chains are other strong threads of her research.

Andrew P Barnes PhD, is Professor of Rural Resource Economics and Acting Head of Rural Economy, Environment and Society Research Group. His research focuses on capturing the impacts of policy change and farmer behaviour at the farm and catchment level, particularly in terms of understanding attitudes, motivations and perceptions of farmers toward environmental issues and uptake of new technologies. Measurement of efficiency and sustainability metrics using longitudinal data is another strong thread of his research.