Sustainable Farming and Food Strategy: Forward Look

Supporting economic and statistical analysis

defra
Department for Environment Food and Rural Affairs

SFFS Forward Look

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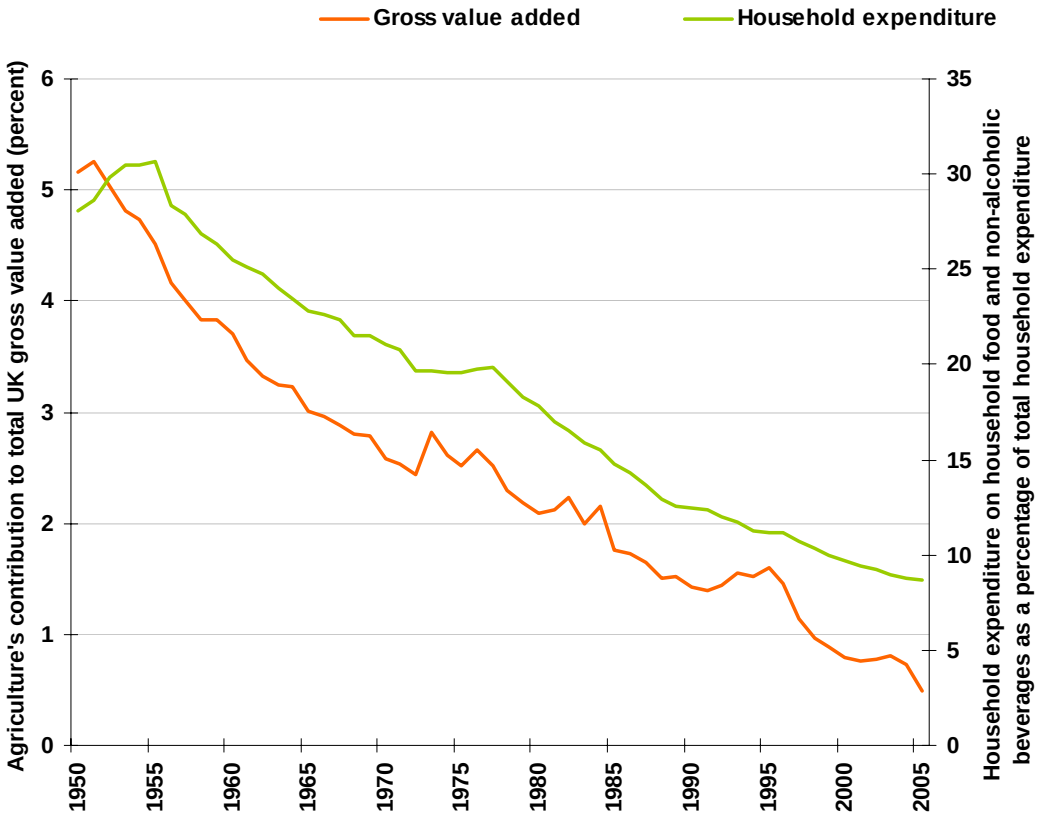
Setting the context

Economic context

The last 50 years have seen a significant reduction in agriculture's share of the UK economy (see Charts 1 and 2). At the beginning of the 1950s agriculture accounted for 5% of Gross Value Added (GVA) and broadly 6% of employment: the figures for 2004 stood at broadly 0.7% and 0.8%, although the share of employment is clearly higher in rural areas, at 4% for England. These trends are common to most developed economies and are indeed more pronounced in most other EU countries.

Chart 1

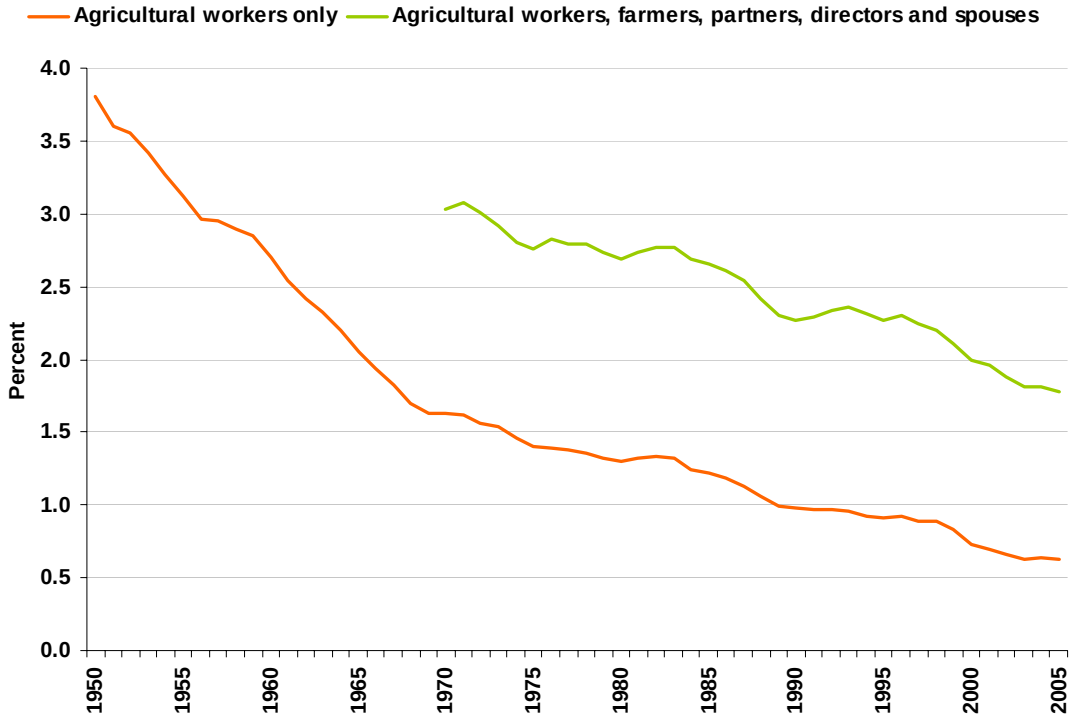
Agriculture's contribution to gross value added, and household expenditure on food and non-alcoholic beverages



Source: Office for National Statistics; A Hundred Years of British Food and Farming (a statistical survey); Agriculture in the United Kingdom 2005, Defra

Chart 2

Agricultural workforce as a percentage of the UK total workforce



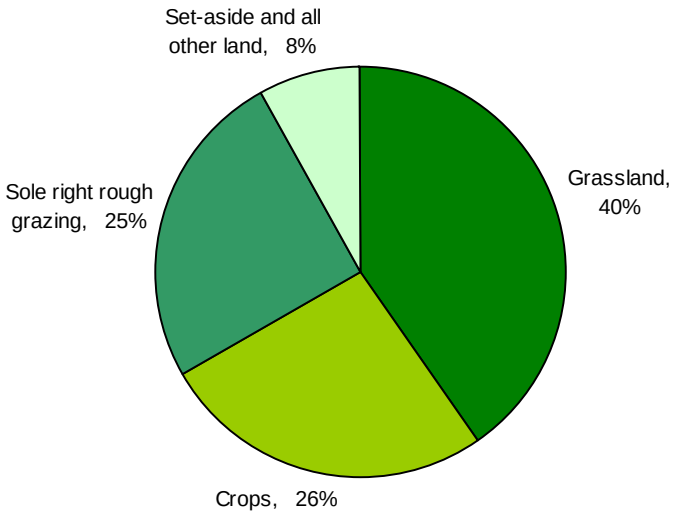
Source: Office for National Statistics; A Hundred Years of British Food and Farming (a statistical survey); Agriculture in the United Kingdom 2005, Defra

These trends are driven by underlying changes in consumption patterns and in technology. As consumers' incomes rise they tend to spend a smaller proportion of their family budget on food and drink (down from 30% to 10% over the last 50 years) whilst expenditure is more focussed on products where value has been added in processing and packaging. At the same time technological developments (in both the farming and transport) have reduced the prices of agricultural commodities relative to the prices for other goods and services (by around a third over the last 30 years) and this means that retail food prices have also risen less quickly than the general price level (although clearly to a lesser degree, because of the range of input costs other than agricultural commodities).

At June 2005, the total area of agricultural land was 18.5 million hectares, some 77 per cent of the total land area in the United Kingdom. Crop production accounts for around a quarter of agricultural land in the UK (see chart 3).

Chart 3

Total area on agricultural holdings in the UK June 2005



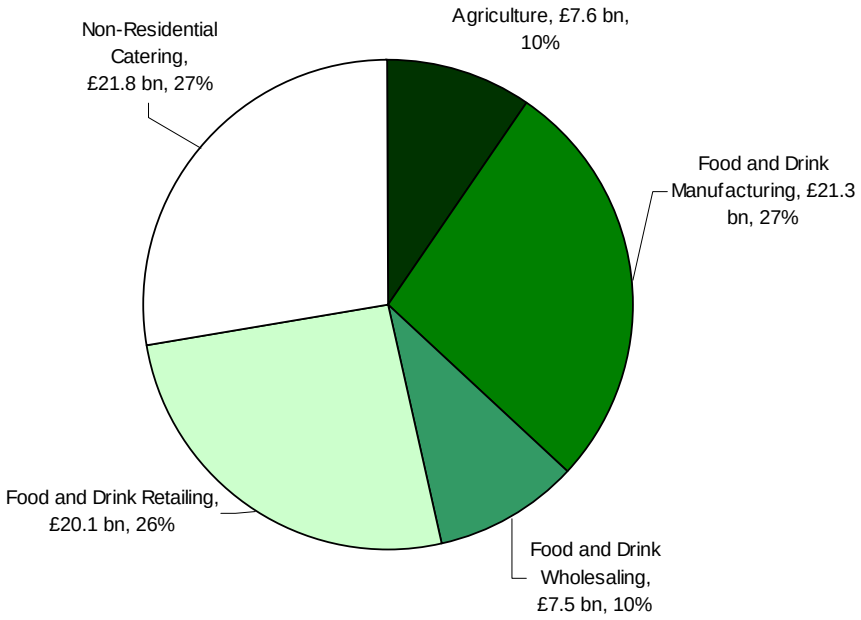
Source: Defra Statistics

The largest 5% of agricultural holdings (by economic size) account for over one half of agricultural production.

The agri-food sector in the United Kingdom as a whole accounted for a total estimated gross value added of £78 billion in 2004, a 9.4 per cent increase on 2003 and 7.6% of the national economy as a whole.

Chart 4

Gross value added by the UK agri-food sector 2004

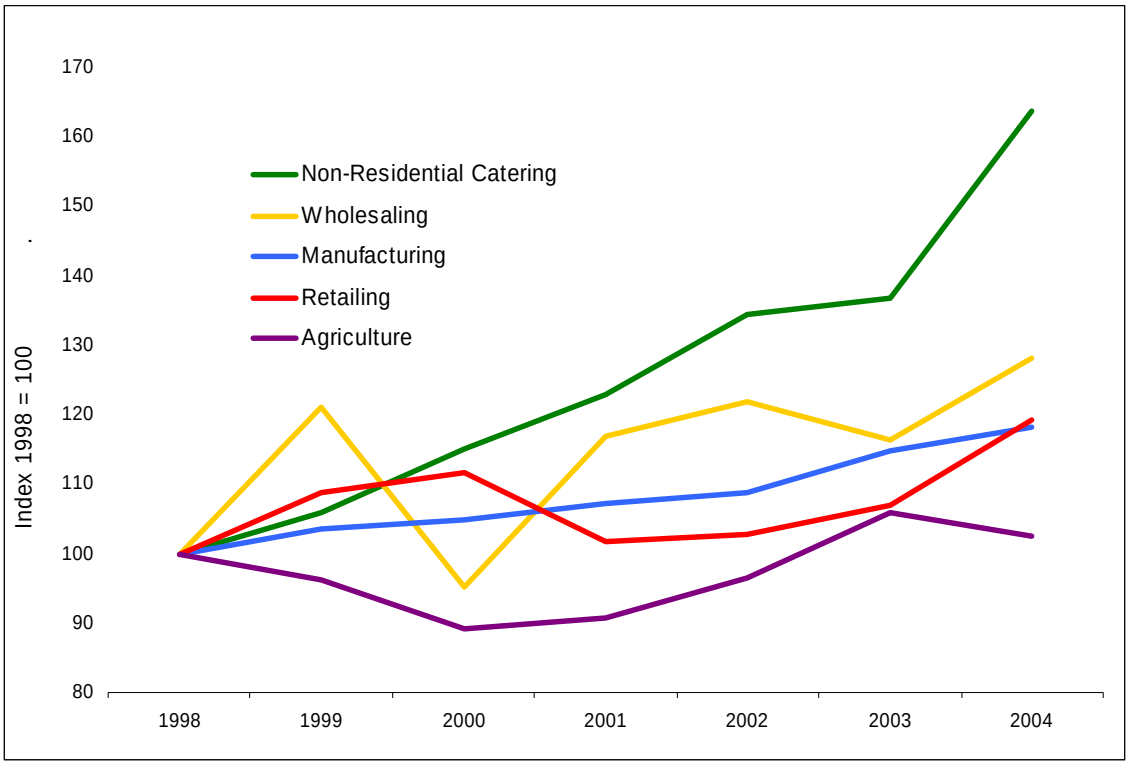


Source: Annual Business Inquiry (ONS) and AUK (Defra)

Non-residential catering is the largest subsector in terms of gross value added, overtaking manufacturing and accounting for 28 per cent of the total. Manufacturing accounts for 27 per cent while retailing accounts for 26 per cent. Agriculture and food and drink wholesaling are the smallest sub-sectors in terms of gross value added, each accounting for around 10 per cent of the total. In 2005, gross value added for agriculture was £5.2 billion, the fall being due to changes in subsidies specifically the introduction of the Single Payment Scheme. This would reduce its share to 6.9 per cent.

Chart 5

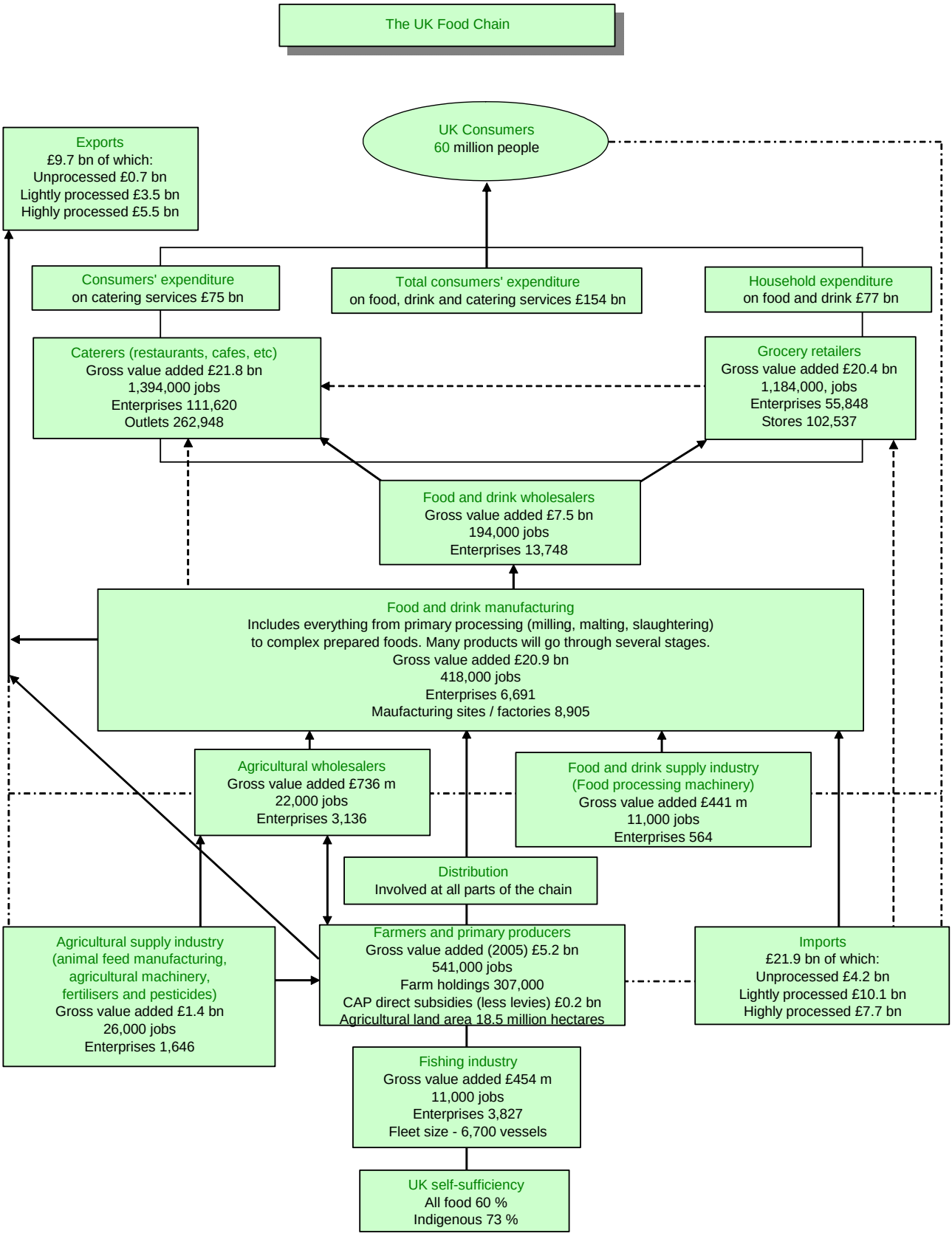
Trends in gross value added in the agri-food sector



Source: Annual Business Inquiry (ONS) and Defra, figures for 2004 are provisional.

National GVA has grown 35 per cent since 1998. GVA of the agri-food sector has grown by 27 per cent since 1998. GVA of the food sector (i.e. excluding agriculture) has increased by 31 per cent since 1998, slightly below growth in the whole economy. The only sub-sector to experience faster growth than the whole economy over the same period was non-residential catering where GVA increased by 63.7 per cent. Agriculture GVA showed the smallest increase of 2.4 per cent over the period. Retailing and manufacturing GVA increased by 19.3 per cent and 18.3 per cent respectively. Wholesaling GVA shows large fluctuations and has increased by 28.1 per cent since 1998.

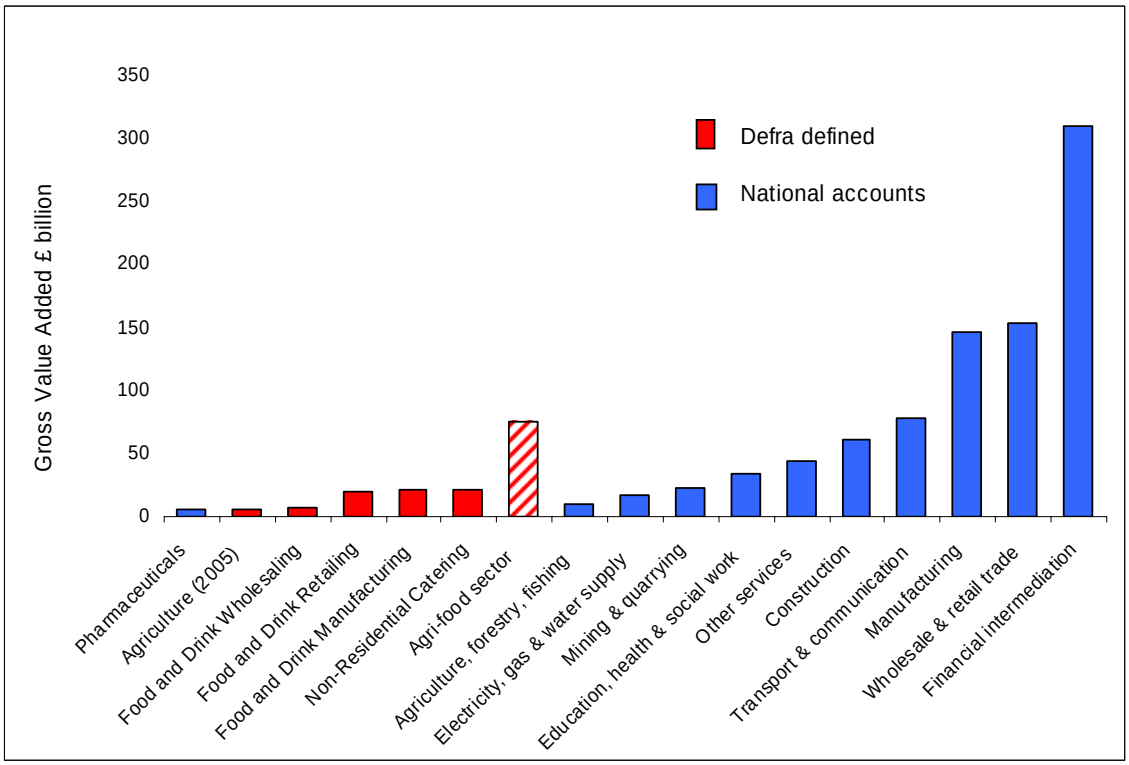
The following page provides diagrammatic representation of the UK food chain.


The UK Food Chain
UK Consumers
60 million people
Exports
£9.7 bn of which:
Unprocessed £0.7 bn
Lightly processed £3.5 bn
Highly processed £5.5 bn
Consumers' expenditure
on catering services £75 bn
Total consumers' expenditure
on food, drink and catering services £154 bn
Household expenditure
on food and drink £77 bn
Caterers (restaurants, cafes, etc)
Gross value added £21.8 bn
1,394,000 jobs
Enterprises 111,620
Outlets 262,948
Grocery retailers
Gross value added £20.4 bn
1,184,000, jobs
Enterprises 55,848
Stores 102,537
Food and drink wholesalers
Gross value added £7.5 bn
194,000 jobs
Enterprises 13,748
Food and drink manufacturing
Includes everything from primary processing (milling, malting, slaughtering)
to complex prepared foods. Many products will go through several stages.
Gross value added £20.9 bn
418,000 jobs
Enterprises 6,691
Maufacturing sites / factories 8,905
Agricultural wholesalers
Gross value added £736 m
22,000 jobs
Enterprises 3,136
Food and drink supply industry
(Food processing machinery)
Gross value added £441 m
11,000 jobs
Enterprises 564
Distribution
Involved at all parts of the chain
Agricultural supply industry
(animal feed manufacturing,
agricultural machinery,
fertilisers and pesticides)
Gross value added £1.4 bn
26,000 jobs
Enterprises 1,646
Farmers and primary producers
Gross value added (2005) £5.2 bn
541,000 jobs
Farm holdings 307,000
CAP direct subsidies (less levies) £0.2 bn
Agricultural land area 18.5 million hectares
Imports
£21.9 bn of which:
Unprocessed £4.2 bn
Lightly processed £10.1 bn
Highly processed £7.7 bn
Fishing industry
Gross value added £454 m
11,000 jobs
Enterprises 3,827
Fleet size - 6,700 vessels
UK self-sufficiency
All food 60 %
Indigenous 73 %

The following chart compares the economic contribution of the agri-food sector with other sectors of the economy.

Chart 6

Food chain contribution relative to other sectors of the national economy[1]



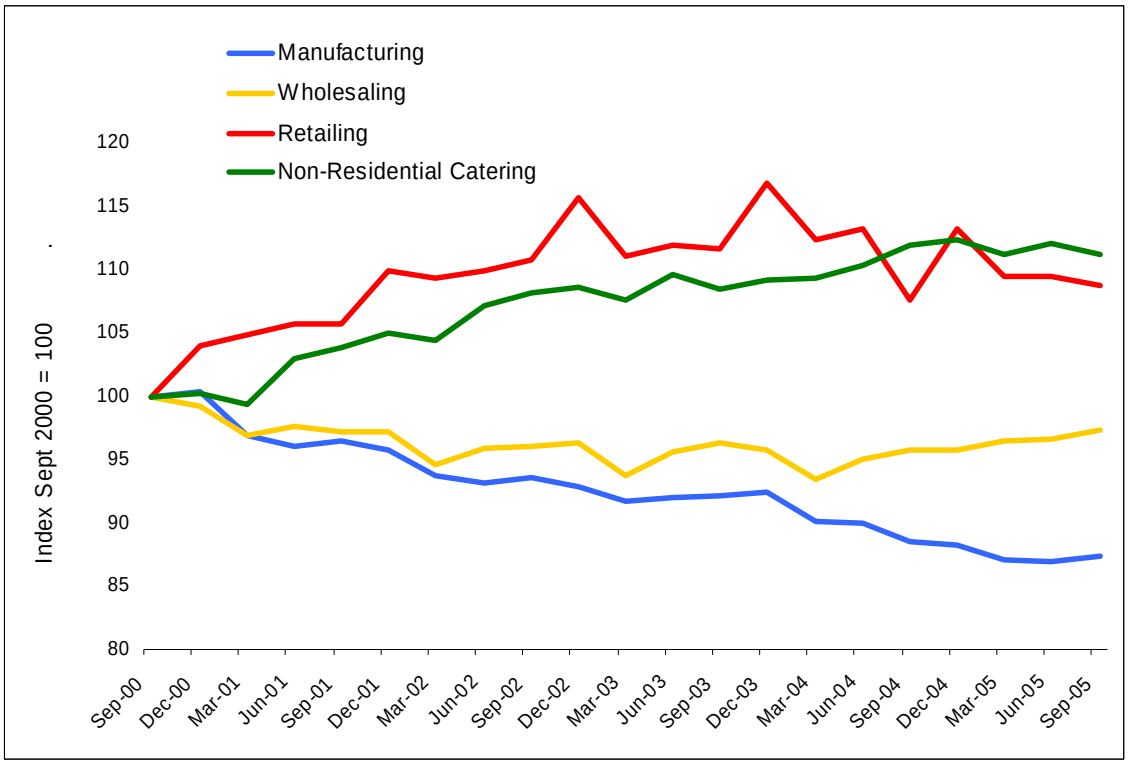
Source: Defra, Annual Business Inquiry (ONS) and Input-Output Supply and Use Tables (ONS)
1 Agriculture estimates are for 2005; agri-food sector estimates are for 2004; national accounts estimates are for 2003.

Agriculture and the pharmaceuticals industry (first two columns in chart) both contribute a similar amount to national GVA. The agri-food sector comprises the food sector plus agriculture (red section in chart). It contributed £76 billion or 8.7 per cent to market sector GVA.

Employment shows different trends across the different parts of the chain as shown in the chart below.

Chart 7

Trends in employment in the food sector, GB basis[1]



Source: Labour Market Trends (ONS)
1 Wholesaling includes agricultural wholesaling

Employment in non-residential catering has experienced the largest growth in the food sector, rising 11.2 per cent over the five year period to the third quarter of 2005. This reflects both a growing market and the labour-intensive nature of catering. Food retailing has also experienced growth in employment compared to five years ago with an increase of 8.8 per cent. Manufacturing saw employment fall by 12.6 per cent over the same period. This reduction is in line with long term trends in this sub-sector. Wholesaling employment appears to show some seasonality and has decreased by 2.6 per cent over the five year period, while employment in agriculture has fallen by 2.9 per cent between 2000 and 2005.

Environmental context

Agricultural activities cover about three-quarters of the land area of the United Kingdom.

- In 2005, 60 per cent of the area of SSSIs on agriculturally managed land were in good or recovering condition.
- The index of farmland bird populations declined by about half between 1978 and 1993 and has remained relatively stable since.
- Agricultural contributes around 7% of UK greenhouse gas emissions (in CO_2 equivalent)
- Emissions of methane, which accounts for 47 per cent of the total for the United Kingdom, have fallen steadily by 11 per cent over the 10 years up to 2003.
- Agricultural emissions of nitrous oxide, which account for 67 per cent of the total for the United Kingdom, have fallen by 10 per cent over the 10 years to 2003.
- Nitrate levels in rivers in England fell steadily between 2000 and 2003 but rose in 2004; in Scotland, Wales and Northern Ireland they remain low.

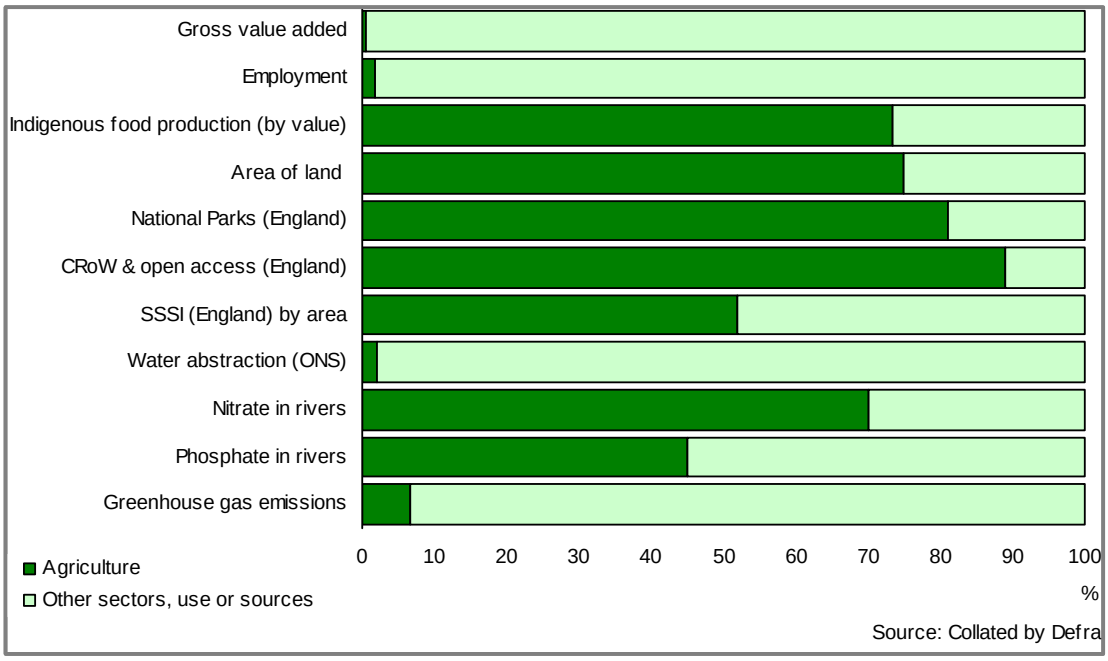
- Phosphate levels in rivers in England have fallen slightly between 2000 and 2004.
- In 2002/03 the number of tourist visits by UK residents was over 25m (with over a billion day visits) providing the underpinning for leisure and tourist businesses in rural areas.

The agricultural sector is made up of around 307,000 holdings varying widely in size and type. A range of different farming practices are employed involving: the way in which livestock are kept; the use of inputs such as soil and water as well as nutrient, land and waste management. The interaction between these practices and the local environmental characteristics affect the extent to which farming activities impact on the environment. The effects on the environment are significant and complex – farming activities can give rise to both positive and negative impacts on the environment operating at local, regional, national and global levels.

The chart below puts UK agriculture into context by bringing together data to summarise agriculture in comparison with other sectors in the UK. It shows the agricultural sector as a proportion of the UK (or England where stated). It includes the agricultural contribution to: the UK economy; land protection and conservation; resources; pollution and emissions.

Chart 8

Environmental profile of the agricultural sector



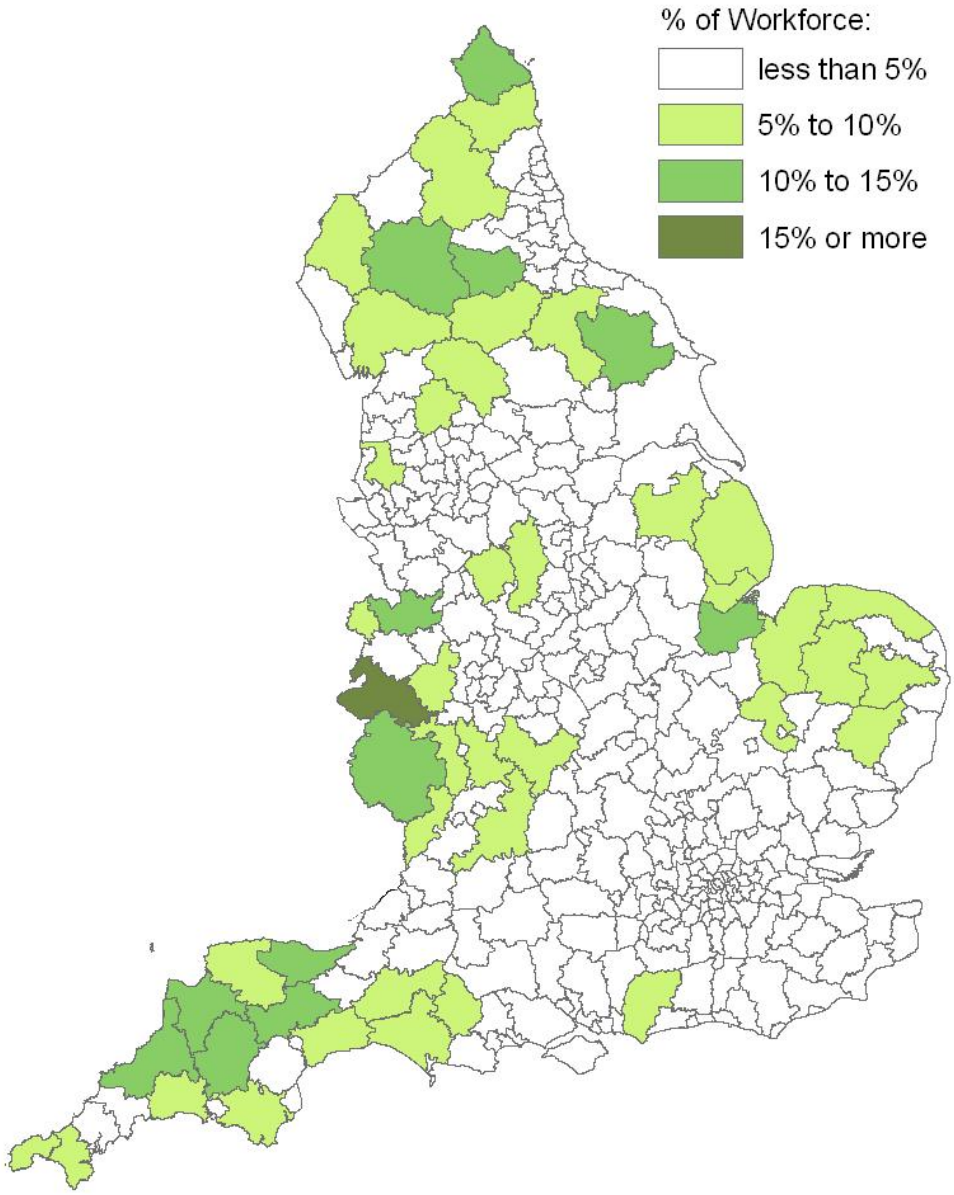
Social context

Fifty years ago the main contribution which food and farming made to social sustainability was through its central contribution to rural economies, at a time when many of these were depressed by the long term decline in agriculture and other traditional industries. Today food and farming provides an increasingly important indirect contribution – through sustaining the countryside environment upon which the countryside leisure and tourism sectors depend, and which is also important to many other rural businesses. As the discussion of economic sustainability illustrated, agriculture's role in the rural economy has declined, and across rural areas in England agriculture now accounts for broadly 4% of employment. Nevertheless this average disguises the much greater significance of agriculture in some parts of the country, particularly the more remote and

less accessible areas (see Chart 9); once upstream and downstream linkages are taken into account this significance is greater still.

Chart 9

Percentage of workforce living in rural areas in England who are employed in agriculture, by Local Authority District (2003)



Sources:

1. June 2003 Agricultural and Horticultural Census, Defra
2. 2001 Census of Population, Office for National Statistics

At the same time that agriculture's role in the rural economy has been declining, a combination of underlying economic and social trends has resulted in different sources of economic growth in many rural. Key drivers include:

• falling communications costs;

• structural shifts in the economy between manufacturing and services;

• together with shifts towards differentiated and customised products;

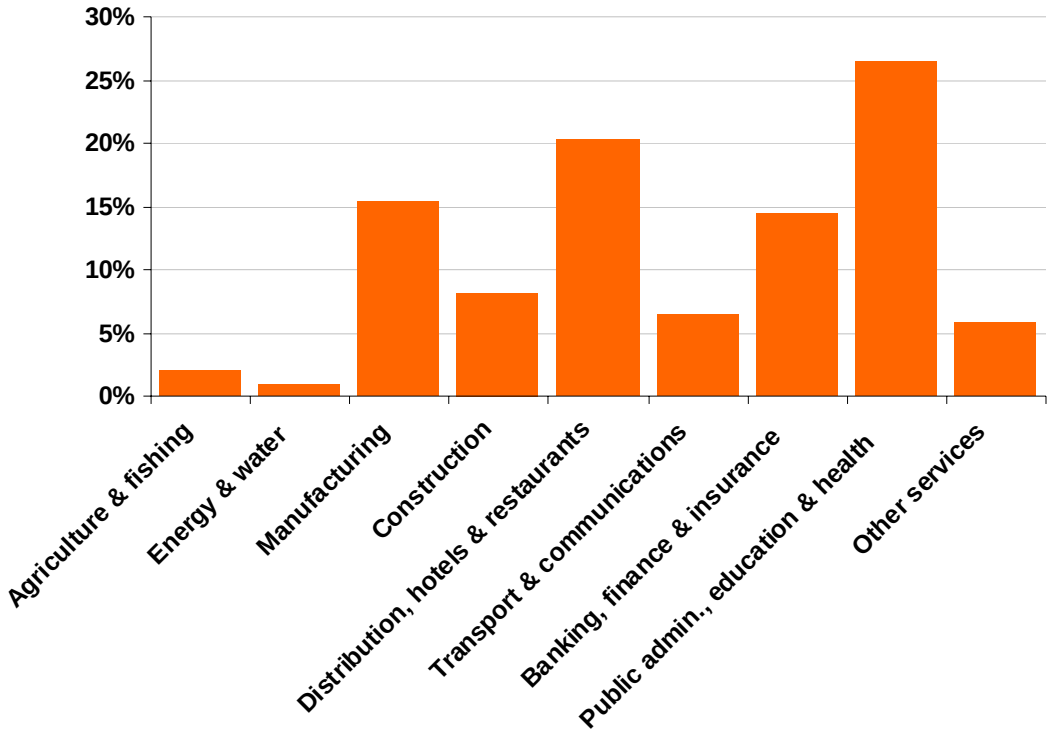
• rising demand for countryside leisure and recreation; and

• shifts in preferences toward countryside living.

The result has been sustained growth in population and employment in rural areas in England, with particularly strong growth in services. These are now the most important sectors of the rural economy in England (see Chart 10). As a result of these underlying trends, most rural economies have been able to adapt reasonably successfully to the long term decline in agriculture; and unemployment rates in rural England have shown a small, gradually slowing decline over the last ten years, comparable to that for urban areas (see Chart 11). But not all rural areas have shared in this growth, and even in otherwise prosperous rural areas there are pockets of deprivation which remain.

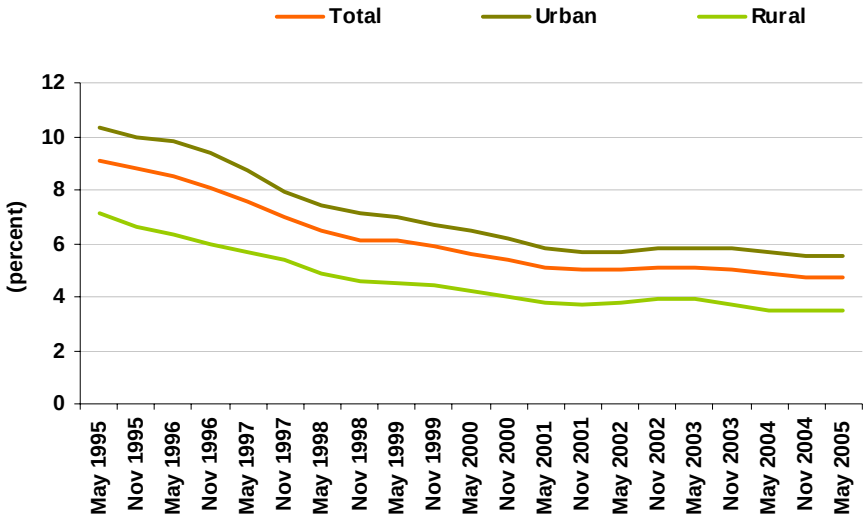
Chart 10

Employment by sector for rural areas in England, 2003



Source: Annual Local Area Labour Force Survey 2003, Office for National Statistics (ONS)
Notes: 1. Totals for those districts classified as such under the classification developed by the ONS and Defra in May 2005.
Figures relate to people of working age.

Chart 11
Unemployment rate



Source: Quarterly Labour Force Survey, England, Office for National Statistics (ONS)
Notes:

1. Unemployment is defined using the International Labour Organisation (ILO) definition which measures the number of people not in paid employment who are available for work and actively seeking work, rather than those claiming benefits.
2. Totals for those districts classified as such under the classification developed by the ONS and Defra in May 2005.
3. Figures relate to people of working age, i.e. people aged 16 to 74.

This means that food and farming's contribution to social sustainability through the underpinning of rural economies in England is now increasingly focused on areas where economic performance is less buoyant and which remain significantly dependent on agriculture.

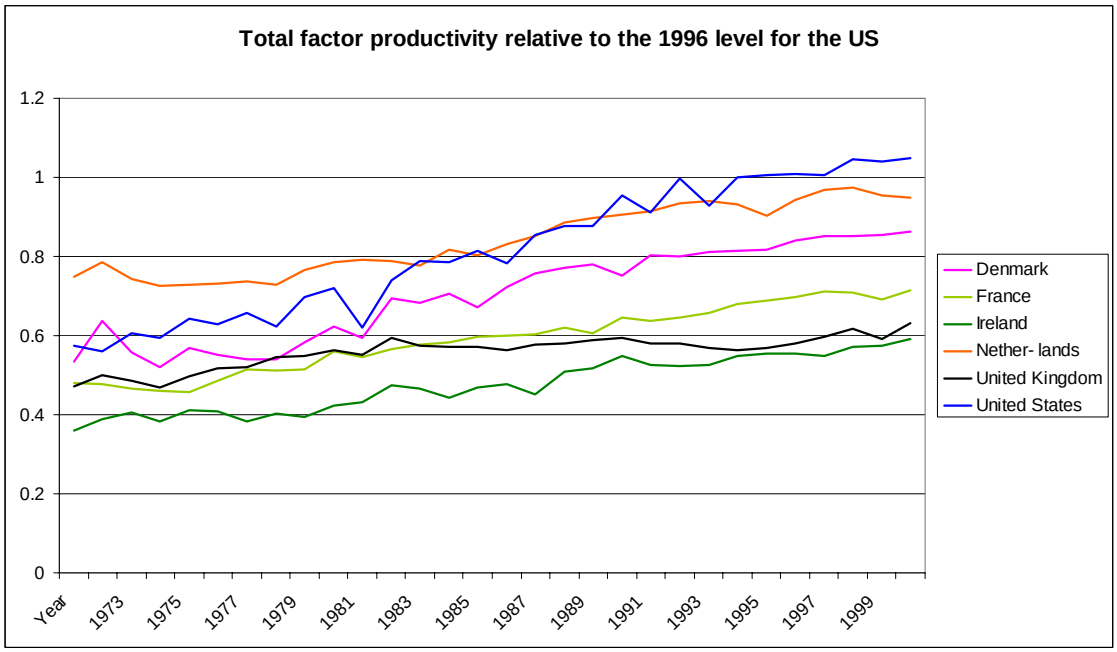
Succeeding in the market

Competitiveness in farming

Research evidence shows that in the mid 1970s the UK's productivity was above the EU average (for the then EU10), although still behind the leading EU countries and the US (as Chart 12 illustrates). By the early 1990s the UK had fallen back relative to other countries, but since then the accelerated productivity growth (largely in response to the severe financial pressures of the late 1990s) has seen a partial recovery. Research studies suggest three groups of factors are important to productivity growth; education and skills; innovation and technology transfer; and business structures and organisation.

Chart 12

Trends in total factor productivity in agriculture



Comparisons of the productivity performance of different farm businesses in the UK show that there is significant scope to improve performance (see Chart 13). Research evidence shows that these differences in performance are driven by a combination of differences in costs and differences in the value added achieved from differentiating higher product quality. Economies of scale are important but equally so too are other factors, relating to skills and business organisation as well as externally determined factors to do with climate and geography.

Chart 13

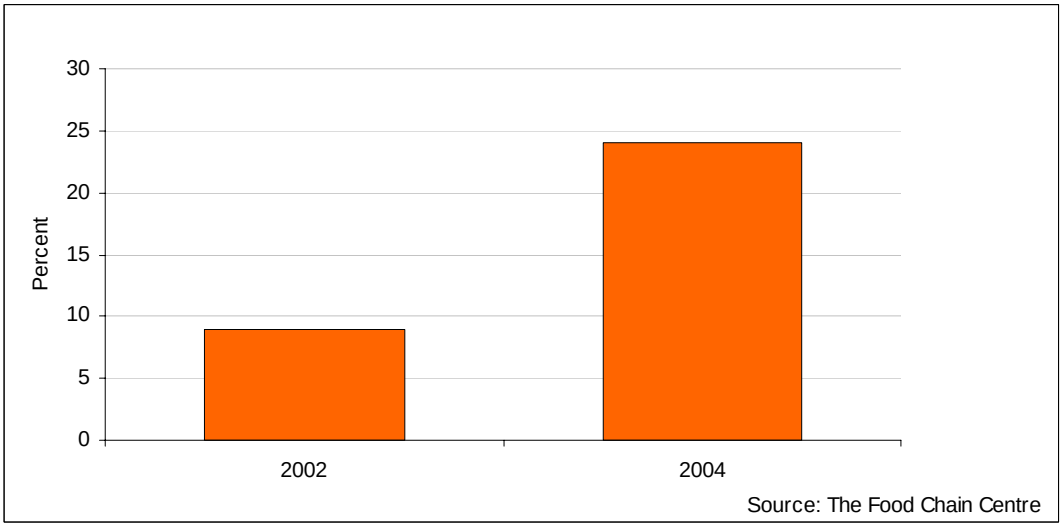
UK distribution of performance across farms > 0.5 SLR 2004/05

Note: Inputs include an allowance for farmer and spouse labour costs and for capital costs.
Source: Farm Business Survey, Defra

Benchmarking is a key tool for farmers to use to identify ways to improve the operation of their business. The following chart shows the number of farmers in England and Wales who are formally benchmarking their businesses.

Chart 14

Farmers who are benchmarking their business 2002/04

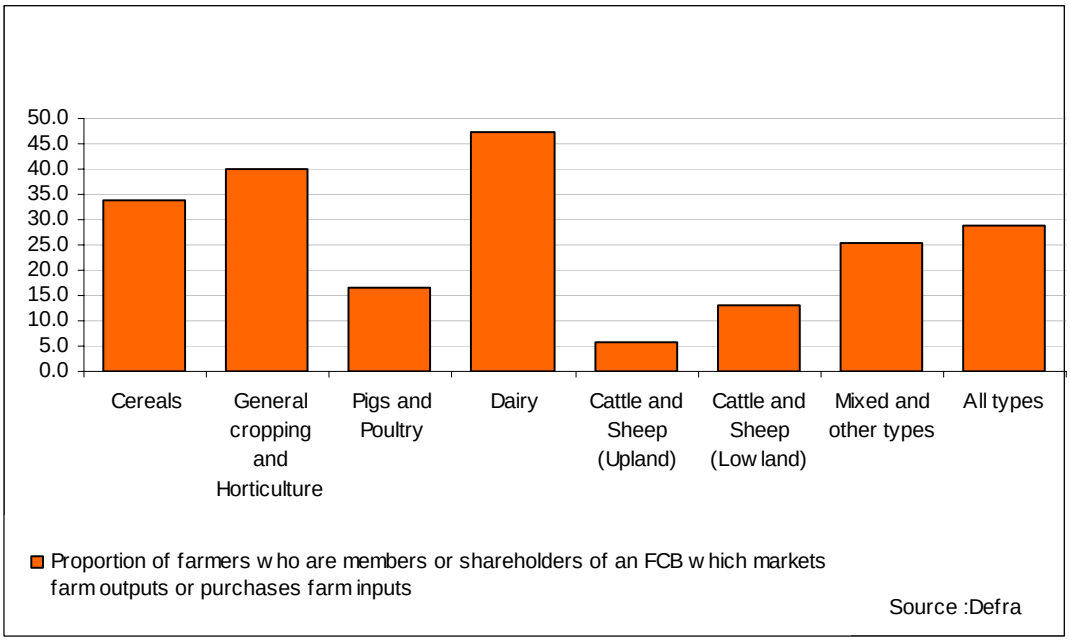


In 2002 only 9% were using benchmarking, whereas, by 2004, this had risen to almost a quarter of all farmers. It is also worth noting that 59% of respondents to the 2004 benchmarking survey cited that they did benchmark with friends or associates in an informal way.

Most farming businesses are small in size, with few regularly employing more than one or two staff, apart from the farmer and his or her family. Whilst this structure may bring benefits (e.g. independence) to the individuals concerned and to rural communities, it also poses problems, for example, due to the lack of economies of scale (which impacts on productivity), and the lack of negotiating power when dealing with supermarkets and other large businesses. One solution is for farms to co-operate so that they function as a larger business for some purposes. In particular, farmer co-operatives (also known as farmer controlled businesses, (FCBs)) can assist in achieving competitive prices when buying inputs such as fertilisers and pesticides and when selling produce. Chart 15 shows the proportion of farmers who are members of FCBs or who use FCBs to market farm outputs or purchase inputs in England for 2004. Dairy farms (47%), general cropping farms (40%) and cereals farms (34%) have the highest levels of memberships of FCBs.

Chart 15

Proportion of farmers who are members of FCBs (2004)

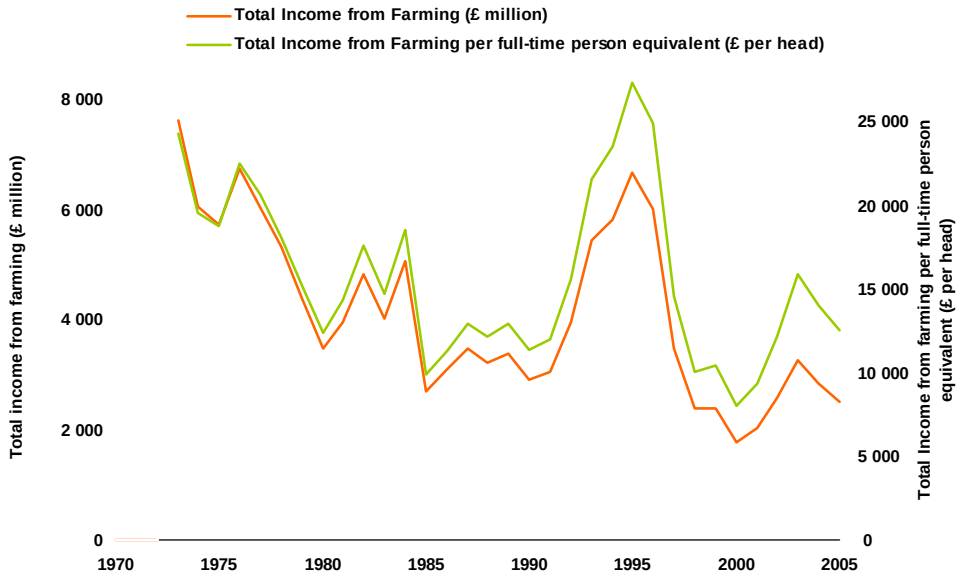


Levels of productivity feed through to farm income levels. Improvements in the UK's relative productivity performance compared to its international competitors will, all other things being equal, lead to increased income levels. However, there are many other external factors (in particular the exchange rate and commodity price movements) which shape farm income trends. In 2000, the "Total Income from Farming" in the UK (the returns to the labour and entrepreneurial input of farmers, spouses and other directors) was at its lowest level, in real terms, since the depression of the late 1930s. Since then, a period of recovery (see Chart 16) has been followed by a fall back over the last 2 years to a level of £12,500 per full time person equivalent. For some farm households the downturn will be partly cushioned by other sources of income. More than a half of full time farms in England have diversified sources of income (either through off-farm employment or other types of business on the farm) and for a significant number of these households diversified income is at present more important than the income earned from farming.

It should be noted that the 2005 estimates include the full value of the Single Payment which, in accordance with National Accounting conventions, is included on an accruals basis. On a cash flow basis total income for 2005 fell by over £2b as a consequence of the delayed payments.

Chart 16

Agricultural industry income trends in the UK (real terms at 2005 prices)



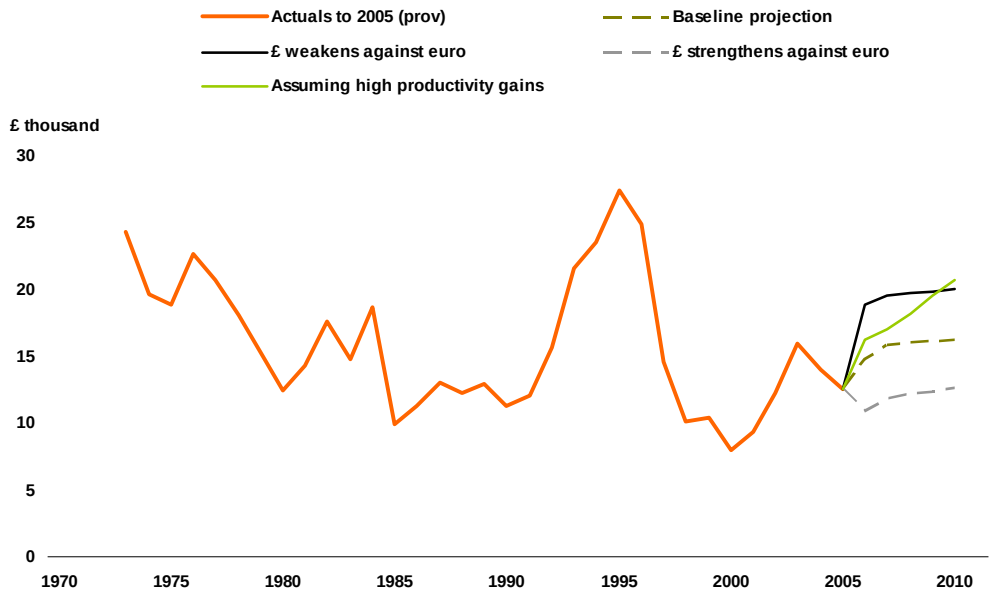
Source: Defra

The steep decline in incomes since the mid 1990s has been shaped by a combination of more immediate drivers, in particular the exchange rate is of greatest significance. The result is that the decline in the pound/euro rate after the UK left the ERM, in the early 1990s, lead to a boom in farming's profitability which was reversed as the pound/euro rate increased in the latter half of the decade. There has also been the impact of commodity prices, BSE and foot and mouth disease and more recently the rise in the oil price.

The future business prospects for farming will reflect the interaction of the key drivers (both long-term and short-term) which have shaped the present position. Chart 17 shows some projections of underlying trends; it should be emphasised that these types of projection have very broad margins of uncertainty and also that agriculture is an industry where specific events, such as disease outbreak or poor weather, can shift incomes from the underlying trend in individual years.

Chart 17

Projections of total income from farming up to 2010: in real terms at 2005 prices per full time person equivalent



Source: Defra

The latest projections suggest an easing of the impact of high oil prices resulting in a slight recovery by 2007 to be followed by levels of around £16,000 per full-time person equivalent. The baseline projection in the chart assumes an exchange rate of 68.5 pence per euro. Projections are also provided to illustrate the effects of further movements in the exchange rate. The exchange rate scenarios shown illustrate the effects of returns to high and low exchange rates of recent years (71 pence per euro for the pound weakens scenario and 60 pence for the pound strengthens scenario).

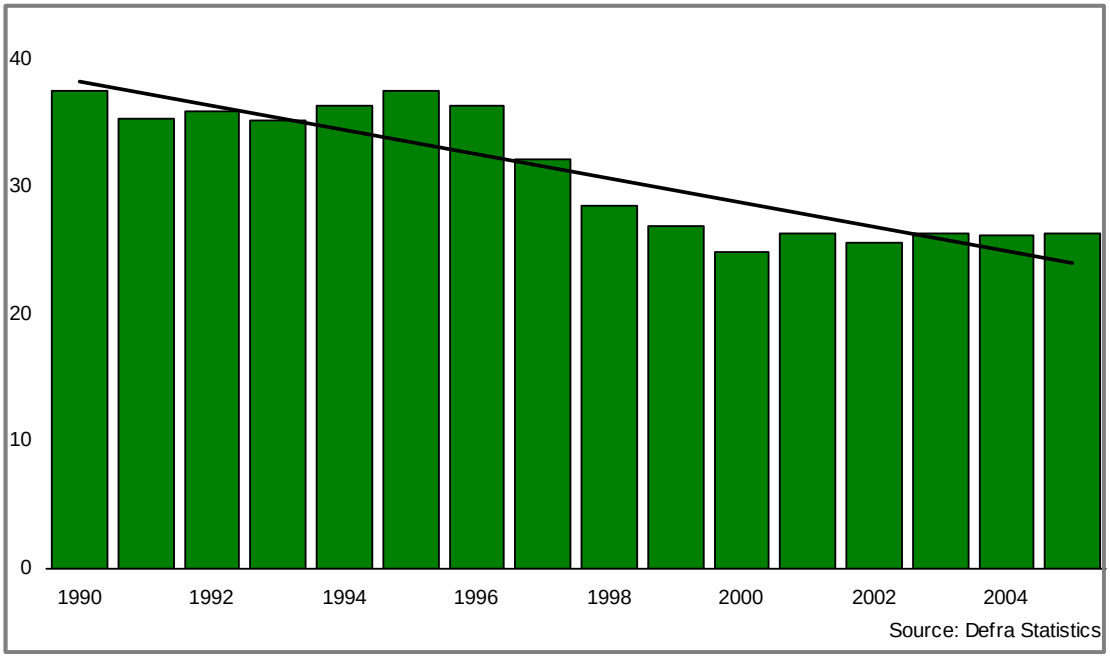
Whilst income levels remain well below the (currency induced) peak of the mid 1990s, the net worth of the UK agriculture industry stands at £120 billion up by around 20% in real terms the mid-1990s. This reflects a value of assets of £130 billion (which is mainly land) and liabilities of £10 billion.

Shares of value along the food chain

Long term trends have had the effect of reducing over time the share that farmers receive of total retail spending on food. In particular, there has generally been increasing consumption of processed foods, and consequently an increase in value added beyond the farm gate. Consumers' expenditure on food has been rising faster than either retail food prices or physical consumption, indicating a switch toward higher value products. The implications of these trends for the farmers' share of retail spending is illustrated in Chart 18.

Chart 18

UK farm gate share (%) of total household food sales (1990-2005)

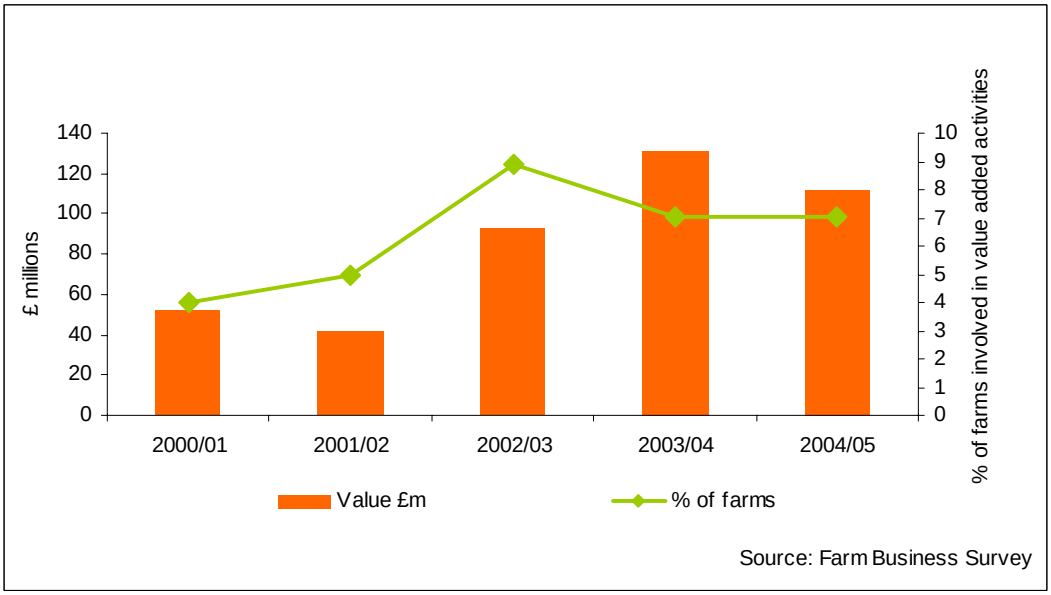


Method note: Farm gate value is adjusted to remove produce going to the catering industry. Consumers' expenditure is adjusted to remove imported food.
Sources: Consumers' expenditure on household food is from the Office for National Statistics (ONS); consumers' expenditure on food eaten out is a Defra estimate, value of farm gate output from Defra's aggregate agriculture account; self sufficiency in food from Defra series.

One of the ways in which farmers can capture more of the retail expenditure by consumers is through adding more value. The chart below shows the aggregate value of value added activities such as processing and retailing of farm produce on farms in England. The value of these activities has increased by 114% over the four years to 2004/5.

Chart 19

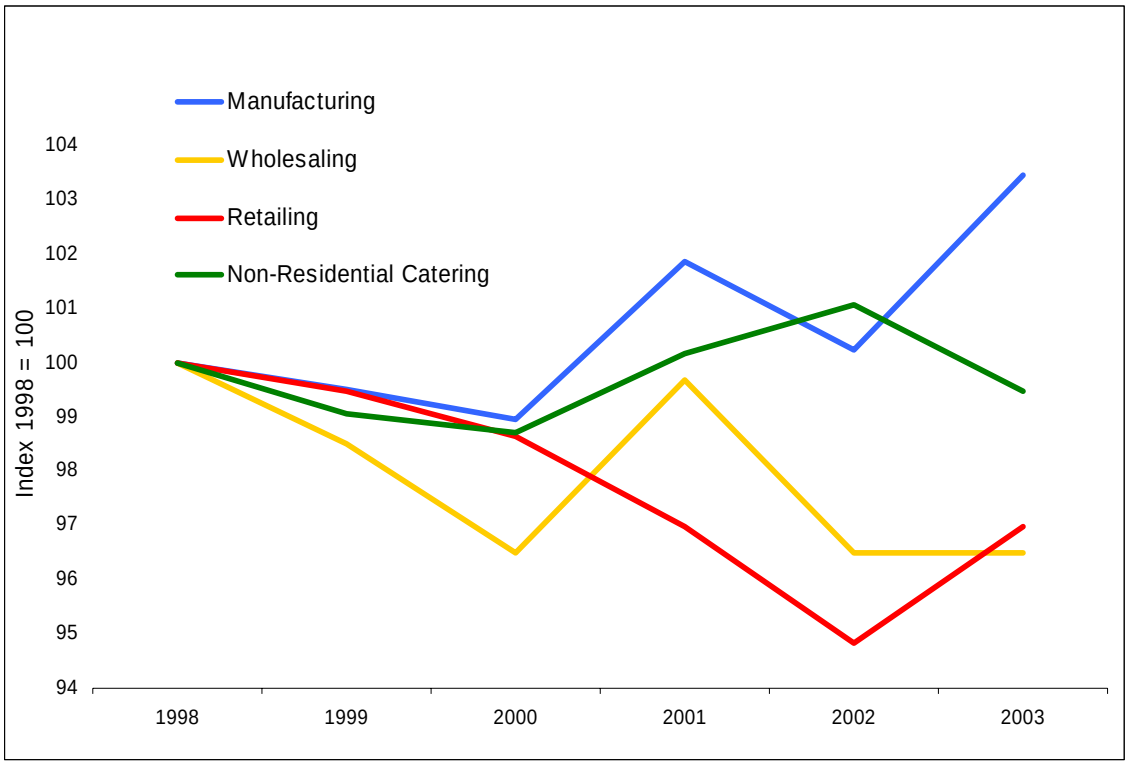
Value added activities



Productivity of the food sector

The next section considers productivity of the food sector beyond the farm gate.

Chart 20
Total factor productivity of the food sector



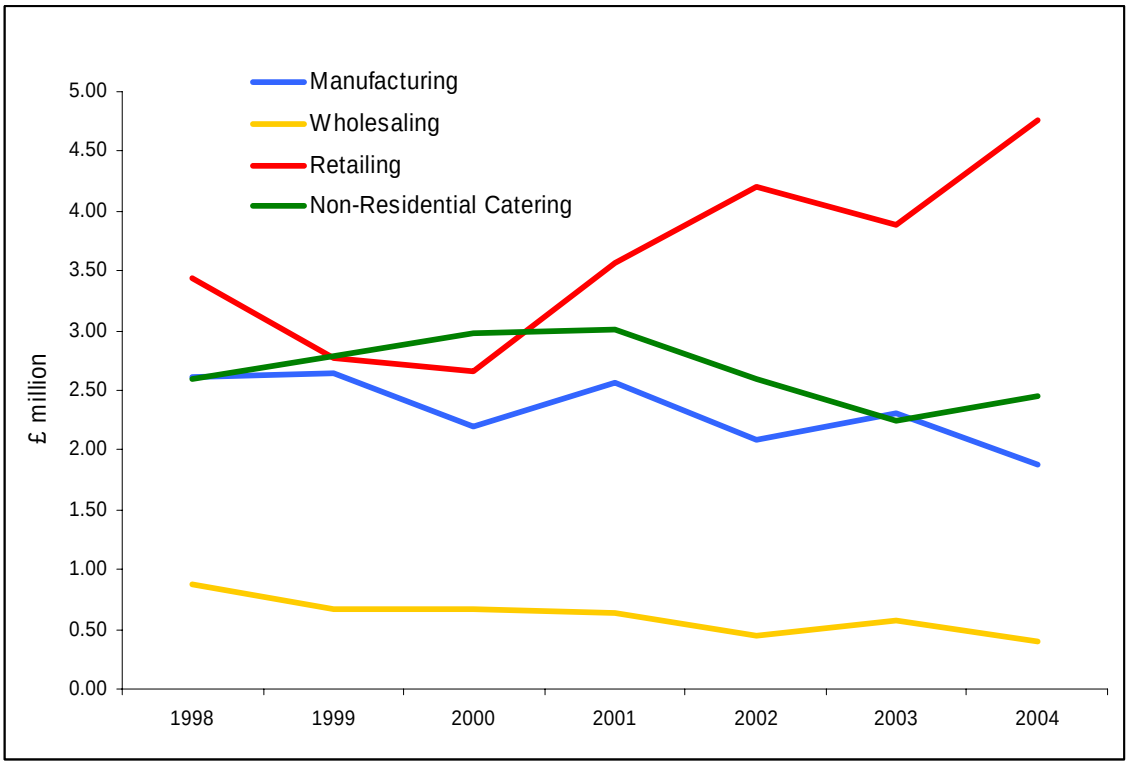
Source: Food Chain Productivity Incorporating External Impacts, a report by SAC Commercial ltd commissioned by Defra.

Productivity measures the efficiency at which inputs are converted into outputs. Total factor productivity provides a comprehensive picture of growth. According to SAC food manufacturing had a positive TFP growth rate of 0.68 per cent per annum (1998 to 2003) which was above the whole economy average of 0.57 per cent. The remaining three sectors had negative growth rates. Food wholesaling at –0.71 per cent, food retailing at –0.61 per cent and non-residential catering at –0.10 per cent. Retail productivity is possibly underestimated by the omission of the non-market benefits offered by supermarkets, such as longer opening hours, and a greater product mix offered within stores.

Productivity trends will in part be shaped by levels of investment and research and development. Net capital expenditure in food and drink retailing increased by 38 per cent between 1998 and 2004 and totalled £4.75 billion in 2004 (see Chart 21). This is around the level of expenditure seen in the rest of the food sector put together. Over the same period net capital expenditure in food and drink manufacturing and non-residential catering decreased by 28 per cent and 6 per cent respectively. Levels of net capital expenditure are lowest in food and drink wholesaling and have decreased by 54 per cent between 1998 and 2004.

Chart 21

Net capital expenditure in the food sector

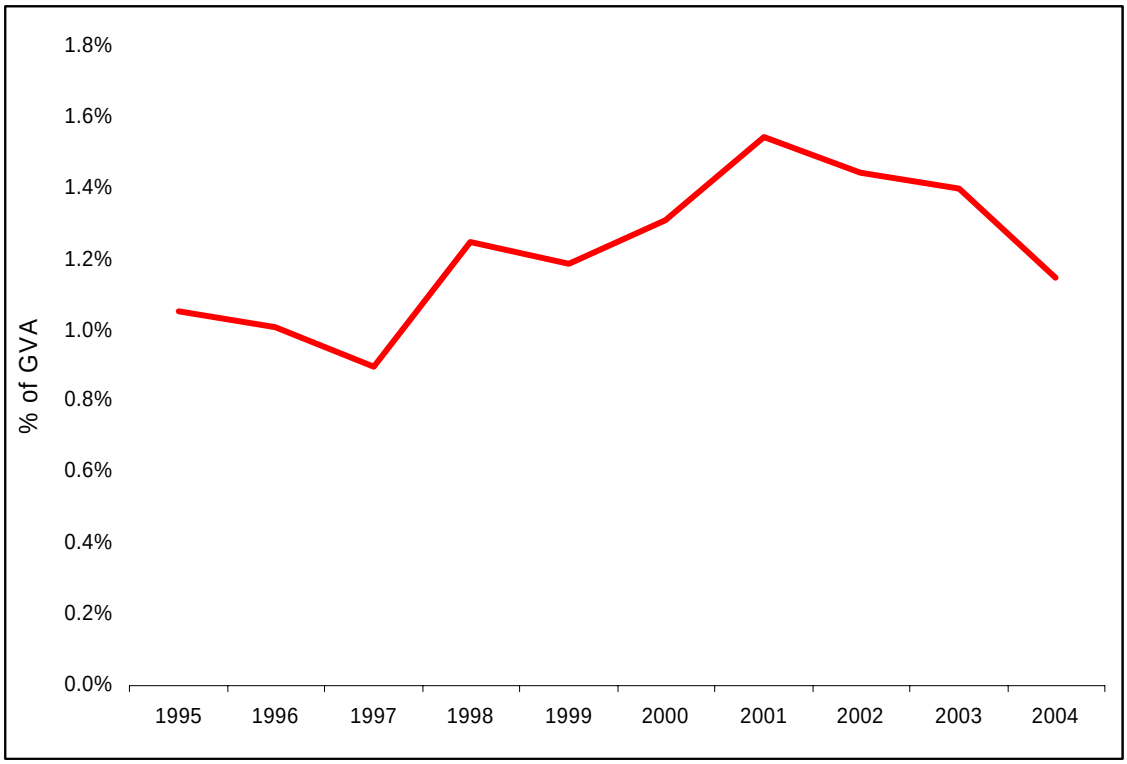


Source: Annual Business Inquiry (ONS)

In 2004 spending on research and development in the food, drink and tobacco manufacturing sector totalled £258 million, equal to 1.15 per cent of the total gross value added of the sector (see Chart 22). In 1995, expenditure on research and development equalled 1.05 per cent of total GVA in this sector.

Chart 22

Spending on research and development in food and drink manufacturing as a proportion of GVA



Source: ONS

Overseas trade

Recent years have seen a rise in imports and a fall in exports of food, feed and drink (see chart 23) and a consequential decline in self sufficiency (chart 24) back to the levels of the mid-1970s. Levels of overseas trade and self-sufficiency are broad indicator, not drivers, of the economic position of the UK farming and food industry, and its ability to supply the produce which UK consumers demand.

Chart 23

UK trade in food, feed and drink in real terms at 2004 prices

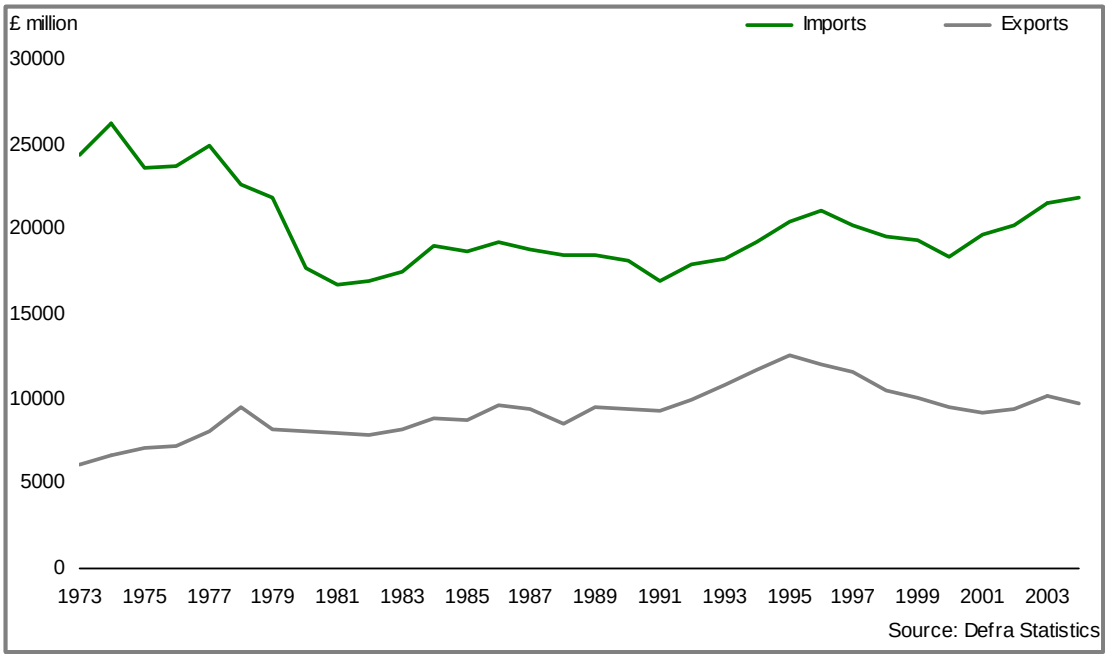
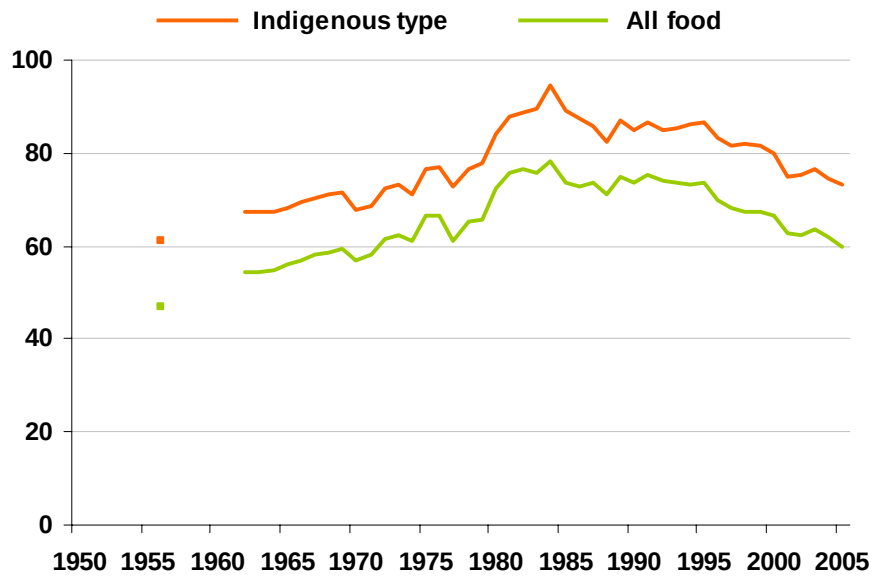


Chart 24

UK self-sufficiency in food as a percentage of all food and indigenous type food



Source: Defra

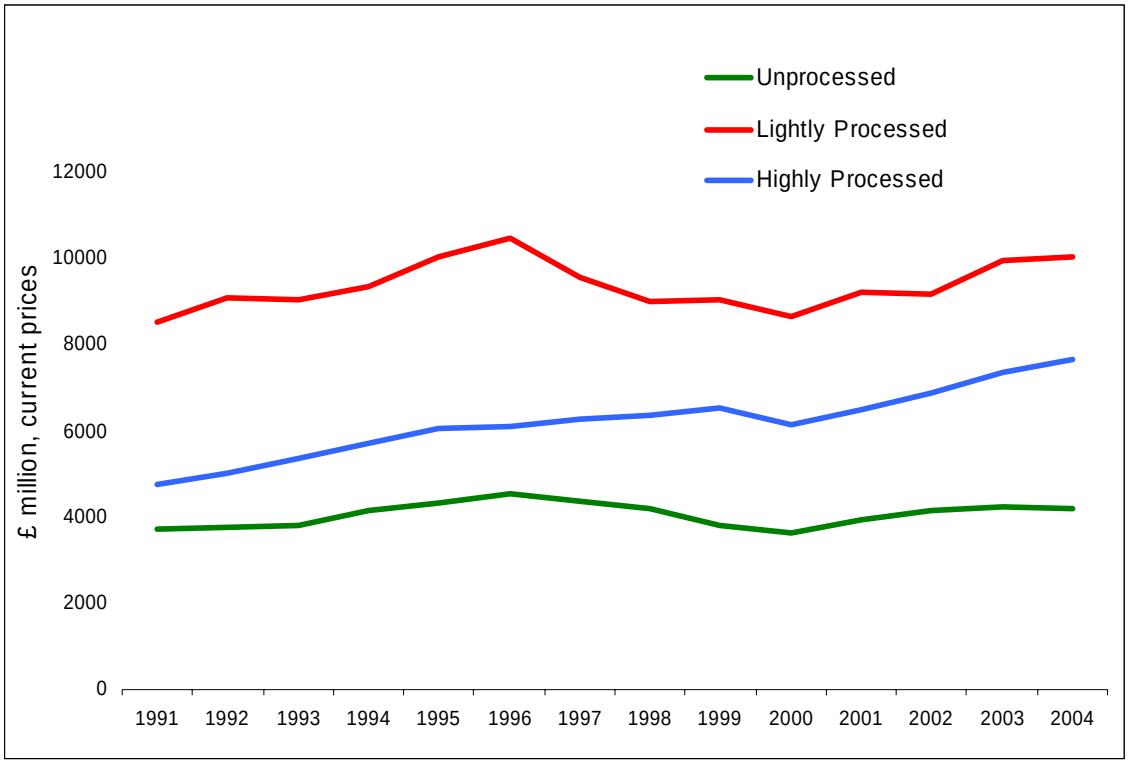
Food security is a legitimate concern, but food security should not be confused with self-sufficiency. Food security is about ensuring consumers have access to a stable and adequate supply of food; it is not about maximising domestic production. Open trading in the European single market and, increasingly, the world market, increases UK food security by unlocking

access to a diversity of supply sources. So if UK has a bad harvest, or animal disease breaks out price spikes and shortages are limited by increased sourcing of imported supplies.

Chart 25 below shows the pattern of imports of food, feed and drink by degree of processing. Lightly processed goods, such as meat, cheese and sugar are the highest value category, followed by highly processed goods, such as confectionary and alcoholic drinks. Unprocessed goods, such as fresh fruit and vegetables and unmilled cereals are the lowest value category. The value of imports of lightly processed food, feed and drink was just over £10 billion in 2004, an increase of 1.2 per cent on 2003, while the value of imports of highly processed goods increased by 4.5 per cent to £7.7 billion. The value of unprocessed goods fell by 1.7 per cent to £4.2 billion over the same period.

Chart 25

Imports of food, feed and drink by degree of processing

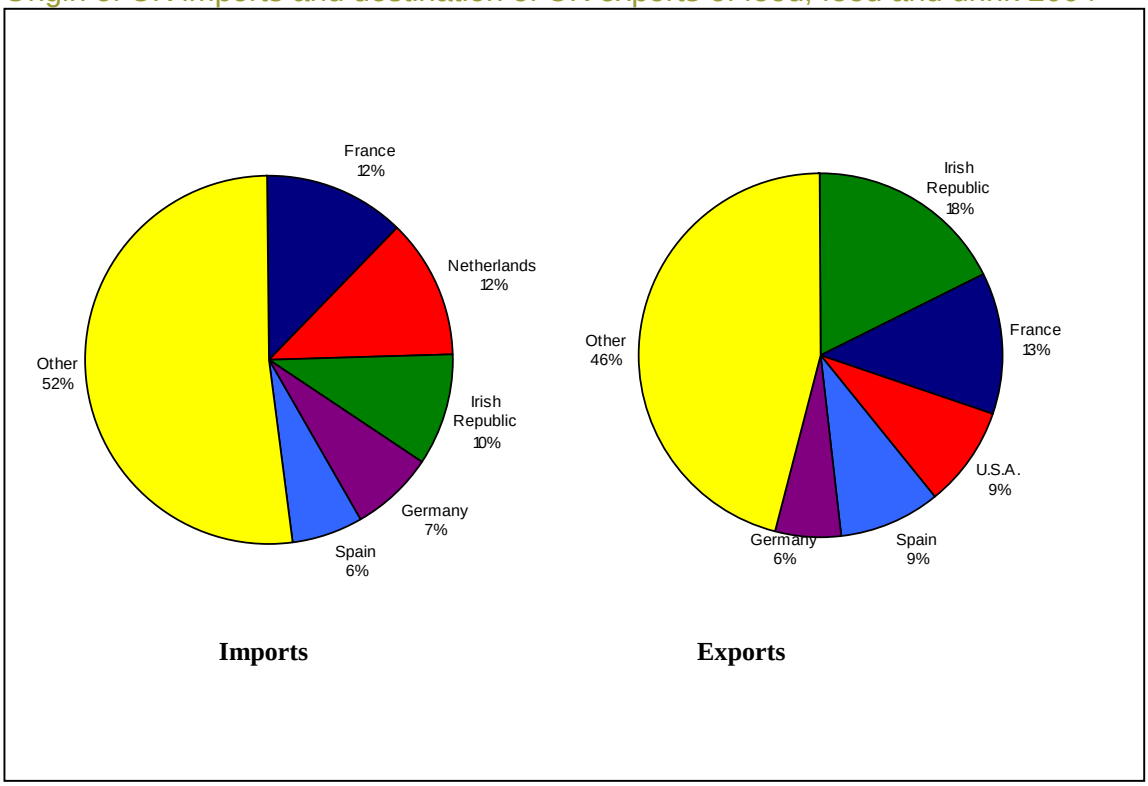


Source: Defra

Chart 26 shows a breakdown of the UK's trade partners in food, feed and drink in 2004. The main origins of imports of food, feed and drink to the United Kingdom were France (£2.72 billion), the Netherlands (£2.68 billion) and the Irish Republic (£2.17 billion). The principal origin of imports of food, feed and drink to the UK from outside the EU was the USA (£0.79 billion) accounting for almost 4 per cent of the total.

Chart 26

Origin of UK imports and destination of UK exports of food, feed and drink 2004



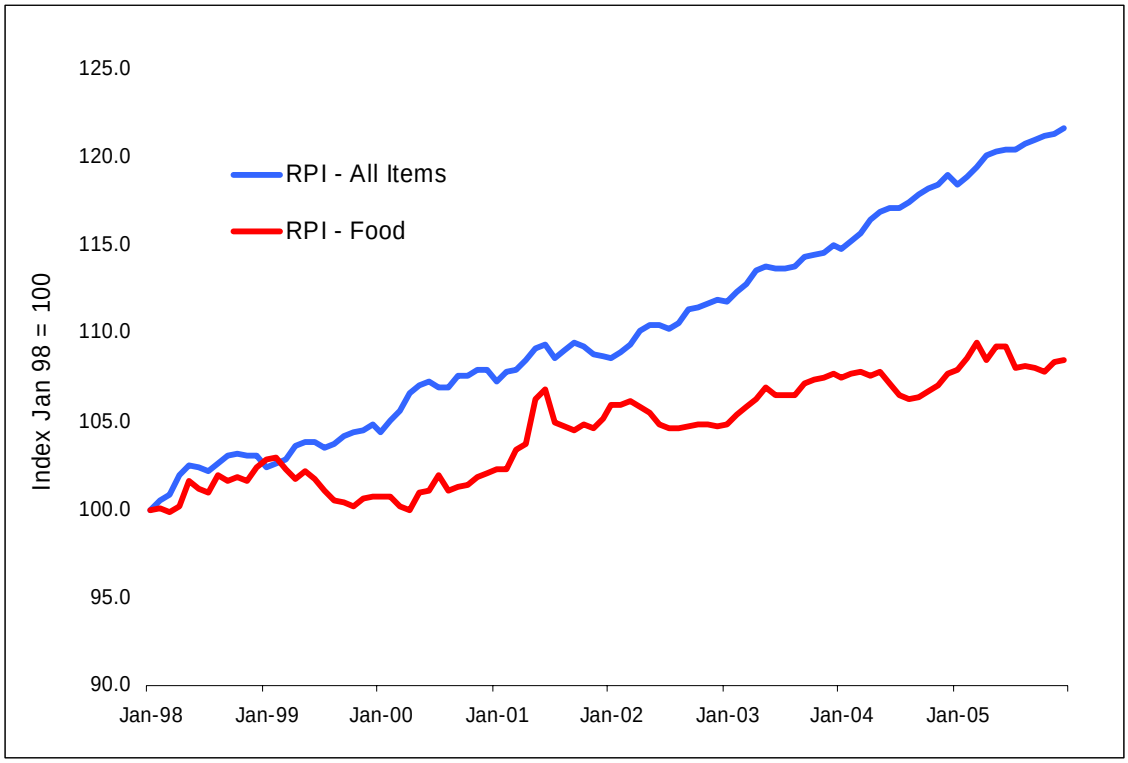
Source: Defra

The principal destinations of UK exports of food, feed and drink in 2004 were the Irish Republic (£1.72 billion) and France (£1.23 billion). The main destinations of UK exports outside the EU were the USA (£0.87 billion), Canada (£0.16 billion) and Japan (£0.16 billion).

Trends in productivity, consumer demand, overseas trade, exchange rates and wider economic factors shape trends in retail prices. The Retail Price Index (RPI) is a statistical measure of a weighted average of prices of a specified set of goods and services. It is used as an indicator of inflation, which is the percentage change in the index compared with the same month one year previously. The following chart compares retail prices for food with prices for all items.

Chart 27

Changes in retail price indices



Source: Retail Price Index (ONS)

Retail food prices were 0.8 per cent higher in December 2005 than in the same month in the previous year. The all items retail price index rose by 2.2 per cent over the same period. This is in line with long term trends that have seen the price of food decline in real terms. Since 1998 food prices have risen by only 8.5 per cent while prices of all items have increased by 21.7 per cent. Retail food prices were 11 per cent lower in real terms in December 2005 compared to January 1998.

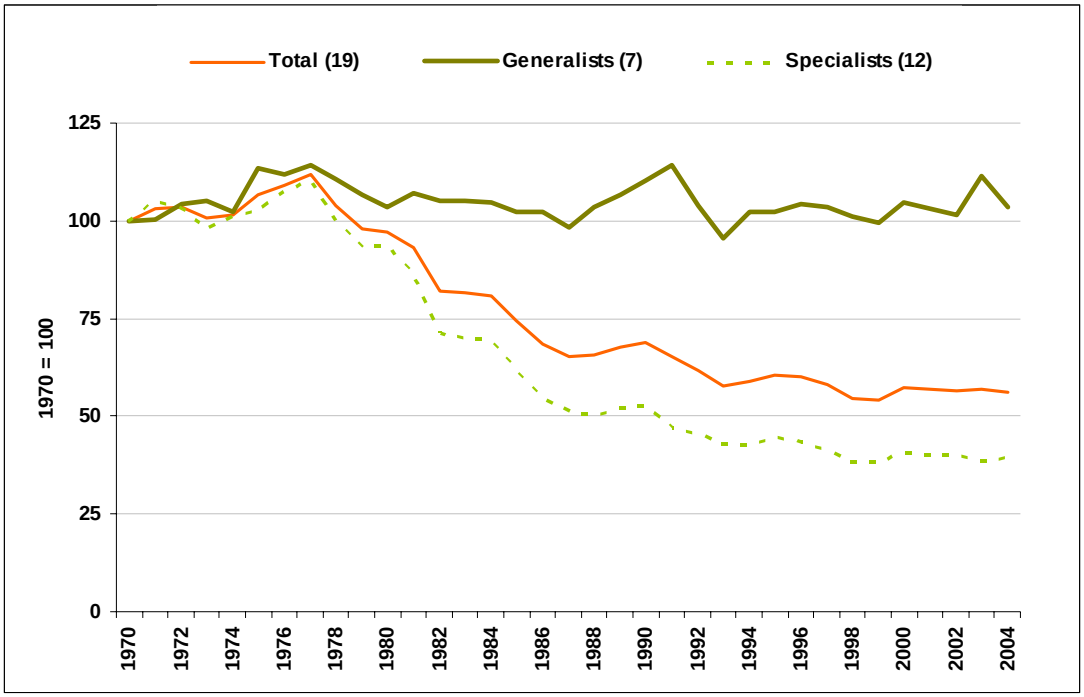
Environmental performance of farming and food

Farming activities carried out in an environmentally responsible manner will help support, maintain and enhance the diversity of the landscapes, habitats and food sources for farmland wildlife. Much of our flora and fauna have adapted to agricultural systems, the common names of wild species indicate their historic relationship with farming, such as corn crake, barn owl, hedge sparrow, field poppy, corn cockle and corn flower.

The population of farmland birds (see Chart 28) can be regarded as a good overarching indicator of the broad state of wildlife and the countryside since they have a wide habitat distribution and are near the top of the food chain. The combined populations of the 20 species included in the farmland bird index have declined by nearly a half between 1977 and 1993, though they have been relatively stable since then. A number of factors have contributed to the decline, including a loss of habitat diversity and quality caused by increased specialisation in farming, the change from spring to autumn sowing for cereals (with fewer stubble fields in winter), the loss of hedgerows and other uncropped habitats, and the use of pesticides.

Chart 28

UK Index of populations of farmland birds



Source: Defra, BTO and RSPB

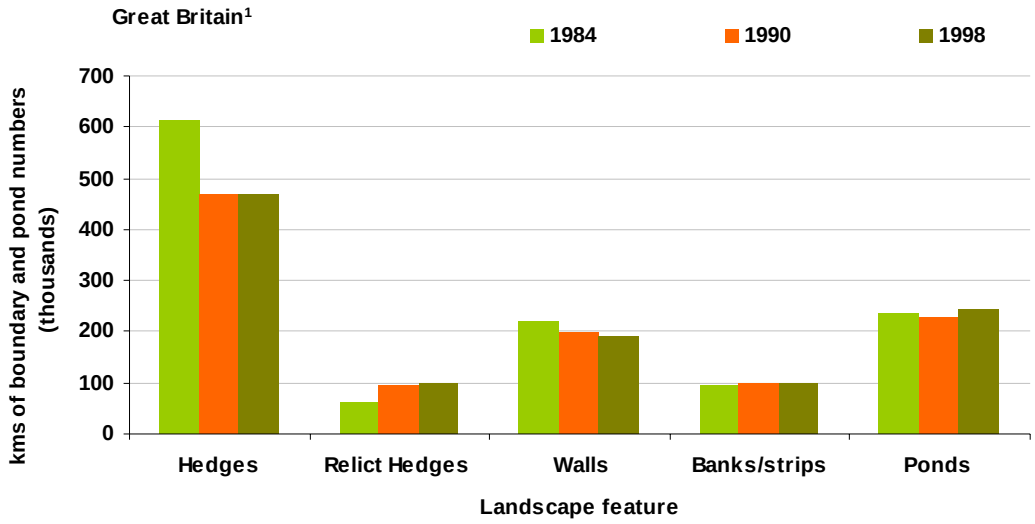
Landscape

The countryside has been shaped and managed by agriculture for several thousand years. Traditional farming methods together with climatic conditions and the underlying geology have produced distinctive and unique regional landscapes. These landscapes are the outcomes of the

interactions between farming and the environment, this includes amenity, cultural and recreation values. Local landscapes are shaped by natural landforms, local building materials, species and habitat types and land management practices. These have combined to create distinctive and unique character areas in the UK. Our ideas of landscape are rooted in history and local, regional and national cultures. National Parks and Areas of Outstanding Natural Beauty (AONB), National Scenic Areas in Scotland, are designated for various reasons including their landscape value. Countryside features – such as hedges, walls and ponds – are a valued part of the landscape, as well as providing valuable habitats. These landscape features have been on a downward trend because of their reduced cost-effectiveness in modern agriculture. Over the last ten years, however, this decline has been halted (see Chart 29). Nevertheless, the Countryside Survey 2000 showed that the condition of habitats in the wider countryside continues to decline.

Chart 29

Changes in characteristic countryside features: 1984-1998



[1] except hedges, which is England and Wales

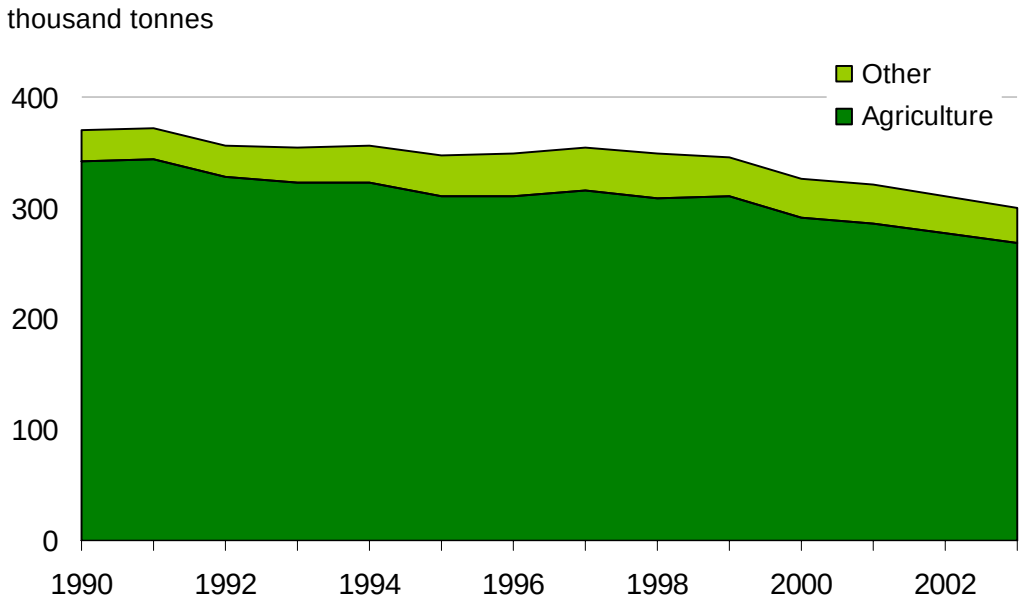
Source: Defra, lowland pond survey (1996), Countryside Survey (1990), Hedgerow Survey (1993), Countryside Survey (2000)

Air

Agriculture's emissions of greenhouse gasses are covered later in this paper. However, agriculture also has other environmental impacts upon the atmosphere. Agriculture is a major source of emissions of ammonia which can damage sensitive habitats. Ammonia is a source of nitrogen which can be deposited on, and enrich soils and habitats. This causes harm to some sensitive habitats of significant conservation importance: upland heaths; upland bogs and semi-natural grassland where the species adapted for growth with little nitrogen can be replaced with faster growing grasses. Chart 30 shows that ammonia emissions have fallen steadily over the last ten years, with farming now contributing 83% of ammonia emissions in the UK.

Chart 30

UK ammonia emissions by source 1990 to 2003



Water

Agriculture is also a material source of water pollution. Phosphate from manure and fertiliser leaks into rivers and lakes and this, together with phosphate in sediment from soil erosion, causes excessive algal growth in up to 200 freshwaters each year. Levels of both phosphate and nitrate increased between 1995 and 2000 although they have shown a gradual improvement in the last few years. However, in 2004 levels of nitrates (where agriculture is a major contributory source) have shown an increase. In 2004, agriculture accounted for 17% of the most serious (category 1 and 2) of water pollution incidents.

Chart 31 shows the lengths of rivers with nitrates levels over 30 mg NO_3 per litre. In Northern Ireland, Wales and Scotland these remain low, in England levels have fallen overall since 2000 (though 2004 shows an increase) reflecting the decrease in fertiliser use. Agriculture accounts for around 60% (ADAS report 2004) of the nitrate in rivers.

Chart 31

Per cent of river length with nitrate levels greater than 30mgNO_3 per litre

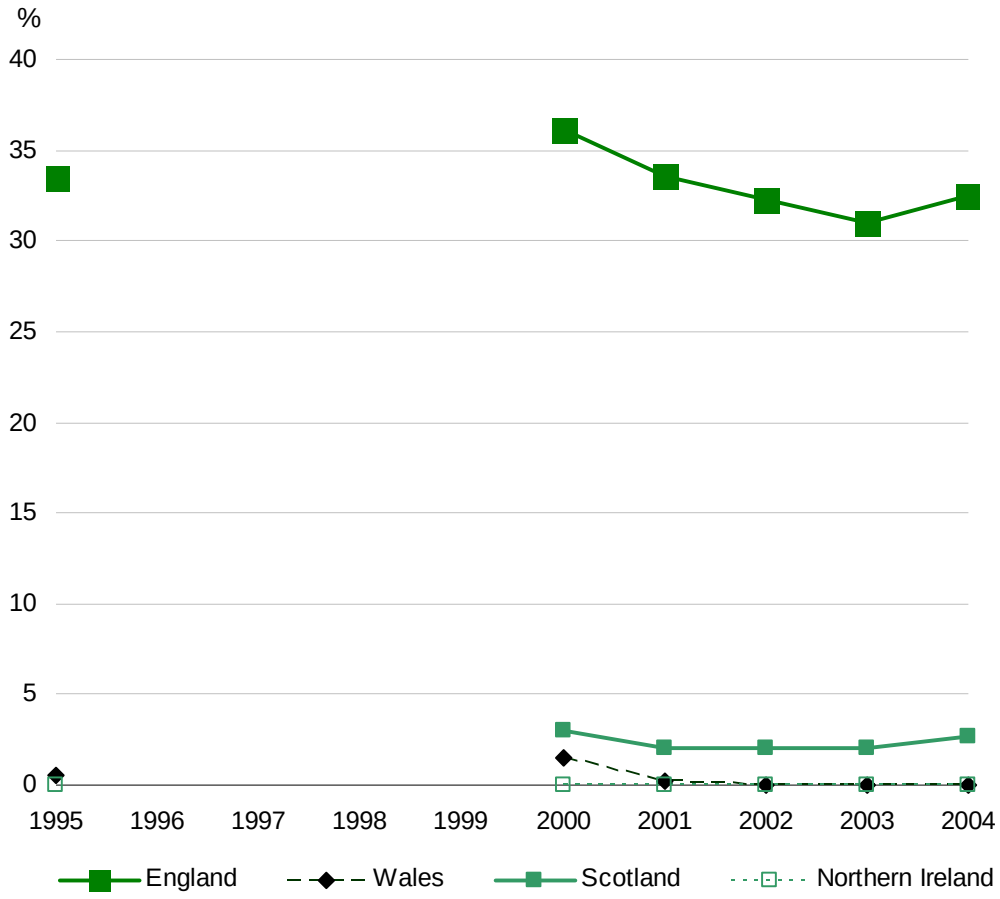
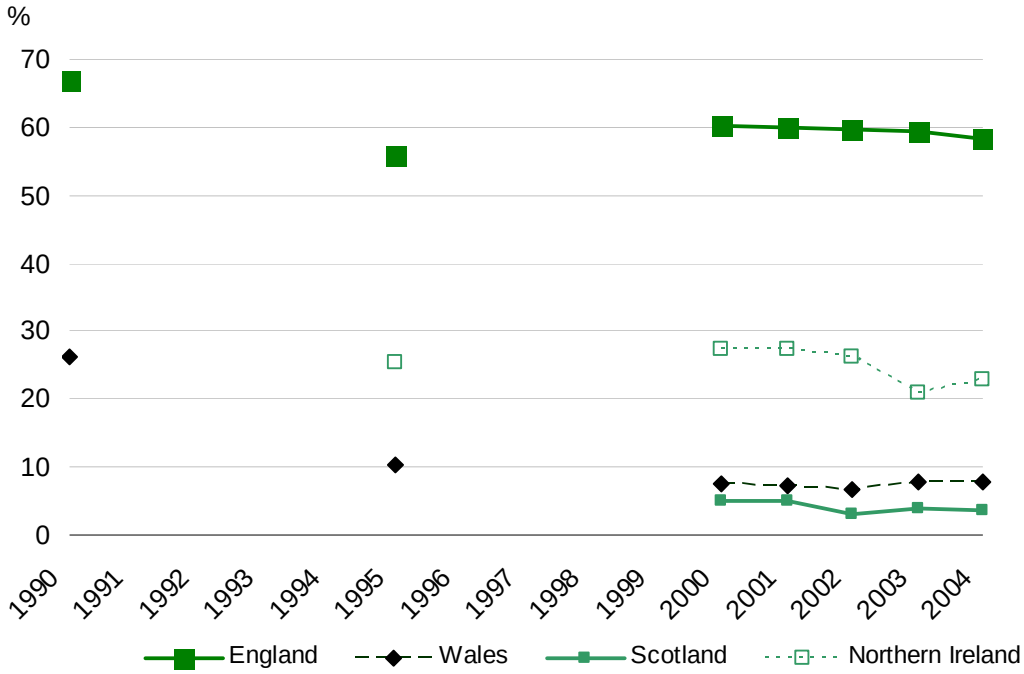


Chart 32 shows phosphate levels in rivers by country. High levels in freshwater can cause eutrophication, which affects the ecological balance of the water environment leading to excessive plant growth. Agriculture accounts for around 43 per cent (Morse 1993) of phosphates in river water.

Chart 32

Per cent of river length with phosphate levels greater than 0.1mg per litre



Habitats

By interacting with environmental factors such as soil type, climatic conditions and existing populations of flora and fauna, agriculture creates, maintains and supports semi-natural habitats, but can also damage them. Agricultural land use and other factors, such as recreational use, impact on habitats and species in a complex and diverse manner.

National Nature Reserves (NNR) are of national importance. Sites of Special Scientific Interest (SSSIs) and Areas of Special Scientific Interest (ASSIs) in Northern Ireland, protect and conserve the most important wildlife and geological sites in the UK. The Natura 2000 sites, Special Protection Areas (SPA), Special Areas of Conservation (SAC) and Ramsar (wetlands) sites are internationally important sites for species and habitats within the SSSIs and ASSIs. English Nature assesses the condition of SSSIs in England using categories agreed for the UK through the Joint Nature Conservation Committee (JNCC). The extent and condition of SSSIs varies across the English regions and between the different habitats (see chart 33). Bogs and upland heaths together account for over a third of the total SSSI area and two thirds of the area of SSSIs under agricultural management. They are particularly sensitive to overgrazing and burning, which causes changes in vegetation and physical damage to the land. As a result less than half of either bog or upland heath SSSI area is in a good condition. In general SSSIs in lowland areas are in a more favourable condition than those in upland areas.

Currently (September 2005) 68 per cent of SSSI land area in England is in a favourable or recovering condition, leaving 32 per cent in an unfavourable condition. However, of the agriculturally managed SSSI land area, 60 per cent is in a favourable or recovering condition, an improvement on the 55 per cent in 2004.

Chart 33

Condition of habitats on agriculturally managed SSSIs (England) 2005

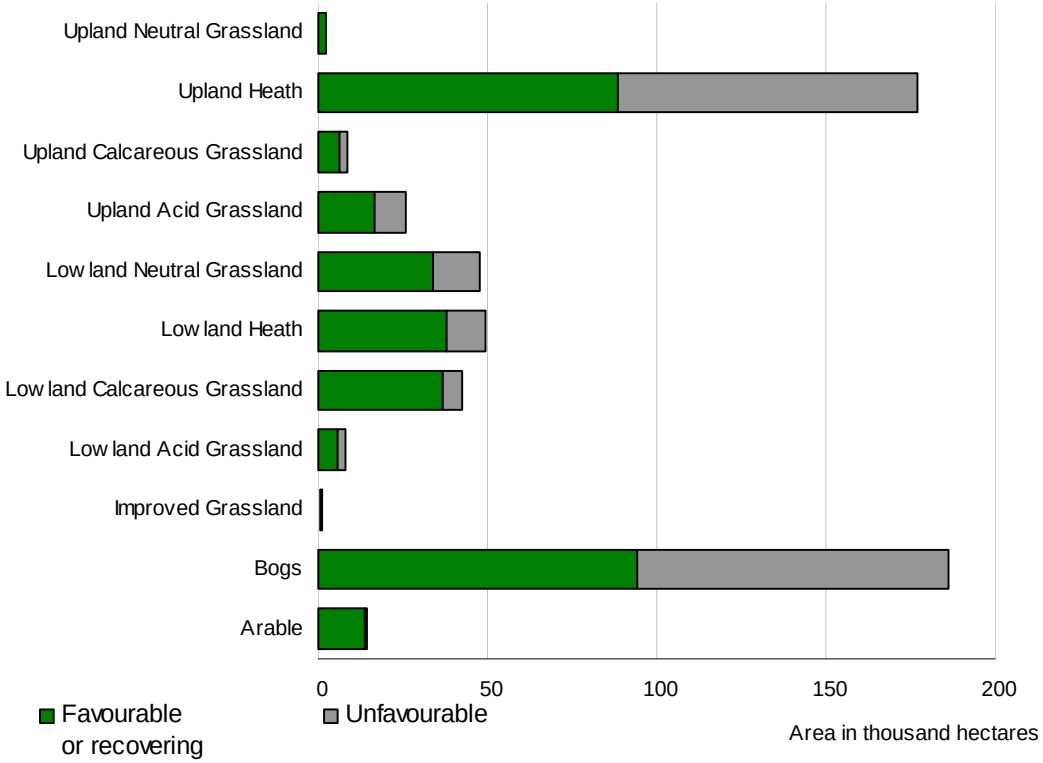
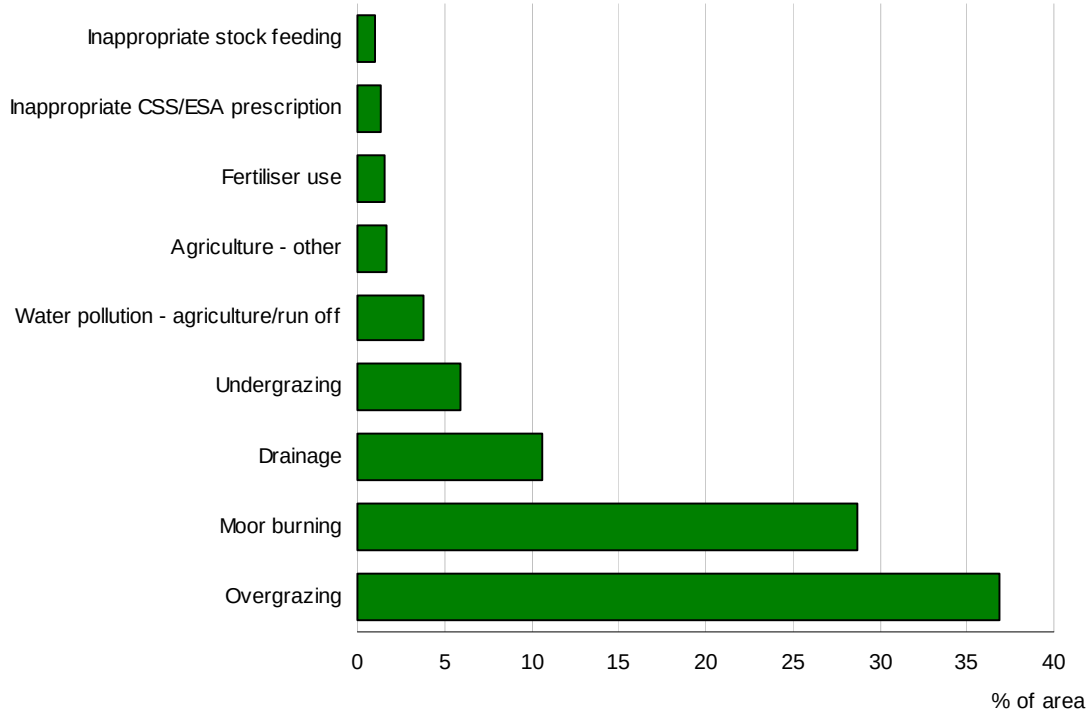


Chart 34 shows the major agricultural reasons for unfavourable conditions on all SSSIs in England. Across the whole series of SSSIs the main causes of unfavourable conditions include overgrazing, inappropriate moor burning, lack of scrub control, inappropriate forestry and woodland management and lack of appropriate ditch management. A large proportion of sites have damage by more than one factor.

Chart 34

Major agricultural reasons for unfavourable conditions on SSSIs (England) 2005



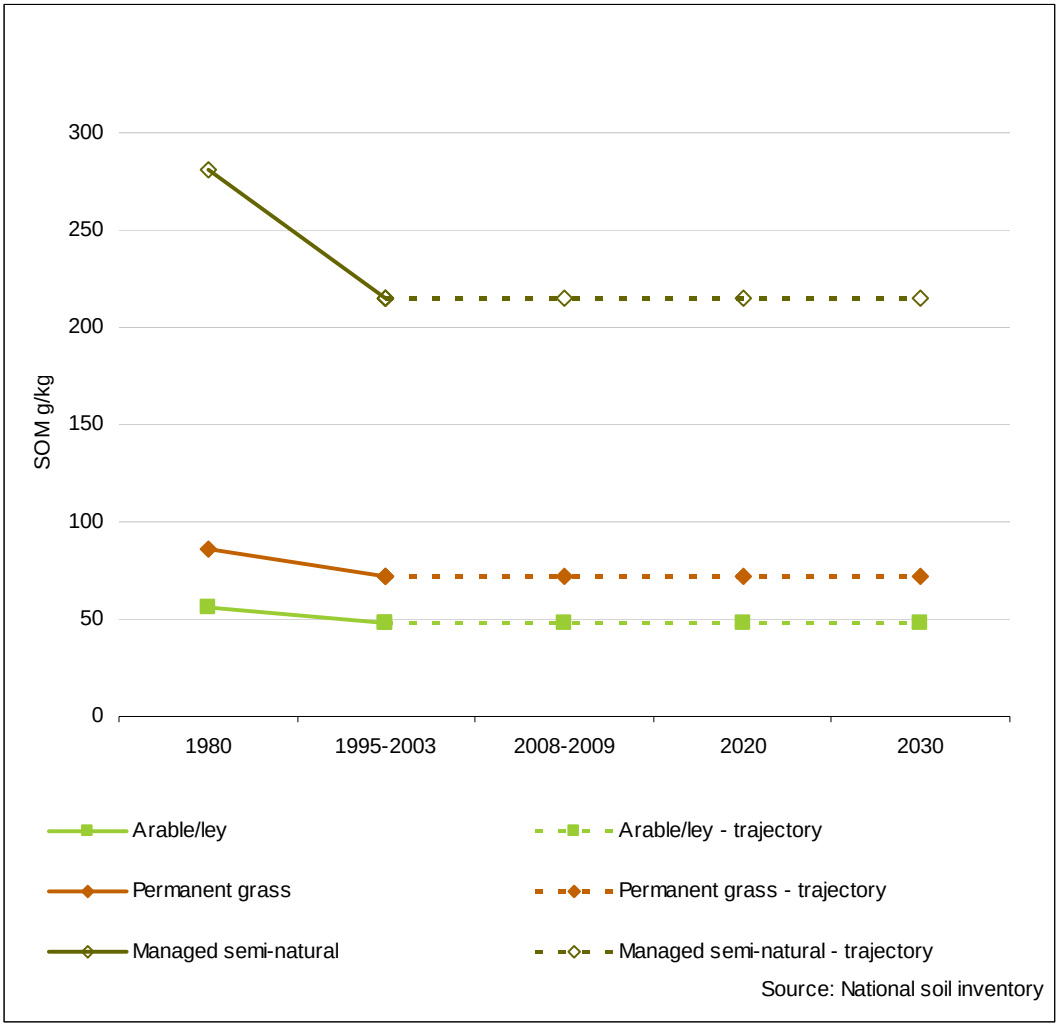
Soil

Soil is a finite and non-renewable natural resource that is essential for plant growth, providing support, nutrients and water. The biological, physical and chemical characteristics of soil need to be maintained or improved to the levels required to allow soils to perform particular functions, such as food and fibre production, and to ensure their resilience to the pressures acting an them, such as erosion by water. Soil provides a habitat for earthworms and other fauna, which are essential for nutrient cycling, maintaining structure and supporting wildlife. Agricultural practices have an important part to play in protecting and improving the soil and preventing its degradation due to loss of organic matter and its loss by erosion. The management of soil to ensure that it is in good condition is essential for sustainable farming.

The following chart shows the soil indicator chosen to monitor progress with the SFFS. The indicator shows the levels of soil organic matter (SOM) in agricultural topsoils: on arable; permanent grass and semi-natural land in England and Wales and is expressed as the grammes of SOM per kilogramme. Organic matter is important for soil fertility, stability and water retention and it should be noted that changes in soil organic matter are gradual.

Chart 35

Soil organic matter



From the chart it can be seen that there has been a reduction in organic matter in soils.
Since 1980 there has been an estimated average overall loss of soil organic matter of:

- 15% in arable and ley soils;
- 16% in soils under permanent grass;
- 23% in soils on agriculturally managed, semi-natural land.

The target for this indicator is to halt the decline of soil organic matter caused by agricultural practices in vulnerable soils by 2025, whilst maintaining, as a minimum, the soil organic matter of other agricultural soils, taking into account the impacts of climate change.

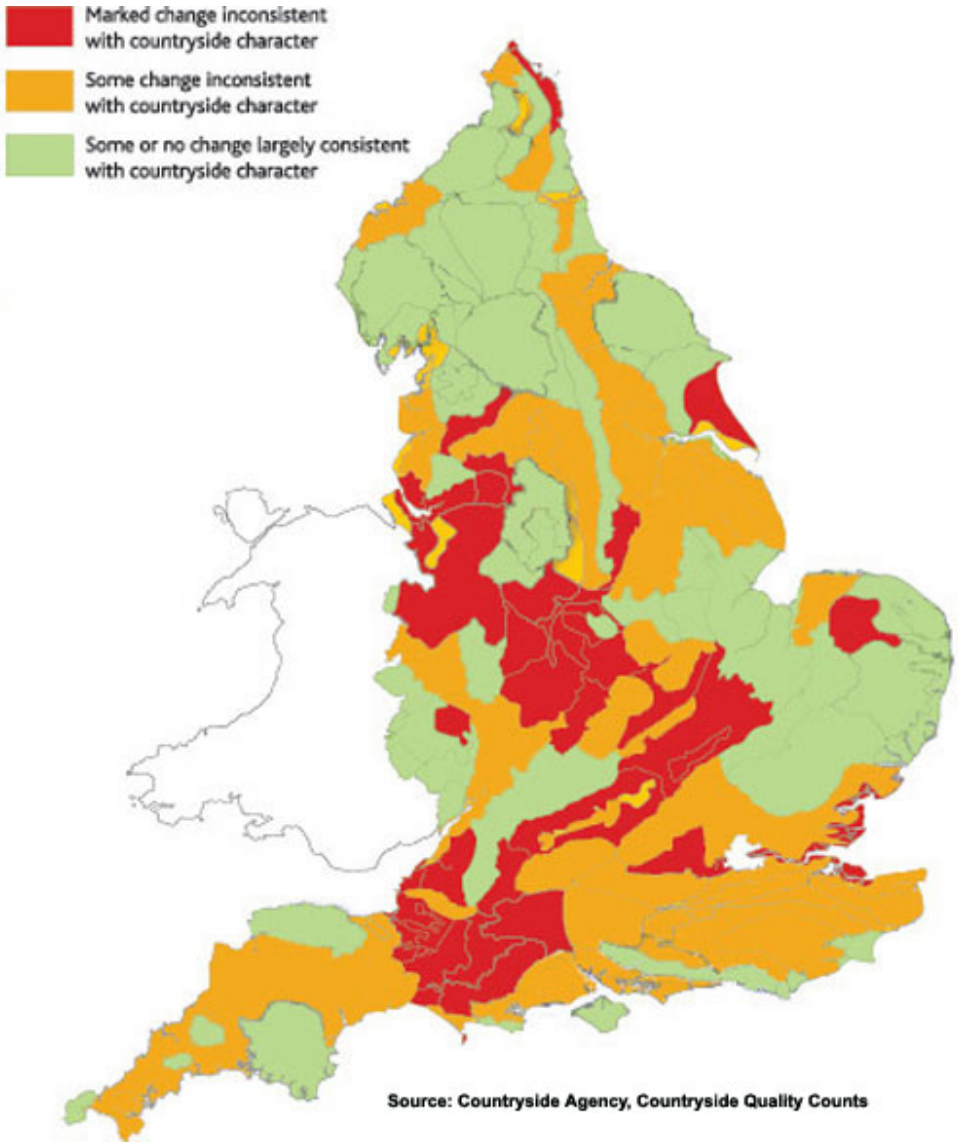
Landscape change

Chart 36 shows the effect of changes to the landscape between 1990 and 1998. It considers features which make up the landscapes within each Joint Character Area (JCA) and the effect that changes to the features or land use have had on the countryside. It shows:
- where changes have been mainly consistent with the character of the area;
- where changes have been inconsistent with the area;
- where changes have been markedly inconsistent with the countryside character of the area.

Of changes to land use or features in the Joint Character Areas:

- 40% of the areas were either stable or changes had been slight and consistent with the character of the area;
- 37% of the areas, the changes were inconsistent with the area ;
- 23% of the landscape areas, changes had been significantly inconsistent with the character.

Chart 36



Costs and benefits of UK agriculture's environmental impact

Putting a value on the various contributions of agriculture to environmental sustainability is more difficult, because the impacts are not directly valued in the market place. This means that estimates of costs and benefits have very broad margins of uncertainty. Chart 37 presents the findings from the most recent study carried out by eftec for Defra in 2004. It provides estimates of the value of agriculture's negative and positive impacts upon the environment (expressed as negative and positive valuations). The impact on air pollution (predominantly greenhouse gas emissions) is the greatest negative impact followed by water pollution. The positive valuations are provided by the provision of landscape, habitat and species.

Chart 37
Estimated monetary adjustments to agricultural accounts

(£million 2003, central estimates)

Impact category	Accounting adjustment		UK
Adjustments for Welfare Impacts on Society:			
I. Water	Water pollution arising from agricultural production	Inland	-£71
		Coastal	-£3 (E&W)
	Agricultural water abstraction		-£36 (E&W)
II. Air	Air pollution arising from agricultural production	Global	-£889
		Regional/Local	-£67
III. Soil	Soil erosion on-farm on future yields		
IV. Landscape	Landscape amenity services by the current provision of landscape (within the agricultural sector)		£488
V. Habitats and Species	Habitat and species protection services provided by current land-use (within the agricultural sector)		£225 (Eng) £307
VI. Waste	Waste pollution and disamenity arising from agricultural production		-£15
Adjustments for Impacts on Other Sectors:			
I. Water	Cost of water pollution clean up costs	Gov't	-£2
		Water Company	-£181
	Costs of flooding		-£153
III. Soil	Cost of off-site soil erosion		-£9

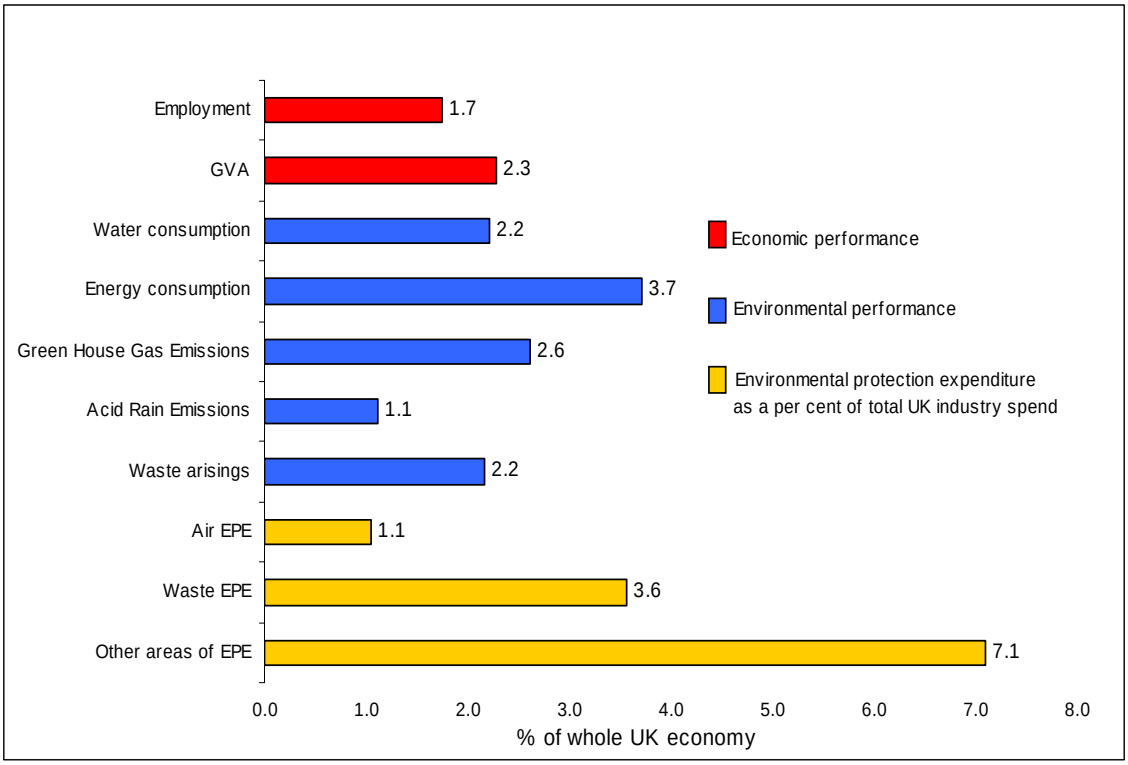
Source: eftec report for Defra 2004

Environmental performance of the wider food chain

The following chart compares the importance of the food, drink and tobacco manufacturing sector with the entire economy, considering economic performance, environmental performance and environmental protection expenditure.

Chart 38

Environmental protection expenditure in food, drink and tobacco manufacturing2 2003



Environmental Protection Expenditure by Industry Survey 2003 (Defra)

The sector is relatively energy intensive, accounting for 3.7 per cent of UK non-domestic energy consumption, but only 1.1 per cent of acid rain emissions. For water consumption, waste and greenhouse gas emissions its share is more in line with GVA. Environmental protection expenditure is defined as spending incurred where the primary aim is to reduce environmental pollution caused during normal operations. Food, drink and tobacco manufacturing rank amongst the primary spending sectors, accounting for approximately £410 million or 12 per cent of the total. The largest spending areas for the sector in 2003 were on water and solid waste.

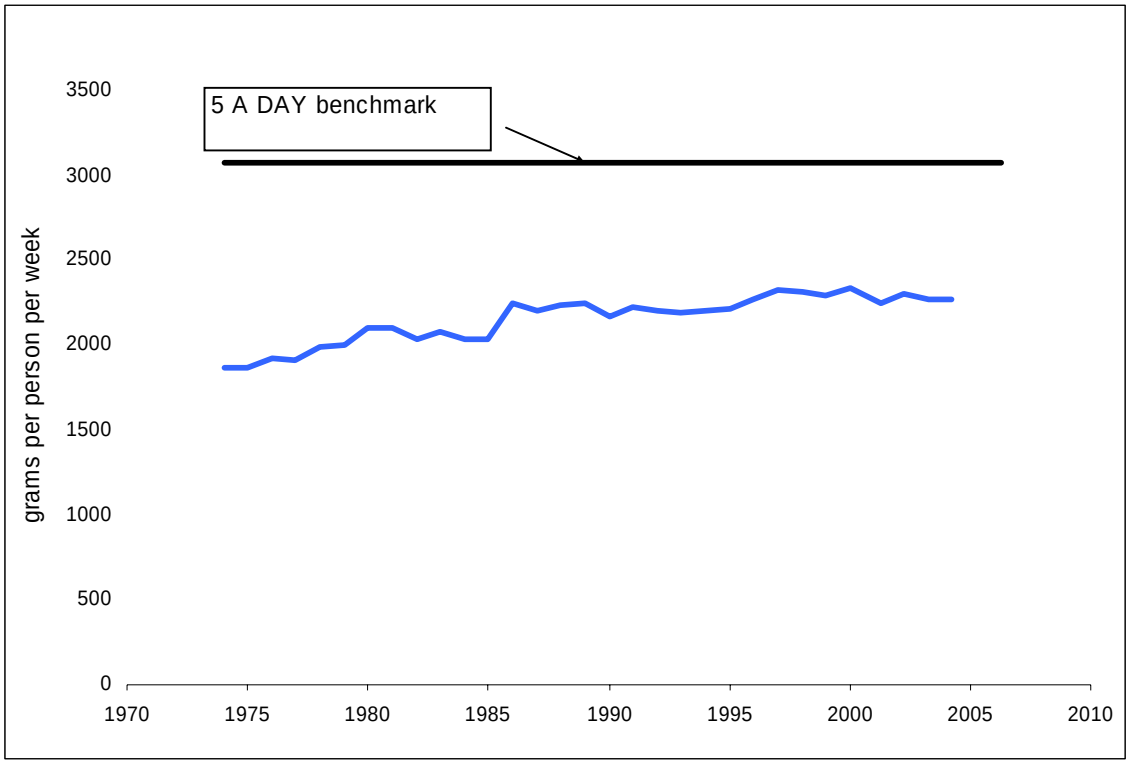
Sustainable Consumption and Production

Diet and nutrition

A strong driver for more sustainable food production is the link between food and health. The following charts show key diet and nutrition measures.

Chart 39

Household consumption of fruit and vegetables



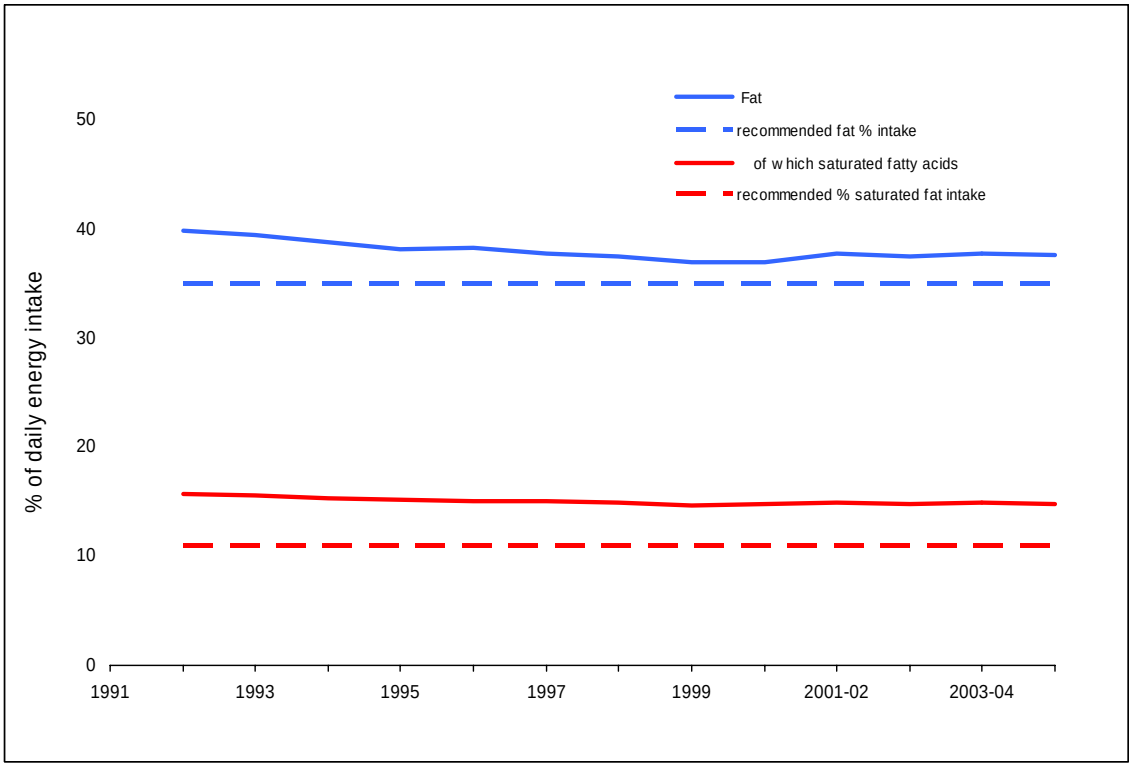
Source: Expenditure and Food Survey (Defra/ONS), National Food Survey up to 2000
Excluding potatoes

Quantities of purchases of fruit and vegetable have remained broadly level over the last 10 years. Assuming 80 grams per portion and allowing 10 per cent for wastage, 5 A DAY consumption of fruit and vegetables requires purchases of 3080 grams per person per week. Current purchases of fruit and vegetables are an average of 2274 grams per person per week. This is 74 per cent of the 5 A DAY target and equivalent to 3.7 portions per person per day. In 1974 purchases were 61% of this benchmark target, equivalent to 3.0 portions per day.

According to the Department of Health's 2004 Health Survey for England, adults aged 16 and over consumed an average of 3.5 portions per day. For both men and women the proportion who consumed more than 5 portions per day has increased between 2001 and 2004, rising from 22% to 24% for men and 25% to 27% for women.

Chart 40

Intakes of fat and saturated fatty acids as a percentage of food energy intake from household supplies

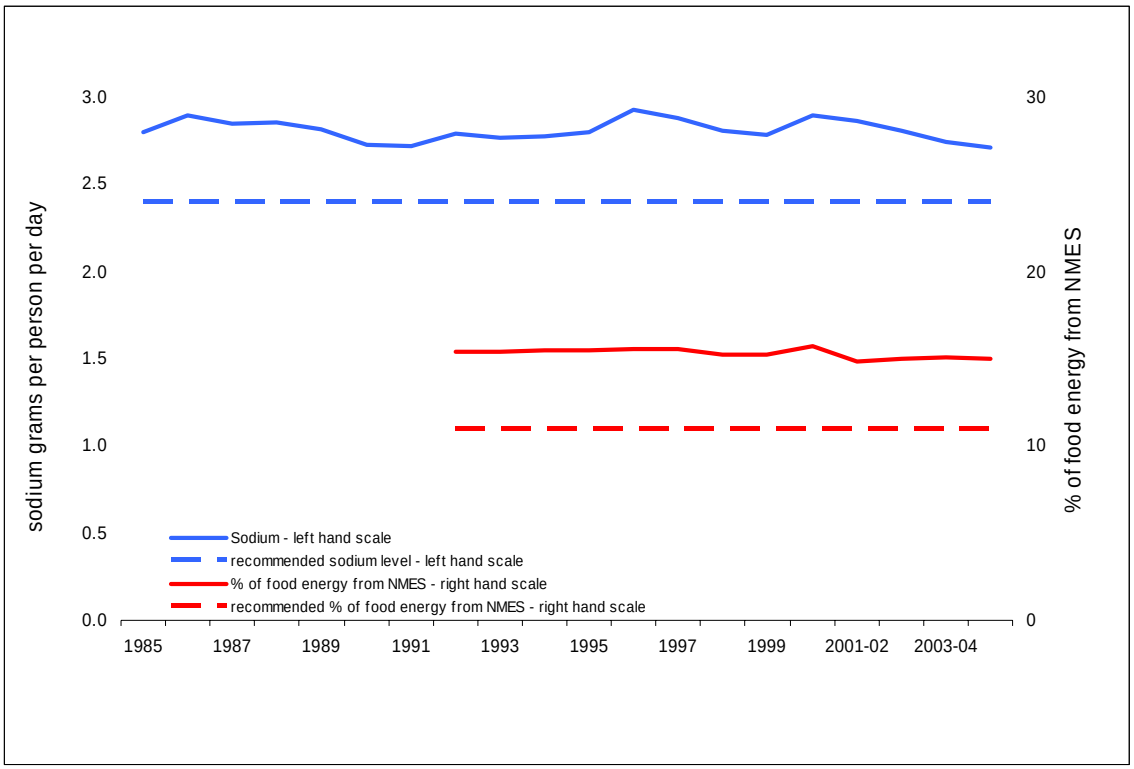


Source: Expenditure and Food Survey (Defra/ONS), National Food Survey up to 2000, 1991 recommendations of the committee on medical aspects of food and nutrition policy (COMA)

Intake by many people of fat and saturated fatty acids are above the recommended levels. The percentage of food energy intake obtained from fat in household food has been in decline from 38.8 per cent in 1994 to 36.9 per cent in 2000. It has been relatively stable since 2001-02 and is estimated to have contributed 37.6 per cent of food energy intake in 2004-05. The recommendation is that total fat should contribute no more than 35 per cent of food energy intake for the population on average. A decline is also seen in the percentage of food energy derived from saturated fatty acids in household food from 15.3 per cent in 1994 to 14.8 per cent in 2000. The percentage energy from saturated fatty acids has been relatively stable since 2001-02 and is estimated to have been 14.8 per cent in 2004-05. The recommendation is that saturated fatty acids should contribute no more than 11 per cent of food energy intake for the population on average.

Chart 41

Trends in intake of sodium and non-milk extrinsic sugars from household supplies



Source: Expenditure and Food Survey (Defra/ONS), National Food Survey up to 2000, 1991 recommendations of the committee on medical aspects of food and nutrition policy (COMA)

In 2004-05 15.0 per cent of food energy intake from household food was derived from non-milk extrinsic sugars, exceeding the COMA recommendation of 11 per cent. The percentage of food energy obtained from non-milk extrinsic sugars (mainly the sugars added during processing or at the table) in household supplies has been relatively stable since 1994. The intake of sodium from household food purchases has been stable since 1985, the earliest year for which data are available. Sodium from table salt is excluded because purchases of table salt aren't closely related to consumption. Sodium from eating out is also excluded. The estimate of sodium intake for 2004-05 is an average of 2.71 grams per person per day. Allowing 10 per cent for wastage, it reduces to an average of 2.44 grams per person per day but still exceeds the COMA recommendation equivalent to an intake of 2.4 grams of sodium per day.

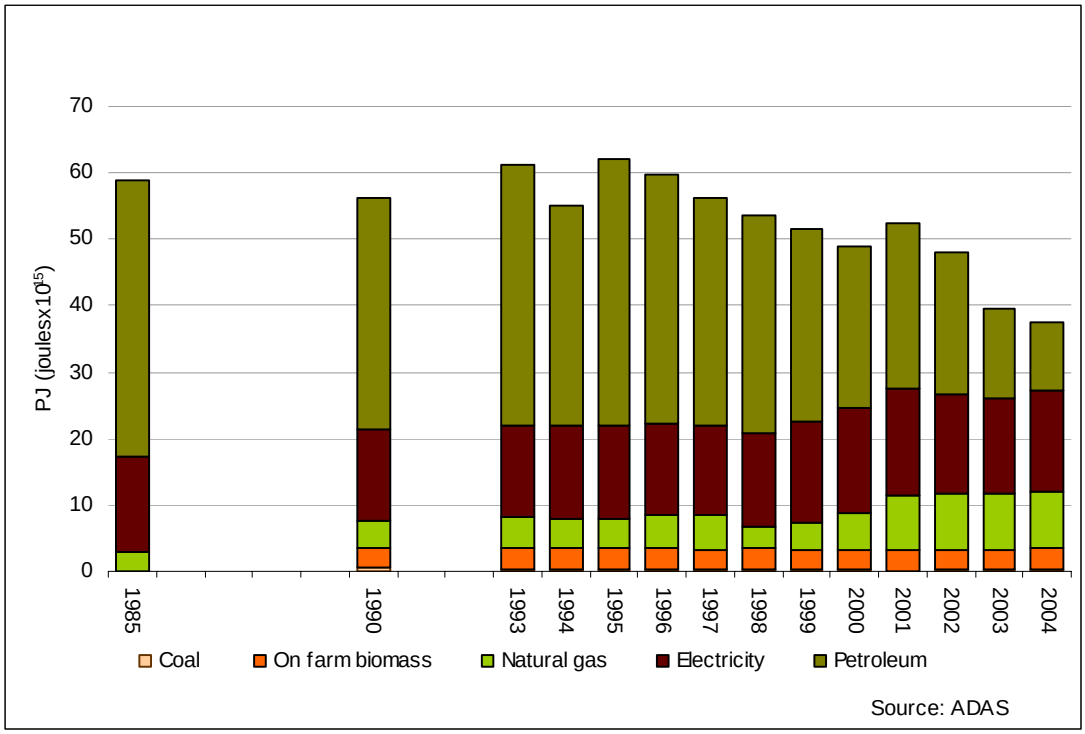
Resource efficiency

Resource efficiency is driven by technological developments which improve economic performance – as measured by productivity and described earlier in this paper – and reduce environmental impact. Energy use is an important element of this.

The following chart shows the energy used directly on farm. Petajoules (PJ: joules x1015) are used for comparison between different sources of energy.

Chart 42

Direct energy use

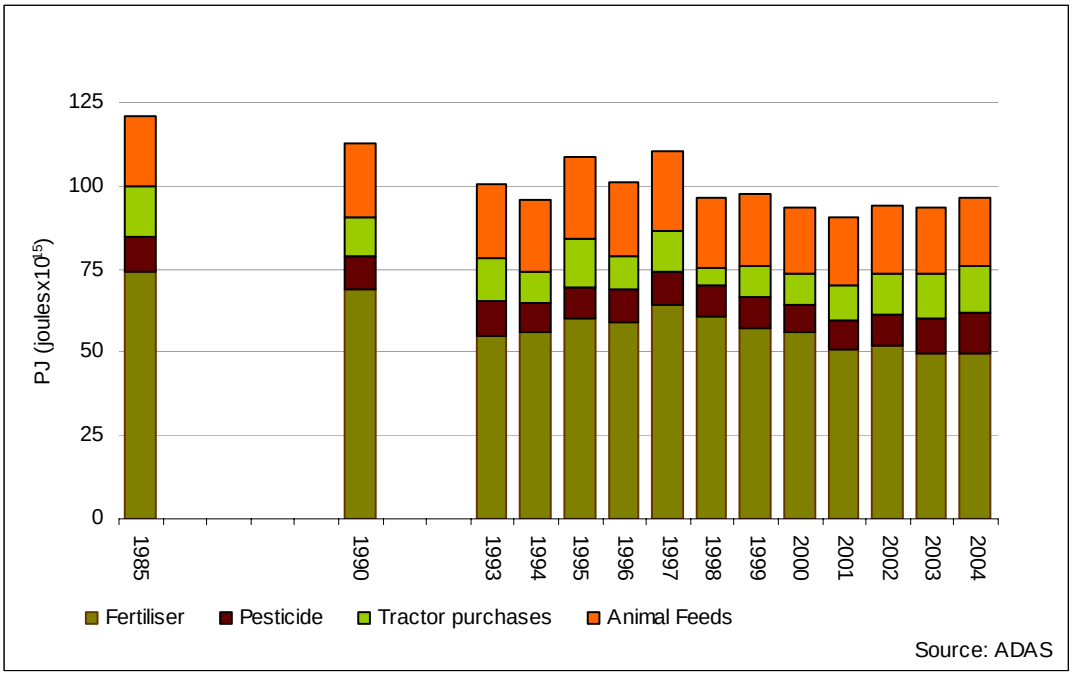


The chart shows that total direct energy has fallen by 40% since 1995. Petrol use has declined from 64% to 28% of the total direct energy used since 1995, and the use of electricity has increased from 23% of the total in 1995 to 40% in 2004.

Agriculture also uses a greater amount of energy through the inputs it uses. The following chart shows the energy used indirectly in agriculture, such as in the manufacturing of fertilisers, pesticides and animal feed.

Chart 43

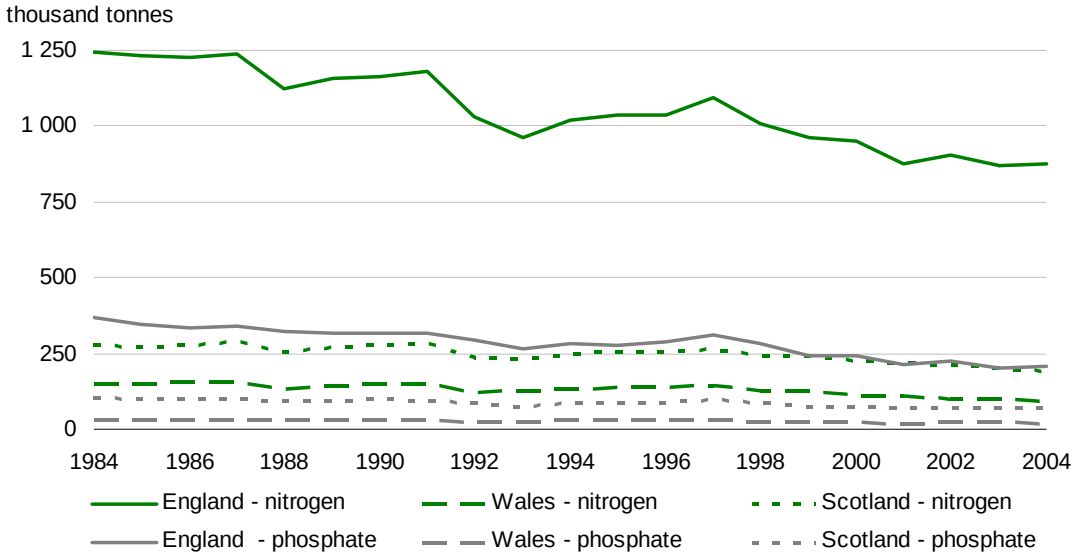
Indirect energy use



Total indirect energy use has fallen by 11% since 1995 and 20% since 1985. In 2004 fertilisers accounted for 51% of indirect energy use compared to 61% in 1985, reflecting in part energy efficiency savings and an overall decline in use (see following chart). In 2004 pesticides accounted for 13% of indirect energy use.

Chart 44

Nitrogen (N_2) & Phosphate (P_2O_5) fertiliser use in the GB 1984 to 2004

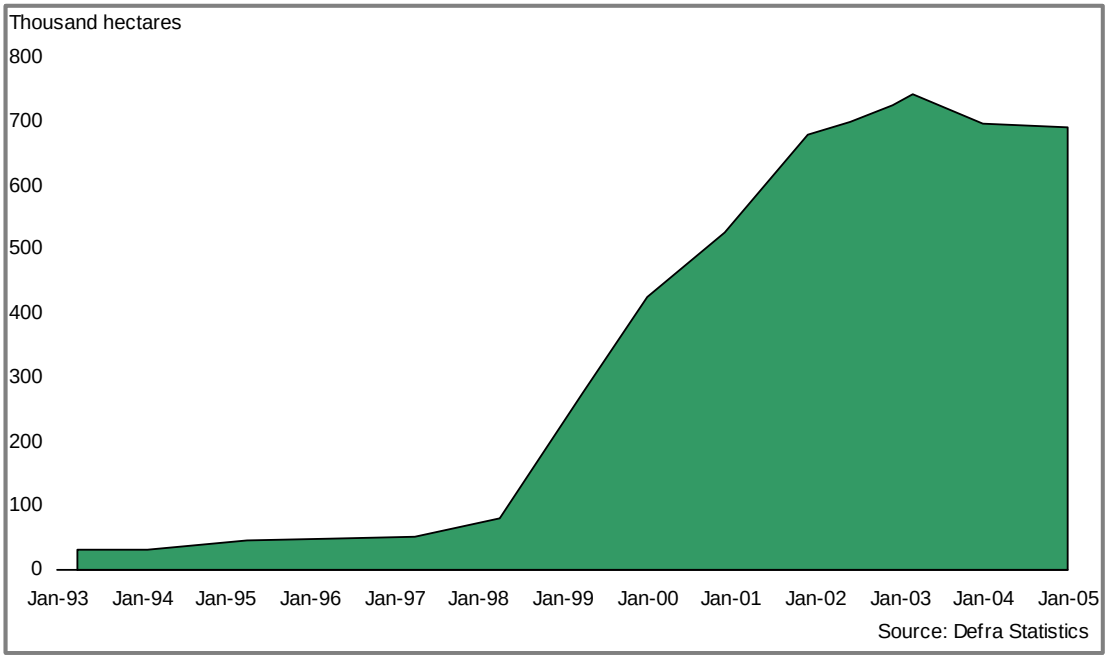


Fertiliser use, shows a gradual decline in fertiliser use in Great Britain. Fertiliser is applied at a higher rate on arable land than grass land. The fall in fertiliser use is mainly due to a reduction in application rates on grass, where the rate has fallen by a third over 10 years.

It is recognised that further evidence is required on the contribution of organic farming to the sustainable production and consumption discussion, recognising that whilst resource use is lower then so is the volume of production. The following chart illustrates the trend in organically managed land since 1993.

Chart 45

UK organically managed land 1993 to 2004



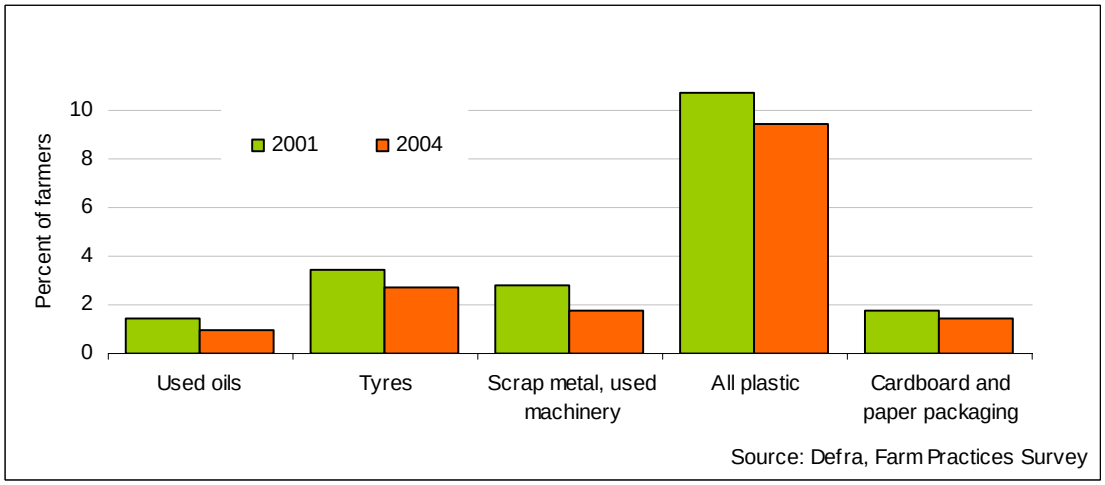
The total area of land that was organically managed, that is either fully organic or in-conversion, fell by 0.8 per cent between January 2004 and January 2005, peaking in March 2003 at 741 thousand hectares, after several years of very notable increases. The late 1990s and early 2000s saw increases in the area of organically managed land for a variety of reasons. Significant factors operating during this period were: farmers seeking alternatives to conventional farming in response to falling farm incomes; the scope of organic farming being extended by the European Union to include livestock production in July 1999; and payment rates under organic farming support schemes being substantially increased. Permanent and temporary pasture accounted for 85 per cent of fully organic or in-conversion land in the United Kingdom. The remainder was made up of cereals and other crops, vegetables including potatoes and set-aside, woodland and other uses.

Waste

An estimated half a million tonnes of waste is produced by agriculture each year, this excludes organic material such as slurry/manure, crop residues etc. when beneficially re-used on farm. The largest components are animal health products, agrochemicals and plastics.
The 2004 report of Defra's Farm Practices Survey (England) shows a general reduction in recycling plastic since the previous survey in 2001. The numbers of farmers taking any waste to land fill sites has fallen from 13.7% in 2001 to 12.3% in 2004 (see chart below). Burning continues to be the main way to dispose of waste, especially for plastics and packaging. In many cases nearly 50 per cent of farmers burn these (except plastic crop cover) in the open or use drum incinerators. The full reports can be found on the Defra website at: http://statistics.defra.gov.uk/esg/publications/fps/fpsreport.pdf.

Chart 46

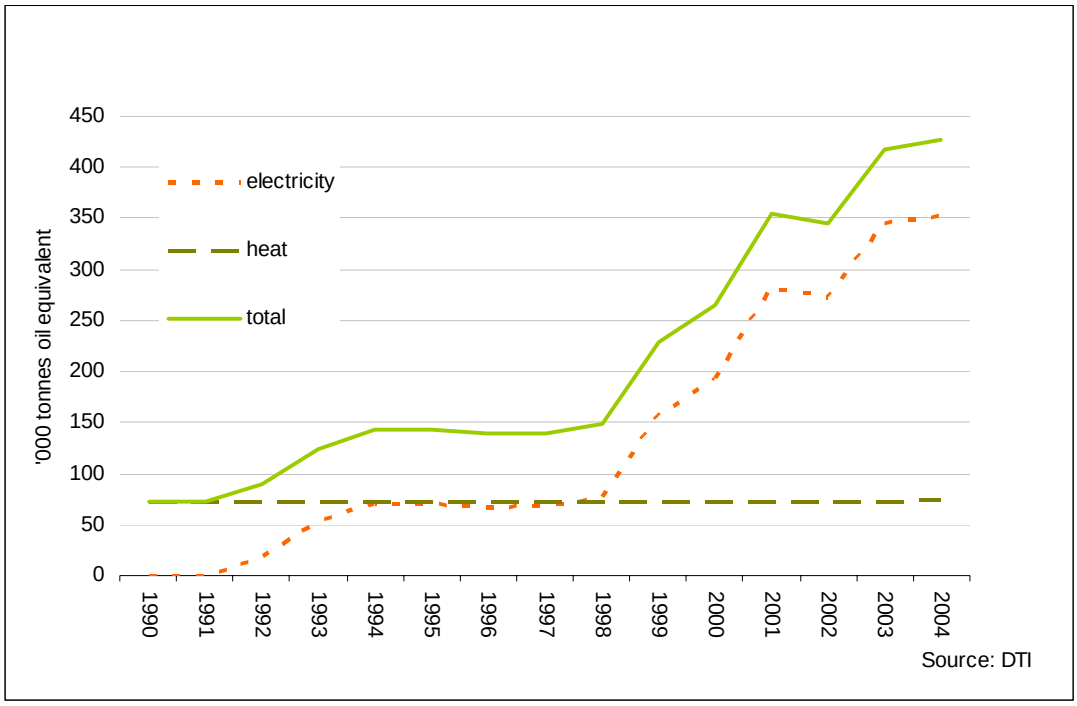
Farm waste sent to landfill



Better use of farm waste also contributes to more sustainable production. As well as slurry and manure being used to fertilise the land, other organic material, such as straw and poultry manure, is now being used as a source of energy, both for heat and power on farm and increasingly for electricity generation. The following chart shows the electricity generated from farm waste and biomass, and the heat generated on farm by burning straw, in thousands tonnes of oil equivalent (TOE).

Chart 47

Energy generated from biomass & farm waste



On farm generation of heat has remained fairly level since 1990, but the generation of electricity from farm waste and biomass has increased by around 400% to 353,000 TOE over the last 10 years.

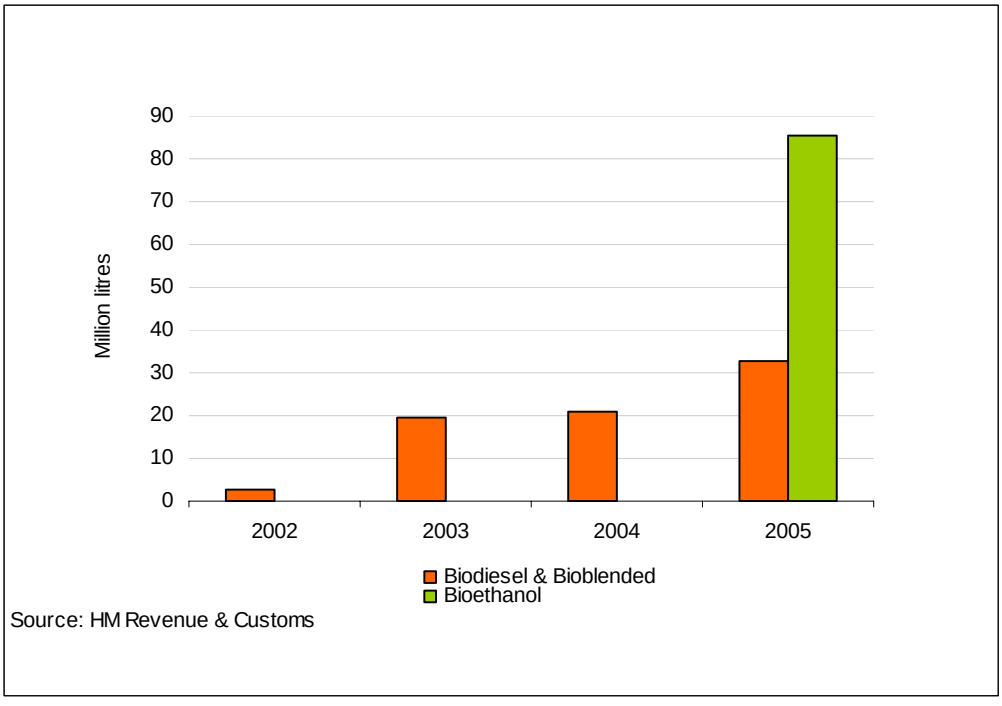
Non-food crops

Energy crops are carbon neutral and when used as a substitute for fossil fuels, reduce greenhouse gas emissions and increase renewable energy generation. These include crops of miscanthus and short rotational coppice of willow or poplar. To date (up to 2005), 1,142 ha of short rotational coppice and 1423 ha of miscanthus has been planted under the Energy Crops Scheme.

Oilseed rape can be used for the production of biodiesel, whilst wheat and sugarbeet can be used to produce bioethanol and biobutanol, all substituting for fossil fuels and offering significant carbon savings. Chart 46 shows volumes of biodiesel and bioethanol released for UK consumption.

Chart 48

UK consumption of biofuels



Source: HM Revenue & Customs

Oilseed rape is the main crop which has been planted under the Non-Food Crops Scheme and the Energy Aid Scheme accounting for 90 and 99% of the crop area respectively in 2005 or almost 110,000 ha in total. These figures do not include crops grown on non set aside land and used industrially. After oil extraction some of the remaining by-product can be used for animal feed or burnt to generate heat and power. In 2004 the total value of non-food crops grown under the Non-food crops and Energy Aid schemes was approximately £35 million. Oilseed Rape accounted for 93% of this value.

Plant based oils can be used to produce biolubricants which reduce environmental impacts associated with their uses. Plant based lubricants typically exhibit much faster rates of biodegradation than traditional mineral oils ie days rather than years and have a lower ecotoxicity classification. Chain bar lubricants derived from plant oils have been used successfully by the Environment Agency since 1997 and more recently by the Forestry Commission. A range of polymers/plastics, solvents and surfactants can also be derived from plant oils.

Wheat is being used to produce starch. In 2002 UK production of wheat starch was 48,000 tonnes, 75-80% of which was used for industrial purposes in papermaking, glues and plastics. Wheat starch can also be extruded into many packaging material forms that is biodegradable and can be recycled with cardboard.

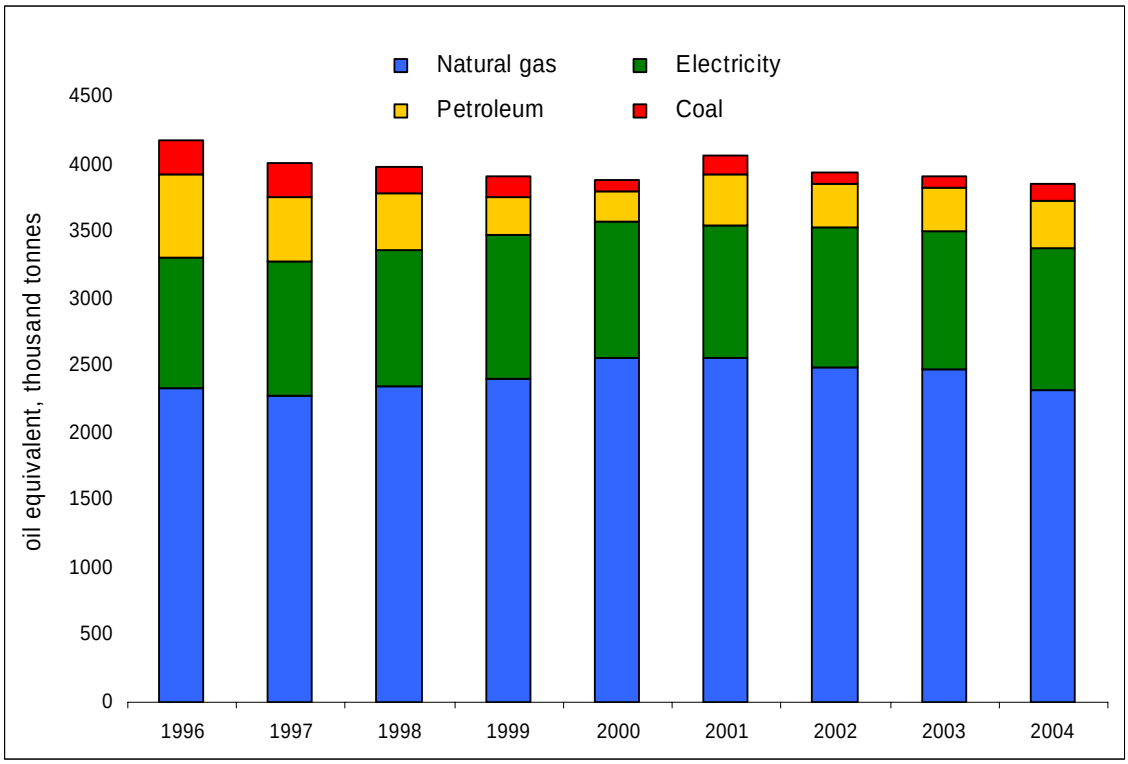
Flax and hemp have been grown in comparatively small amounts for fibre with end uses in matting, composites in the automotive sector and also insulation materials; other fibre crops have potential uses in the board and paper industry. Other non food crops include those for pharmaceutical and healthcare uses.

Energy use in food manufacturing

Looking at the food chain beyond the farm gate, the following chart shows trends in energy consumption by the food manufacturing sector.

Chart 49

Energy consumption in food, drink and tobacco manufacturing by type



Source: Digest of United Kingdom Energy Statistics (DTI)

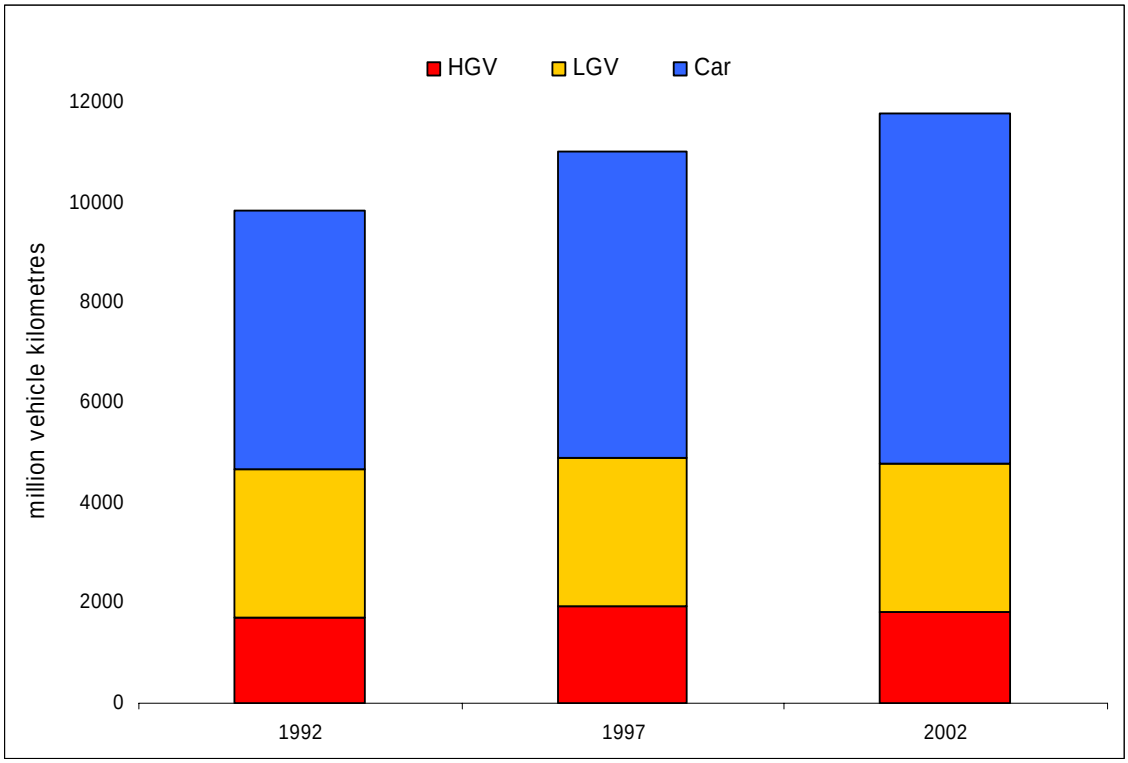
Energy consumption in the food, drink and tobacco manufacturing industry totalled 3.85 million tonnes of oil equivalent in 2004, down 1.6 per cent on 2003. Since 1996, energy consumption has decreased by 328,000 tonnes of oil equivalent, a fall of 7.9 per cent partly due to productivity gains over this period. This decrease is mainly due to declining petroleum and coal consumption with reductions of 44 per cent and 49 per cent respectively since 1996. Usage of electricity has increased by 9 per cent over the same period, while usage of natural gas has decreased by 1 per cent. Natural gas is the main energy resource, accounting for 60 per cent of total energy consumption in 2004, followed by electricity with 28 per cent. Petroleum and coal provide 9 per cent and 3 per cent of total energy consumption respectively.

Transport of food

The transport of food is relevant in the debate on sustainable consumption and production. The issue is complex and that a range of factors have an effect on the overall impacts of food transport, not purely the distance travelled by individual products. Also transport and trade of food has the potential to lead to economic and social benefits, for example, through economic gains for both developed and developing countries, reduced prices for consumers and increased consumer choice

Chart 50

Food transport on urban roads

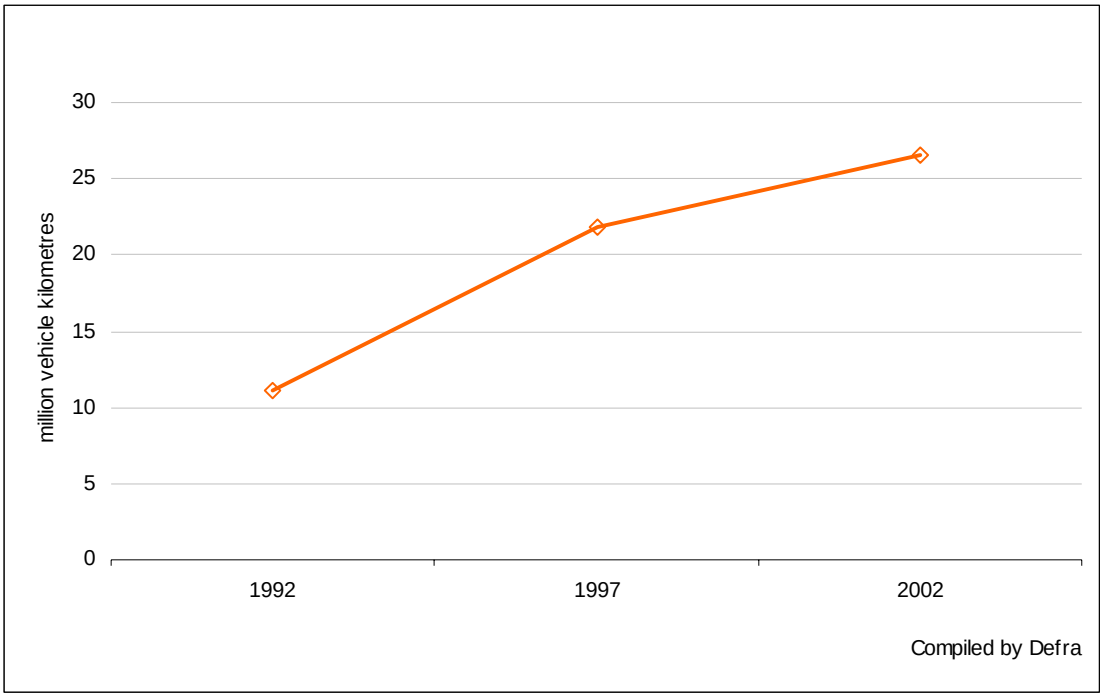


Source: The Validity of Food Miles as an Indicator of Sustainable Development, a report by AEA Technology Environment commissioned by Defra

Over the last 50 years, there have been dramatic changes in the UK food production and supply chain. The main changes have been: a globalisation of the food industry with an increase in trade; a concentration of the food supply base; changes in delivery patterns and a change from local to supermarket shopping. The food miles report states that 'urban food kilometres account for most of the accident and congestion costs'. The above chart shows that there was a 20 per cent increase in vehicle kilometres transporting food in urban areas between 1992 and 2002, 7 per cent from 1997 to 2002. Food vehicle kilometres by cars in urban areas have increased by 35 per cent over 10 years, reflecting changes in shopping patterns and an increase in usage of cars. Food vehicle kilometres by heavy goods vehicles in urban areas increased by 8 per cent over the 10 year period but decreased by 5 per cent between 1997 and 2002. LGV estimates are all based on data for 1992.

The following chart shows the trend in transport of food by air. Air freighting of food doubled between 1992 and 1997 and rose a further 21% from 1997 to 2002. Whilst air freighting of food accounts for only 1% of food transport, it produces 11% of the food transport CO_2 equivalent emissions.

Chart 51
Food transport by air



Climate Change and Agriculture

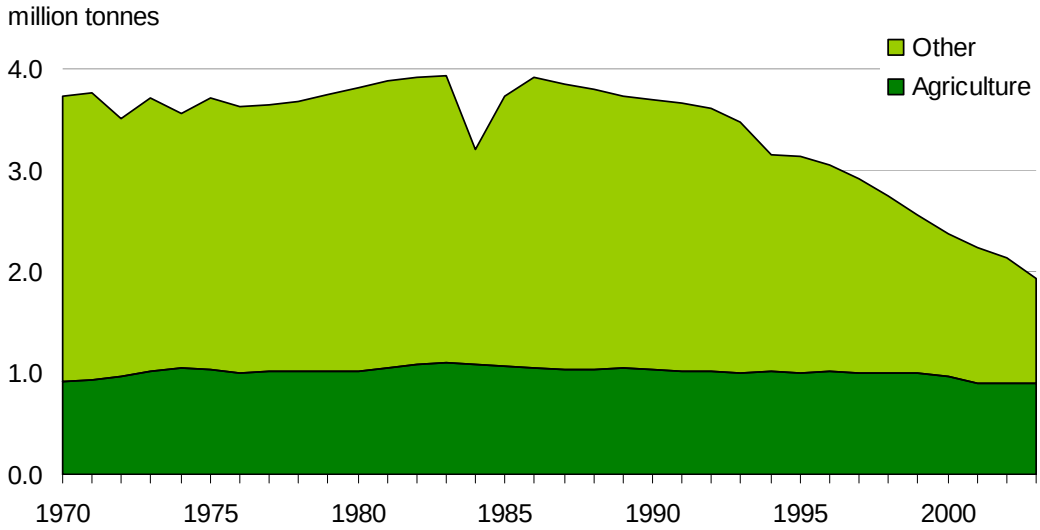
Greenhouse gas emissions

Emissions of carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) are of concern as they are greenhouse gasses and contribute to climate change. Methane and nitrous oxide have global warming potentials greater than carbon dioxide of 21 and 310 times respectively. Greenhouse gas emissions from agriculture account for around 7 per cent of total UK emissions.

Agriculture is a major source of emissions of methane, contributing 47% of methane emissions in the UK. Whilst methane emissions from other sectors have fallen in the last 20 years, emissions from agriculture have remained steady thereby increasing farming's relative contribution. Methane is generated as a result of enteric fermentation in ruminating animals and the 11 per cent fall over the last 10 years, reflects a general reduction in livestock numbers over this period.

Chart 52

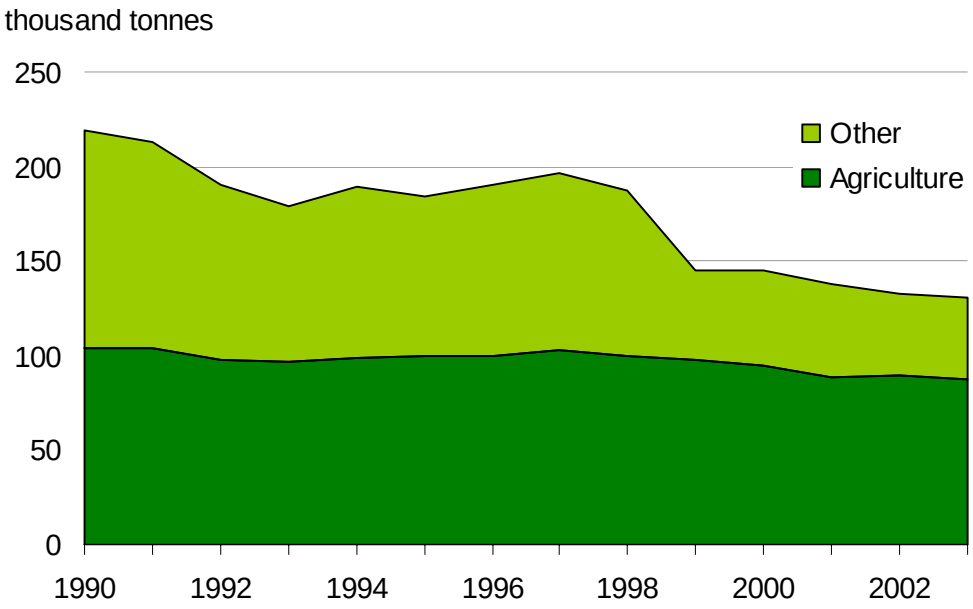
UK methane emissions by source 1970 to 2003



UK emissions of nitrous oxide (N_2O) from all sources and that from agriculture are shown in the following chart. Agricultural emissions of nitrous oxides are produced mainly from the oxidation of the nitrogen in fertilisers and account for 67 per cent of all UK nitrous oxide emissions. The fall since the late nineties in these emissions reflects a reduction in fertiliser use.

Chart 53

UK nitrous oxide emissions by source 1990 to 2003



Carbon dioxide (CO_2) is emitted during cultivation of arable land or semi-natural vegetation, when the soil is rotated to the surface and exposed to the air, when peat or fenland is drained and during the combustion of fossil fuels, e.g. to power tractors and machinery. Agriculture accounts for less than 1 per cent of carbon dioxide emissions in the UK.

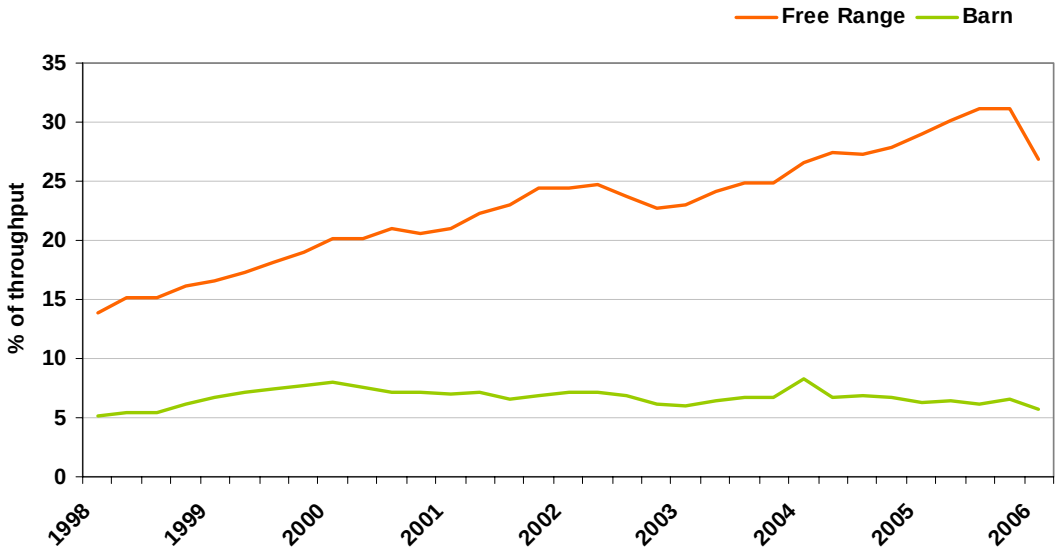
Animal Health and Welfare

Animal Welfare

Consumers will buy particular foods for a variety of reasons including some perceived aspects of quality, such as “corn fed” or “organic”, the expected taste, or the welfare conditions under which the food is produced. Free range eggs are an example of this. Chart 54 shows how the consumption of free range eggs has increased over time, with the share of packing station throughput increasing from 14% in 1998 to around 27% currently. The premium that consumers pay for free range eggs over what they pay for battery eggs provides an indication of the value they assign to the free range system, with free range eggs retailing at nearly twice the price of battery eggs. However, as already noted, not all of this extra value necessarily relates to perceptions of animal welfare: some may relate to other perceived benefits.

Chart 54

UK egg packing station throughput by system

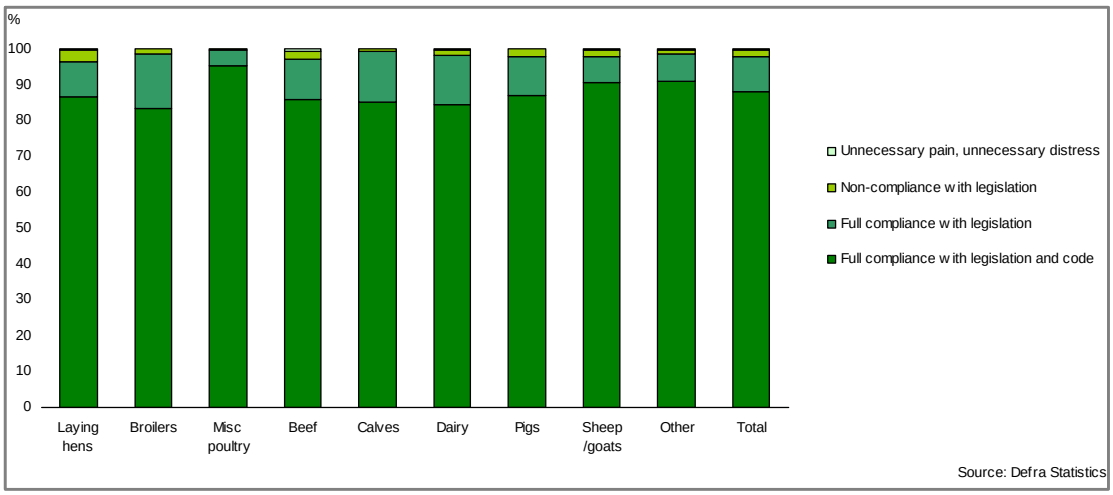


Source: ASA, Defra

The following chart provides details of the level of welfare of farm animals as assessed through SVS inspections. It shows that 5% of programme and elective visits (i.e. those other than complaint or targeted) found unnecessary pain or distress.

Chart 55

Results of SVS assessments of the welfare of animals on farm in Great Britain between 1 January and 31 December 2004 during programme and elective visits

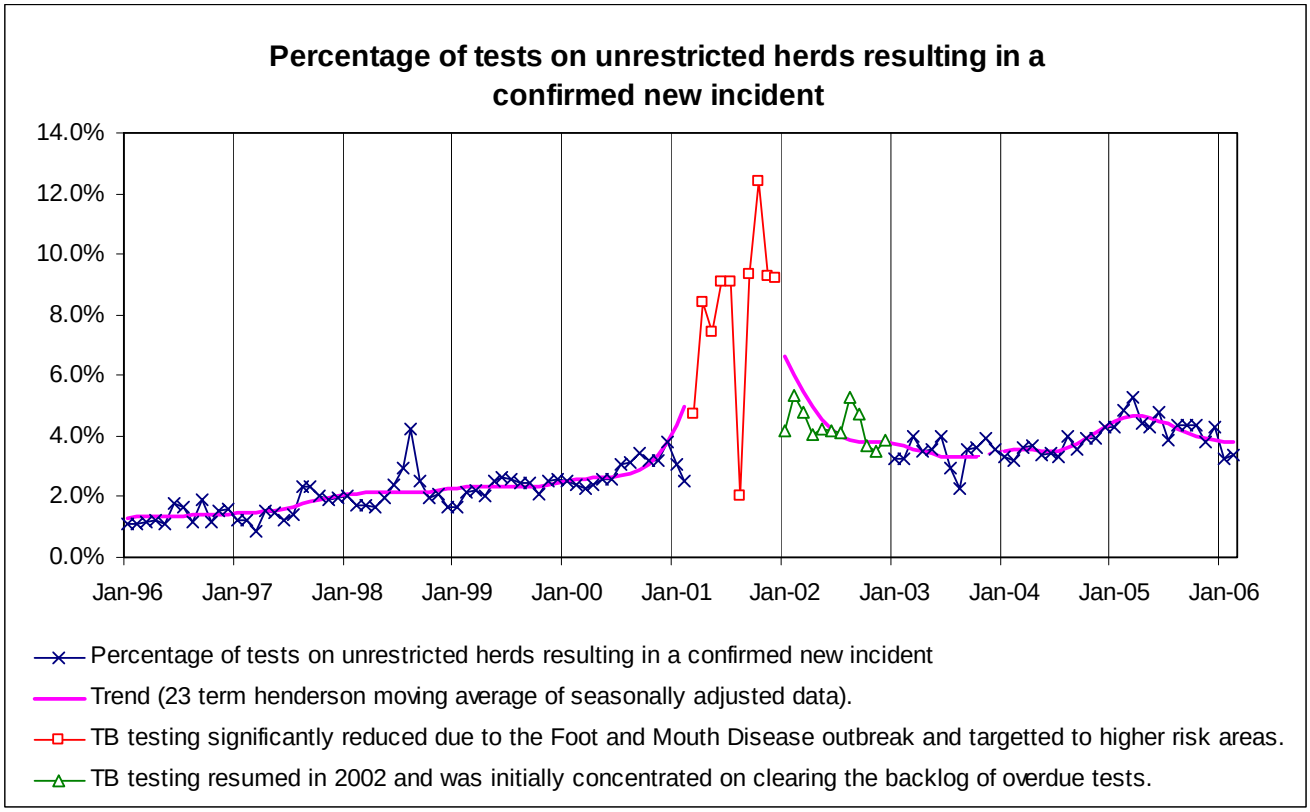


Economic costs of animal diseases

The potential costs to the economy of animal diseases are illustrated by the FMD outbreak in 2001. It is estimated that the outbreak cost the public sector over £3 billion and the private sector more than £5 billion including losses to farmers and to other businesses along the food chain. There have also been very significant costs (of a broadly similar order of magnitude) to a range of other rural businesses as a consequence of fewer people visiting the countryside. However, much (but not all) of these latter costs have been offset by gains in other sectors of the economy as consumer spending was displaced.

Bovine tuberculosis affects a small percentage of the national cattle herd but still presents some of the greatest challenges to the industry in the United Kingdom. In some areas of the United Kingdom such as south west England, it is significant. In Great Britain, 5.6 per cent of cattle herds were affected during 2004. The average annual increase in the number of animals slaughtered as a result of bovine tuberculosis control measures between 1990 and 2001 was 20 per cent. Since 1990, the number of confirmed herd breakdowns has been increasing at an average rate of 18 per cent per annum.

Chart 56
Incidence of Bovine TB



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