

INQUIRY INTO FUTURE AGRICULTURAL SUPPORT IN SCOTLAND

Response from Soil Association Scotland

11th November 2009

Soil Association Scotland welcomes the opportunity to submit evidence to this important enquiry. Our submission responds to the main questions asked. We would be delighted to give oral evidence too.

1. How can financial support to agriculture and rural development be best tailored to incentivise delivery of the Scottish Government's purpose of sustainable economic growth?

The Scottish Government defines Sustainable Economic Growth as growth that meets all the Government's purpose targets at the same time. With respect to agriculture, we take this to require the integration of economic growth with other public policy objectives – which should include preservation of biodiversity, maintenance and enhancement of the quality of natural resources, and combating damaging climate change.

We believe organic farming has an important role to play in each of these areas. The Scottish Government believes that too.

We attach at Appendix 1, in that regard, the statement issued in May 2008 by the Scottish Government on the many attributes of organic farming.

Organic farming also has an important contribution to make in benefiting animal welfare and promoting good public health.

We suggest that agricultural support should be more explicitly tied to these objectives than at present. In particular, in addition to payments being conditional on Good Agricultural and Environmental Condition (GAEC), we propose

- The scale of payments be fully de-coupled from production, to avoid both skewing market signals and vulnerability to challenge on trade policy grounds.
- GAEC be developed to include among its conditions
 - o the continuation of farming,
 - o support for rural employment, and
 - o management of soils to avoid losses of soil carbon.

2. How can support be best directed to ensure high productivity from Scotland's natural resources bearing in mind challenges such as the loss of biodiversity?

'High productivity' is not defined. If the intention is to ensure adequate supplies of food are available to maintain food security, adequate production is only one consideration: the level of demand is equally relevant.

Scotland's is fairly typical among developed country diets, in being exceptionally resource intensive. A change in diet – towards eating less resource-intensive meat and dairy products (particularly those produced using large inputs of grain, soya, and other concentrated feed sources) - would reduce demand for animal feed, making more land available to grow food for human consumption.

Such dietary change could also have significant benefits to public health.

We therefore reject the suggestion that 'high productivity' is desirable from a public benefit viewpoint. Much current high-productivity farming is based on high inputs of finite, and increasingly expensive, resources - such as oil, natural gas and rock phosphate. As these inputs become less available and more expensive it is unlikely that yields in such systems can be maintained at their current level.

Rebalancing diet and more resource-efficient farming would be a preferable route. This approach assumes that dietary trends can and must be changed, to reverse the global epidemic of obesity and diet-related disease; acknowledges impending constraints on oil and phosphate use; and contributes to the need to reduce agriculture's greenhouse gas emissions by 80% (in line with other sectors of the economy). Priority is given to maximising farming's potential to sequester carbon in soils, and shifting diet away from over-consumption of animal fats and towards more fruit and vegetables and starchy carbohydrates.

This vision, for agro-ecological or organic farming systems, is advocated by the UK Government-supported IAASTD report. Such systems are drought-resilient and resource-efficient, livestock production is based on grass rather than grain, and through building soil fertility within mixed farming systems, reduces reliance on unsustainable oil and phosphate-based inputs, while increasing levels of soil carbon.

3. How can support be best directed to help deliver the Scottish Government's targets on Climate Change?

Scottish agriculture, according to the report of the Agriculture and Climate Change Stakeholder Group report of May 2008, is responsible for around 25% of Scotland's emissions. (This contrasts with the widely-cited figure of

12-13% - calculated according to the IPCC international inventory methodology, and therefore excluding several categories of emissions, such as manufacturing and transport, associated with agriculture).

The figure of 25% is confirmed by Scotland's leading land use, agriculture and climate change specialist, Professor Pete Smith from Aberdeen University (also lead author of the most IPCC report chapter on land use and agriculture).

Scotland's ambitious GHG reduction targets – of 42% by 2020 and 80% by 2050 – will, if they're to be met, require agriculture to play an important role in reducing emissions. Farming systems will be required that both reduce direct emissions, and maximise the sequestration of carbon.

Emissions from Scottish farming are constituted as follows:

- CO₂ 2.3%
- CH₄ 43%
- N₂O 54.7%

(Source – Scottish Government, figures for 2005).

All farming systems have the potential to reduce emissions, by changing farming practice away from intensive use of nitrogen (particularly mineral nitrogen) and towards natural sources of fertility.

There is also huge scope for sequestering carbon in soils. Historically, the loss of carbon from soil to the atmosphere has been a major anthropogenic driver of climate change. Changes in land use and management have prompted the release of almost half as much carbon dioxide as the burning of fossil fuels over the last 200 years. The remaining soil organic carbon store of UK arable soils is estimated at more than 500 million tonnes of carbon, to a depth of 30cm.

Critics have been too quick to dismiss soil carbon sequestration on the basis that the rates of sequestration tend to diminish after some twenty years of improved practices. The next twenty years are in fact critical for delivering major greenhouse gas reductions. Moreover, carbon sequestration continues thereafter, albeit at lower rates, for a hundred years or more.

Through soil carbon sequestration measures, the agricultural sector offers major opportunities for greenhouse gas mitigation that are cost-competitive with those in other sectors (e.g. industry, housing, transport and energy). Cropland management offers the greatest potential: measures are cheaper to implement and offer significant soil carbon gains. Most farming systems have a contribution to make in this respect. Organic farming is particularly effective.

Soil scientists agree that organic farming will result in higher soil carbon levels than non-organic farming. One of the most important factors influencing soil carbon sequestration is the level and type of organic matter added: farming methods that incorporate livestock manures and fertility building plants into the system can provide significant soil carbon benefits.

Long-term studies show that the addition of farmyard manure can have extremely significant effects (e.g. data from manured plots at Rothamsted Research demonstrate that soil carbon levels can rise for 150 years before reaching a new equilibrium).

The quality of the organic matter added substantially affects carbon accumulation and retention in soil. Organic matter "matured" by microbial action (such as compost and straw-based manure) contains a higher proportion of carbon with a long residence time in soil - compared, for example, to slurry.

Farmland soil carbon sequestration can be achieved through:

- adding high levels of organic matter to the soil by using farmyard manure, grass leys, green manures
- composting organic matter before incorporating it into the soil, for greater stability
- improving efficiency of storage and distribution of organic matter to reduce carbon losses
- maintaining a protective cover of vegetation year-round
- stocking density limits to prevent overgrazing
- switching to less extractive crops on at-risk soils
- converting highly erodible, low carbon soils to systems with permanent grass or plant cover
- identifying activities which lead to organic matter being lost (e.g. straw burning) and ensuring that the organic matter is instead returned to the agricultural system.

Public policy should support these measures.

Since many of them are common in organic farming, further support for organic agriculture is desirable from a climate change mitigation viewpoint.

Upland peat soils contain extremely large carbon stocks that are decreasing rapidly in many areas. To prevent further carbon loss from such soils it is

necessary to keep them wet, avoid burning, liming, and inappropriate tree planting that will extract moisture from the soil. Management should prevent soil exposure through over-grazing, and 'improvement' of peat grassland, through ploughing, reseeded and applying mineral fertilizer.

Grasslands for grazing livestock, whether permanent pasture or temporary grass leys on mixed farms, represent vitally important soil carbon stores. Grass-fed livestock is responsible for a large share of the methane emissions from agriculture, but also has a critical role in preventing carbon emissions from soil.

Shifting from red meat to grain-fed white meat to address methane emissions could have the perverse effect of exchanging methane emissions for carbon emissions from soils, and the destruction of tropical habitats (for the production of soya to feed pigs and chickens), as well as having a far reaching impact on our countryside, wildlife and animal welfare.

A review of all available comparative studies indicates that, on average, organic farming produces 20-28% higher soil carbon levels than non-organic farming. This represents a soil carbon sequestration rate of approximately 970kgC/year for each hectare of cultivated land converted to organic farming in the UK, for at least the next twenty years.

Support should therefore be directed at

- farming practices specified above, as practiced already on many Scottish livestock and most organic farms
- encouraging organic farming, through better funding of both the conversion and organic maintenance elements of the Organic Aid Scheme

Consideration should be given, in line with suggestions from the European Commission, to creating a Third Pillar of the CAP to support emissions reduction and sequestration

APPENDIX ONE.

RURAL DEVELOPMENT CONTRACTS RURAL PRIORITIES Support for the conversion to, and maintenance of, organic farming Reference notes for RPACs and Case Officers

1. The purposes of this information note are to:

- Outline the benefits of organic farming that the Scottish Government recognise.
- Give information on the organic sector in Scotland.
- Detail sources of further information

2. Organic Farming: an introduction

Organic farming plays a valuable role in helping to protect and enhance the environment as well as assisting producers to meet consumer demand for organic products. Evidence has shown that there are significant biodiversity, pollution control, energy efficiency and soil protection benefits associated with organic farming.

Organic farming is based on enhancing the natural biological cycles in **soil** (e.g. nutrient cycling in the soil), **crop** (e.g. encouraging natural predators of crop pests) and **livestock** (e.g. development of natural immunity in young animals); on building up soil fertility through the use of nitrogen (N) fixation by legumes and enhancing soil organic matter; and on avoiding pollution. Thus the aim is to work **with** natural processes rather than seek to dominate them, and to minimise the use of non-renewable natural resources such as the fossil fuel used for the manufacture of fertilisers and pesticides. Organic farming principles also encompass high animal welfare standards and the improvement of the environmental infrastructure of the farm.

Any farmer wishing to produce food for sale as organic must comply with EU Regulation 2092/91, which became operational in January 1993 (to be replaced on 1st January 2009 by EU Regulation 834/2007). This regulation sets out the minimum standards of production and stipulates that organic farmers must be registered with an organic certification body which itself must be approved by Defra, the National Certifying Authority for the UK.

3. Business Prospects

In 2007, the market for organic food was worth around £1.5 (Mintel, 2007), having increased by 70% since 2002. Increased product availability and rising consumer interest in health and premium food markets have fuelled sales. It is predicted that demand will continue to grow but, at present, further expansion in retail sales is constrained by lack of supply of primary product, at least for some products such as milk, eggs, table birds, pork,

beef, and a seasonal undersupply of lamb. The expansion of non-ruminant production in particular is being held back by a severe shortage of organic feed grain. Vegetables (including potatoes) are profitable with ready markets, although production costs can be high.

These shortages are to some extent a result of the relatively slow rate of conversion of farms in the last 3-4 years, after a very rapid expansion of the sector in the late 1990's and in 2000 to 2001. At the farm gate, therefore, prices are good for most products, particularly organic grain, beef and lamb (although seasonal over supply can make marketing of lamb challenging in the autumn glut period). Premiums for organic store cattle and lambs have also been available. The two year conversion period (when yields are reduced, no full organic premiums are available, and some investment costs may be necessary, e.g. for reseeding) is the most challenging period

financially, but once the organic system has been fully established, good market prospects and generally lower input costs should result in improved business profitability.

4. Contribution to Biodiversity

Many organic units comprise mixed farming systems and several studies have shown that mixed farms, both in upland and lowland situations, have a positive impact on biodiversity because of the mixed range of habitats provided spatially and over time^[5;33;23;15]. Table 1 provides an illustration of the positive effects that organic farming can have on biodiversity in comparison to conventional arable, conventional mixed lowland, and LEAF farms^[17].

Table 1. The impacts of farming operations in four farming systems on the biodiversity of soil organisms, plants, invertebrates, birds and mammals (the higher the score, the more beneficial the impact)^[17].

Agricultural Practice	Conventional Arable	Conventional Mixed Lowland	LEAF	Organic
Cultivation	-1.5	-1.5	-1.5	-1.5
Production	-2.0	-1.0	-1.0	+4.0
Protection	-6.0	-6.0	-6.0	-0.5
Post Cropping	+4.5	+9.5	+9.5	+11.5
OVERALL	-5.0	+1.0	+1.0	+13.5

4.1 Flora

The non use of agrochemicals is probably the key factor in increasing floral diversity on organic farms^[12]. Synthetic herbicide and pesticide use can have a dramatic negative impact on wild flora^[45]. A study of adjacent conventional and organic farms in England^[42] showed that organic farms support significantly rarer and declining plant species. In another study^[2], the diversity of threatened floral species within the field and in crop margins on organic farms was approximately double that of conventional farms. Evidence suggests that the use of agrochemicals can have a major negative impact also on faunal numbers and diversity^[45].

4.2 Birds & bats

The BTO (British Trust for Ornithology) study of 22 paired organic and conventional lowland farms in England and Wales^[9] showed that the density of all the bird species studied was greater on the organic holdings and was in proportion to the greater availability of invertebrates and other food sources. Other research into the abundance and diversity of insectivorous mammals, including bats, has also shown that the population and diversity of species is greater on organic than on conventional farms^[4, 48], for similar reasons. Fuller *et al.* (2005)^[15] concluded that organic holdings were likely to support 5-48% more spiders, 16-62% more birds and 6-75% more bats than conventional holdings based on data collected over 89 paired farms in England, including several upland ones.

Reducing stock numbers in pastures is likely to have a range of benefits for ground-nesting birds including the creation of more complex sward structures, reduced trampling and positive effects on food resources^[14]. Stubbles can be particularly beneficial as food sources^[20,49] and the relatively greater use of spring cropping on organic farms is likely to be beneficial in this instance^[9, 50,51].

4.3 Invertebrates

A German study^[16] concluded that the population and diversity of insect-pollinated plants are greater under organic farming, compared to conventional cropping systems, presumably because invertebrate abundance and activity is greater. Organic standards prevent the routine use of prophylactic veterinary drugs and an Irish study^[24] found that organic farming was beneficial to dung beetle communities, with dung on organic farms possessing greater beetle biomass than dung on intensively managed grassland. The number of beneficial predatory invertebrates (e.g. ladybirds and ground beetles) has also been found to be higher on organic systems

compared to conventional systems^[19,41]. The practice of undersowing, common in organic systems, is known to encourage earthworms and other beneficial soil fauna activity. The greater emphasis on clover in organic compared to conventional farming systems is beneficial to butterfly and bee species, including bumblebees^[45;10].

5. Contribution to valued and attractive landscapes

A number of studies^[9;25;39;40], have shown that on average, organic farms had a more attractive landscape than either extensive or intensive conventional farms of a similar type.

6. Contribution to protection and enhancement of water and soils

Mineral N fertiliser is prohibited in organic standards. Artificial sources of P & K are prohibited although some natural products may be permitted under certain circumstances. In organic farming, N is generated by legumes (e.g. grass/clover swards) and nutrient supply to crops is maintained by efficient recycling of manures, and by optimising soil N mineralization. This organic approach of recycling or restricting P & K, will tend to lead to lower soil indexes, compared to unrestricted nutrient application, The non-use of inorganic N fertilisers is likely to reduce leaching, particularly when comparing net losses over the whole rotation and assuming timing and husbandry operations are sympathetically undertaken^[35]. A review of European literature^[43] also concluded that nitrate leaching per hectare from organic farms was generally less than conventional farms. Reduced use of P in less soluble forms, as happens on organic farms, is also likely to reduce impacts on water and eutrophication^[25].

Soil flora and fauna are also likely to benefit from the non-use of mineral N fertilisers, as these chemicals are associated with reductions in arbuscular mycorrhizae (AM) and other soil fungal populations and diversity^[34]. The beneficial effects of AM fungi including improved soil structure are liable to be stimulated in organic systems^[6, 31].

On organic farms, it is often the practice to undersow cereal crops with grass/legume seed mixture. This provides soil cover which suppresses weeds, enhances crop fertility and grazing after harvest and in addition prevents nutrient leaching over winter on uncropped land. There is little evidence that storage and handling methods of slurries, manures and compost are significantly different between organic and conventional farm holdings^[13]. However, the lower stocking density predominant in organic farming systems would tend to result in lower production of livestock manures per holding and hence lower risk of N leaching. Overstocking is also

known to be a major factor in soil erosion, thus the lower stocking rates in organic systems should help to minimise risk of erosion.

7. Contribution to the amelioration of Climate Change

The use of large amounts of fossil fuels for production and transport of fertiliser and pesticide is the main factor making conventional systems less energy efficient than organic^[7]. This indirect energy accounts for around 50% of the total energy input to a conventional potato or winter wheat crop^[1]. Although direct energy use for some field operations in organic farming (e.g. thermal weeding in vegetable crops) can be higher than in conventional systems, the lower indirect energy use highlighted above results in a lower overall energy use in the organic system. This reduction ranges from 20 to 65% less relative energy used in organic systems^[27;32;46]. Another study^[43] suggests that organic farming systems emit only 34 – 53% of the CO₂ emitted from conventional farming.

The levels of greenhouse gas emissions from organic livestock farming should be lower than from conventional systems, because of the generally lower stocking rates in organic systems^[3]. Similarly, N₂O emissions from land treated with mineral N fertiliser tend to be greater than from land treated with manure or slurry^[8].

8. Further information is available from:

David Younie, SAC, Organic Farming Specialist, 01224 711072

Caroline Bayliss, SAC, Organic Market Link Co-ordinator, 01224 711073

These roles are part funded by the Scottish Government to provide impartial advice to the industry and the Scottish Government. Information is available over the phone or email, or we can look to arrange training events for RPACs/Case Officers on organic farming/markets, or any particular aspect, if required.

Information is also available from:

Scottish Organic Producers Association:

SOPA Development Officer (Debs Roberts), 0131 335 6619

Soil Association Scotland:

Agricultural Development Officer (Lyn Matheson), 0131 666 0847

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