



Rural Policy Centre

Farming's Retreat from the Hills



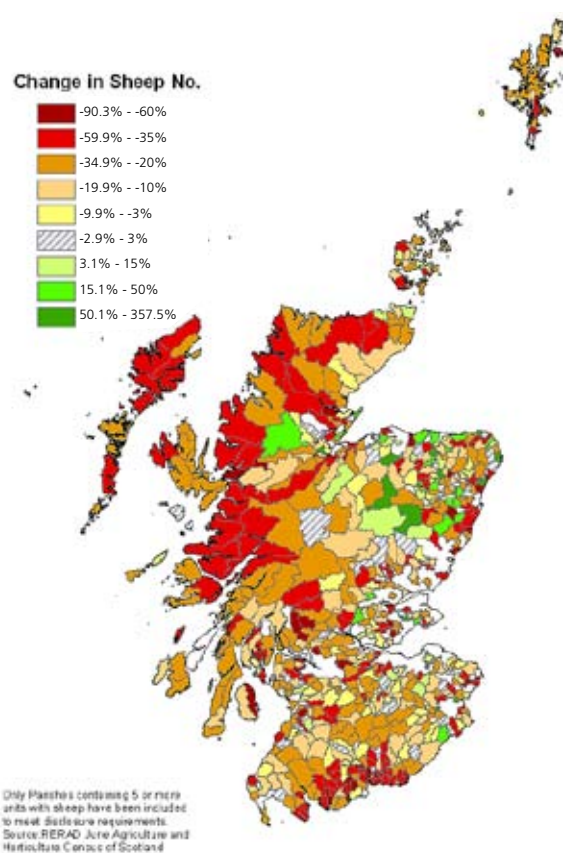
Executive Summary

In the context of growing concerns about declining numbers of livestock on Scottish hills, this report brings together some of the evidence on what is happening to livestock numbers at the national, regional and local scales. It also provides an assessment of the current economic situation and a discussion of the possible consequences for biodiversity and communities. The purpose is to identify the trends and geography of current changes and to ask what the most appropriate responses might be. The report is divided into several sections:

Is farming retreating from the hills? – This section of the report highlights that sheep numbers have fallen dramatically since 1999, most notably in the North West, with some areas seeing reductions of between 35 and 60 percent. Through an analysis of the census data it appears that this reduction is part of a process of down-sizing coupled with a number of farmers leaving the industry. Cattle numbers are also shown to have declined, although not so dramatically as sheep and not in the same areas. The decline in cattle numbers in some areas is a combination of down-sizing and farmers withdrawing from production. However, in many areas the changes are due to an increase in intensity as some farmers have expanded as others leave the industry. Analysis of the changes over different time periods suggests that declines in livestock numbers have accelerated since the introduction of the Single Farm Payment and the decoupling of livestock numbers from payments. Crucially, detailed mapping of the data highlights that the decline in livestock numbers is complex with a great deal of spatial variation even within single geographical areas (such as Highland). There will be no easy solutions because of the need for context specific responses.

The economic reality of farming in the hills – The report demonstrates that farming in the hills and remote parts of Scotland is challenging and that most current hill production is financially uneconomic. It finds that support payments, primarily in the form of the Single Farm Payment (SFP) and payments under the Less Favoured Area Support Scheme (LFASS), are keeping people on the land, but that since the SFP is no longer linked to the number of animals, stock levels have gradually dropped (although LFASS has been a strong factor in keeping cows in hill and crofting areas). The report also highlights how rising stock prices, which should have improved the situation, have been negated by rising costs with the result that many farmers continue to face difficult decisions about the future viability of their businesses.

Case studies – Since census data cannot provide insight into why changes might be taking place, this section looks behind the trends by speaking to the hill farmers themselves. In a survey of hill farmers, more than 50 percent said they had made changes between 2001 and 2005, with the main changes being a reduction in sheep numbers and an increase in cattle numbers. Since 2005, 55 percent said they had made changes to their management, with the main change being a reduction in sheep numbers. Two case studies also identify the importance of several factors – the activities of neighbouring farms; the availability of labour at key times of year; and the nature of land tenure – in shaping the management decisions on hill farms.



Change in sheep numbers 1999 - 2007



The consequences for biodiversity – The report examines the potential impact of livestock declines on biodiversity and highlights that while some species and habitats will be negatively affected, others will benefit. Some sites will be of greater conservation value, while others will have a lower conservation value. The section on biodiversity notes, however, that the areas of High Nature Value farmland in Scotland coincide with the areas that are experiencing the greatest declines in livestock numbers and that a reduction of grazing in systems that are already low intensity and extensive could lead to a decrease in biodiversity.

The consequences for rural communities – The report points to the national decline in full-time occupiers and spouses and the trend of increasing part-time working (where people spend less than 50 percent of their time on farm), but notes that the Highlands and Islands have seen the greatest decline in the number of full-time occupiers and spouses at the same time as witnessing the slowest growth in part-time occupiers working 50 percent of their time or less. There has also been a rise in the number of spouses working less than 50 percent of their time on farm, suggesting that spouses in particular are shifting to find employment off-farm. In addition to examining some of the data on recent trends, the section on communities discusses the potential knock-on effects of livestock reductions in terms of supply chain infrastructure (e.g. hauliers) and, if agriculture contracts in remote areas, a continuing loss of the younger generation. A spiral of decline is a likely reality in some areas.

Where next?

The final section of the report highlights some of the broad issues that have arisen in the process of reviewing the data on livestock trends:

The importance of the Single Farm Payment (SFP) and payments under the Less Favoured Area Support Scheme (LFASS). Although it appears that the decline in livestock numbers has accelerated since the introduction of the SFP, without these payments the reductions would be very much greater, as many farmers would simply not be able to continue farming. As such, these payments, and the rules that surround them, will play a crucial role in influencing farmer behaviour in the future.

Ambiguity in cross compliance may also be an important factor. There is a significant degree of ambiguity surrounding what the GAEC measure on undergrazing means in a hill farming context, not least because of the complexities of the interactions between domestic and wild grazers.

The declines in livestock numbers are taking place in a complex way. While there is a general trend that livestock are declining most in the North and West, a local scale analysis shows that some areas are much more affected than others. Any response will have to be regionally or locally specific.

The report then looks at the possible types of response, focusing on 1) accepting that farming is changing; 2) attempting to halt the decline through changes to the rules surrounding direct payments; and 3) attempting to halt the decline through enhanced rural development measures.

The report closes by suggesting that the identification of the trends and issues illustrates how much we do not know and where some extra effort in terms of support or investment may be required. More specifically, there is a need for research on the impacts of changes in the system of support payments on farmers, the environment and rural communities; research on how to develop payments for ecosystem services; research to identify the winners and losers in terms of biodiversity, specifically linked to designated sites and species; research and development of new farming systems that operate with fewer, higher output sheep, possibly with significantly reduced labour inputs through change to wool shedding breeds; more advice that will enable farmers to cope with change.

Contents

Introduction

Alan Renwick and Tony Waterhouse 4

Is farming retreating from the hills?

Steven Thomson and Andrew Midgley 7

The economic reality of farming in the hills

John Vipond and Gavin Hill 21

Case studies from North West Scotland

Claire Morgan-Davies 27

The consequences for biodiversity

John Holland, Meg Pollock and Tony Waterhouse 32

The consequences for rural communities

Fiona Williams and Steven Thomson 36

Managing the retreat from the hills – where next?

Tony Waterhouse, Alan Renwick and Andrew Midgley 44

Notes 52



Introduction

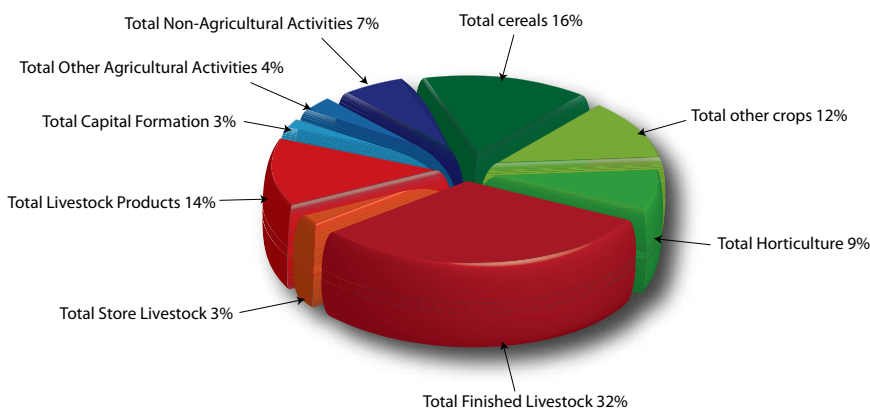
Alan Renwick and Tony Waterhouse

In recent years there have been growing concerns that there are fewer and fewer livestock on Scottish hills with potentially negative consequences for the social, economic and environmental sustainability of upland areas. This short report brings together some of the evidence on what is happening to livestock numbers at the national, regional and local scales with an assessment of the current economic situation and a discussion of the possible consequences for biodiversity and communities. The purpose is to identify the trends and geography of current changes and to question what the most appropriate responses might be.

Livestock numbers in Scotland are indeed declining. Headline figures from the agricultural census suggest that between 1998 and 2007 the national sheep flock declined by 2,305,573 animals¹. The beef cattle herd declined by 66,476. But these national figures hide a great deal of variability and the fact that these declines have been felt most severely in the most disadvantaged hill and island areas. This report will examine the detail of the changes taking place in the livestock sector to identify those areas where change is happening most. It will look behind the statistics to what is happening on the ground and ask why these changes are taking place.

Figure 1 Livestock's share of gross Scottish agricultural output 2007
(Source: Adapted from Scottish Agricultural Output, Input and Income Statistics 2008)

Gaining a clear understanding of what is happening to livestock numbers is important because the reduction in numbers has prompted a range of concerns. A primary concern is that because livestock farming represents such a large part of Scottish agriculture (figure 1), a decline in livestock numbers suggests a contraction in agricultural activity. Further, since agriculture is still a major component of



remote rural economies (figure 2), any contraction of the sector that involves farmers leaving the industry could have serious implications for the local economy and for others that remain in farming. If there are fewer farmers in an area, for example, the related supply industry may find it difficult to remain in business, which, in turn, creates problems for the remaining farmers, potentially leading to more people leaving the industry. Small changes in remote rural areas can have significant consequences.

There are also concerns about the potential negative impact on the environment. Extensive grazing has been shown to be important for the maintenance of moorland bird biodiversity² and the impact of changes in livestock numbers as a result of changes in policy is under review in some areas³. A reduction in the numbers of animals on the hills, however, could potentially mean reduced grazing with negative consequences for some priority species and habitats⁴. A critical issue revolves around the point at which 'extensive grazing' becomes too extensive, which in reality means virtually no livestock grazing (with an uncertain response by red deer) and a loss of the benefits derived from the presence

of grazing animals. Anecdotal evidence of whole flocks of sheep being removed from certain areas of the Highlands suggests significant implications for the biodiversity of those areas.

These concerns highlight the importance of livestock farming to rural economies, communities and the environment and how changes in the nature of livestock farming could have consequences for the degree to which sustainable rural development can be achieved.

It must be remembered, however, that changes in the number of livestock in the hills is nothing new. There has been an ebb and flow in the farming of the uplands over millennia, with large changes over most of upland Scotland over the last two centuries. More recently, though, the Highlands have not seen large increases typical of the rest of the British uplands. For example, the Scottish breeding flock increased from 1981 (when the UK joined the sheep meat regime of the Common Agricultural Policy) to 1995 by 14% to 3.8 million. By contrast, as an example of an area with particular concerns today, the Highland region breeding flock increased by 4% to 687,000. Thus recent times have seen relatively stable numbers in the hills in contrast to bigger changes before the period of price support and subsidy.

Today, though, we are in a different policy context and changes will have different impacts on behaviour and ultimately rural economies, society and environment, potentially making it harder to achieve a range of wider policy objectives. We must also ask whether the current change represents something new. Does the decline in livestock numbers represent the beginning of a much more serious problem with the retreat from the hills presaging future land abandonment?

Many are worried about the current trends. A report for Highlands and Islands Enterprise (HIE), for example, highlighted that the rate of decline in the number of ewes in the HIE area between 2001 and 2006 was more than twice the Scottish average⁵. The Committee of Inquiry on Crofting identified similar trends and highlighted the lack of available labour which is leading to a decline in the use of hill grazings⁶. Sheep are now increasingly likely to be managed more intensively on in-by ground, which can lead to negative environmental outcomes in the form of increased grazing of in-bye and significantly reduced grazing of the hill areas. The Royal Society of Edinburgh is also conducting an inquiry into the issues affecting Scotland's hill and island areas and the impact of agricultural reform on communities, the maintenance of environmental quality and the prospects for economic development⁷.

This report will compliment these studies by bringing a range of specialists from across SAC together to examine what is an important issue for rural Scotland.

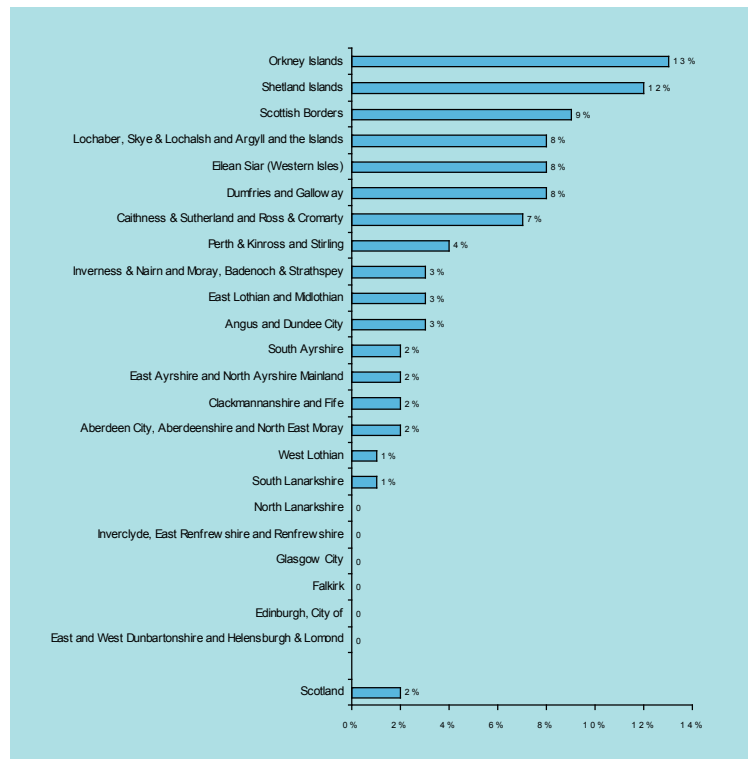


Figure 2 Agriculture, forestry and fishing as a percentage of total GVA in NUTS 3 Areas in 2004

(Source: Scottish Government).



Drivers of change

Policy

The recent reform of the Common Agricultural Policy is the biggest change in UK and EU farm policy in a lifetime. Agricultural support payments made to farmers have been 'decoupled' from the level of production. In an attempt to increase the competitiveness of Scottish and UK agriculture and to allow farmers greater freedom to react to the market, the old support systems have been replaced in Scotland by the Single Farm Payment (SFP), which gives farmers much greater freedom to farm⁸. This means that farmers are no longer unduly influenced by headage-based payments, seen by some as having led to large flock sizes and over-grazing⁹. Provided that a farmer holds SFP entitlements and meets the requirements of 'cross compliance' – which involves keeping their land in Good Agricultural and Environmental Condition and complying with a number of Statutory Management Requirements – they will receive support. Crucially, as agricultural support has changed, so farmers have been allowed to change their livestock numbers without penalty. As long as their land remains in Good Agricultural and Environmental Condition, they can reduce their livestock numbers to better suit their business model and the capacity of the land.

Economics

In recent years the market for meat products has been depressed, meaning that for a large proportion of farmers the price received has been less than the true economic cost of production. This situation is particularly acute for hill farmers. Their animals have to cope with a difficult climate and are reared on what is usually poor quality land (compared to lowland farms), so their output is low and the price that they can get for their animals tends to be lower than that received by lowland farmers. Recently this problem has been compounded by a marked increase in fuel, feed and fertiliser prices. Consequently, many farmers are having to find ways of dealing with this cost-price squeeze and in the context of decoupled support payments some farmers have reduced their costs by reducing the size of their operation, thereby removing the need to employ extra labour. Under these circumstances it can make economic sense for hill farmers to reduce the number of animals that they own.

Structure

The following sections concentrate on the current situation, developing trends and the potential consequences of declines in livestock numbers. The first section uses data available from the June census to examine the trends in livestock numbers at the national, regional and local levels. As the best available data, the census provides a useful insight into processes of change over time. This is followed by an assessment of the economic reality of farming in the hills – which clearly demonstrates the current difficulties that many farmers are facing – and by case studies of hill farms to highlight some of the decisions that the farmers are facing. Subsequent sections look at the consequences for biodiversity and for communities. The final section then draws this together by asking whether the changes that are taking place present a policy problem and how they might be addressed.



Is farming retreating from the hills?

Steven Thomson and Andrew Midgley

Summary

- Sheep numbers have declined dramatically since 1999, most notably in the North West. Many areas have seen a reduction of between 35 and 60 percent. Cattle numbers have also declined, although not so dramatically and not in the same areas.
- The reduction in sheep numbers is part of a process of down-sizing coupled with a number of farmers leaving the industry.
- The decline in cattle numbers in some areas is a combination of down-sizing and farmers withdrawing from production. However, in many areas the changes are due to an increase in intensity as some farmers have expanded as others leave the industry.
- Declines in livestock numbers appear to have accelerated after the introduction of the Single Farm Payment and the decoupling of livestock numbers from payments.
- The decline in livestock numbers is complex with a great deal of spatial variation even within single geographical areas (such as Highland).

Introduction

Amidst the anecdotal references to the loss of livestock from the Scottish hills, an impartial review of the current evidence is needed. This section uses data from the June Agriculture and Horticulture Census of Scotland¹⁰ to gain a better understanding of the trends in livestock numbers at the national, regional and local scales. Working through these scales enables an understanding of how change in specific areas relates to the national picture.

The National Picture

Taking a long-term perspective at a national level, cattle numbers have stayed relatively stable. The total number of beef cattle, for example, has stayed broadly in the range of 1,100,000 and 1,000,000 since 1982. Numbers reached a high in 1998 with 1,106,008 beef cattle in total with 534,518 beef cows. Since this high the national herd has seen a gradual decline in numbers. By 2007, total cattle numbers had dropped by 6 percent to 1,039,532 and beef cow numbers had dropped by 11.7 percent to 472,224.

Sheep numbers have fluctuated more widely than cattle. From a national flock of 8,179,827 in 1982, a high of 9,987,040 was achieved in 1991, but this has subsequently fallen to 7,498,216 in 2007. Between 1998 and 2007 the national flock reduced in size by 2,305,573 animals, which represents a 23 percent fall in numbers. A large fall between 2000 and 2001, which saw a loss of 1,077,075 animals, was not followed by restocking and recent years have witnessed a further drop in numbers.

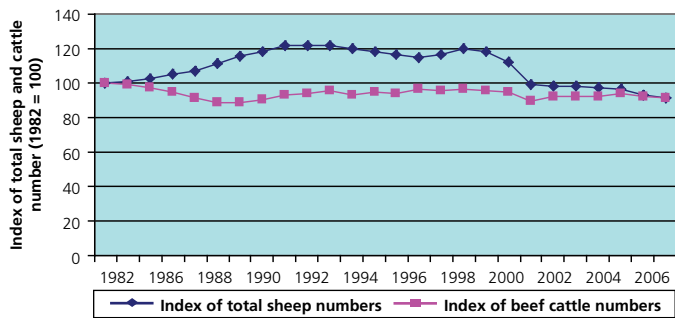


Figure 3 Trends in sheep and beef cattle numbers between 1982 and 2007¹¹

(Source: Scottish Government 2008)

fall in lamb numbers between 1998 and 2007. Sheep numbers were more severely affected by the 2001 FMD cull than beef cattle, with ewe numbers falling by 437,500 (11.8 percent) and lamb numbers by 569,120 (12.8 percent) in a single year. There was no real recovery from these 2001 reductions and since 2005 sheep numbers have started to fall more sharply again. Overall, in comparison to 1982 both sheep and beef cattle numbers were about 8 percent lower in 2007, although the significant growth in sheep numbers in the 1980's means that the loss of sheep is actually more pronounced in the last decade, as highlighted in figure 4.

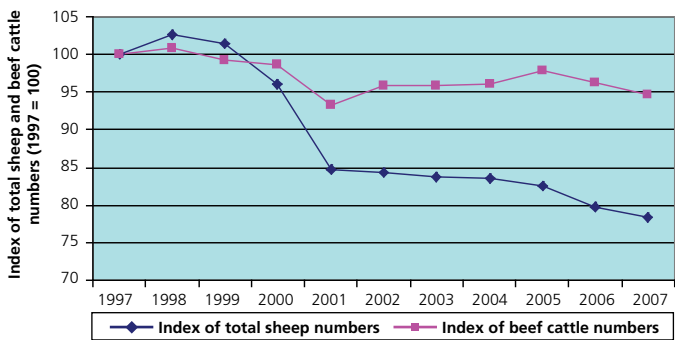


Figure 4 Index of change in sheep and cattle numbers between 1997 and 2007¹²

(Source: Scottish Government 2007)

To gain an insight into the changes in sheep and cattle numbers the June Census data has been interrogated and manipulated to try and highlight the factors behind these changes. It is clear that increases or decreases in livestock numbers occur because of:

- (a) a change in the proportion of farms farming cattle or sheep
- (b) a change in the average size of sheep flocks or cattle herds
- (c) a combination of (a) and (b).

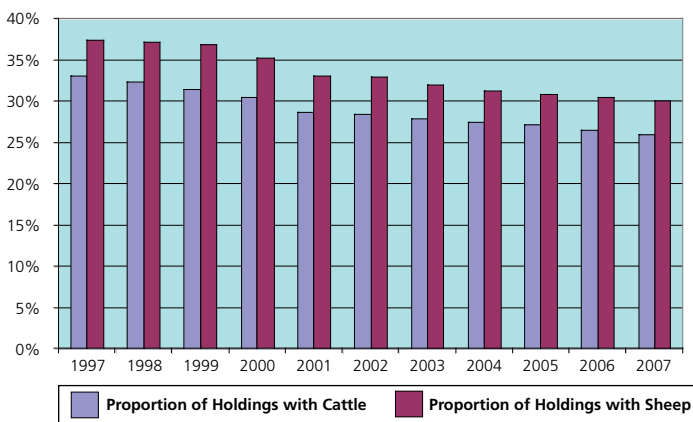


Figure 5 Proportion of Scottish holdings with cattle and sheep, 1997 - 2007

(Source: Scottish Government 2007)

Figure 5 highlights that during the decades leading up to 2007 the proportion of Scottish farms containing sheep gradually fell (although this was more significant during the 2001 FMD outbreak) from 38 percent in 1997 to 30 percent in 2007. During the same period the proportion of holdings with cattle also fell from 33 percent in 1997 to 26 percent in 2007.

During this period of decline in the proportion of Scottish farms with sheep and cattle, the average number of cattle per holding actually rose by around 15 per cent (see figure 6), from 124 cattle per holding in 1997 to 142 cattle per holding in 2007. This increase in herd size helped to counter the decline in the number of cattle producers, meaning that the fall in cattle numbers has not been as significant as may have been expected. On the other hand, although the average number of sheep per holding rose by 5 per cent in 1998, the 2001 FMD outbreak caused average flock sizes throughout Scotland to fall by 5.7 per cent. Although there was some recovery in average flock sizes until 2004, they subsequently fell again, meaning that in 2007 they were 7.7 percent lower than in 1998, at 486 sheep per holding. This decrease in sheep flock size, coupled with the fall in the proportion of farmers with sheep, means that the fall in total sheep numbers may be larger than anticipated if looking at the proportion of holdings with sheep in isolation.

The Regional Picture

While national figures are important to give a sense of broad trends, they mask a great deal of variation which occurs at regional and local levels. A national decline in cattle numbers, for example, can hide the fact that in some areas numbers are increasing and that impacts at local level can be significantly different within Scotland's regions.

Figures 7 and 8 illustrate trends in total sheep and cattle numbers between 1997 and 2007 in Scotland's NUTS II regions¹³ (Eastern Scotland, Highlands and Islands, North Eastern Scotland and South Western Scotland). Figure 7 illustrates the large declines in sheep numbers with the Highlands and Islands and the South West witnessing the greatest reductions. The South West was particularly hit by the FMD outbreak in 2001 and the data suggest that there was limited subsequent restocking of culled sheep in this region. The Highlands and Islands, by contrast, were less affected by the FMD cull, but have seen continued declines from 1997. Numbers in North Eastern and Eastern Scotland dropped to approximately 2002, but have remained relatively constant since, reflecting the changing fortunes of agriculture after a period of five years of suppressed incomes.

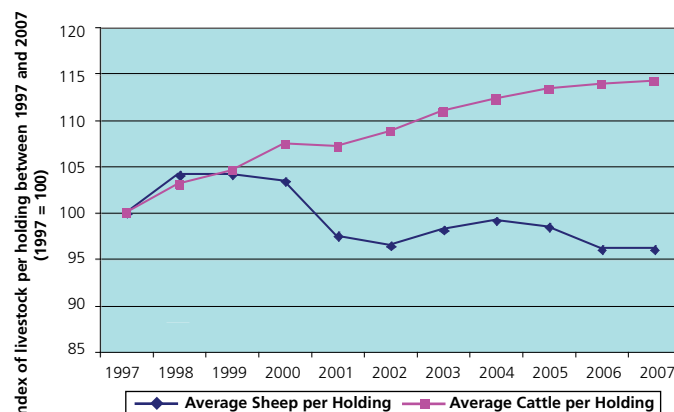


Figure 6 Index of Average number of cattle and sheep per holding, 1997-2007

(Source: Scottish Government)

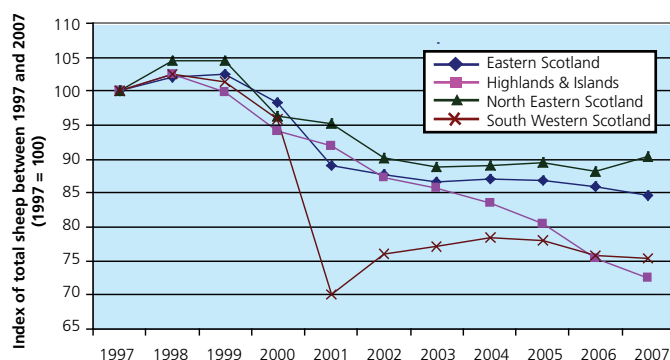
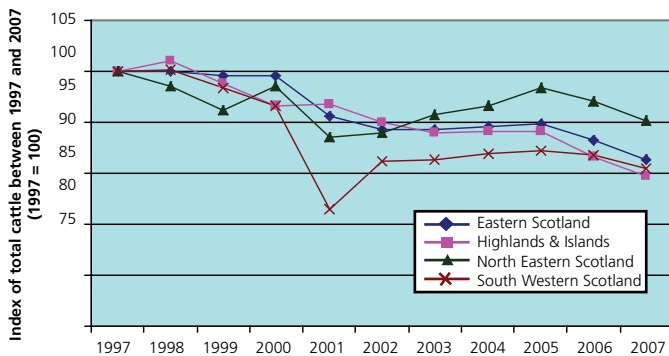


Figure 7 Index of change in total sheep numbers 1997 – 2007 by NUTS II region

(Source: Scottish Government)



With regard to cattle (figure 8), numbers at the regional level have declined, but not so dramatically as sheep. Numbers in North Eastern Scotland have held up well and by 2007 had risen above the 2002 figures. The decline associated with FMD in South Western Scotland in 2001 is marked, again with less restocking than might have been expected. The Highlands and Islands and Eastern Scotland have seen continued declines (although this does mask a great degree of variation within these areas).

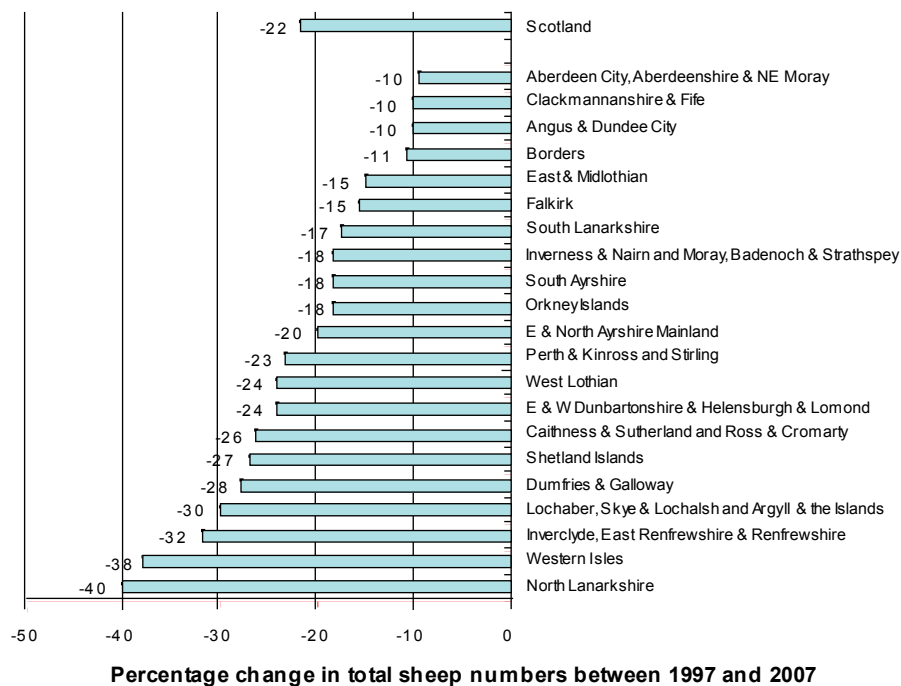
Figure 8 Index of change in total cattle numbers between 1997 – 2007 by NUTS II region
(Source: Scottish Government)

The sub-regional picture

A more finely detailed understanding of what is happening to livestock numbers is possible by examining changes at smaller scales. Data from the June Census can be analysed at the level of NUTS III, NUTS IV and parish areas which allows insight into changes in discrete areas such as the Borders, Orkney, Western Isles and Dumfries & Galloway as well as at individual parish level.

Figures 9 and 10 highlight some of the areas that have been experiencing declines in sheep and cattle at the sub-regional level. Whereas the national sheep flock fell by 22 percent between 1997 and 2007, some areas – notably North Lanarkshire; Western Isles; Inverclyde, East Renfrewshire & Renfrewshire; Lochaber, Skye & Lochalsh and Argyll & the Islands – experienced above average declines. Similarly, while the total cattle herd fell between 1997 and 2007 by 9 percent, figure 10 shows that in some areas the decline was much greater. Higher than average losses were experienced in many areas, although not to the same extent as witnessed for sheep.

Figure 9 Percentage change in sheep numbers between 1997 and 2007 by NUTS III regions
(Source: Scottish Government)



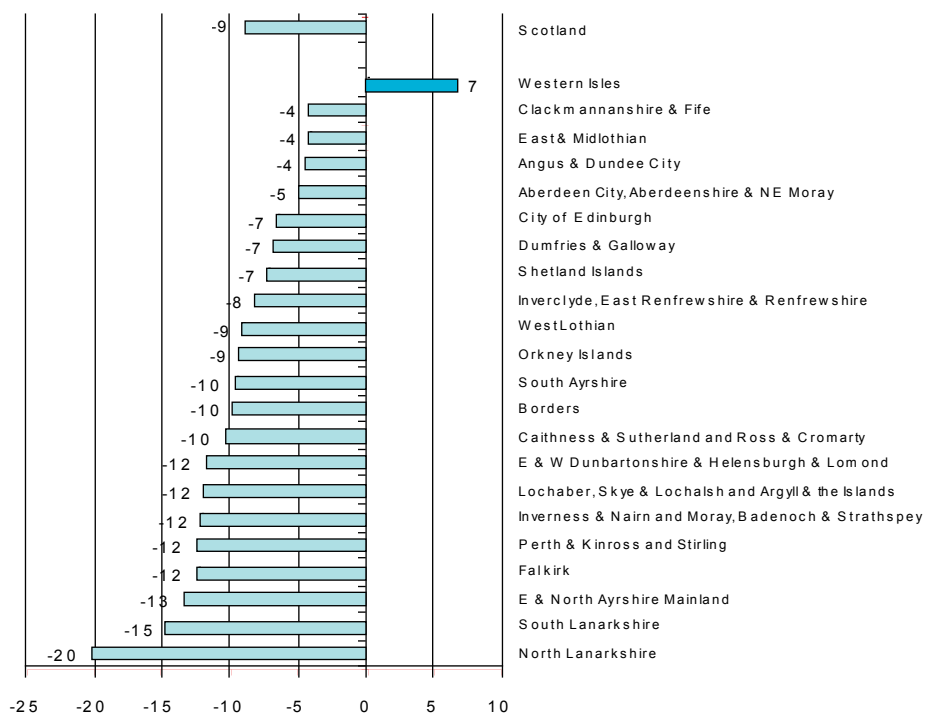


Figure 10 Percentage change in beef cattle numbers between 1997 and 2007 by NUTS III regions

(Source: Scottish Government)

Percentage change in total cattle numbers between 1997 and 2007

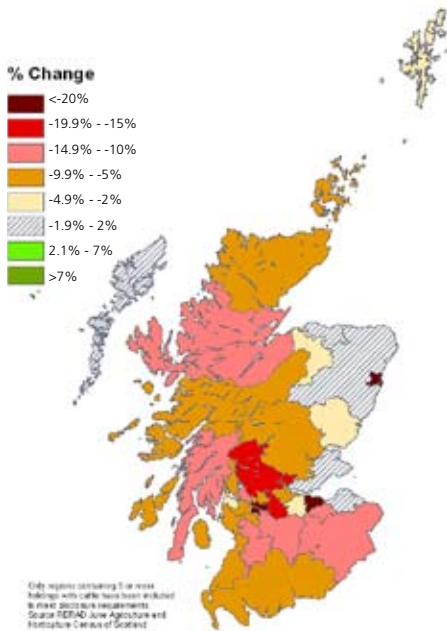


Figure 11 Change in cattle numbers between 1999 and 2007 (NUTS IV)

Cattle

Examining these changes in livestock numbers and the underlying factors has also been completed at NUTS IV level. Figure 11 illustrates that between 1999 and 2007 cattle numbers declined across much of Scotland, with the exception being much of the East coast and the Western Isles. The largest declines were witnessed (apart from the cities) in Stirling and North Lanarkshire where cattle numbers fell by 15 to 20 percent, with a 5 to 15 percent reduction in most of the remaining hill areas.

Figures 12 to 14 highlight how cattle numbers have been changing over the last decade, with areas such as Lochaber experiencing increases (albeit small ones) in cattle numbers between 1997 and 2000 and between 2000 and 2004, whilst many other hill areas experienced declines during those timeframes. Figure 14 also highlights that between 2004 and 2007, whilst most of the regions north of the Great Glen experienced small declines in cattle numbers, Skye and Lochalsh and Lochaber saw cattle numbers fall by between 10 and 15 percent. During this time the numbers in the Western Isles increased by just over 7 percent.

In order to examine the underlying factors behind these changes in cattle numbers the proportion of holdings within each region carrying cattle was calculated to see if these declining cattle numbers were due to a reduction in the number of farmers carrying cattle (i.e. withdrawal), or if it was due to general down-sizing.

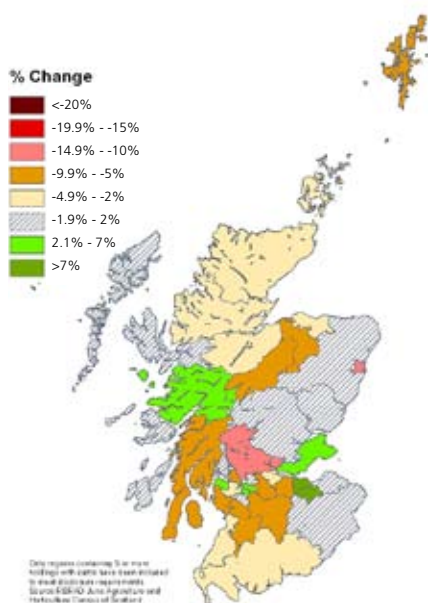


Figure 12 Change in cattle numbers between 1997 and 2000 (NUTS IV)

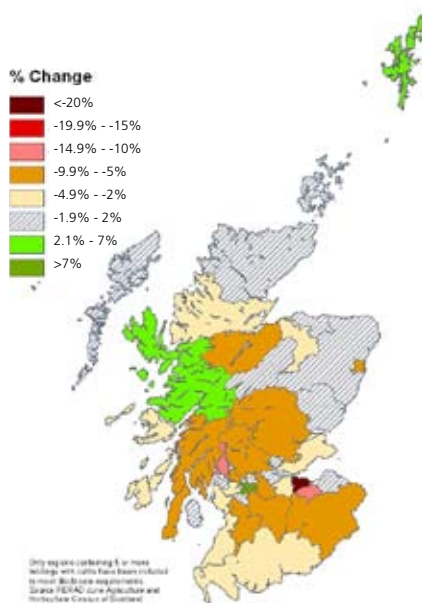


Figure 13 Change in cattle numbers between 2000 and 2004 (NUTS IV)

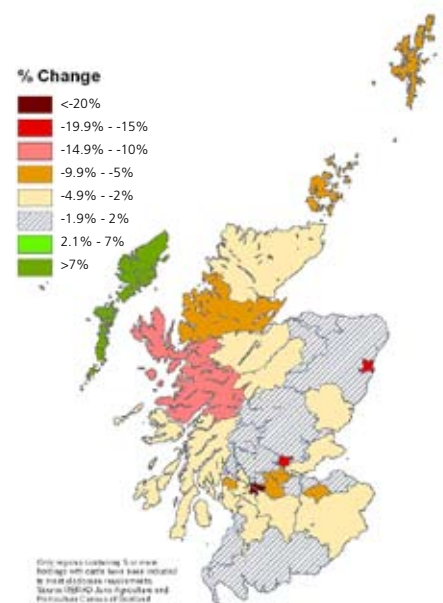


Figure 14 Change in cattle numbers between 2004 and 2007 (NUTS IV)

Figure 15 shows that the Western Isles, Shetland and Skye and Lochalsh are the only areas that witnessed very little, or no change in the proportion of holdings with cattle between 1999 and 2007, implying that changes in cattle numbers in these regions is entirely due to average stocking levels. The rest of the Highlands and Islands (except Orkney) saw between 4 and 7 percent decreases in the proportion of farms and crofts with cattle, whilst the more cattle intense areas to the East and South of Scotland saw the largest declines. Perhaps unsurprisingly Dumfries and Galloway experienced the largest decrease in the proportion of farms with cattle (falling by 12.3 percent). From figure 17 it can be seen that much of this decline in Dumfries and Galloway came between 2000 and 2004 and closer inspection of the dataset highlights that it is largely due to changes in 2001 during the FMD outbreak where farmers have clearly not restocked. Figure 18 illustrates that little change in the proportion of farmers and crofters with cattle occurred between 2004 and 2007, particularly in the hill and island areas.

As highlighted below, some of the changes in livestock numbers may be due to some withdrawal from cattle farming but it may also be related to relative stocking densities. If, over the period, it is the smaller cattle farmers that have withdrawn it may be expected that the average number of cattle per holding would have increased.

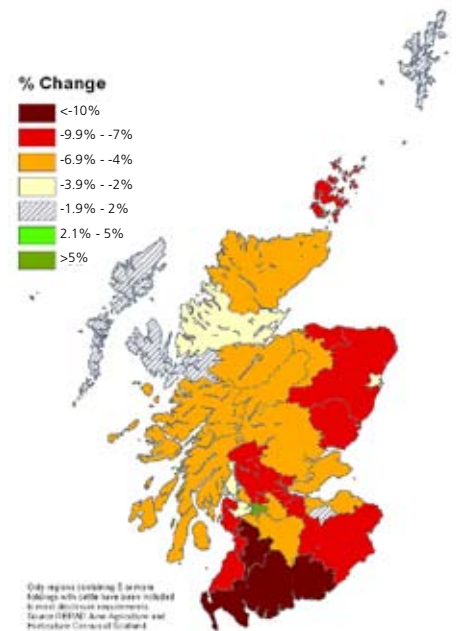


Figure 15 Change in proportion of farms with cattle, 1999-2007 (NUTS IV)

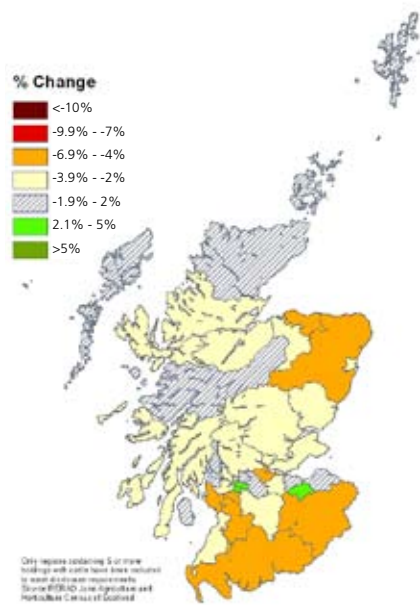


Figure 16 Change in proportion of farms with cattle, 1997-2007 (NUTS IV)

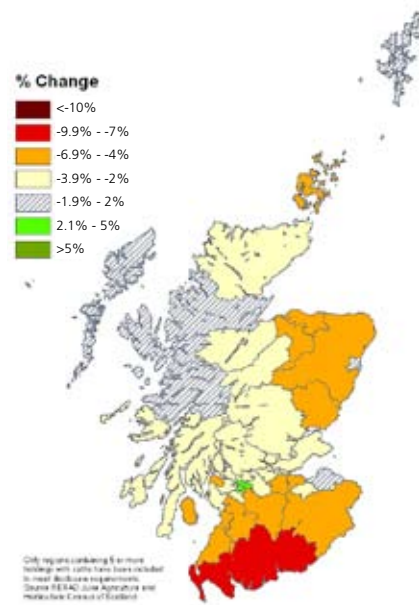


Figure 17 Change in proportion of farms with cattle, 2000-2004 (NUTS IV)

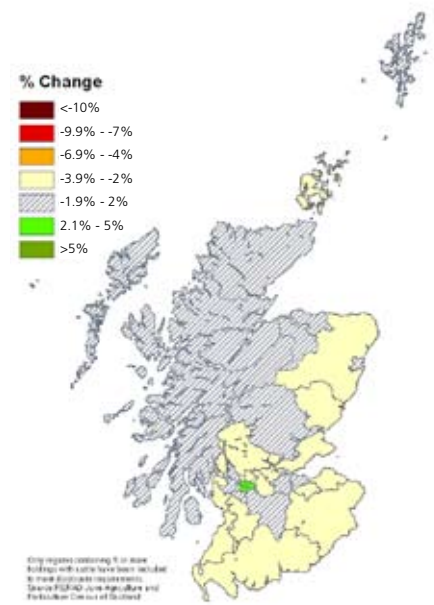


Figure 18 Change in proportion of farms with cattle, 2004-2007 (NUTS IV)

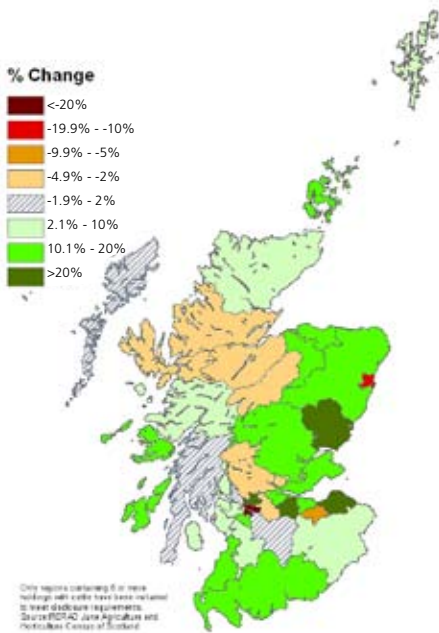


Figure 19 Change in the average number of cattle per farm 1999-2007 (NUTS IV)

Figure 19 illustrates that between 1999 and 2007 in much of the cattle intensive areas of Scotland (the East, Orkney, Dumfries and Galloway and Ayrshire) average herd sizes increased by between 10 and 20 percent. Elsewhere they remained relatively stable, with the exception of Stirling, Skye and Lochalsh, Ross and Cromarty, Inverness and Nairn and Badenoch and Strathspey, which saw modest declines of between 2 and 5 percent. Figures 20 to 22 show that between 1997 and 2000 herd sizes were growing in many areas with between 10 and 20 percent growth in Skye and Lochalsh, the Borders and the Western Isles. Between 2000 and 2004 growth in herd size was more modest although some areas, such as Arran, Lochaber and Angus still experienced 10 to 20 percent herd size growth. However between 2004 and 2007, despite modest growth in herd sizes across much of Eastern and Southern Scotland, there were significant reductions in herd sizes in Skye and Lochalsh (14.1 percent), Lochaber, Ross and Cromarty and Badenoch and Strathspey.

A similar analysis of livestock numbers, holdings and average stocking levels has also been completed for sheep at NUTSIV level. However, the picture painted is much bleaker than that of cattle with significant reduction in sheep numbers in much of the hill and island areas of Scotland.

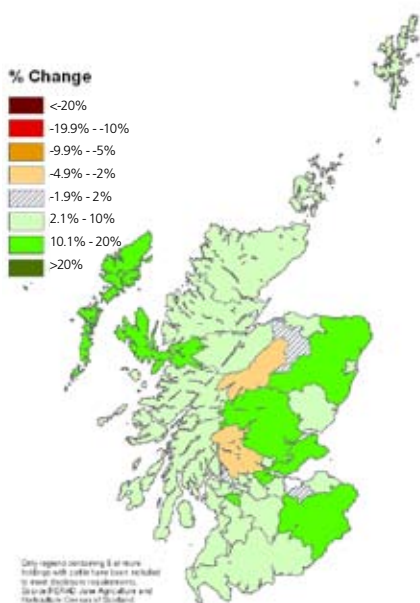


Figure 20 Change in the average number of cattle per farm, 1997-2000 (NUTS IV)

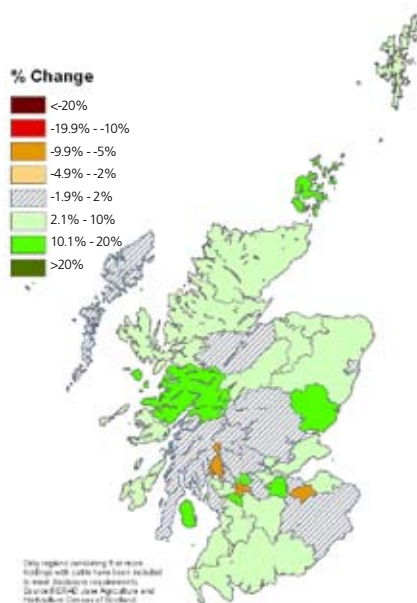


Figure 21 Change in the average number of cattle per farm, 2000-2004 (NUTS IV)

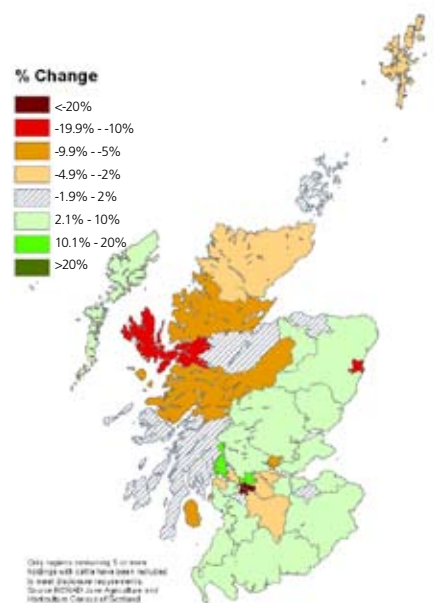


Figure 22 Change in the average number of cattle per farm, 2004-2007 (NUTS IV)

Sheep

Figure 23 highlights the changes in sheep numbers across the Scottish regions between 1999 and 2007. No areas experienced growth in sheep numbers during the period with significant decline in North Lanarkshire (39 percent), Lochaber (39 percent) and the Western Isles (38.5 percent). During that time much of the North and West Highlands, Shetland and Dumfries and Galloway experienced between 25 and 35 percent decline in sheep numbers. In the North East, Angus and Borders the declines were not quite as dramatic, with falls in sheep numbers of between 10 and 15 percent.

Figures 24 to 26 show that the decline has been ongoing in most areas since 1997, although the decline was mostly modest between 1997 and 2000 with perhaps the exception of Ross and Cromarty (11 percent). Between 2000 and 2004 the decline in sheep numbers did accelerate across much of Scotland, in particular in Dumfries and Galloway (25 percent), Arran (22 percent), the Western Isles (17 percent) and North Lanarkshire (16 percent).

Figure 26 shows that in many of the North and West Coast regions this trend of declining sheep numbers continued between 2004 and 2007 with 27 percent reduction in sheep numbers in Lochaber, 18.7 percent decline in Skye and Lochalsh and the Western Isles. It should be noted, however, that in much of Grampian, the Borders and Dumfries and Galloway, between 2004 and 2007, sheep numbers remained relatively stable with some modest growth occurring in some Eastern areas.

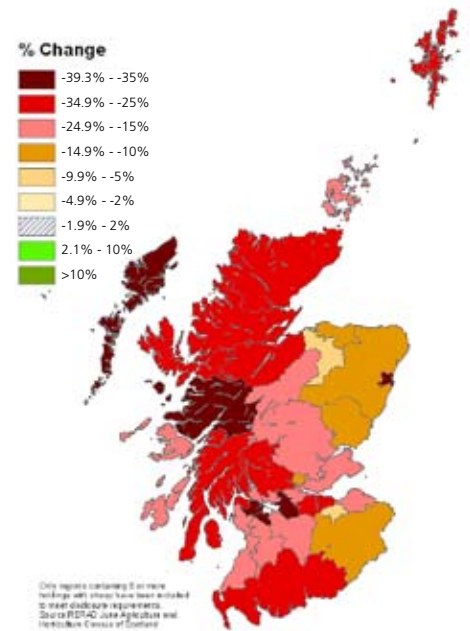


Figure 23 Change in sheep numbers, 1999-2007 (NUTS IV)

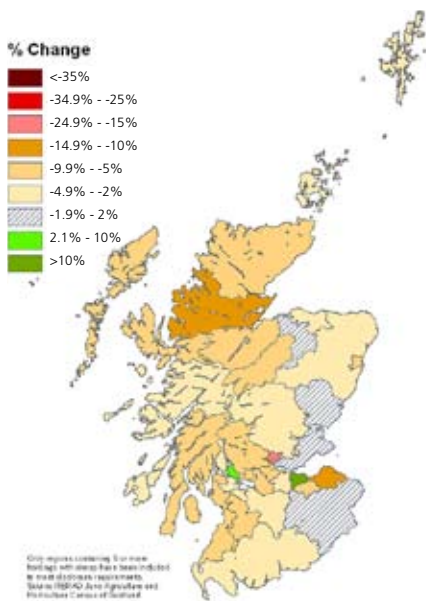


Figure 24 Change in sheep numbers, 1997-2000 (NUTS IV)

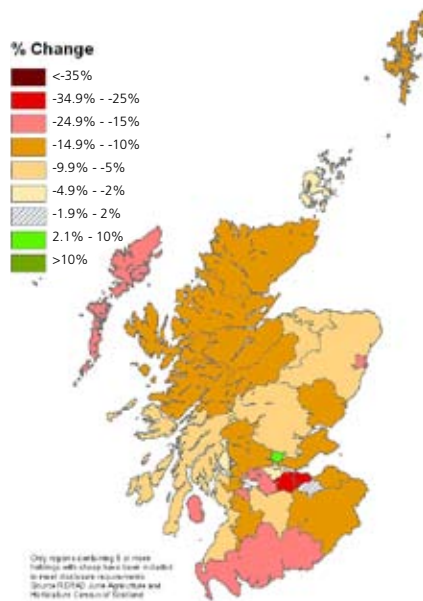


Figure 25 Change in sheep numbers, 2000-2004 (NUTS IV)

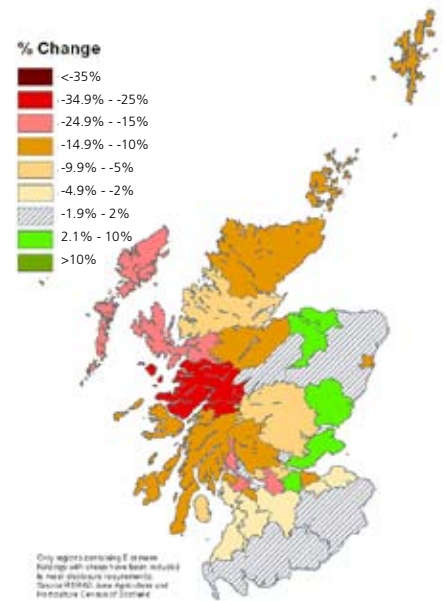


Figure 26 Change in sheep numbers, 2004-2007 (NUTS IV)

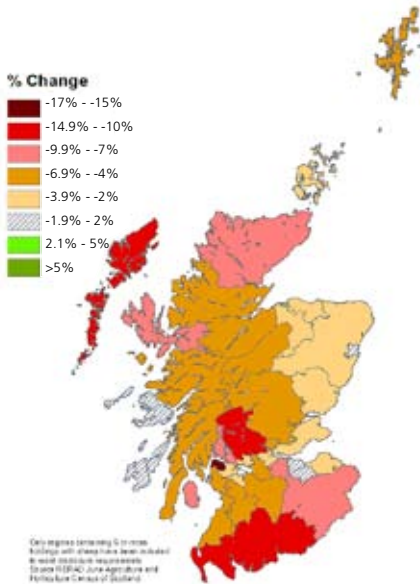


Figure 27 Change in Proportion of Farms with Sheep, 1999-2007 (NUTSIV)

As with cattle, in order to examine the underlying factors behind these changes in sheep numbers the proportion of holdings within each region carrying sheep was calculated to see if these declining sheep numbers were due to farmers entirely withdrawing from sheep production or if it was due to general down-sizing. Figure 27 shows that between 1999 and 2007 there was between a 10 and 15 percent withdrawal from sheep farming in Dumfries and Galloway, Stirling and the Western Isles. Generally, the North East fared best (with the exception of the Argyll islands) with declines of between 2 and 4 percent, with the larger declines occurring in the North, the South and the West.

Figures 28 to 30 show that whilst in some areas there is a long term trend of withdrawing from sheep production (e.g. Western Isles, Stirling and Caithness and Sutherland) for the rest of Scotland the key period of withdrawal from sheep production occurred between 2000 and 2004. This was particularly the case in Dumfries and Galloway where a proportion of the holdings affected by the FMD cull in 2001 did not restock with sheep.

Since the decline in the proportion of holdings carrying sheep is not as large as the total decline in sheep numbers, the data suggests that the remaining farmers with sheep are down-sizing, or that some of the larger sheep farms have withdrawn. As such, in areas where sheep numbers have declined significantly it can be expected that there will also be a sharp decrease in the average flock size as well.

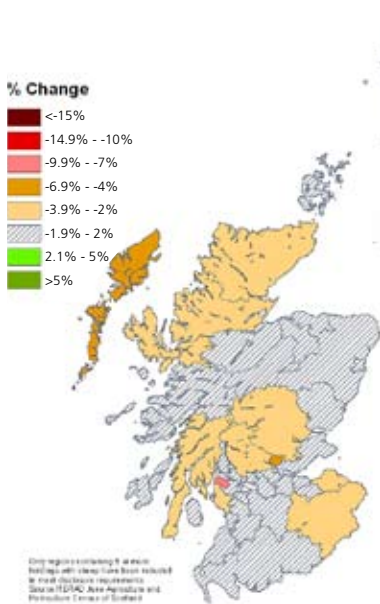


Figure 28 Change in proportion of farms with sheep, 1997-2000 (NUTS IV)

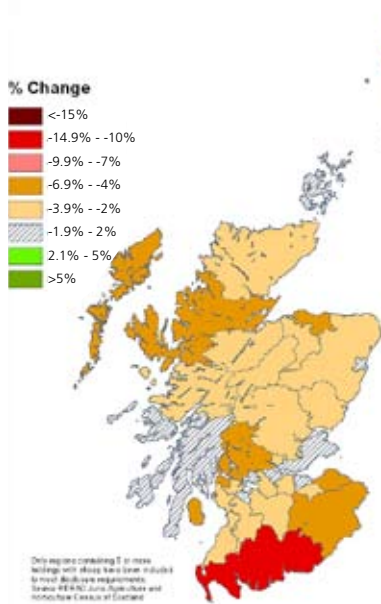


Figure 29 Change in proportion of farms with sheep, 2000-2004 (NUTS IV)

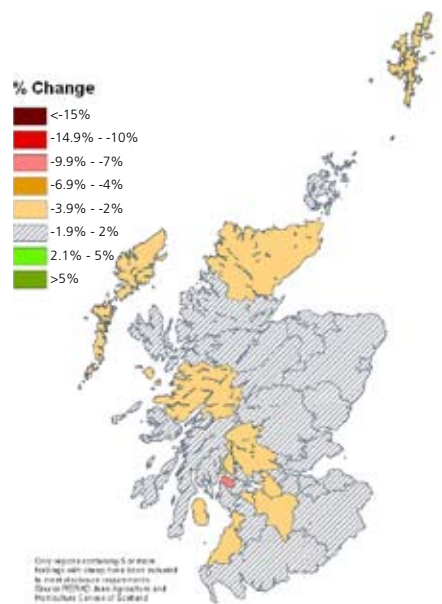


Figure 30 Change in proportion of farms with sheep, 2004-2007 (NUTS IV)

Figure 31 highlights how the average flock size has changed over the period 1999 to 2007. Lochaber experienced the largest level of downsizing where average flock sizes fell by 28.5 percent, with a 22.2 percent reduction in the Western Isles and 21.1 percent decline in Inverness and Nairn. Skye and Lochalsh and Argyll were also witness to large falls in average flock sizes (between 15 and 20 percent) with the North of Scotland and Northern Isles witnessing declines of between 10 and 15 percent. Very few areas saw any intensification, although there were 5 percent increases in flock sizes in Angus and West Moray.

Figures 32 to 34 reveal that between 1997 and 2000 flock sizes were actually increasing in much of Scotland, particularly the east coast and Borders, but also in the northern and west coast islands. The largest changes occurred between 2004 and 2007, particularly in the North and West with much of the rest of Scotland showing stability in flock sizes. In particular, it should be noted that during this period the average flock sizes in Lochaber fell by 20.7 percent with a 15.3 percent decline in Skye and Lochalsh.

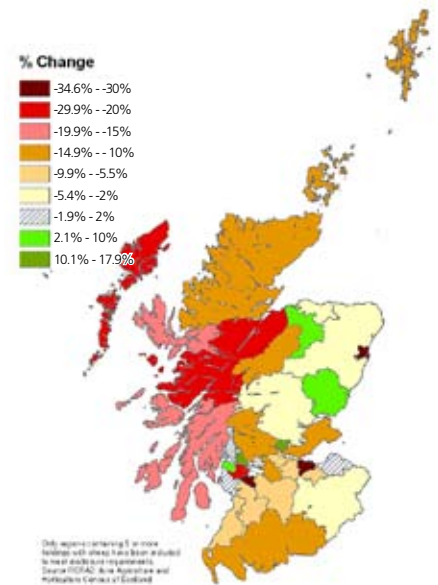


Figure 31 Change in average sheep per holding, 1999-2007 (NUTS IV)

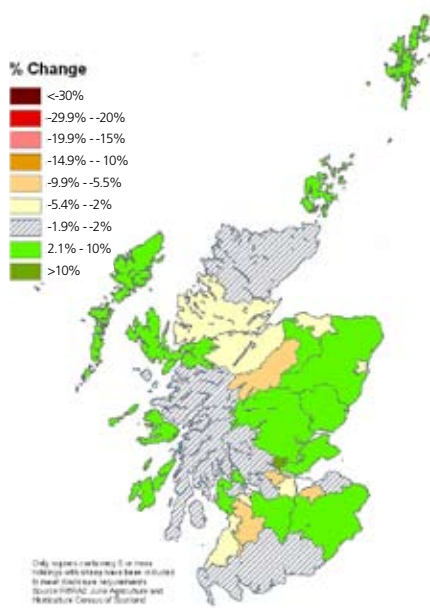


Figure 32 Change in average sheep per holding, 1997-2000 (NUTS IV)

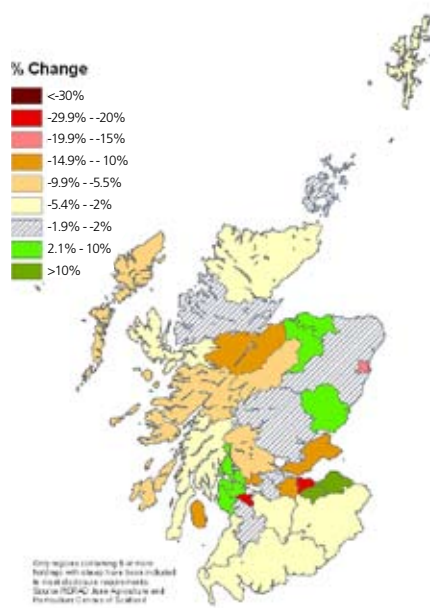


Figure 33 Change in average sheep per holding, 2000-2004 (NUTS IV)

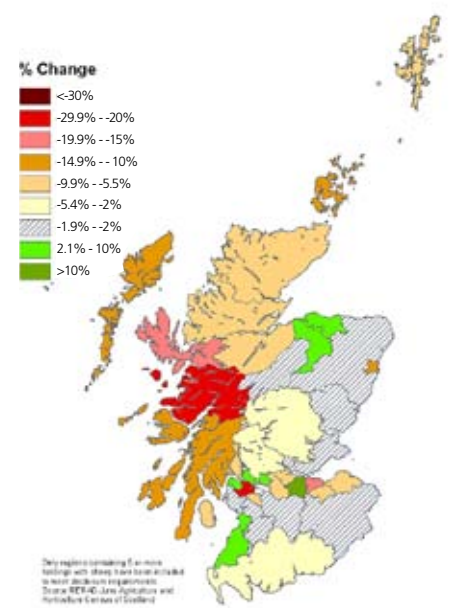


Figure 34 Change in average sheep per holding, 2004-2007 (NUTS IV)

The local picture

Further detail on trends in livestock numbers can be obtained by mapping parish level data. This level of information highlights that even within broad geographical areas (such as Highland), there can be significant variation at smaller scales.

Cattle

Some areas have seen dramatic increases in cattle numbers, notably on Lewis (perhaps the result of changes in the rules for support payments for crofters), but other areas have seen significant falls. Further, in some cases, one area that has witnessed a rise in numbers can be immediately adjacent to an area experiencing dramatic declines. The picture is therefore complex (figure 35).

In terms of broad trends, it is possible to identify an area from Fort William northwards towards Sutherland that has seen a broad decline in cattle numbers. Some parts of the Southern Uplands have also witnessed declines.

Figures 36, 37 and 38 provide greater detail in terms of the changes that have occurred over time. These graphs illustrate that prior to 2000, cattle numbers over large parts of Scotland were increasing, but that after 2000 more areas began to witness declines (although, again, the picture is complex because the different trends in numbers over very small distances can be quite marked).

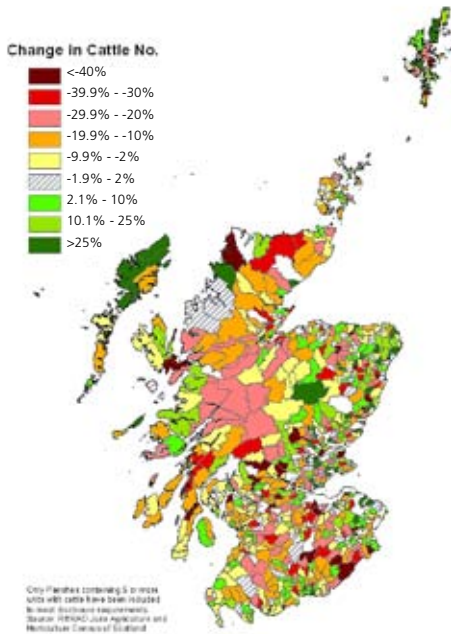


Figure 35 Change in cattle numbers between 1999 and 2007 by parish.

witness declines (although, again, the picture is complex because the different trends in numbers over very small distances can be quite marked).

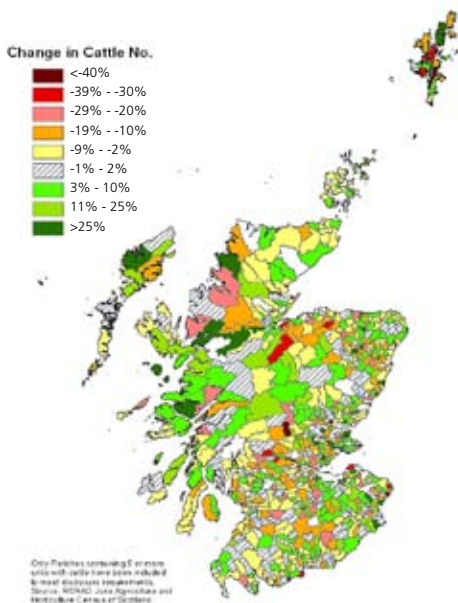


Figure 36 Change in cattle numbers by parish 1997 - 2000

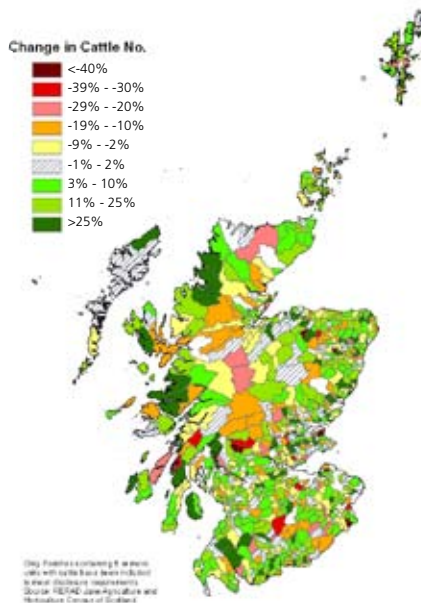


Figure 37 Change in cattle numbers by parish 2000 - 2004

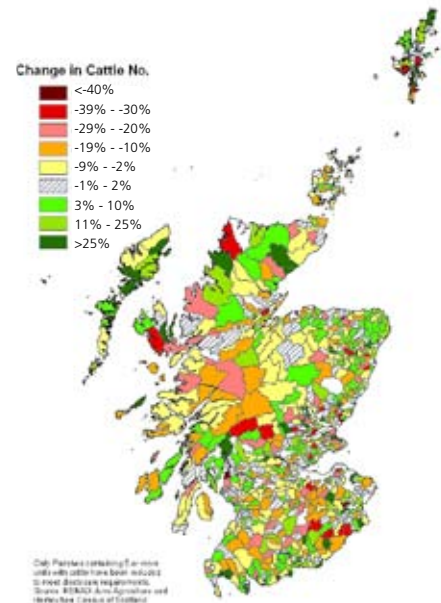


Figure 38 Change in cattle numbers by parish 2004 - 2007

Sheep

Figure 39 illustrates that the reductions in sheep numbers between 1999 and 2007 are concentrated in the north and west. Many areas have seen a reduction in sheep numbers of between 35 and 60 percent.

This broad change in sheep numbers in the period 1999 to 2007 can be broken down to better understand what is happening over time. Figures 40 to 42, for example, suggest that change has taken place in different areas at different times. Before 2000 only very few areas were experiencing large declines. Between 2000 and 2004 the impact of Foot and Mouth Disease is apparent in Dumfries and Galloway and larger declines are seen in the North West. After 2004 further declines in the West compound the established trends.

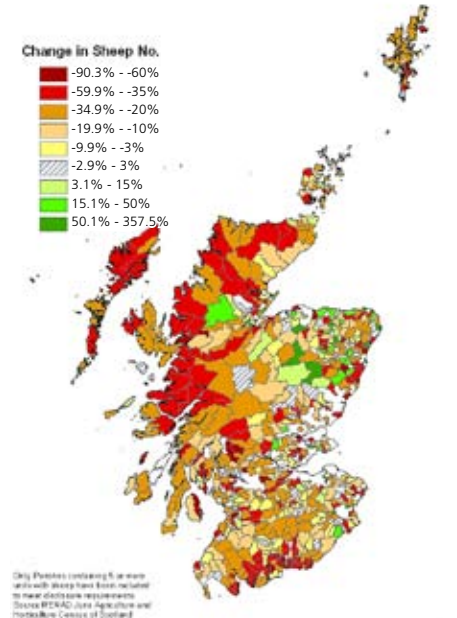


Figure 39 Parish level data for changes in sheep numbers between 1999 and 2007

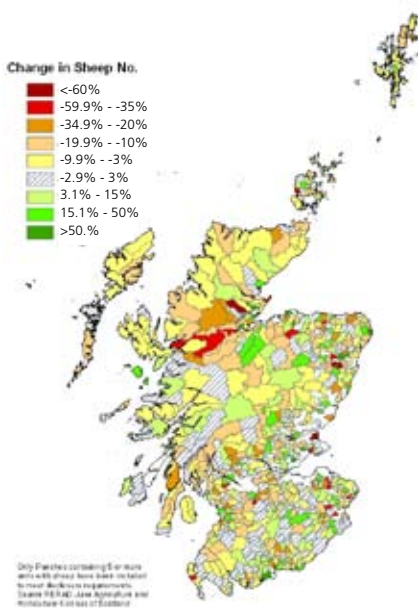


Figure 40 Change in sheep numbers 1997 - 2000

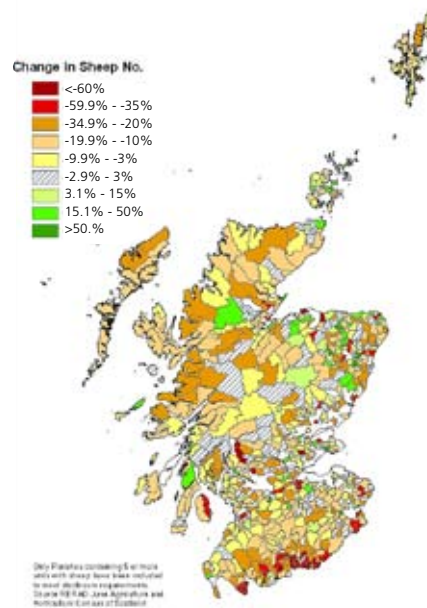


Figure 41 Change in sheep numbers 2000 - 2004

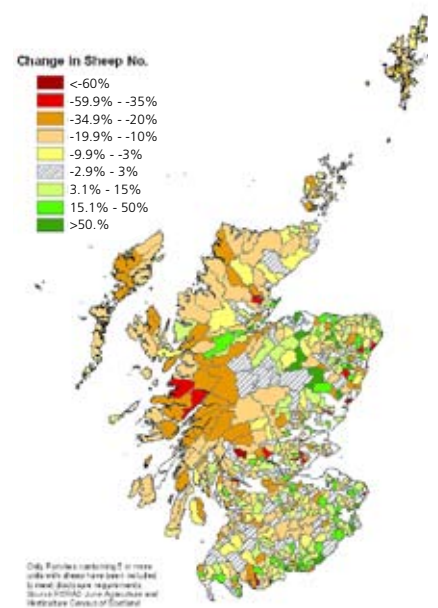


Figure 42 Change in sheep numbers 2004 - 2007



Conclusions

- Sheep numbers have declined dramatically since 1999, most notably in the North West.
- Cattle numbers have also declined, although not so dramatically and not in the same areas.
- The reduction in sheep numbers is part of a process of down-sizing coupled with a number of farmers leaving the industry
- The decline in cattle numbers in some areas is a combination of down-sizing and farmers withdrawing from production. However in many areas the changes are due to an increase in intensity as some farmers have expanded as others leave the industry.
- Declines in livestock numbers appear to have accelerated after the introduction of the Single Farm Payment and the decoupling of livestock numbers from payments.
- The decline in livestock numbers is complex with a great deal of spatial variation even within single geographical areas (such as Highland).

The economic reality of farming in the hills

John Vipond and Gavin Hill

Summary

- Farming in the hills and remote parts of Scotland is challenging and most current hill production is financially uneconomic.
- Support payments, primarily in the form of the Single Farm Payment and payments under LFASS, are keeping people on the land.
- Since the SFP is no longer linked to the number of animals, stock levels have gradually dropped, although LFASS has been a strong factor in keeping cows in the hill areas.
- Rising stock prices, which should have improved the situation, have been negated by rising costs and many farmers continue to face difficult decisions about the future viability of their businesses.

Hill farmers are under significant pressure at present because most hill production is financially uneconomic. The price that farmers receive for their livestock, for example, is often below the costs of production and much of the farming in hill areas only continues because of the support payments provided by government. In some areas – especially the North West – this situation is particularly pronounced and some farmers have already scaled back their livestock numbers or removed livestock altogether.

During 2008 there have been favourable moves in the prices that farmers can achieve for their animals, but, unfortunately, a parallel increase in the costs of feed, fuel and fertiliser mean that few farmers in hill areas are improving their profitability. As such, the decline in stock numbers is expected to continue.

While in hard economic terms hill farming is not viable, many farmers continue to farm because of family links to the land and for social reasons. Without a significant change in the economics of hill farming, however, this social justification for continuing to farm will increasingly provide less of a reason for staying on as farmers' finances get further stretched.

Sheep

Data on the economics of sheep farming is available from several sources including profitability figures provided by Quality Meat Scotland (QMS)¹⁴, gross margin data from SAC's Farm Management Handbook¹⁵ and farm income data from the Scottish Government¹⁶. QMS data on the financial performance of breeding flocks in different geographical zones provides some insight into the challenging situation faced by many hill farmers (table 1). Although gross margins give an image of economic health, once fixed

costs are considered the average sheep farmer in the LFA is making a loss on every ewe, with the loss being greatest for hill breeding flocks.

The average true loss per ewe of around £25 in 2006 will have been worse in 2007 due to low prices received as a result of movement restrictions caused by foot and mouth disease and bluetongue. In Scotland, this was ameliorated by a one off ewe headage payment of £6 and an emergency slaughter scheme for light lambs under 25Kg, which was particularly used in the island communities where high transport costs for store lambs are an additional burden.

Table 1 Gross and net margins per ewe for lowground, LFA upland and LFA Hill breeding flocks

(Source: QMS 2007).

	Lowground Breeding Flocks	LFA Upland Breeding Flocks	LFA Hill Breeding Flocks
	Average holding £ per ewe	Average holding £ per ewe	Average holding £ per ewe
Gross Output	78.98	67.38	38.99
Less Replacement costs	(-) 6.42	(-) 10.21	(-) 7.50
Net Output	72.56	57.17	31.49
Variable Costs (incl. concentrates and forage)	(-) 28.96	(-) 22.08	(-) 15.25
Gross Margin	43.60	35.09	16.24
Fixed Costs	(-) 44.54	(-) 44.97	(-) 42.09
Net Margin per ewe	(-) 0.94	(-) 9.88	(-) 25.85

This data is complemented by information from SAC's Farm Management Handbook which provides estimated gross margins by area (table 2)¹⁷. This information suggests that behind the broad categories of the QMS profitability data there are significant geographical variations with the North West experiencing a significantly different financial situation to other places in Scotland. Sheep farmers in the North West would appear to be making a loss on each ewe before any of the fixed costs are accounted for, whereas farmers in the Southern Uplands are in a more favourable position. The key difference is that farmers in the Southern Uplands and Grampians can expect to sell more lambs per 100 ewes and at a higher price. Farmers in the North West have less product to sell and, because of the quality of the land, must usually sell at a lower price.

Table 2 Gross margin data for hill breeding ewes, store lamb production with limited inbye

(Source SAC 2007: 171).

	Blackface NW & W Highlands	Blackface Grampian & S Uplands
	£ per ewe	£ per ewe
Net Output	7.25	17.82
Variable Costs (incl. concentrates and forage)	14.81	11.80
Gross Margin	-7.56	6.02

These figures suggest that the average sheep farmer in the LFA (but especially in the North West), is making a loss and is heavily dependant on subsidy support. Data from the Scottish Government on farm incomes in 2006/07 demonstrates that the subsidy payments through the Single Farm Payment (SFP) and the Less Favoured Area Support Scheme (LFASS) are crucial in making up the shortfall between costs and the income from selling livestock (figure 43).

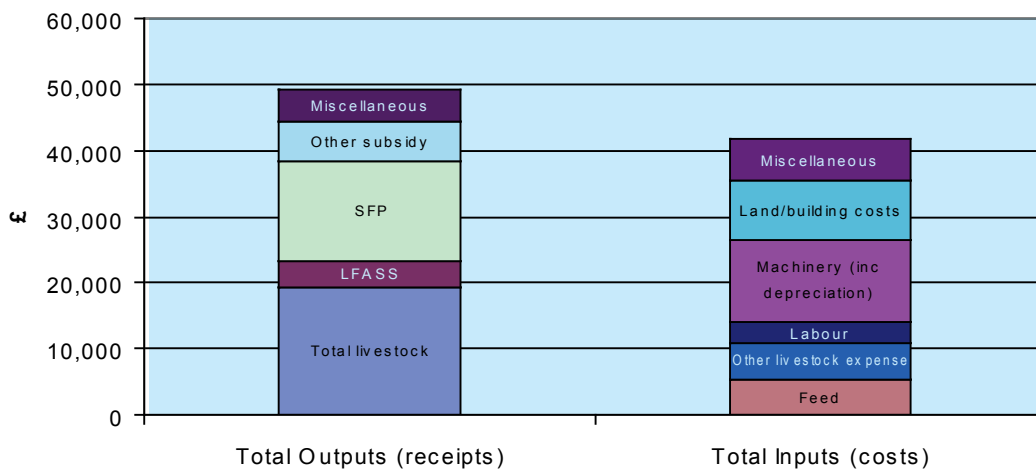


Figure 43 Comparison of inputs (costs) and outputs (receipts) for medium-sized specialist sheep farms in LFAs
(Source: Scottish Government 2008)

Cattle

The financial performance of cattle farms is equally challenging. QMS data on the profitability of LFA hill suckler herds¹⁸, for example, highlights that average performance is poor with a loss of £284 per cow (table 3)¹⁹. Without the SFP and payments under LFASS, cattle businesses would be in a poor economic situation (figure 44).

	Average £ per cow
Gross Output	386.36
Less Replacement costs	(-) 52.92
Net Output	333.44
Variable Costs (incl. concentrates and forage)	(-) 231.09
Gross Margin	102.35
Fixed Costs	(-) 386.46
Net Margin per cow	(-) 284.11

Table 3 Gross and Net margins per cow for LFA Hill Suckler Herds
(Source: QMS 2007)

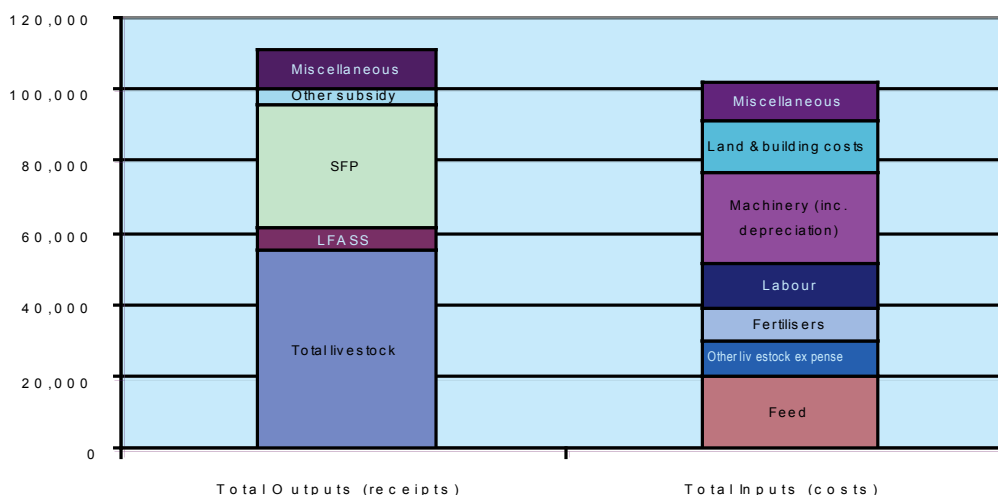


Figure 44 Comparison of inputs (costs) and outputs (receipts) for medium-sized specialist beef farms in the LFA
(Source: Scottish Government 2008)

Recent price and cost changes

The prices received for lambs (figure 45) and for steers (figure 46) have risen recently and represent a welcome increase in the income per animal. Finishing cattle prices have been improving considerably and are now at 270p/kg DW, which compares with 220p/kg DW in 2007. This 50p/kg increase provides grounds for optimism (although it must be noted that many hill farmers are weaned calf/store cattle producers who sell to finishers and the price for store cattle has not risen to such a great extent).

The welcome news of the rising prices has, however, been dampened by the simultaneous increase in input costs (figure 47), which means that there are continuing concerns over farm profitability in Scotland. In general terms, as both the costs and income rise they balance each other out, meaning that net margins stay broadly the same. While the prices that farmers receive for their animals have risen, the farmers do not feel the benefit because their costs have also risen. Those businesses that were on the margins of profitability (including support payments) will therefore still be marginal and face difficult decisions about the future of the farming enterprise.

Figure 45 Auction market price for lamb in Scotland

(Source: QMS)

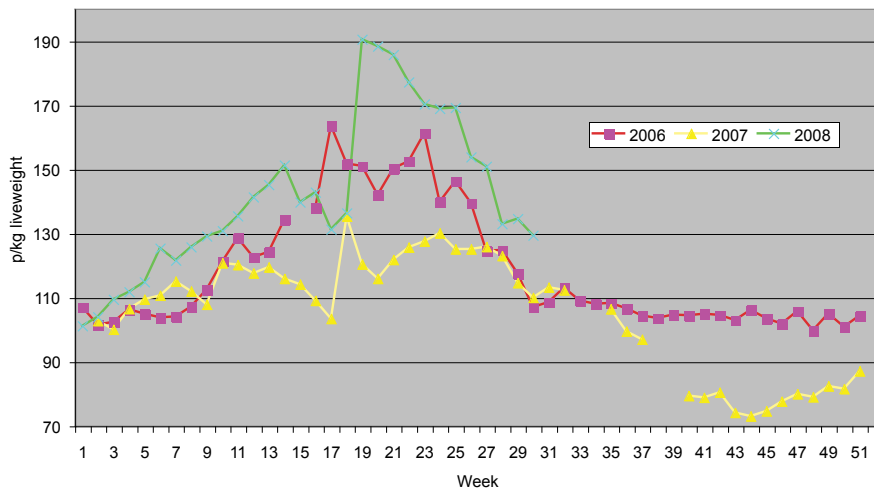
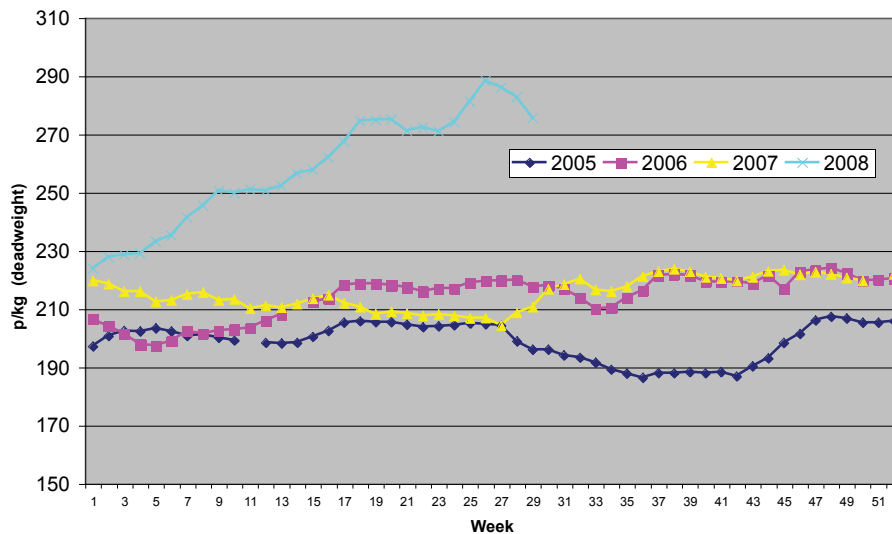


Figure 46 Deadweight prices for steers in Scotland

(Source: QMS)



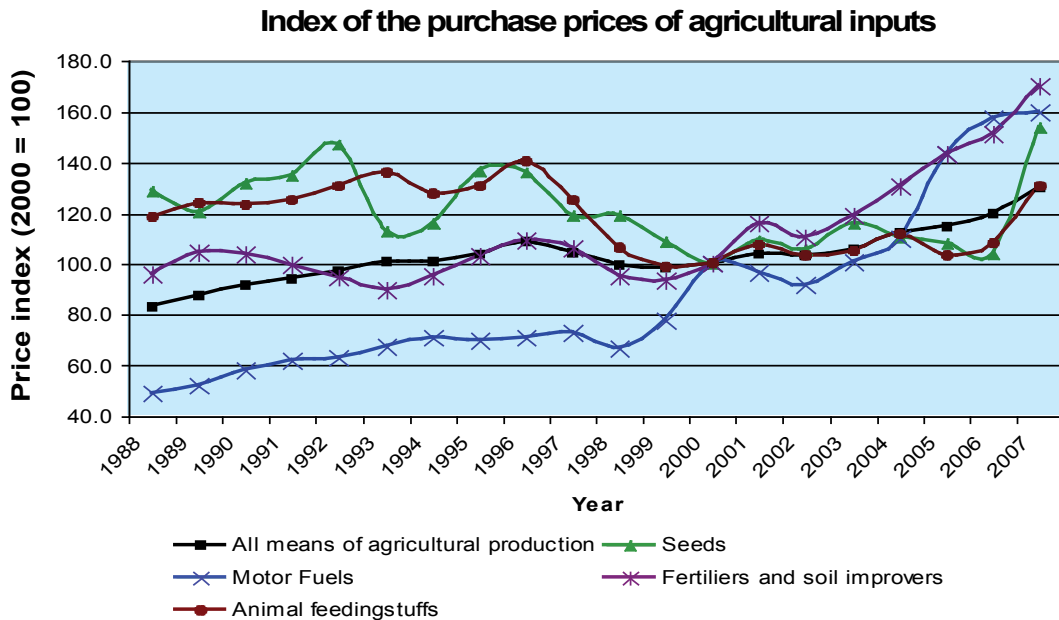


Figure 47 Index of prices of agricultural inputs
(Source: DEFRA)

The headline figures of rising costs do not tell the whole story, however, as rising feed, fertiliser and fuel costs affect each sector of Scottish agriculture differently. Hill farmers may be particularly hard hit because while feed, fertiliser, fuel and power costs generally account for only a modest proportion of suckler enterprise production costs, hill suckler herds are notable for their relatively high dependence on purchased feed, which is consistent with the longer term move away from traditional systems based on hardy native breeds utilising low value pastures. Similarly, rising input prices, which are particularly severe in the remoter areas, mean that lighter lambs (under 25Kg), which are hard to finish outside on forages because they are too small to cope with the weather, will no longer be profitably finished indoors on cheap cereals (since the cost of cereals has risen).

In practice, different businesses will be affected in different ways. The degree to which a farmer will benefit from rising prices will depend on the detail of their operation. The better hill farms with 100% lambing, for example, do not buy in great quantities of concentrates or fertilisers. Further, the price of feed blocks has not increased as much as that for concentrates, so the better hill farms should benefit significantly from better prices. Indeed, when sheep are in short supply the relative price of finished hill breeds is higher (when there is a good supply of sheep, hill farmers are subject to price deductions for poorer conformation, but when supply is restricted the difference between hill and other breeds is smaller).

Ultimately, the farmers who farm better ground will be best placed to survive. However, many hill farmers are quite vulnerable to changes in the market, not least because they have limited choices. Most hill cattle producers operate around spring calving and have to sell in the autumn because they lack appropriate housing or because feed prices make it uneconomic. They are therefore subject to the market in a very short window of the year.

Rising prices and the supporting industries

The increase in the price of fuel has the potential to have a significant impact on farmers in remote hill and island locations, not only because of the direct impact on their farm business, but also because of

the impact of price rises on other businesses upon which these remote farmers depend. Hauliers, for example, connect remote farmers to markets and represent an important link in the chain that enables remote farms to stay in farming. Yet many hauliers are suffering as a result of the increases in fuel costs (figure 48) and some have already decided to cease their activities, a situation that may present hill farmers with additional difficulties, especially if they move only small numbers of stock.

Figure 48 Trends in diesel prices
Source: BERR 2008



Case studies from Scottish hill farms

Claire Morgan-Davies

Summary

- Census data can be used to highlight trends but it does not provide insight into why changes might be taking place. This section looks behind these trends and is based on data gathered by speaking to the hill farmers themselves.
- In a survey of hill farmers, more than 50 percent said they had made changes between 2001 and 2005, with the main changes being a reduction in sheep numbers and an increase in cattle numbers.
- Since 2005, 55 percent said they had made changes to their management, with the main change being a reduction in sheep numbers.
- Case studies identify the importance of several factors in shaping the management decisions on hill farms: the activities of neighbouring farms; the availability of labour at key times of year; and the nature of land tenure.

Introduction

According to the census data collected by the Scottish Government, the main trend since 2001 in the hill areas of the North West of Scotland (namely Highlands, Western Isles and Argyll & Bute) has been a decline in sheep and cattle numbers. Census data does not, however, tell the whole story because it does not provide any insight into why these general changes might be taking place. It is important, therefore, to look beyond the census data to the reasons behind these trends by investigating what is happening on the ground and by speaking to the hill farmers themselves.

In order to gain a better insight into the management decisions that lie behind these trends research involving a postal survey and face-to-face interviews was conducted in 2007 with hill farmers in Argyll, the Borders and an area north of Inverness. What follows reports the broad results of the postal survey and provides some summary information about two case studies.

Survey

In this research, farmers were asked if they had made any changes in their management a) between 2001 and 2005, b) since 2005 (i.e. since the introduction of the SFP), and c) if they planned any major changes in the next 5 years. These questions aimed at gauging what was happening on the ground in real terms.





The results confirmed the national trends:

More than 50 percent of the farmers surveyed said they had made changes between 2001 and 2005. The main changes were a reduction in sheep numbers and an increase in cattle numbers. The increase in cattle numbers can be explained by the Less Favoured Areas Support Scheme of the time, which gave incentives to farmers to have a mix of cattle and sheep on their farm.

Since 2005, 55 percent of the farmers surveyed said they had made changes to their management. Again, the major change was a reduction in sheep numbers. Cattle numbers were also reduced, which shows that the increase of 2001 was short-lived. This reinforces the sensitivity of hill farming to rules and support payments. The reasons for these changes were not only economic but also often linked to people (labour, other interests, retirement, etc.).

Finally, when asked about their long-term plans (in the next 5 years), more than 30 percent said they would consider tourism and diversification as a potentially viable option. However, there were other land-based options, such as getting more sheep, investing in forestry, or exploring the potential of small-scale hydro-electric schemes.

Case study 1 – Owner-occupier hill farm

This farm was large (more than 4,000ha), with more than 3,700 hill ewes and 100 cattle. Most of the land was classified as hill.

Changes

No change was made between 2001 and 2005. The numbers of sheep had always been at this level, but cattle numbers were higher than in the past. In 2005, however, this farm decreased its numbers of sheep by 700 (a reduction of 19%). The main reason was the problem of the neighbouring hill, which was de-stocked recently. As a result, this farm's sheep were straying and gathering became very difficult. The longest gather took 12 hours, with 6 people. By, in effect, de-stocking the hill adjacent to the neighbour's de-stocked hill, management of the sheep on the farm became easier. There were therefore several reasons for this decision to reduce numbers: they were financial and based on labour availability, but they were also related to animal health concerns (straying sheep might not have been dipped or treated and could have become a pool of infections). Ultimately, the main driver of changes was the change in management on neighbouring farms.

Effects of these changes

Although this was a reduction of 19%, the farmer said that there would be no effect on the local economy or on the habitat. However, the paid labour and unpaid labour would decrease. This farm employed 3 contract workers for gathering and shearing and this number will change with the decrease in sheep numbers.

Future of the farm

For the next 5 years, his plans are to make the farm more manageable with a minimal workforce and probably to reduce his hill ewes further.

The farm had already diversified 15 years ago towards tourism, with self-catering accommodation and a farm shop. So for the future, the farmer did not see the need to look in this direction for further income.

His main motivation in farming is to provide a working system for the next generation. Although he disagreed that there was no future in hill farming, he agreed that more support from agri-environmental schemes was necessary for the future of hill farming and that hill farmers were important contributors to the local economy.

The farmer does not have any successor, but thinks the farm will carry on after he retires.



Case Study 2 – Tenanted hill farm

This farm was tenanted and had an area of around 1,600 ha, most of it being classified as hill. At present, it carried around 1,500 hill ewes and 20 cattle.

Changes

In the past, the farm supported 2,000 ewes, but it was reduced to 1,930 following a Rural Stewardship Scheme before 2001. Between 2001 and 2005, the farmer rented an additional 80 ha of better lowland ground, 20 miles from the hill farm, to expand his business. This lowland farm is where the 20 cows are kept during the winter. It also provides silage for the animals. In 2005, he decreased his hill flock to 1,500 hill ewes, to allow him to have more ground to winter the hogs on his hill, and thus saving the off-wintering costs. In total, his hill flock had been reduced by 25% since before 2001.

Effects of these changes

These changes decreased his paid and unpaid labour. The farmer did not think that these changes would have an effect on the local economy. However, reducing the hogg wintering would potentially have an effect on the haulage companies. The farmer thought that reducing the ewes from 1,930 down to 1,500 improved the habitat (his hill). Reducing the ewes was a result of the CAP reform. Before this, his quota was for 2,500 ewes, although he thinks that the maximum carrying capacity for the farm is for 2,000 ewes. At present, his longest gather takes 6 hours, with 3 people. If his neighbours were to reduce their sheep numbers, he would be affected and his own ewes would stray into the neighbouring hill, making gathering more problematic.

The future

- This farmer would like to reinvest in the farm in the next 5 years. He does not plan any further reduction of stock. Being a tenant, he cannot reduce excessively his stock, diversify his income too much, or convert anything on the farm for tourism business²⁰.
- The farmer did not have any successor and thought that once he retires, the estate will lease the farmhouse but not the land. In effect, he expected to be the last tenanted farmer on this piece of land.
- He considered that there was no future for hill farming.

Conclusions

These two case studies illustrate the disparities linked to land tenure and the options available to hill farmers in both cases. In the case of the owner-occupier farm, with more flexibility in management and numbers of animals, despite having an established diversified business beyond purely farming, the resilience of the system was undermined by neighbouring farms and by the nature of hefting in the hills. The farm reduced its stock numbers mostly because of the labour aspect of gathering sheep. It showed that even a hill farm that is well managed with a diversified income could be at the mercy of the rest of the industry. This illustrates how linked the hill farms are and how a “domino effect” can occur when there are major changes in subsidies or any other land use policy.

In the case of the tenanted farm, options were more limited. The farmer was trying to farm his way out of the current situation by modifying the grazing conditions and by trying to reduce inputs. The idea was for the cattle to use the hill in summer and the better lowland ground in the winter, and to provide grazing for the hogs on-farm in order to reduce costs of otherwise off-wintering animals. The only way to achieve this was by reducing animal numbers to free up land. Any other way of diversifying or improving income was not possible due to the nature of the land tenure. This example illustrated the different situation that tenant farmers could be facing. In our interview sample, whilst all the owner-occupier farmers had made a change during the two periods considered, 40 percent of the tenant farmers did not make any changes at all. This perhaps reflects the lack of flexibility that tenant farmers face.

In both cases though, the loss of animals was quite high, between a fifth and a quarter of the flock. Whilst these are only case studies, they still reflect the observed trends in these areas and shed light on why these trends are being observed and their potential effects on the wider rural economy.





The consequences for biodiversity

John Holland, Meg Pollock and Tony Waterhouse

Summary

- A reduction in grazing on hill land will benefit some species but be detrimental to others.
- Some sites will be of greater conservation value while others will have a lower conservation value.
- High Nature Value (HNV) farming systems are low intensity, low input systems, frequently involving the utilisation of semi-natural vegetation by livestock. A reduction of grazing in systems that are already low intensity and extensive could lead to a decrease in biodiversity. In Scotland, the areas of HNV farmland coincide with the areas that are experiencing the greatest declines in livestock numbers.

Although the production of hill livestock has changed markedly over the last 200 years, the system of continuous grazing on hill pastures by hardy breeds of hill sheep has been in place in much of Highland Scotland since the beginning of the 19th Century. The stability of this grazing system is now, however, under threat in many parts of the Highlands. Although grazing levels were considered to be too high in large parts of the British uplands through the latter part of the twentieth century (leading to heather loss and damage to vegetation and soils²¹), the situation in some places has now reversed with little or no livestock, which may lead to problems associated with under-grazing.

There have been a number of studies looking at the effect of removing sheep from hill vegetation in the UK²². These studies have shown that the species composition and structure of the vegetation change when sheep are excluded. Different vegetation types, however, respond in different ways and at different rates. The geographical location together with the physical and biological environment of the site also effect how the vegetation responds. Any changes in the composition or structure of the vegetation will in turn have an impact on the insect, bird and mammal assemblages present. Some species and habitats will benefit from the removal of livestock, but for others that are dependent on grazing, the loss of livestock is likely to be detrimental to their condition and conservation value. Although no two sites will respond in exactly the same way, some general predictions can be made about the impact of livestock exclusion on upland habitats.

Dwarf shrubs, including Ling (*Calluna vulgaris*), Blaeberry (*Vaccinium myrtillus*) and Crowberry (*Empetrum nigrum*) are likely to increase under reduced grazing pressure. An increase in the cover of dwarf shrubs will be of benefit to a number of bird and invertebrate species which are associated with heathland such as Red Grouse (*Lagopus lagopus*) and the Northern Eggar moth (*Lasiocampa quercus*).

Many alpine plants, tall herbs and montane scrub species cannot tolerate high levels of grazing and

Assessing the impact on biodiversity

Change is an integral part of natural processes. Different species and habitats will respond in different ways to changes in land management practice. There will be some winners and some losers as some species benefit from the changes in the environment in which they currently live, while others lose out. In a general sense, then, given that no one species is inherently more worthy than another, change is, in and of itself, neither good nor bad.

However, through extensive monitoring of trends in species populations and the extent of different habitats, nature conservationists have devised a system for identifying priority species and habitats (as a means of focusing on those parts of nature that need help the most). Priority species and habitats tend to be those that are known to be declining in number or area or which occur in specific places (and perhaps are unable to move) and are threatened by some form of change (whether that be from people or from climate change).

By using the priority species as a register against which to judge the impact of change it is possible to come to a view on whether current trends are positive or negative.

tend therefore to be restricted to inaccessible cliff ledges. By reducing or removing grazing, species such as Globeflower (*Trollius europaeus*), Wood Crane's-bill (*Geranium sylvaticum*), Goldenrod (*Solidago virgaurea*), Wild Angelica (*Angelica sylvestris*), Roseroot (*Sedum rosea*), Alpine Saw-wort (*Saussurea alpina*), Downy Willow (*Salix lapponum*) and Whortle-leaved Willow (*Salix myrsinites*) will have the opportunity to expand off the cliff ledges on to the surrounding ground, if the conditions are suitable²³. The expansion of tall-herb species will provide an additional nectar source benefiting insects such as bumble bees and hoverflies. One of the first things to happen when grazing is reduced on hill grasslands is a change in the sward structure. The swards become taller, more homogeneous with more litter and dead standing material²⁴. Small mammals – Field Voles (*Microtus agrestis*) in particular – thrive in these un-grazed grasslands²⁵. Field voles are an important food source for raptors, short-eared owls (*Asio flammeus*), foxes (*Vulpes vulpes*) and stoats (*Mustela erminea*). Predator control is likely to be absent on abandoned ground and there is likely to be less disturbance which will also benefit populations of wild predators. However, by removing sheep from hill areas an important source of carrion for species such as Raven (*Corvus corax*) and Golden Eagle (*Aquila chrysaetos*) will be lost.

With the increase in available herbage, reduced competition from grazing livestock and lower levels of disturbance, large herbivores such as Red Deer (*Cervus elephas*), Roe Deer (*Capreolus capreolus*) and Mountain Hare (*Lepus timidus*) are likely to increase. These increases in native herbivores may in part compensate for the loss of livestock, however there are differences in the grazing behaviour of sheep and native herbivores and their numbers and geographical distribution are likely to be much more variable both seasonally and annually.

Some ground nesting birds may benefit from the removal of livestock as fewer nests will be trampled and fewer nesting adults will be disturbed. However, the loss of patches of short grazed grassland will reduce feeding opportunities for ground feeding bird species such as Meadow Pipit (*Anthus pratensis*),





Skylark (*Alauda arvensis*) and Wheatear (*Oenanthe oenanthe*). Invertebrate species which are associated with short grazed swards or dung are likely to decline whereas those associated with taller swards will increase.

One plant which is likely to increase particularly at moderate altitudes, where it can become dominant, is Purple Moor-grass (*Molinia caerulea*). Bracken (*Pteridium aquilinum*) is also likely to expand at both low and moderate altitudes. Like grasslands, wetland and peatland habitats are likely to become taller and more homogeneous which may have a detrimental impact on upland waders such as Curlew (*Numenius arquata*) and Golden Plover (*Pluvialis apricaria*). With reduced nutrient cycling, the build up of dead material and lower levels of trampling, it is likely that peat formation will increase.

Within species-rich montane grasslands, annual and low-growing perennial herbs are likely to decline where livestock have been removed. Many of the scarce alpine species found in these grasslands, which are of greatest conservation value, will decline, while tall perennial sedges, grasses and dwarf shrubs will increase. Some plant species respond very rapidly to changes in grazing management. Small isolated populations of these species are at significant risk of local extinction if livestock are removed from particular sites²⁶. The condition and conservation value of sites designated for their species-rich montane grasslands are likely to suffer if livestock are removed.

Scrub and woodland species such as Eared Willow (*Salix aurita*), Bog Myrtle (*Myrica gale*), Rowan (*Sorbus aucuparia*) and Downy Birch (*Betula pubescens*) are likely to expand in the upland fringe if seed sources are available. This increase in scrub and woodland is likely to benefit bird species such as Black Grouse (*Tetrao tetrix*), Whinchat (*Saxicola rubetra*), Stonechat (*Saxicola torquata*), Linnet (*Carduelis cannabina*) and Willow Warbler (*Phylloscopus trochilus*)²⁷.

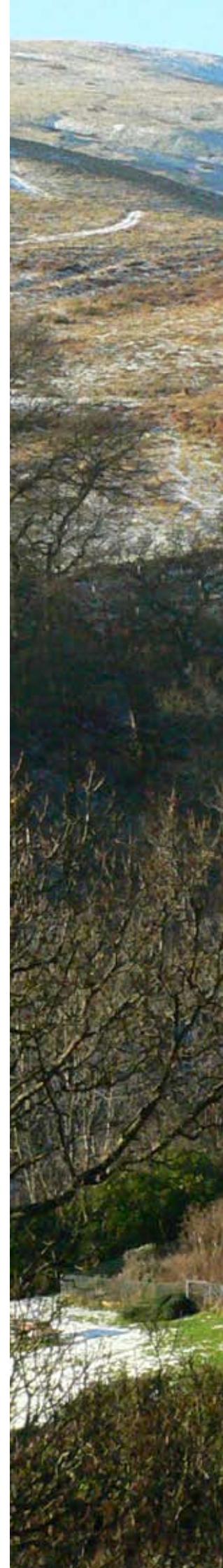
High Nature Value farmland

While it is possible to identify the potential winners and losers of a reduction in the amount of grazing in a Scottish context, there are also potential lessons from wider European experience. Land abandonment has been an increasing problem in Central and Eastern Europe²⁸ and it has been noted that as land has been abandoned so biodiversity has suffered.

The concept of High Nature Value (HNV) farmland emerged as a response to this problem as it was recognised that in some areas of farmland there is a strong relationship between the farming practices and biodiversity and where the continuation of those practices is important for the maintenance of the biodiversity value²⁹. Generally, high nature value farming systems are low intensity, low input systems, frequently involving the utilisation of semi-natural vegetation by livestock.

In Scotland, the areas of HNV farmland coincide with the areas that are experiencing the greatest declines in livestock numbers, suggesting that the HNV farming systems in these areas are in decline. Crucially, a reduction of grazing in systems that are already low intensity and extensive could lead to a decrease in biodiversity.

HNV livestock grazing systems are, however, a European policy priority. Each Member States' rural development programme is meant to work towards the Community's strategic objectives, one of which is 'to protect and enhance the EU's natural resources and landscapes in rural areas [including] three EU-level priority areas: biodiversity and the preservation and development of high nature value



farming and forestry systems and traditional agricultural landscapes; water; and climate change'. The declines in livestock numbers raise important questions about the future development of Scotland's HNV farmland.

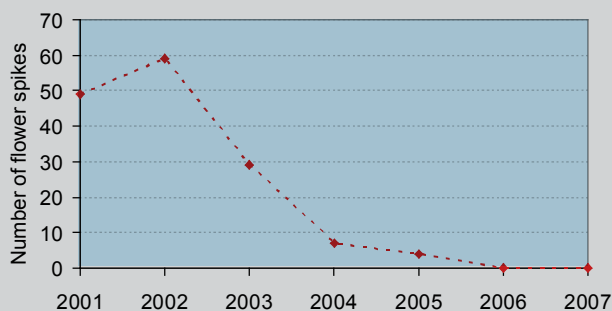
Conclusion

If sheep continue to be removed from the hills, achieving the right management to maintain or enhance the biodiversity of upland vegetation, in particular montane grasslands, will be a difficult challenge not only for those responsible for managing the land, but also for those in charge of nature conservation and land management policy. Previously over-grazing was the main concern but under-grazing is now considered a greater danger. Precautionary policies would restrict livestock removals and potentially help retain HNV farming systems.

From over-grazing to under-grazing: are we going from one extreme to the other?

The reduction or removal of sheep in some areas is likely to have a significant effect on biodiversity. Some species and habitats will benefit, however those that are dependent on grazing are likely to suffer. Recent research by SAC investigated four sites in west Perthshire – Cam Chreag, Tyndrum Community Woodland, Kirkton Face and Gleann a' Chlachain – where livestock were excluded from areas of semi-natural grassland and heath to examine the consequences of changes in management.

- At Cam Chreag there were some major changes in species composition following five years of stock exclusion. A number of annual and low growing perennial herbs and scarce montane species declined, while most of the tall perennial sedges, grasses and dwarf shrubs increased. Some tall-herb species increased in frequency, but few flowered.
- At Tyndrum Community Woodland the removal of grazing animals from an area of heath resulted in a dramatic decline in a population of small white orchids (*Pseudorchis albida*).



- At Kirkton Face the removal of grazing livestock from an area of grassland resulted in a significantly taller sward.
- At Gleann a' Chlachain the sward profile altered significantly after three years of no grazing. The proportion of grasses in measured areas declined while the amount of dead standing material increased.



The consequences for rural communities

Fiona Williams and Steven Thomson

Summary

- The Highlands and Islands have seen the greatest decline in the number of full-time occupiers and spouses at the same time as witnessing the slowest growth in part-time occupiers working 50 percent of their time or less.
- There has been a rise in the number of spouses working less than 50 percent of their time on farm, suggesting that spouses in particular are shifting to find employment off-farm.
- Less livestock has a knock-on effect in terms of supply chain infrastructure (e.g. hauliers). A spiral of decline is a likely reality in some areas.

Introduction

Agriculture plays an important role in many rural economies and communities either directly, through employment, or indirectly, through the way that farm businesses are linked to other businesses in an area³⁰. A great deal of research has explored the multiplier effects of the upstream and downstream linkages of land-based businesses and highlights the importance of agricultural production in rural economies³¹. Indeed, similar work on the impact of agricultural support payments to the farming community has demonstrated that such payments provide benefits to the wider community³². Change in agricultural production, then, especially in remote rural areas – where agriculture plays a more prominent role in the economy – could have significant implications for the local economy and for local communities.

More broadly, in addition to contributing to the economy of Scotland directly, through their operations and outputs, and indirectly, in the way that their operations contribute to further economic activity, farming also delivers wider (non-market) benefits. These non-market benefits (which include attractive landscapes, biodiversity and clean water) can be vitally important, for example, in the way that attractive landscapes underpin tourism. Change in agricultural production could therefore alter the current provision of non-market benefits with knock-on implications for rural communities.

This section explores some of the implications of reductions in livestock numbers for rural communities, particularly in the Highlands and Islands where these reductions have been greatest.

Employment trends

The marked decline in sheep and cattle numbers in the Highlands and Islands prompts important questions about the degree to which these declines are also associated with changes in employment,

with consequent implications for rural communities. Are we witnessing adjustment through changes to farming systems or a more acute situation characterised by a declining number of farm holdings and/or those seeking a livelihood from farming?

The data on the number of sheep and cattle per unit indicates that we are witnessing a process of flock and herd reduction as opposed to disposal. This suggests a process of down-sizing rather than a widespread trend of farmers leaving the industry. The situation is, however, more complex because of the workforce changes associated with a process of down-sizing. There are, for example, changes taking place in terms of both the number of people employed and in patterns of work.

Available data shows that the number of full-time occupiers and spouses and the number of occupiers and spouses working more than 50 percent of their time on the farm are both in decline (figures 49 – 52), while the number of occupiers and spouses working less than 50 percent of their time on-farm is increasing (figures 53 and 54). On further, and separate, examination of the data relating to occupiers and spouses, it is possible to see a rise from around 2002 in the number of spouses working less than 50 percent of their time on farm, and a corresponding fall in the number of spouses working more than 50 percent of their time on the farm (figures 52 and 54). This suggests that spouses in particular are shifting to find employment off-farm.

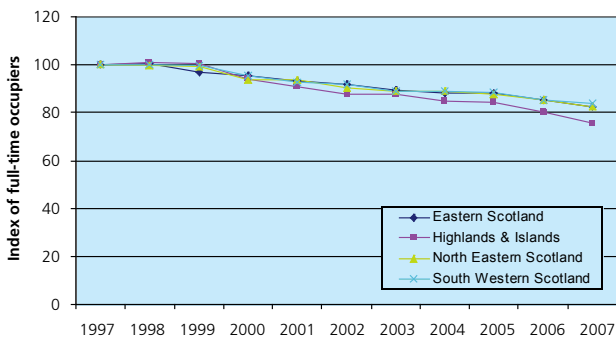


Figure 49 Change in full-time occupiers between 1997 and 2007

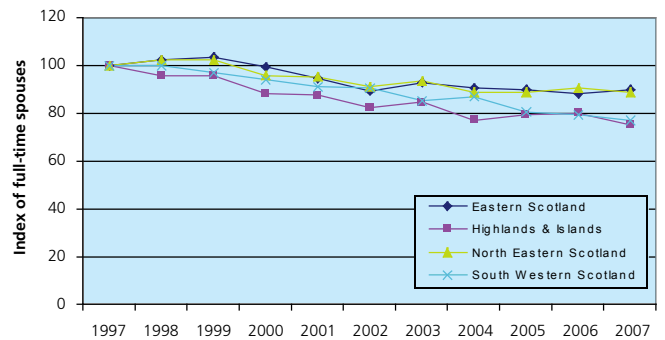


Figure 50 Change in full-time spouses between 1997 and 2007

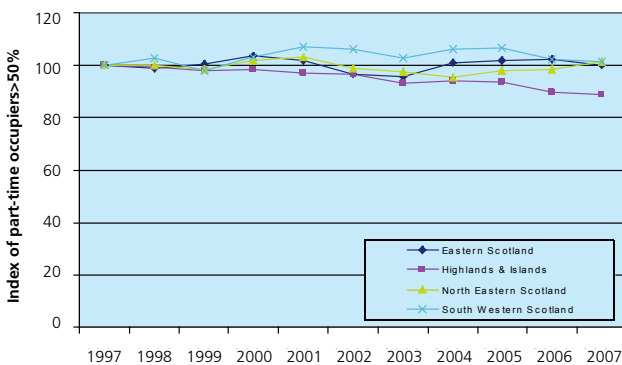


Figure 51 Change in part-time occupiers >50% between 1997 and 2007

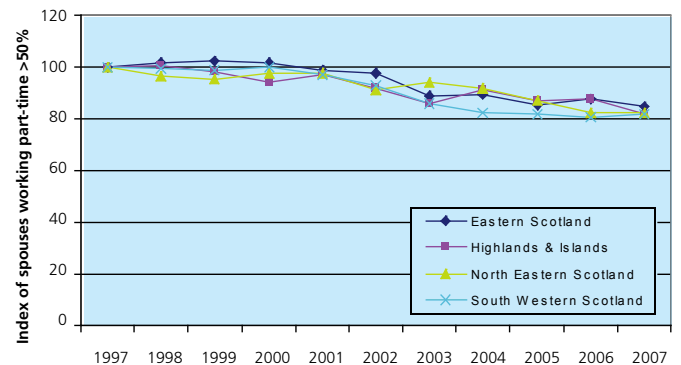


Figure 52 Change in part-time spouses >50% between 1997 and 2007

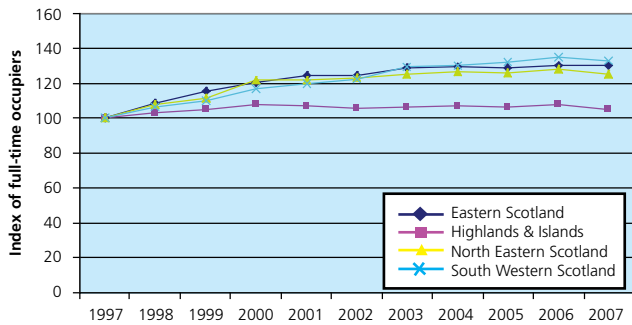


Figure 53 Change in part-time occupiers <50% between 1997 and 2007

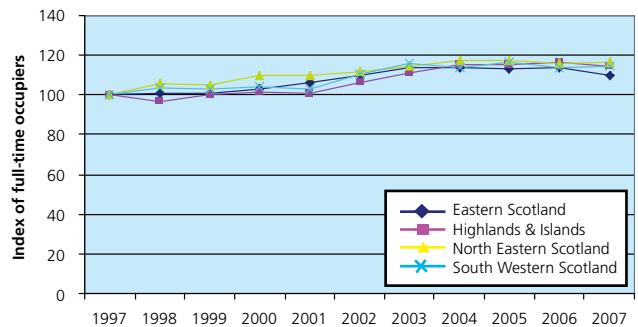


Figure 54 Change in part-time spouses <50% between 1997 and 2007

The regional breakdown for these figures, suggests that the Highlands and Islands have seen the greatest decline in the number of full-time occupiers and spouses (figures 49 and 50) at the same time as witnessing the slowest growth in part-time occupiers working 50 percent of their time or less. The differences between regions in the move towards part-time farming is related, in part, to the fact that the scope for diversification is case and locality dependent, as are opportunities for alternative employment, particularly that of a nature that complements the operation of a livestock farming enterprise. It may be that in the Highlands and Islands, the slowing (aggregate) trend in part-time working among occupiers is due to the fact that much of the farming is already part-time and the scope for further change is limited (figure 55)³³.

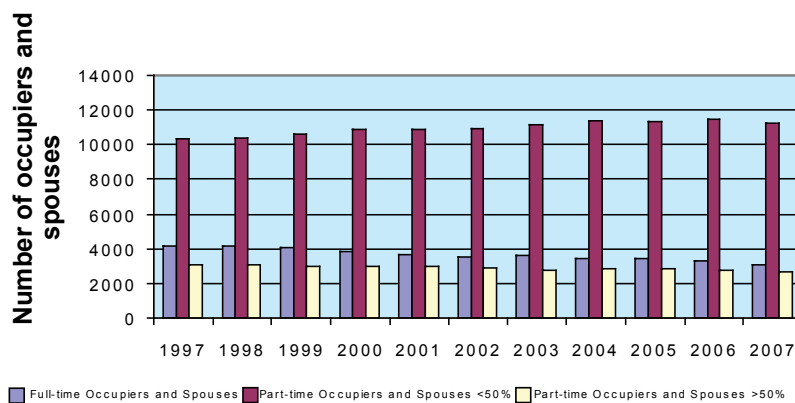


Figure 55 The work patterns of occupiers and spouses in the Highlands and Islands.

Mapping the change in the numbers of occupiers and their working patterns provides useful smaller-scale information on the changes that are taking place. The maps that follow highlight that it is difficult to speak in general terms about changes in occupier numbers, as one parish could be experiencing severe change whilst a neighbouring parish is experiencing little change. Parishes in the North and West are experiencing the greatest decline in terms of the presence of full-time farm occupiers (figure 56).

Data on the number of employees illustrate a long-term trend of decline. Table 4 highlights that the North Eastern and South Western regions have experienced the greatest declines in employee numbers. Further, the changes have taken place at different rates over time. Overall, the period of greatest (downward) change was between 2000 and 2004, the rate of decline slowing between 2004 and 2007 (following the previous period of rapid shift to part-time working). The North Eastern region, however, does not conform to this temporal pattern, exhibiting a sustained decline in numbers over the decade. Change reported at the regional level can mask extreme diversity at a lower geographical scale. Between 1999 and 2007, for example, the number of employees in the Borders fell by 5 percent while in Perth & Kinross and Stirling the number fell by 21 percent³⁴.

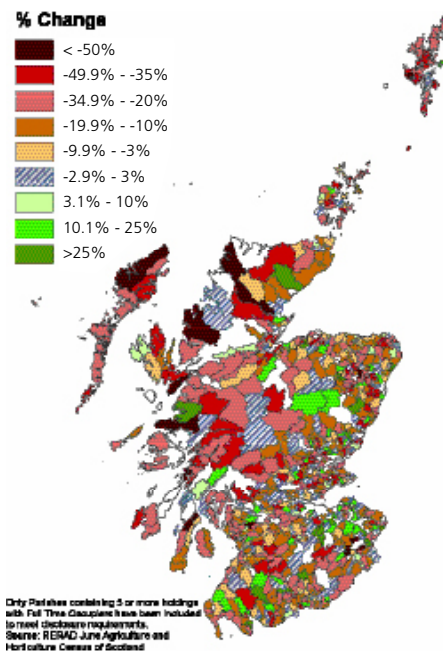


Figure 56 Change in full-time occupiers between 1999 and 2007

Table 4 Change in full-time employees by NUTS II and NUTS III regions.

	No. in 1999	No. in 2007	% change 1999-2007	% change 1997-2000	% change 2000-2004	% change 2004-2007
Eastern Scotland	6660	5530	-17	-3	-12	-4
Highlands & Islands	2348	1961	-16	2	-10	-8
North Eastern Scotland	2783	2106	-24	-10	-12	-12
South Western Scotland	4848	3672	-24	-9	-14	-7
Aberdeen City, Aberdeenshire & NE Moray	2783	2106	-24	-10	-12	-12
Angus & Dundee City	982	783	-20	1	-16	-3
Borders	1486	1413	-5	-10	-8	2
Caithness & Sutherland and Ross & Cromarty	617	540	-12	-1	-4	-8
Clackmannanshire & Fife	1017	763	-25	-10	-16	-7
Dumfries & Galloway	2389	1809	-24	-12	-13	-7
E & North Ayrshire Mainland	701	534	-24	-7	-13	-8
E & W Dunbartonshire & Helensburgh & Lomond	174	160	-8	-13	14	-10
East & Midlothian	920	813	-12	3	-6	-4
Falkirk	154	103	-33	-5	-22	-10
Inverclyde, East Renfrewshire & Renfrewshire	197	118	-40	-9	-20	-22
Inverness & Nairn and Moray, Badenoch & Strathspey	514	406	-21	4	-8	-13
Lochaber, Skye & Lochalsh and Argyll & the Islands	690	614	-11	4	-12	-3
North Lanarkshire	179	157	-12	-5	-18	11

	No. in 1999	No. in 2007	% change 1999-2007	% change 1997-2000	% change 2000-2004	% change 2004-2007
Orkney Islands	357	254	-29	-3	-16	-9
Perth & Kinross and Stirling	1688	1338	-21	6	-13	-7
Shetland Islands	58	64	10	8	-9	8
South Ayrshire	546	401	-27	1	-19	-5
South Lanarkshire	649	481	-26	-8	-17	-10
West Lothian	257	180	-30	-2	-22	-19
Western Isles	112	83	-26	14	-25	-11
Scotland	16639	13269	-20	-5	-12	-7

Data on the numbers of employees is significant because the figures highlight the paradoxical nature of the labour issue as it relates to the loss of livestock from the hills. On the one hand, adoption of low input management systems and the reduction in flock/herd sizes removes the need to employ full-time staff. Many farmers are seizing the opportunity to reduce costs by not employing staff and doing the work themselves. As such, the employee count continues to fall. On the other hand, it is often claimed that it is increasingly difficult to find skilled and experienced employees to work on livestock farms. Consequently, where a farmer seeks to employ someone, the lack of available labour influences decisions about the number of animals that they wish to keep. A declining number of employees would initially suggest that there should be more labour available, but in reality, farm labour is being pulled away from the sector by other, often more attractive, opportunities.

Figure 57 highlights that the largest drop in total employees has been experienced in the Stirling area. Other areas most affected include Shetland, Orkney and the Western Isles and Lochaber, Badenoch and Strathspey and Argyll. Figures 58, 59 and 60 show disaggregated figures for full-time, part-time and casual workers. Again a complex picture emerges. Some areas, such as around Inverness, which are experiencing marked declines in full-time workers are seeing increases in part-time workers. But other areas, such as Argyll appear to be experiencing decline in all categories. The strong increases in casual and seasonal workers on the east coast is associated with lowland, and especially fruit, businesses.

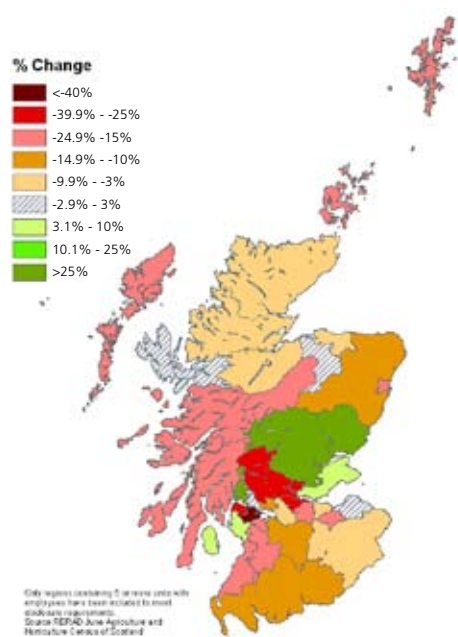


Figure 57 Change in total employees on farms between 1999 and 2007 (excluding occupiers and spouses).

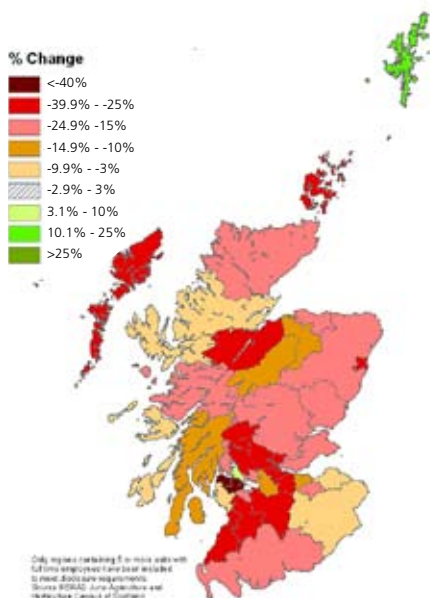


Figure 58 Change in full-time employees between 1999 and 2007

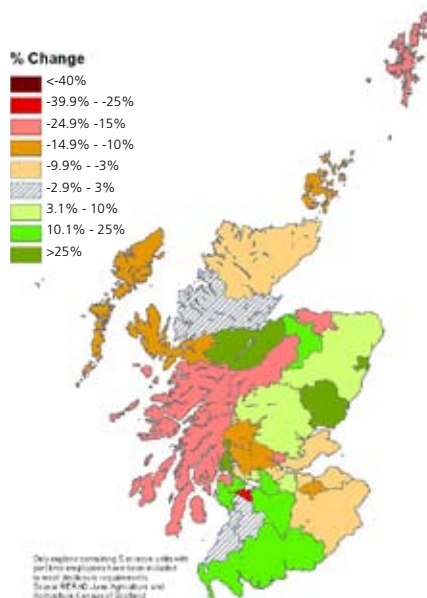


Figure 59 Change in part-time employees between 1999 and 2007

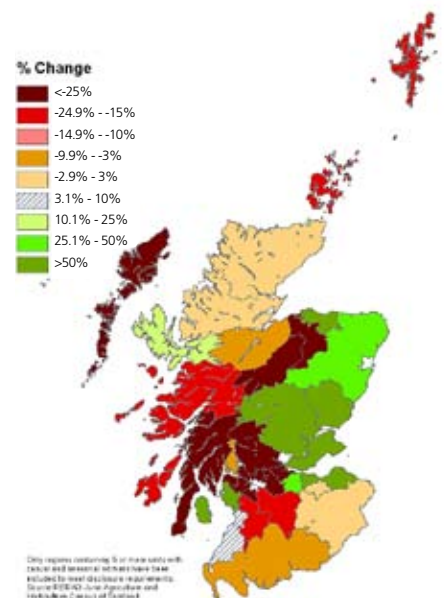


Figure 60 Change in casual and seasonal employees between 1999 and 2007

Loss of younger generation

Both the trend towards part-time farming and the decline in the number of agricultural employees potentially present difficulties for rural communities. Where local employment and diversification prospects are limited, often the aggregate effect is that young families become replaced with retired communities, as young people seek employment elsewhere³⁵. Findings from a series of recent studies



and consultations³⁶ highlight that a number of barriers (largely related to land availability and profitability) are both driving young people away from the industry, and preventing entry to it. Figures from these studies broadly concur in that as many as half of Scotland's farms currently have no successor in place. The livestock sector is particularly vulnerable to the vagaries of the succession decision with certain stages in the succession process often acting as triggers for change. Farming systems are revisited and adjusted to accommodate succession intentions, the latter being subject to a plethora of influences.

From the perspective of livestock farming, causality, in terms of which goes first, the livestock or the people with the relevant skills to care and manage livestock, is unclear, but either way declining sheep and cattle numbers require less skilled labour and there is a perception that core farming skills are in danger of dying out. This point was evident in the recent industry consultation and survey on barriers to new entrants to Scottish farming³⁷. The exodus of a younger generation takes with it the chain of opportunity (as epitomised through the traditional succession process) to pass on farming skills.

Changing communities

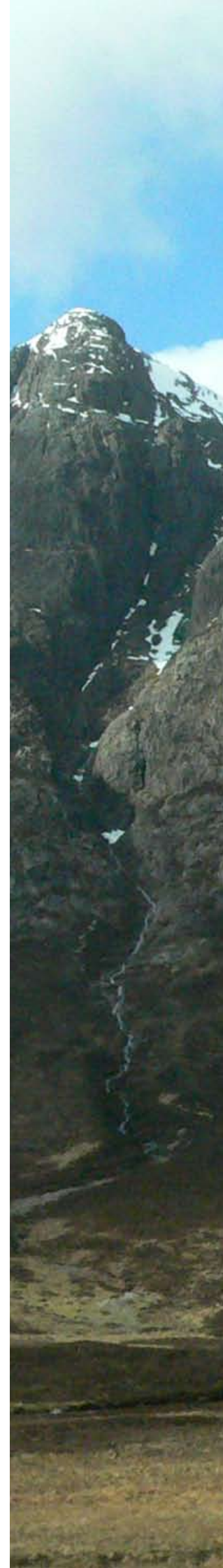
In addition to the potential loss of the younger generation, the social networking that has traditionally surrounded particular events in the farming calendar (e.g. clipping), is in danger of being lost. Where agriculture is a mainstay in many upland areas and has traditionally formed the basis of the economy and community, it has also formed the basis of the local culture and identity. The networks (and an associated common identity that arise through working together) are often vital to rural areas and communities in a variety of ways³⁸. A strong sense of community is sometimes linked to ways in which livestock are farmed, a point highlighted in the recent Crofting Inquiry³⁹. The erosion of these networks is likely to be heightened through declining livestock numbers because of the reduced opportunities for social interaction, for example through sheep gathering, clipping, and the marts.

It is acknowledged that communities are always subject to a degree of fluidity and change as they respond to the many drivers affecting their form. The changing nature and composition of many rural communities raises a number of issues and tensions between traditional farming interests and those living in a community but deriving their income elsewhere (professionals disconnected from where they live). For farmers and crofters, maximising opportunities from new and additional sources of income is important but these new activities can often bring them into conflict with others that view the countryside differently.

Implications: infrastructure

Anecdotal evidence of a loss of dedicated shepherds and the potential difficulties in maintaining sufficient active livestock farmers and crofters to sustain livestock in hill areas is but one facet of the situation. Reduced agricultural activity could also have a knock-on effect in terms of the loss of related supply chain infrastructure, such as cost-effective haulage and availability of, and potentially greater distance to, marts and abattoirs. Market and regulatory pressures on the infrastructure have exacerbated an already difficult operational environment for the businesses concerned⁴⁰. Casualties of the current situation have been Thurso Mart⁴¹ and more recently an Oban-based haulage firm that traditionally served the Inner and Outer Hebrides⁴². A loss of infrastructure places greater pressures on existing producers and their viability, leading to more stock reductions, and in turn, further strain on the infrastructure (and so on). This situation is commonly referred to as a spiral of decline.

The consequences of a decline in livestock numbers in terms of the natural habitat, has been discussed previously. Such change will ultimately impact upon the visual appearance of the landscape, though the implications of this for other economic sectors such as tourism are unclear. There is a significant inter-relationship between land use (agriculture, forestry and land-based sporting interests) and the landscape. Imagery of Highland Scotland is frequently used in the portrayal of Scotland to potential overseas and domestic visitors in an attempt to entice visitors to stay and spend. In a Tourism Attitudes Survey of visitors to Scotland, scenery was most often cited as a highlight of the respondents' visit⁴³. Local food initiatives also form part of the tourism product, establishing local identity through the targeting of niche markets and developing linkages between the sectors. However, isolating the contribution of a particular land use (in this instance, livestock farming in the upland areas) to the attraction of an area for tourists, the amenity value of a locality, and purposes of marketing (for example, local foods), is challenging. There is very little empirical research available in this respect and precisely identifying what is valued about a particular landscape is necessary before claims about the importance of different forms of land use to the 'green infrastructure' can be made with any clarity⁴⁴.





Managing the Retreat from the Hills – Where next?

Tony Waterhouse, Alan Renwick and Andrew Midgley

Agriculture is vitally important in the upland and hill areas of Scotland. While the gross value added by agriculture, forestry and fishing to the Scottish economy as a whole was 2% in 2004, in some areas the gross value added to the local economy can reach 13%. As this report has described, agriculture – and especially livestock farming, when it comes to the uplands – is connected in complex ways to many aspects of rural life. Livestock farming provides employment, it supports the wider economy through the connections with other businesses and it supports important national industries such as tourism by providing the landscapes that people come to see. Change in the nature of farming in the uplands and in remote rural areas could therefore have significant implications.

While it is important to recognise that livestock numbers have fluctuated in the past and that rural areas have never fulfilled the image of an unchanging rural idyll, it is also important to examine current changes and assess the degree to which they represent the emergence of new problems or present new policy challenges.

This report has demonstrated that there are significant changes taking place in livestock farming. The key points are:

- Sheep numbers have declined dramatically since 1999, most notably in the North West. Cattle numbers have also declined, although not so dramatically and not in the same areas.
- Declines in livestock numbers appear to be part of a process of down-sizing rather than representing many farmers leaving the industry.
- This down-sizing reflects the fact that most current hill production is financially uneconomic. Support payments, primarily in the form of the Single Farm Payment and payments under LFASS, are keeping people on the land.
- Rising stock prices, which should have improved the situation, have been negated by rising costs and many farmers continue to face difficult decisions about the future viability of their businesses. In practice, different businesses will be affected in different ways and the degree to which a farmer will benefit from rising prices will depend on the detail of their operation. At a general level, the farmers who farm better ground will be best placed to survive.
- Farming in hill areas is interconnected – as one farmer changes their management there are often consequences for their neighbours (since much upland farming involves some form of collaboration). Reductions in the number of animals on one farm can lead to a domino effect or spiral of decline.
- If sheep continue to be removed from the hills, achieving the right management to maintain or enhance the biodiversity of upland vegetation, in particular montane grasslands, will be a difficult challenge (although deer grazing appears to compensate for livestock reduction to a degree). Having

a range of different management systems, including some which have little or no grazing livestock is perhaps the key to maximising biodiversity in the uplands.

- At a national level the number of full-time occupiers and spouses has gradually declined but the Highlands and Islands have seen the greatest decline at the same time as witnessing the slowest growth in part-time occupiers working 50 percent of their time or less.
- Spouses, in particular, are shifting to find employment off-farm.
- Caution in interpreting national trends is required as there is a great deal of spatial variation in how these trends are being played out in different locations.
- Declining livestock numbers mean fewer opportunities for social networking i.e. events that reinforce a common identity and contribute to a strong sense of community.
- Less livestock has a knock-on effect in terms of supply chain infrastructure (e.g. hauliers). A spiral of decline is likely in some areas.
- Isolating the contribution of livestock farming to the visual landscape in terms of attraction to tourists and amenity value is challenging but necessary if claims are to be made about the importance of livestock to the 'green infrastructure'.

Key issues

Importance of agricultural support payments

The data presented on the economics of livestock farming in the hills demonstrates the importance of the Single Farm Payment (SFP) and payments under the Less Favoured Area Support Scheme (LFASS)⁴⁵. Although it appears that the decline in livestock numbers has accelerated since the introduction of the SFP (because payments have been decoupled from numbers of livestock), without these payments the reductions would be very much greater, as many farmers would simply not be able to continue farming without continued support. The costs of production currently exceed the receipts from sales and the SFP and LFASS make up the shortfall. As such, these payments, and the rules that surround them, will play a crucial role in influencing farmer behaviour in the future.

Good Agricultural and Environmental Condition

A key element of the recent reforms to agricultural support payments involved the decoupling of subsidies from the level of production. Provided that a farmer meets the requirements of 'cross compliance' – which involves keeping their land in Good Agricultural and Environmental Condition and complying with a number of Statutory Management Requirements – they will receive support. For example, land abandonment is not allowed under Cross Compliance – a farmer cannot abandon farming and still receive support payments. Further, the GAEC measure most relevant to the current focus on declining stock numbers is GAEC 10 on undergrazing. This measure states that in order to comply with GAEC a farmer must 'avoid undergrazing at a level where the growth of scrub or coarse vegetation is detrimental to the environmental or agricultural interest in the field'⁴⁶. There is, however, a significant degree of ambiguity surrounding what this GAEC measure means in a hill farming context.

More specifically, the requirement is either to maintain GAEC or to ensure that the land should be able to be used for standard agricultural purposes, in this case grazing for meat or fibre, within the next growing season. Given the slow pace at which hill vegetation changes, on most hill grazings it will almost always be the case that it is possible to graze the hill in the next season. Expansion of gorse, bracken and woodland all pose long-term potential to make land unavailable at the margins, but not to make





whole hills unavailable for grazing. Thus as long as the farm is not abandoned, then arguably both the letter and spirit of GAEC is being achieved, with significantly fewer stock⁴⁷. Without contravening the requirements of GAEC 10, farmers have the ability to respond flexibly to the challenge of farming profitably by retreating from some areas of the farm more than others, for example a particularly difficult heft or along a boundary where a neighbour has destocked. The result is a potential for significantly reduced grazing in the hills despite the intention of restricting undergrazing through GAEC.

Complex changes require subtle responses

The declines in livestock numbers are taking place in a complex way. While there is a general trend that livestock are declining most in the North and West, a local scale analysis shows that some areas are much more affected than others. Any response will have to be regionally or locally specific. The consequences of changes in stock numbers will vary from place to place and will depend upon what activities the farmers that are reducing livestock numbers go on to pursue. If the changes in livestock numbers represent a restructuring of agricultural activities then the impact on the local economy may be small – but the degree to which changes in numbers represents restructuring as opposed to destocking varies from place to place. If most of the domestic stock are removed the consequences on biodiversity will depend on the extent to which wild herbivores replace the grazing pressure. Again, these sorts of variables change from place to place. Thus an assessment of the problem and any response will have to be place specific. A 'one size fits all' policy solution is unlikely to work.

Responding to the retreat

In the context of a broad objective of achieving sustainable rural development, we, as a society, want to retain a thriving farming sector, we want to see vibrant rural communities and we want a healthy natural environment. Responding to the issue of declining livestock numbers will therefore be complex because, as this report has shown, the decline of livestock has the potential to have an impact not only on the farming sector but also on rural communities and the environment.

Deciding on the most appropriate response will therefore require consideration of the best way to achieve our desired objectives and of the way that the most appropriate response to deliver one objective affects the others. If we want to keep animals on the hills it is possible to change policy to encourage the retention of animals, but that policy may not be the best way to encourage thriving rural communities. Developing policies that are meant to achieve multiple objectives is extremely difficult. Indeed, it is a process that is not made any easier by the need to take into account the projected trends in wider economic variables – if, in the longer-term, prices for lamb and beef rise, for example, the market could potentially solve the problem and remove the need for any other action.

The importance of government intervention

Governments intervene in a number of situations, but primarily when the provision of goods and services cannot be achieved efficiently through the market and when disparities between individuals and families require intervention on the grounds of equity⁴⁸. To tackle these problems the government has a range of levers at its disposal: it can pass legislation to force change by making certain actions mandatory or illegal; it can provide incentives to change behaviour by linking the availability of money to the adoption of desirable behaviour; it can alter the tax regime; and it can educate or provide information to raise awareness of particular issues.



With respect to agriculture, rural communities and the environment, the government intervenes in a variety of ways. The government (at the level of the nation state and the European Union) supports the farming sector through financial assistance because of the obvious desirability of retaining the ability to produce our own food, while at the same time regulating the sector to mitigate negative externalities such as pollution and to ensure wider public goods such as animal welfare. Increasingly, though, the financial support for rural land use is being re-oriented away from a straightforward subsidy for farming towards financial support for land managers to deliver public goods (such as high quality landscapes and farmland biodiversity) and for rural communities (through Leader). National and local government also support rural communities through financial support for services in remote areas, such as transport. And with regard to the environment, the government protects particular places through legislation (protected sites), provides incentives for sympathetic land management and educates through a range of channels.

As such, it is obvious that the government already intervenes in agriculture, rural development and environmental management in a variety of ways to achieve a range of objectives. The reduction in livestock numbers in the hills therefore begs the question of whether this decline is a problem and whether it works against current objectives, thereby requiring an alteration to the established means of intervention i.e. new policies.

Why is the decline in livestock numbers a problem?

It is possible to see the decline in the number of livestock as a correction from the artificially high numbers that were encouraged through production related support payments. Now that the support payments have been substantially reformed, numbers could be understood to be falling back to a more appropriate level for the industry. As such, the decline in livestock numbers could be seen as a success. Given that the production related support payments were heavily criticised for promoting high stock numbers and potentially over-grazing, reform has resulted in the desired response.

Such a view is, however, simplistic. As this report has shown, there is a geography to the decline in stock numbers with some areas experiencing a great deal of change and other areas experiencing very little change. Many of the areas with the greatest declines were areas that did not have large increases in the past. Such a broad view on the desirability of falling livestock numbers would therefore miss the complexity of the change that is currently taking place. In those areas that have experienced the greatest decline it will be important to assess at which point declines in livestock numbers become a problem. Some areas may, for instance, be experiencing real impacts as agricultural production changes shape with knock on effects for jobs and the local economy.

Ultimately, the degree to which the decline in livestock numbers can be understood to be a problem depends on the policy objective under consideration. If the goal is to retain a thriving farming sector, the decline in numbers suggests a less than thriving sector. If the goal is thriving biodiversity, the loss of grazing in the hills could be detrimental.

In general terms, the decline in livestock numbers in the hills could have several negative implications:

- The farming sector appears to be contracting in hill areas.
- There are knock on consequences for local economies and communities.
- Some moorland species are likely to be detrimentally affected.



Possible responses

The trends in livestock numbers, the number of people working in the hills and the high input prices suggest that, in the short-term at least, the decline will continue. Other factors, such as the relative profitability of alternative land uses such as forestry, may also come into play. If the profitability of hill farming remains low and funding is available for forestry, it could make economic sense over the long-term for many landowners to move further away from hill sheep farming. Such a shift is not without its own economic, social and environmental consequences and requires further examination.

At a general level, given the current situation, there are three broad responses: accept farming is changing; attempt to halt the decline through changes to the rules surrounding direct payments; attempt to halt the decline through enhanced rural development measures.

Accept farming is changing – One way of responding is simply to allow the changes to happen and deal with the consequences. It would be possible, for example, to accept that farming systems change and that the current changes represent local corrections from previous national highs in livestock numbers. Such a position would mean accepting that some people would leave the industry and that the size of the sector in hill areas would contract, with potential consequences for the local economy and for biodiversity. It would therefore be necessary to find ways of mitigating the economic and social impacts through the provision of support and targeting biodiversity management where it was most needed. One way to achieve this would be through investment to add value to the produce from hill areas as a more economically viable farming sector in mountain areas will ensure sustained positive land management and rural communities⁴⁹.

One potential difficulty with simply accepting the changes that are happening in hill areas is that the Scottish livestock sector is highly interconnected. For example, many Scottish hill farmers sell their lambs or store cattle to lowland farms for finishing because they do not have the ground themselves or because the costs of housing and feed are too high. Thus, if the supply of animals for finishing declines there will also be knock on effects for the rest of the sector.

Halt the retreat through change to the direct support to farmers – If it is judged that the decline in stock numbers brings with it too many negative consequences it would be possible to try and stop the retreat by, for example, reinforcing cross compliance or providing some form of support payment (perhaps through Article 69, although the move away from headage payments makes returning to coupled payments difficult).

Halt the retreat through enhanced rural development measures – Instead of simply paying farmers to keep animals in the hills, it would be possible to move further towards paying farmers for the 'public goods' that they supply (and which require animals to be kept appropriately in the hills). Although it is still difficult to quantify, hill farming can deliver a range of public goods in the form of landscape, biodiversity and access benefits. The hills and uplands provide ecosystem services in a way that contributes towards water and flooding management, they are a vast reserve of carbon and they draw in millions of pounds in tourism income.

A more detailed breakdown of some of the likely impacts of following these various options is provided in the following policy matrix.

Policy matrix for the issue of livestock in the hills

Policy Option	How	Impact – Farmers	Impact – Environment	Impact – Communities
Accept that farming is changing	No Government intervention	In the short-run, farmers are able to protect SFP by reducing stocking. In the long-run many could face severe difficulties if SFP reduces or disappears.	There are positive affects if declines in stock numbers reduce overgrazing, but too great a decline can lead to undergrazing with negative consequences for some species and habitats.	Stock removal reduces demand for ancillary services (such as vets, hauliers etc) but maintains farmers spending power. The impact on the community will depend on where farmers spend their money.
	No Government intervention – but farmers themselves could move to add value to their products (genetic improvement can add £7 to lamb output/ewe).	Higher prices for quality products will mean improved incomes for some.	There are likely to be fewer sheep/cattle but maintained grazing.	Fewer total numbers but higher value products may increase demand for services e.g. more likely to use supply industry, transport and processors.
	No Government intervention on livestock numbers – but encourage diversification e.g. tourism	Farmers able to enhance incomes by diversifying (holiday lets etc) or adding value to production to sell to tourists.	If adding value then maintain production - If tourists want sheep/cattle then maintain grazing	Support industries for tourism will benefit - e.g. catering, excursions, outdoor activities etc. Ag services may benefit from adding value
Halt decline through change to the rules surrounding direct payments	Government intervention to maintain stock on the hills through adjustments to Pillar 1 payments of the Common Agricultural Policy e.g. Article 69.	Some form of limited coupling may retain livestock numbers but will reduce farm incomes because farmers will be encouraged to engage in unprofitable sheep/cattle production (unless extra money goes into the hills – e.g. by top-slicing all SFP and directing it to the hill areas).	If stocking rates are set to match local conditions then maintaining livestock could be beneficial.	Linking support to production benefits ancillary industries e.g. vets and hauliers etc. but reduces farmers spending power thereby reducing money that could be spent in local economies.
	Government intervention to maintain stock on the hills through adjustments to Pillar 1 payments of the Common Agricultural Policy through changes to cross compliance.	Cross compliance that requires sheep/cattle production will potentially lower farm incomes by forcing farmers to engage in uneconomic production.	If stocking rates are set to match local conditions then maintaining livestock could be beneficial.	Requiring stock to be retained would benefit ancillary industries but reduce farmer spending power thereby reducing money that could be spent in local economies.
Halt decline through enhanced rural development measures under Pillar II of the Common Agricultural Policy	Support payments for biodiversity management.	If Pillar II were to be more targeted to the uplands then redistribution of income from lowlands to uplands may increase overall income in these areas. There is scope for more interaction with tourists/visitors and enhanced interpretation.	If stocking rates are set to match local conditions then maintaining livestock could be beneficial.	If rural development funds led to capital expenditure it is likely that local economies would benefit through the spending of this money locally.
	Support payments for carbon management.	More profitable to move to forestry?	Loss of moorland but other wider benefits?	Depends on relative multipliers for forestry compared to agricultural production?
	Support payments for flood prevention and water management.	Potential income source for farms but localised	Depends on change of land use	Likely to be less production and less demand for services but farmers have enhanced spending power



In the short term, given the constraints that Scotland faces operating within the EU policy framework, changing the legislative and incentive mechanisms available in the form of the Single Farm Payment and payments under the Less Favoured Area Support Scheme provide the only real means of arresting livestock reductions:

Single Farm Payment

- Clearer cross compliance – In the hill farming context, 'grazing' cross compliance currently has a degree of ambiguity. The English approach is slightly clearer in that cross compliance suggests that hill grazings should be grazed or burnt at least every five years. Would greater clarity be warranted in Scotland, not least because in Scotland grazing by deer plays a much greater role?
- Under the CAP Health Check there are proposals to allow member states to extend the support they can give to specific sectors through the use of Article 69. Scotland could take advantage of this to design a policy to maintain sheep numbers.
- Payment levels could potentially be regionalised and based on land type.

LFASS

- It would be possible to shift the balance of LFASS even more towards extensive systems, but LFASS is currently under review and a new system will operate from 2010.
- Requiring (and thus defining) active farming is a challenge, but it might be possible to find a way of linking LFASS money to farming of livestock in certain areas.

Recommendations

As this report has demonstrated, the issue of the decline in livestock numbers is extremely complex. This report has only highlighted some of the trends and issues, but in doing so it has illustrated how much we do not know and where some extra effort in terms of support or investment may be required. More specifically, there is a need for:

- More research on the impacts of changes in the system of support payments on farmers, the environment and rural communities.
- Research on how to develop payments for ecosystem services. There is also scope for developing pilot projects to explore the possibilities of paying for the delivery of ecosystem services, perhaps starting in the national parks. The SRDP is potentially a vehicle for this approach, but there is a need for leadership rather than adopting a laissez-faire approach.
- Research to identify the winners and losers in terms of biodiversity, specifically linked to designated sites and species.

- Research and development of new farming systems that operate with fewer, higher output sheep, possibly with significantly reduced labour inputs through change to wool shedding breeds.
- More advice that will enable farmers to cope with change.
- Targeted support for new business development.



Notes

¹ This report uses data collected in the Scottish Government's June Agricultural Census. The government attempts to capture information from all holdings in Scotland, but where this is not possible a degree of estimation (based on other data sources) is applied. The census is the best available data source for this report.

² Evans, D.M., Redpath, S.M., Evans, S.A., Elston, D.A., Gardner, C.J., Dennis, P., Pakeman, R.J. (2006) Low intensity, mixed livestock grazing improves the breeding abundance of a common insectivorous passerine. *Biology Letters*, 2, 636–638; Wright, I.A., Pakeman, R.J., Dennis, P., Dalziel, A.J., Milne, J.A. (2006) The effects of cattle on the natural heritage of Scotland. *Scottish Natural Heritage Commissioned Report No. 203* (ROAME No. F04AA103); IEEP (2007) *Final Report for the Study on HNV Indicators for Evaluation*, Report prepared by the Institute for European Environmental Policy for DG Agriculture, http://www.ieep.eu/publications/pdfs/hnv/hnv_indicator_report.pdf; Dennis, P., Skartveit, J., McCracken, D., Pakeman, R.J., Beaton, K., Kunaver, A., Evans, D.M. (2008) The effects of livestock grazing on foliar arthropods associated with bird diet in upland grasslands of Scotland, *Journal of Applied Ecology*, 45, 279–287.

³ Clothier, L., (2006) Analysis of recent data on suckler cows in England and implications for the environment, *Defra Agricultural Change and Environment Observatory Research Report No. 2*, <http://statistics.defra.gov.uk/esg/ace/research/pdf/observatory02.pdf>.

⁴ For a long view on the relationship between livestock prices, animal numbers and biodiversity see Hanley, N., Angelopoulos, K., Tinch, D., Davies, A., Watson, F., Barbier, E.B., (2007) "What Drives Long-Term Biodiversity Change? New Insights from Combining Economics, Paleoecology, and Environmental History". Available at SSRN: <http://ssrn.com/abstract=1004780>.

⁵ Yuill, B., Cook, P., (2007) Trends in Agriculture and Supporting Infrastructure within the HIE area 2001 – 2006, A Report for Highlands and Islands Enterprise.

⁶ Committee of Inquiry on Crofting: Final report, <http://www.croftinginquiry.org/Resource/Doc/0/0000405.pdf>.

⁷ http://www.rse.org.uk/enquiries/hill_and_island_areas/index.htm.

⁸ In Scotland, the Single Farm Payment is currently based on the average historic level of subsidy payment for that business in the reference period of 2000-2002.

⁹ Although it must be noted that some payments remain partially coupled in order to ensure the delivery of wider benefits for particular sectors or the environment. The Scottish Beef Calf Scheme (SBCS), for example, was adopted under Article 69 of Council Regulation 1782/2003. Article 69 enables EU Member States to retain funds that can be used to support specific types of farming which are important for the protection or enhancement of the environment or improving the quality and marketing of agricultural products. Accordingly, it remains a means for partially coupled support within member states.

¹⁰ Parish level data for the June Agriculture and Horticultural Census of Scotland were received from RERAD for the years 1997 to 2007. These results were then aggregated at NUTSII, NUTSIII and NUTSIV level for interpretation and extracts mapped using ArcView® 9.2 using boundaries available from the UKBorders service at EDINA.

¹¹ Scottish Government (2008) Agricultural Census Statistics 1982-2007, <http://www.scotland.gov.uk/Publications/2008/02/06131043/0>.

¹² Scottish Government (2007) Final Results of the June Agricultural Census 2007, <http://www.scotland.gov.uk/Publications/2007/10/agriccensus2007>.

¹³ The NUTS layer (Nomenclature of Units for Territorial Statistics (NUTS)) contains several boundary and point data sets which serve as a base map of regional boundaries covering the entire EU territory. The NUTS nomenclature is a hierarchical coding system defined by Eurostat that subdivides the EU into administrative levels, from country (level 0), through regional (level 1,2,3) to local (level 4,5) level.

¹⁴ QMS (2007) *Cattle and Sheep Enterprise Profitability in Scotland: Results for 2006*, <http://www.qmscotland.co.uk/>.

¹⁵ SAC (2007) Farm Management Handbook, Scottish Agricultural College, Edinburgh.

¹⁶ Scottish Government (2008) *Farm Incomes in Scotland 2006/07*, <http://www.scotland.gov.uk/Publications/2008/04/29162115/0>.

¹⁷ Data from the Farm Management Handbook is used here to highlight the geographical differences in gross margins, but it must be noted that the data from the Handbook is different to that provided by QMS. The QMS data is based on the accounts of a number of sample farms, whereas the Farm Management Handbook data is based on the assessment and expertise of SAC staff.

¹⁸ 'LFA hill suckler herds' refers to those businesses where open unimproved hill land makes up more than three-quarters of the farm area, resulting in low stocking densities and more than half the calves being sold at weaning.

¹⁹ These figures are compiled by collecting data on prices and costs on different farms and averaging this information to provide an averaged financial performance table. Actual performance of individual herds therefore varies around this average, with some performing better and some worse. In the case of hill suckler herds, the sample size was small, but QMS report that no business in the sample made a positive net margin.

²⁰ The Agricultural Holdings (Scotland) Act 2003 sought to give tenants greater rights that would allow them to diversify and make the most of potential options, but the degree to which a tenant will be able to exercise these rights will vary on a case by case basis because of the nature of the relationship between tenant and land owner.

²¹ Ritchie J. (1919) Some effects of sheep-rearing on the natural condition of Scotland, *Scottish Journal of Agriculture*, 2, 190-197; Fenton E W. (1937) Some aspects of man's influence on the vegetation of Scotland, *Scottish Geographical Magazine*, 53, 16-24; Wildlife Trusts (1996) *Crisis in the Hills: Overgrazing in the Uplands*. Lincoln: The Wildlife Trusts.

²² Rawes M. (1981) Further results of excluding sheep from high-level grasslands in the North Pennines, *Journal of Ecology*, 69, 651-669; Rawes M. (1983) Changes in two high altitude blanket bogs after the cessation of sheep grazing, *Journal of Ecology*, 71, 219-235; Hill M.O., Evans D.F., Bell S.A. (1992) Long-term effects of excluding sheep from hill pastures in North Wales, *Journal of Ecology*, 80, 1-13; Ball M.E. (1974) Floristic changes on grasslands and heaths on the Isle of Rhum after a reduction or exclusion of grazing, *Journal of Environmental Management*, 2, 299-318; Davies D.A. (1987) Long-term effects of improvement methods on *Molinia caerulea* dominant rough grazing on wet hill land. I. Pasture production, quality and botanical composition, *Journal of Agricultural Science*, 109, 231-241; Grant S.A., Torvell L., Common T.G., Sim E.M., Small J.L. (1996a) Controlled grazing

studies on Molinia grassland: effects of different seasonal patterns and levels of defoliation on Molinia growth and responses of swards to controlled grazing by cattle, *Journal of Applied Ecology*, 33, 1267-1280; Marrs R.H., Bravington M., Rawes M. (1988) Long-term vegetation change in the *Juncus squarrosus* grassland at Moor House, Northern England, *Vegetatio*, 76, 179-187; Holland J.P. (2006) Changes in the composition of a species-rich montane grassland following the removal of grazing livestock, in *The Future of Biodiversity in the Uplands. Proceedings of a UHI Millennium Institute Conference, Battleby*, 8 December 2006. Published online at: http://www.cms.uhi.ac.uk/conferences/upland_biodiversity_Dec2006/Holland_extendedabstract.pdf.

²³ Mardon D. K. (2003) Conserving Montane Willow Scrub on Ben Lawers NNR, *Botanical Journal of Scotland*, 55, 189-204.

²⁴ Holland J.P., Pollock M.L., Waterhouse A. (2008) From over-grazing to under-grazing: are we going from one extreme to another? In: Stockdale E. (ed) *Shaping a Vision for the Uplands. Aspects of Applied Biology*, 85. Warwick: Association of Applied Biologists.

²⁵ Hill et. al 1992; Hope D., Picozzi N., Catt D.C., Moss R. (1996) Effects of reducing sheep grazing in the Scottish Highlands, *Journal of Range Management*, 49, 301-310; Wheeler P. (2008) Effects of sheep grazing on abundance and predators of field vole (*Microtus agrestis*) in upland Britain, *Agriculture, Ecosystems and Environment*, 123, 49-55; Evans D.M., Redpath S.M., Elston D.A., Evans S.A., Mitchell R.J., Dennis P. (2006) To graze or not to graze? Sheep, voles, forestry and nature conservation in the British uplands, *Journal of Applied Ecology*, 43, 499-505.

²⁶ Holland 2006.

²⁷ Gillings S., Fuller R.J., Balmer D.E. (2000) Breeding birds in scrub in the Scottish Highlands: variation in community composition between scrub type and successional stage, *Scottish Forestry*, 54, 73-85.

²⁸ Anon, (2004) Land abandonment, biodiversity and the CAP, <http://www.lvaei.lv/sigulda/BOOK.pdf>.

²⁹ McCracken, D.I., Huband, S. (2005) Nature conservation value of European mountain farming systems. In: *Global change and mountain regions: an overview of current knowledge*, eds. U.M. Huber, H.K.M. Bugmann & M.A. Reasoner, 573-582. Springer, Dordrecht, The Netherlands; IEEP (2007) *Final Report for the Study on HNV Indicators for Evaluation, Report prepared by the Institute for European Environmental Policy for DG Agriculture*, http://www.ieep.eu/publications/pdfs/hnv/hnv_indicator_report.pdf; Hoogeveen, Y., Petersen, J.E., Balazs, K., Higuero, I., (2004) *High nature value farmland - Characteristics, trends and policy challenges* http://reports.eea.europa.eu/report_2004_1/en.

³⁰ Slee, R.W., Roberts, D., Thomson, K., Barnes, A., Wright, I. (2001) *Agriculture's contribution to Scottish society, economy and environment*, Department of Agriculture and Forestry, University of Aberdeen and Macaulay Land Use Research Institute, <http://www.scotland.gov.uk/Publications/2001/06/9405/File-1>.

³¹ Upstream linkages are those initiated by input purchases, while downstream linkages arise from the sales of output. The multiplier effect relates to a process whereby change in the demand and output of one commodity can have an impact on the rest of the economy. For example, if there is an increase in demand for a particular commodity, producers will react to meet the increased demand. As these producers increase their output, there will be an increase in demand on their suppliers and so on down the supply chain. The result of this impact will be increased employment and increased household income, which will have wider effects. Similarly, if people are downsizing, their reduced output will mean reduced demand from suppliers and potentially reduced employment and so on.

³² Schwarz, G., Wilson, R.M., Swales, V., Burton, R., Wright, I.A., Gilbert, A., McLeod, J., (2006), *Less favoured area support scheme in Scotland: review of the evidence and appraisal of options for the scheme post 2010*, Report for the Scottish Executive by Macaulay Institute, University of Edinburgh and IEEP, <http://www.scotland.gov.uk/Resource/Doc/171377/0047934.pdf>; Frontier Economics (2005) *Modelling the impact of CAP reform on the agricultural supply chain*, A Report Prepared for Defra, <http://www.defra.gov.uk/rural/research/economic-linkages.htm>.

³³ This was suggested by Yuill, B. and Cook, P. (2007) *Trends in Agriculture and Supporting Infrastructure within the HIE area 2001 – 2006*, Report for Highlands and Islands Enterprise. Also see Copus, A., Lloyd, J., (2006) *Patterns of Change in Agricultural Labour in Scotland 1998-2003*, Scottish Agricultural College, Edinburgh; Copus, A., Hall, C., Barnes, A., Dalton, G., Cook, P., Weingarten, P., Baum, S., Stange, H., Lindner, C., Hill, A., Eiden, G., McQuaid, R., Grieg, M., Johansson, M., (2006) *Study on Employment in Rural Areas*, (SERA) Final Deliverable, unpublished report prepared for the European Commission, DG AGRI, Brussels, http://ec.europa.eu/agriculture/publi/reports/ruralempl/sera_report.pdf.

³⁴ It is important to note that reporting in terms of percentage changes can disguise changes in absolute numbers and the importance of farm related employment in the local economy is not necessarily reflected in the percentage figures. For example, a 40 percent drop in employees in Inverclyde, East Renfrewshire & Renfrewshire represents a loss of 79 jobs, while a 21 percent drop in Perth & Kinross and Stirling represents a loss of 350 jobs.

³⁵ Thomson, S., Skerratt, S. Renwick, A. (2007) SAC Response to the RSE Inquiry into the Future of Scotland's Hill and Island Areas.

³⁶ Slee, B., Grieve, J., Cook, P., Williams, F. (2008) *Barriers to New Entrants to Scottish Farming - An Industry Consultation to the Tenant Farming Forum*; Crofting Inquiry (2008); ADAS Consulting Ltd, University of Plymouth, Queen's University Belfast, Scottish Agricultural College (2004) *Entry to and Exit from Farming in the United Kingdom*, Report to DEFRA.

³⁷ Slee, B., Grieve, J., Cook, P., Williams, F. (2008) *Barriers to New Entrants to Scottish Farming - An Industry Consultation to the Tenant Farming Forum*.

³⁸ See Scottish Agricultural College, Macaulay Land Use Research Institute, University of Central Lancashire (2005) *Policy for the delivery of public goods in the uplands: the implications of the social capital of traditional hill farming*, Workshop Report, <http://www.theuplandcentre.org.uk/Reference/Reports/Summary%20Hill%20Farm%20Social%20Capital.doc>.

³⁹ Committee of Inquiry on Crofting (2008), available at www.croftinginquiry.org.

⁴⁰ See for example: Scrimgeour, D., Bevan, K. (2003) *Review of the Impact of the Proposed EU Animal Transport Regulations on Livestock Movements in the HIE Area*, Report to HIE and the Scottish Islands Network; Wright, J., Stephens, T., Wilson, R., Smith, J. (2002) *The effect of local livestock population changes on auction market viability – a spatial analysis*, *Journal of Rural Studies*, 18 (4), 477-483; Boyne, S., Booth, J. (2005) *Transport, distribution and storage costs associated with farming*, Special Study Report to SEERAD.

⁴¹ <http://www.caithness.org/fpbjuly2006/thursomart.htm>.

⁴² Haulage exodus, headline article in *The Scottish Farmer*, May 17, 2008.

⁴³ Harris Interactive (2005) Tourism Attitudes Survey 2005, VisitScotland, http://www.visitscotland.org/tas_2005_exec_summary_final_version-2.pdf.

⁴⁴ Midgley, A., Williams, F., Slee, B., Renwick, A. (2008) Primary Land-Based Business Study, Report to Scottish Enterprise.

⁴⁵ Indeed LFASS has played an important role in the trends identified in this report. The fact that cattle numbers have not dropped to the same extent as sheep numbers may be due, at least in part, to the fact that higher LFASS payments could be achieved by retaining cattle in the enterprise mix.

⁴⁶ Scottish Executive (2005) Cross Compliance: Notes for Guidance, <http://www.scotland.gov.uk/Publications/2005/12/0990918/09199>.

⁴⁷ In Scotland, the capacity of wild graziers, such as red deer, to continue to graze land means that grazing will not reduce to zero, though it is likely that the different pattern and impact of deer will lead to some changes.

⁴⁸ In terms of market failure, the government intervenes to ensure the delivery of 'public goods' that would not normally be delivered by the market, or, if they were delivered by the market, would benefit some more than others – such as public health care. The government also intervenes to prevent or mitigate externalities, which occur when the actions of individuals or firms affect others but where the cost of this action is not reflected in the value of the transactions. For example, when society has to bear the costs of cleaning up pollution that is the result of production by businesses, the Government may intervene by legislating to limit emissions to watercourses, thereby building the costs of limiting pollution into the price of the product. In terms of equity, governments might intervene in markets to seek a redistribution of income from richer to poorer households, or to ensure that everyone has access to income opportunities and services so that they can participate in the society of which they are part.

⁴⁹ SAC is currently involved in a European project that is examining the interest of European consumers and retailers in mountain food products in order to find ways of adding value to these products, thereby contributing to the survival and management of mountain diversity - biological, rural, cultural and economic. See http://www.mountainproducts-europe.org/sites/Euromontana/EuroMARC_Project/Origins_and_methodology.aspx#.

This report is based upon ongoing research funded by the Scottish Government and represents an output from Work Package 3.1 – Sustainable Farming Systems, linked to research in Work Package 2.5 - Livestock Genetics and Management for Product Quality and Sustainability and WP 3.7 - Management of Biodiversity.

The Loch Lomond and the Trossachs National Park Authority part-funded some of the research reported.