
Feeding the animals
that feed us
Soil Association
Hi Peak Organic Feeds
As nature intended

Executive summary

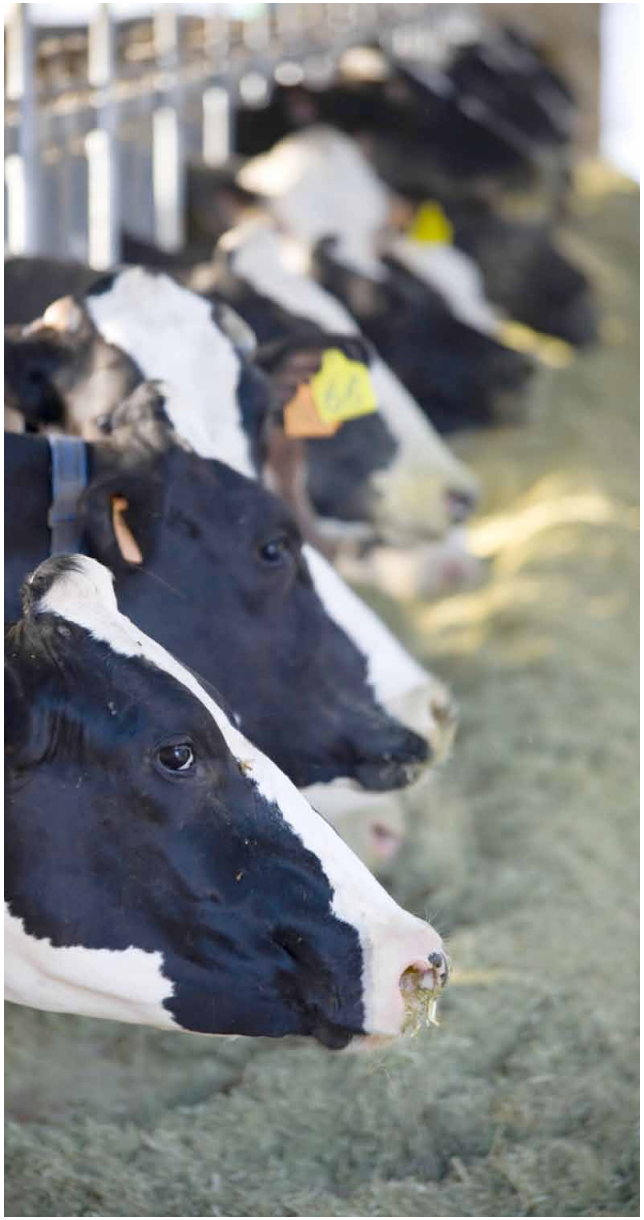
A trend towards intensive factory farming systems over the past 60 years has meant that cows, chickens and pigs are now eating less grass and food waste and more grains and imported proteins like soya. These practices have added to the vulnerability and the unsustainability of our food chain. We are using more land and resources to feed farm animals – destroying rainforests and grasslands and contributing towards climate change in the process. Dependence on animal feed like grain and soya, imported from across the globe, makes our food systems much less resilient.

Organic farmers have a head start in meeting the feed challenge. They are less reliant on grain, do not use soya from recently converted forest or grassland, and use more grass and silage to feed animals, yet the organic movement still has work to do. A number of important questions about organic animal feed deserve debate among all those involved in meat and dairy production, processing, retailing and consumption. These include:

- How can we slow the trend on some organic farms towards using more grain and protein-based diets for animals?
- Is there more we can do to maximise farm animals' ability to store carbon in grassland soils, to recycle our waste food, and to provide nutrients to grow our crops?
- What more can we do to reduce soya use in organic animal feed?
- Can we do more to ensure that organic soya continues to be sourced from countries where problems of rainforest and grassland destruction do not arise?
- How can we reverse the practice of animal feed mills using imported organic grains and pulses when supplies are available from UK sources?
- Can we do more to encourage the use of other UK crops, like lupins and vetch, which may have a role to play in some of the problems raised in this report?

The Soil Association believes that the way we feed the animals that feed us, across the world, needs urgent attention. This paper aims to promote discussion about animal feed – and in particular to debate possible improvements to organic production in the UK, with the intention of producing further environmental and animal welfare-friendly outcomes. Organic farming offers many solutions to the challenges posed by climate change and resource depletion, but we must strive continually to improve our standards to ensure that we are producing food in way that is both sustainable and resilient.

Introduction



Food and farming face radical changes in the coming years, as a result of what the Government's Chief Scientist, Professor John Beddington, calls a 'perfect storm'. The storm raging towards us is usually described as combining the need to feed a rising global population, with rising demand for food, especially meat and dairy products, and the need to make huge cuts in the greenhouse gas emissions from farming and food in the face of climate change. In addition, one billion people on the planet are hungry or starving. Farming will have to adapt to significant changes in climate as the world warms.

Less often mentioned by government and industry sources is the fact that in addition to the one billion people short of food, around one billion of us are eating too much, leading to a crisis of diet-related ill-health (notably a rise in type 2 diabetes and higher levels of obesity) in North America, Europe, and increasingly in countries like India and China. To feed any number of people a healthy diet we need to change what we eat as well as how we farm.

In future, farming will not only have to deal with changing, and more extreme weather, but will face severe constraints as supplies of mineral phosphates, a key element in growing crops, continue to increase in price as they get scarcer and more expensive to mine. The most important element needed to grow crops is nitrogen, and non-organic farming uses mineral nitrogen extracted from the air with the help of fossil fuels, mainly natural gas. The manufacture and spreading of mineral nitrogen is a major contributor to climate change, and as oil and gas become scarcer and thus more expensive, this key input will increase in price.

In the debate about climate change and food and farming, one issue has tended to seize the headlines around the world. Climate scientists, public health professionals and environmentalists all say that those of us in the north and west should eat substantially less meat and dairy products on both health and climate change grounds. While it is true that most of us in the North and West need to eat less meat and dairy products, it is also true that not all meat or milk are equal. Intensively reared beef cattle or factory farmed chickens may appear efficient in terms of resource use, because of their rapid growth, shorter lives and efficiencies from the scale of production. However, once the full environmental cost of their feed and their waste, and the price the animals pay in poor welfare, are factored in, they may look like a very poor bargain. While we have to eat less dairy and meat overall, we need to eat proportionally more, good quality meat and milk, from animals fed on grass whenever possible.

For many centuries, the animals we eat and milk lived outside, eating mainly grass (which humans cannot digest), the parts of crops that we cannot eat (such as straw and the leafy tops of root crops), and our waste food. Animals lived in small groups, and were kept on most farms. Over the last 60 years that has changed in many developed and increasingly in developing countries. Farm animals are eating more

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grain (mainly maize, wheat and barley) and protein (mainly soya). They are kept in large groups, often indoors, and increasingly reared on highly specialised farms. Indeed, for many animals, the idea that they are kept on a farm is absurd, considering the huge factory-like buildings or feed-lots where many are kept. The trend towards bigger and bigger animal factories continues. The intensification of meat and dairy production continues, as demonstrated by a proposal to build a 8,100-cow dairy in Lincolnshire, where all of the cows would be inside for the entire period they are milked.

As animals consume more of food which could go to feed humans, so we consume more animals. In particular, our consumption of red and white meat and dairy products has increased dramatically over the last 50 years. Global per capita consumption of meat has increase 87 per cent between 1961 and 2002.[1] This trend is associated with increased wealth. As societies get richer, they consume an increasingly unhealthy diet of burgers and steaks, chicken and processed meat. White meat consumption in India alone is set to double by 2015. We also eat less of the whole animal, with nutritious offal, like liver, disappearing from most people's diets. In view of the current problems we have in feeding everyone on the planet, and the frequent discussion about the difficulty of feeding more, it is right to be concerned about the increasing proportion of grains and proteins that could feed human beings going to feed animals. It is well-known that this process is highl inefficient. It takes 10kg of animal feed to make 1kg of beef, 4 to 5.5kg of grain to produce 1kg of pork and 2.1 to 3kg of grain to produce 1kg of poultry meat. Indeed, on average, a farmer can feed up to 30 people throughout the year on one hectare with vegetables, fruits, cereals and vegetable fats. If the same area is used for the production of eggs, milk or meat, the number of people fed varies from 5 to 10.[2]

Ever since animals like cows, chickens and pigs moved from eating grass and food waste to grain based diets, providing the animals with sufficient protein for them to thrive has caused environmental or other problems. In the period after the second world war, for example, the UK imported fishmeal, a highly nutritious source of protein for farm animals, from the South Atlantic. This industrial fishery scooped up so many anchovies that the fish stock eventually collapsed, and it has never recovered. Now almost all the world's major fisheries are endangered. Animal feed companies then turned to the discarded bones and brains of cattle as a cheap and readily-available source of protein, only to have this implicated as the cause of mad cow disease (BSE).[3] Since then soya has been the primary source of protein for most animal feed in regions like North America and Europe.

One of the greatest threats facing the planet's biodiversity is the destruction of rainforests in Latin America and South East Asia, and the conversion of the world's grasslands to arable cropping. These massive changes in land use release huge quantities of CO_2 to the atmosphere, and are a key driver of climate change. The Food and Agriculture Organisation (FAO) calculates that globally, livestock induced land use change generates 2.4 billion tonnes of carbon dioxide a year, approximately 7 per cent of global GHG emissions.[4] Much of this destruction is driven by the need for more land to produce soya to feed to animals. So destructive is the drive to grow more soya that Friends of the Earth is campaigning to stop all imports of soya from Latin America to the UK.

Friends of the Earth[5] point out that 'the European Union (EU) relies on Brazil for 64 per cent of soybean imports and Argentina for 61 per cent of soymeal imports. This demand accounts for almost a third of Brazil's total soybean harvest. In 2007 more than 78 per cent of UK soybean imports and 34 per cent of soymeal imports came from Brazil. A further 47 per cent of the UK's soymeal was imported from Argentina... The amount of land needed to produce soy for the European market since the ban on meat and bone meal in 1996 is roughly equal to the area of deforestation in the Brazilian rainforest since that date'.

Friends of the Earth identify poultry as the fastest growing sector in the global livestock industry and it is the most frequently eaten meat in the UK: 'There are around 3,000 broiler farms in the UK (raising chickens for meat) with approximately 120 million broiler chickens in production at any one time. High-protein diets have been developed to make birds grow faster, keeping the cost of the meat low.

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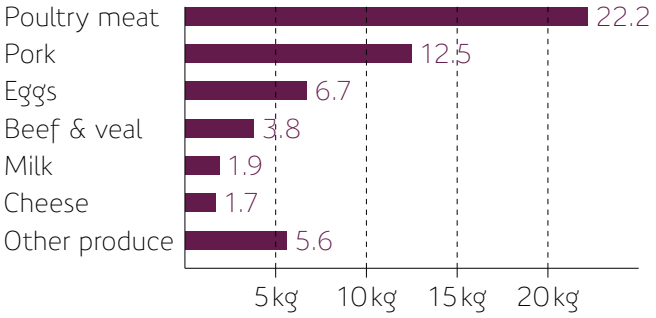
Soybean equivalent required to produce a UK citizen's annual intake of meat and dairy products[6]
(kg required per person)



Most chickens now reach their desired weight within about 40 days, compared to 84 days for organic birds. Cereals, soya and legumes form the basis of most poultry feed, with soya making up between 20 and 25 per cent. The UK poultry industry supplies around 88 per cent of the overall UK market, but imports roughly twice the quantity of chicken that it exports'.[7]

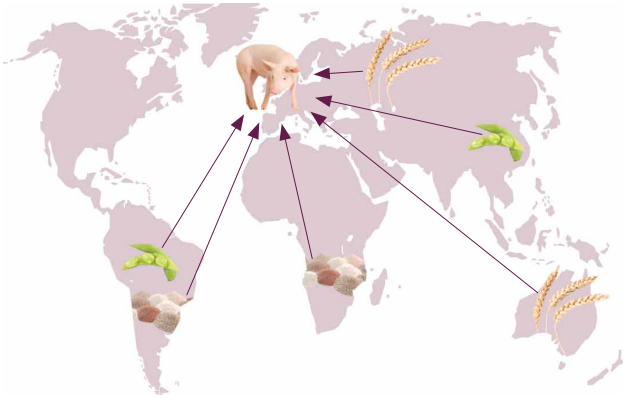
There were 320,000 cattle, 1,178,000 sheep, 71,000 pigs, 4,363,000 poultry and 5,000 other livestock being reared organically in the UK in 2008.[8] Organic farming is different, a little less dependent on imported protein, using more grass and conserved grass (hay and silage) to feed sheep and cattle during the summer and winter. Under European organic regulations, feed is intended to ensure quality production rather than to maximise production, while meeting the nutritional requirements of the livestock at various stages of their development.[9]

UK grown beans and peas feature more in organic animal feed, but imported soya – almost none from Latin America – is also used. However, for pigs and poultry, and dairy cows, organic systems have tended to follow the trends in non-organic production, partly because organic systems for producing dairy products, pork, chicken and eggs have increased in size and intensity to meet the demands of consumers. Nevertheless, organic standards ensure that all farm animals have access to the open air, and in the UK, the Soil Association's standards mean that forage (usually grass/clover mixes and conserved grass) must count for at least 60 per cent of a cow's diet, that no grain and protein crops can come from land that has been recently converted from high conservation value land, such as ancient forest. There is now a great deal of scientific evidence to show that beef and dairy cattle fed on entirely or mainly grass/clover and conserved grass/clover produce meat and dairy products of a better nutritional quality than those fed on grains and protein, or from the increasingly popular (among non-organic farmers) maize silage.

How we feed our farm animals is rightly coming under greater scrutiny because of the challenge of climate change and deteriorating human health. These pressures will soon have added to them the increasing cost of oil-based nitrogen fertiliser and scarce mineral phosphates – indeed there have been clear signs that these trends are already under way, although halted temporarily by the current global recession.

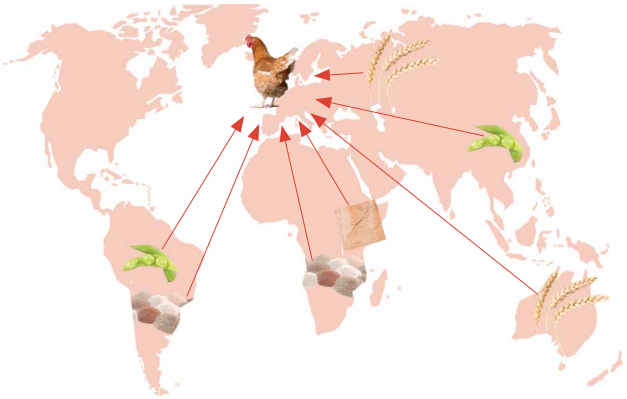
The Soil Association believes that the organic movement has work to do to meet these new challenges. We need to consider how we halt the trend in organic farming in many countries towards greater use of grain and protein based diets and maize silage. Farm animals could be helping us store carbon in grassland soils, recycling our waste food, providing nutrients to grow our crops, and giving us delicious food to eat. Organic farming's reliance on grazing and outdoor systems gives us a head start, but there are a number of issues we need to discuss and to act on. This paper sets these out, and suggests possible solutions to the challenges we face.

How far does UK animal feed travel?



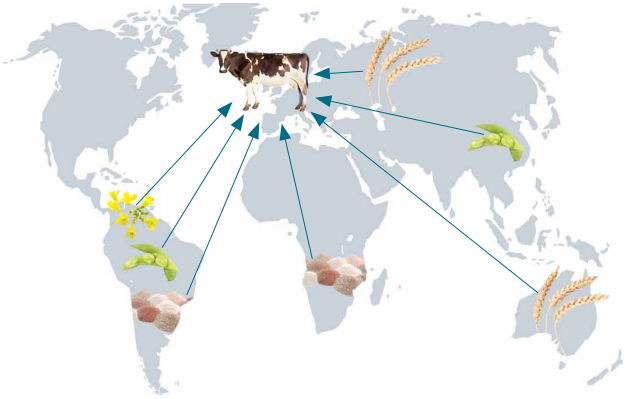
Pigs

Ingredient (organic and non-organic)	%	Origin
Cereals and cereal by-products	**60%+**	UK/EU/Russia/Australia/Ukraine/Kasakhstan
Other by-products 'processing waste'	**<10%**	Anywhere
Pulses	**<10%**	UK/EU
Soya and soya products	**10–25%**	S. America/China/EU
Minerals and supplements materials	**<4%**	UK supplied (imported from Africa/S. America/Germany)



Poultry

Ingredient (organic and non-organic)	%	Origin
Cereals and cereal by-products	**60%+**	UK/EU/Russia/Australia/Ukraine/Kasakhstan
Other by-products 'processing waste'	**<5%**	Anywhere
Pulses	**<5%**	UK/EU
Soya and soya products	**15–25%**	S. America/China
Minerals and supplements	**<4%**	UK supplied (imported from Africa/S. America/Germany)
Fats	**<5%**	EU
Limestone (layer birds only)	**7–10%**	UK/Africa



Cattle

Ingredient (organic and non-organic)	%	Origin
Cereals and cereal by-products	**20–40%**	UK/EU/Russia/Australia/Ukraine/Kasakhstan
Other by-products 'processing waste'	**10–30%**	S. America and far East
Soya and soya products	**0–10%**	S America/China/EU
Minerals and supplements	**<4%**	UK supplied (imported from Africa/S. America/Germany)
Fats	**<5%**	UK and EU
Other oilseed extracts	**10–30%**	UK, EU and S. America
Sugar beet pulp	**0–20%**	UK and EU

Problems and opportunities

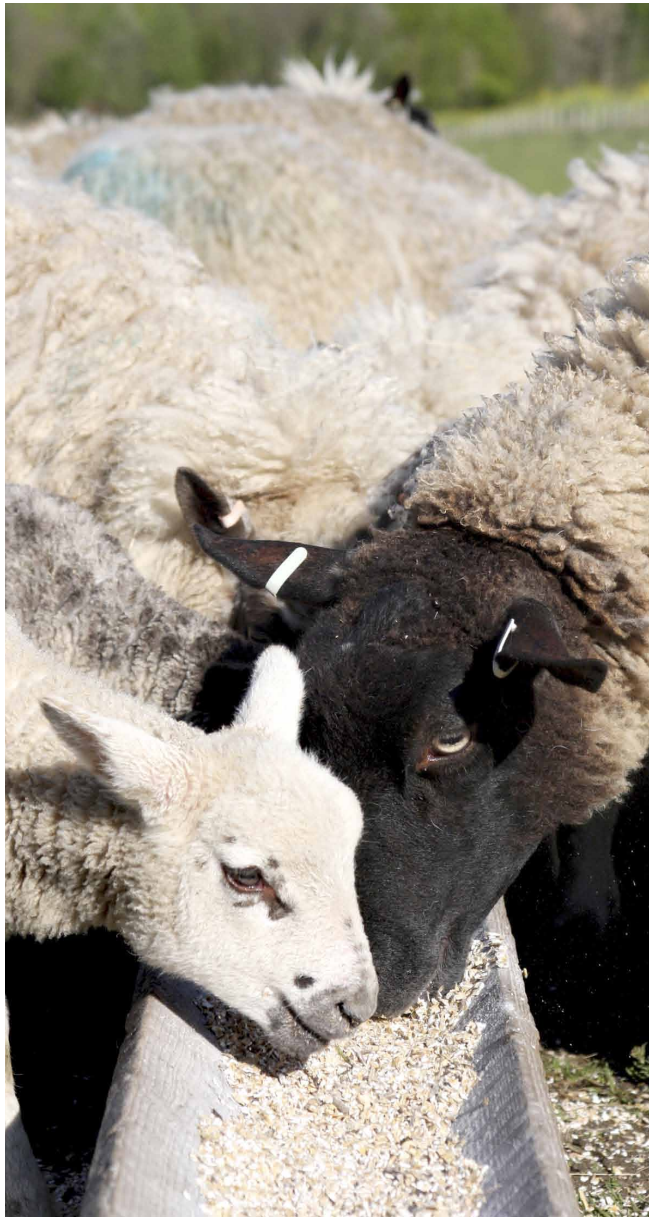
To implement organic principles, livestock should ideally be fed largely from the farms they inhabit. Two main issues determine that for pigs and poultry, and increasingly for dairy, this is rarely the case. Firstly, the structure and/or geography of many organic farms means that they are unable or unwilling to grow the non-forage components of the ration. Secondly, to achieve economic production levels, high quality protein feeds like soya are used for the more intensive livestock sectors, and these feeds are not suited to our temperate maritime climate conditions.

For dairy, beef and sheep producers, these problems are relatively easily overcome. From an economic and physiological perspective, these livestock will perform best on a predominantly forage diet, indeed Soil Association organic standards ensure that at least 60 per cent of the ration is forage. However, there may be moments in the production cycle when supplementary feed is essential, for instance, in twin bearing ewes pre-lambing, and in the first few months in the lives of dairy bred calves. However, home or at least UK grown pulse crops could and should provide adequate protein even at these times.

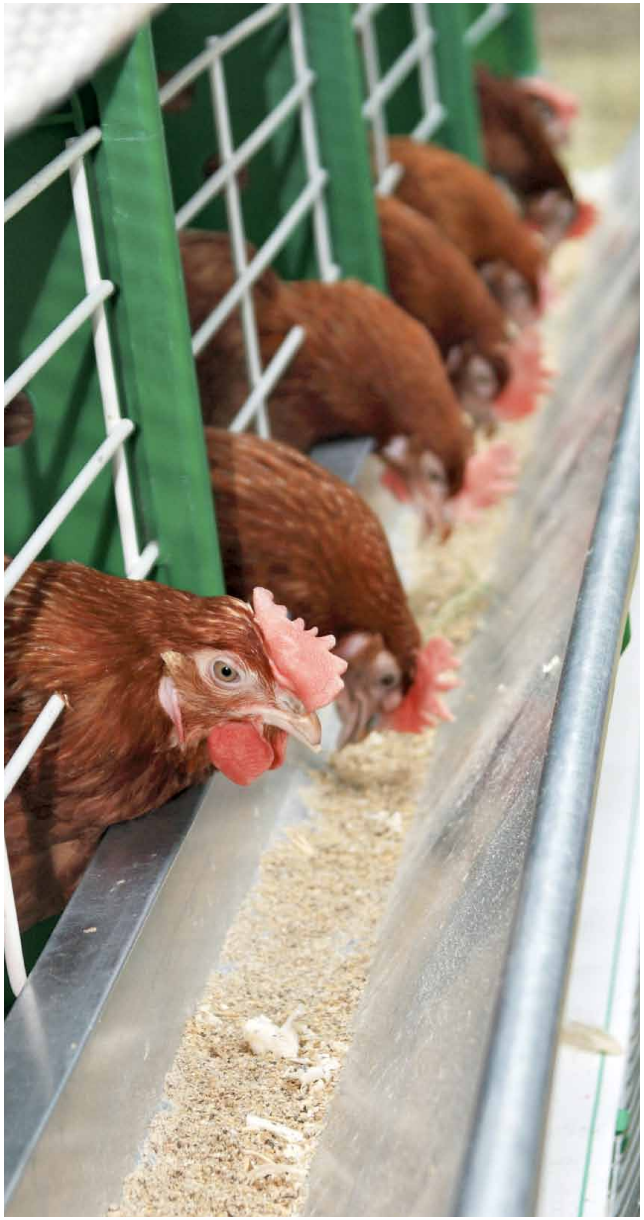
Many dairy farmers are nervous about maintaining productivity and health without the use of high protein feeds such as soya. For herds yielding less than around 7,000 litres per year, experience shows that this fear is largely unfounded as long as excellent forage quality is maintained. However, herds with the genetic potential to yield significantly more than this, such as many Holstein dairy herds, will both struggle to do so, and may compromise fertility along the way.

The most serious problems are with pigs and poultry. As omnivorous monogastrics (with a single stomach, rather than the complex stomach of cows which enables them to digest grass) they require high quality protein. In particular they require the amino acids lysine, methionine, and tryptophan, not only to grow efficiently, but also to prevent serious health and welfare problems. Modern breeds and strains of poultry are especially vulnerable; they may resort to injurious pecking behaviours when essential amino acid levels are inadequate, and sows may be likely to cannibalise their piglets without adequate amino acids. Both pigs and poultry systems currently rely heavily on soya and, to a lesser extent fishmeal, to achieve a diet that allows optimum performance, and therefore least cost to the consumer, and to prevent health and welfare problems.

Pigs and, to a lesser extent, poultry were once highly effective users of waste from the food chain, converting kitchen and shop waste into meat and eggs, often on a household scale. Commercial piggeries were often associated with cheese-makers, where the whey by product was fed to pigs. Swill feeding has diminished in importance since the 1960s, and was abolished in the UK after the 2001 foot and mouth outbreak. The organic sector was prevented from using meat and bone meal, not by our standards which applied only to ruminants but by the logistical impossibility of separating organic



Problems and opportunities



material at abattoirs and at renderers. Its use for all classes of livestock has been banned since BSE. Synthetic amino acids were permitted in organic pig and poultry rations until the EU regulation prohibited this in 2000. The use of synthetic amino acids is widespread in non-organic pig and poultry systems, and allows lower grade protein crops, such as peas and beans, to be supplemented by the required amino acids, preventing an oversupply of crude protein whilst achieving adequate levels of these key nutrients. Fishmeal can still be used in organic diets for pigs and poultry, as long as it comes from waste or sustainable sources. However, feed mills that make diets for ruminants are not permitted by law to use fishmeal in pig and poultry diets due to the risk of cross-contamination – another legacy of BSE. There can be taint issues with high levels of fishmeal usage, and there are concerns in some quarters about any use at all.

Other novel, essential sources of balanced protein for monogastrics include: potato protein, very expensive, and not widely available; palm kernel; polychaete production, very much at an early stage of development and not yet cleared for use in organic systems; and rapeseed meal. The possibility of breeding pulse crops with higher levels of lysine, methionine and tryptophan has been explored through the 'Green Pig' research programme. However, the narrow genetic base of these crops, with little variability between strains, mitigates against this as a likely solution (although some have expressed interest in vetch).

Very small scale pig and poultry systems can manage more easily without fishmeal or soya, as, if well managed, the animals may be able to secure sufficient balanced protein from their environment, especially during the growing season. Production levels may also be lower, so putting less physiological strain on livestock. Slow growing breeds and strains of pigs and meat birds will also cope better, but will require more feed per unit of meat produced over their lifetime, and a lower lean to fat ratio, and carcase conformation, is likely in pigs. So from a carbon and energy perspective these approaches may be less satisfactory, and cost is also likely to be an issue if fully accounted. With the rise in interest in domestic and small scale food production, there may be more opportunities for communities to feed themselves with micro scale systems.

Issues with key organic feed ingredients

Cereals

Around 60 to 80 per cent of a typical concentrate feed ration will be cereals, primarily wheat and barley, though oats, triticale and by products from flour milling or brewing are also used. All of these crops are widely and readily grown in the UK; however imported grains are frequently used. This is due partly to availability, especially during periods when the organic pig and poultry markets are buoyant, as only around 11 per cent of organic land in the UK is in arable cropping.

Many feed manufacturers say that they have serious problems due to poor information on the quantity, quality and whereabouts of cereals on the domestic market. This uncertainty means that it is often easier for manufacturers to secure their raw material through importers rather than risk not being able to purchase from UK farms. It can also be easier to deal with one trader than with multiple farm suppliers. On the other hand, some merchants selling organic grain say that the problems are caused by the feed manufacturers' reluctance to give organic farmers in the UK reasonable forward contracts, preferring to take the chance to buy cheaper organic grain on the world market.

Whatever the cause, the extensive use of imported cereals is both a missed opportunity for farmers and for biodiversity and resource use improvements in the UK. In addition, it is inevitably more difficult to ensure provenance and authenticity for crops and products from overseas.

There is support for a move towards organic only mills because it more easily permits the keeping of a wider range of organic raw materials. The danger of the non-organic/organic mill situation is, for many, organics is seen as an 'add-on', with organic bin storage of secondary importance to conventional.

Soya

In almost every respect, soya is a magnificent crop. It has a high and excellent quality protein content for animals and humans, it is leguminous and so can fix its own nitrogen requirements and leave a modest residue for subsequent crops. Livestock systems worldwide have become reliant on soya to ensure good performance, and its very success has become a key part of its problem, in that demand for the crop has led to very damaging land use change, for example in Brazil and Argentina. As demand for meat grows with population growth and improving incomes, so does the march of soya in the regions where it grows most easily.

Despite some attempts to develop strains suited to temperate conditions, soya is rarely grown successfully in the UK, and only moderate amounts are grown in the EU, mostly in Italy and France, and increasingly in Eastern Europe. European non-organic soya trades at a substantial premium, currently £70 to £100/tonne.

As such a major commodity crop, the rewards from genetically modifying soya to secure patents on both seed and pesticides are immense for the biotechnology companies. The widespread use of GM soya poses major problems for organic and non GM soya users, in maintaining the integrity of supplies. This integrity has also been threatened by contamination by melamine in Chinese soya, and although feed importers and manufacturers have tightened further their testing processes, a risk will inevitably remain. The Soil Association's 2007 report 'Silent Invasion: the hidden use of GM in livestock feed' highlighted the increased use of GM in soya and other animal feed.

Despite these issues, most of the large scale organic pig and poultry, and to a lesser extent dairy production, are currently as dependent on soya as the rest of the livestock industry. This dependence has been exacerbated by the loss of synthetic amino acids to the organic movement, in that the use of these allows the use of lower grade protein sources, such as peas and beans, without reduced physical or welfare performance.

However, in the case of organic dairy, productivity and health can be satisfactorily achieved without the use of soya. Research shows soya replacement with other protein sources is possible with no adverse effects on milk yield, composition and body condition. Possible replacements are sunflower, rape, linseed, beans, peas, and vetch; these can provide a more desirable amino acid balance and can be grown in the UK. They can be equally palatable, can be less vulnerable to contamination and can be grown with potentially less environmental impingement. It is contended that 8,000 litres (above the conventional average) is a reasonable expectation for an organic

Issues with key organic feed ingredients

dairy cow; and this can be achieved with good health status without the use of soya. A dietary balance is key.

There is also some evidence to suggest that sunflower meals for poultry and rapeseed for pigs can successfully replace up to 50 per cent of soya requirement in feeds.

Fishmeal

Fishmeal has historically been used as a source of very high quality protein for most livestock species. It is generally used in small quantities in rations for animals at vulnerable or high performance periods of their production cycle; for some animals such as laying hens, this may be for most of their life; for pigs, for a period after weaning only. Since BSE, it has been banned from use in ruminant diets and feed mills handling ruminant diets cannot use fishmeal in their pig and poultry diets due to the risk of cross contamination. In the UK, around 165,000 tonnes of fishmeal are used each year, with 38 per cent of this coming from trimmings from fish used for human consumption.

Organic standards allow the use of fishmeal in monogastric diets, as long as it comes from sustainable fisheries. The EU has recently confirmed that fishmeal will not be deemed an 'agricultural ingredient' which means that it can continue to be used in organic rations, even once diets move to 100 per cent organic, and some fear this may lead to an increase in the use of fishmeal in organic systems.

This is a controversial issue. On the one hand, this ruling allays the fears of the poultry sector in particular, that the move to 100 per cent organic diets would lead to health, welfare and performance problems, in the absence of synthetic amino acids or another source of animal-derived protein, such as meat and bone meal. However, some are concerned that, given the sensitivities and difficulties in ensuring the sustainable sourcing of fishmeal, the parlous state of fisheries worldwide, and the possibility of heavy metal contamination, it would be wrong for the use of fishmeal to increase on the back of this ruling. They suggest that UK certifiers and/or the Government should take a much stronger line and consider banning or limiting its use in organic rations.

The use of fishmeal – from whatever source – ultimately increases the industrial fishing catch and depletes fish stocks. Global catches of wild fish peaked around 1989 and have ever since been in decline. As the influential film 'The End of the Line' highlighted, scientists predict that if we continue fishing as we are now, we will see the end of most seafood by 2048. To prevent this disaster, we need to control fishing by reducing the number of fishing boats across the world, protect large areas of the ocean through a network of marine reserves off limits to fishing, and educate consumers that they have a choice by purchasing fish from independently certified sustainable fisheries. Globally, some 75 per cent of wild marine fish are now said to be either fully-exploited or overfished, according to the United Nations' Food and Agriculture Organisation (UN FAO).

Fisheries targeting species to manufacture fish oil and meal, are referred to as reduction or industrial fisheries. The Marine Conservation Society (MCS) says that fish meal and oil is produced almost exclusively from small, pelagic[10] species, for which there is little or no demand for direct human consumption. The methods of capture are purse-seining[11] and trawling with small mesh nets in the range of 16–32mm. Fish meal and oil is used in the manufacture of pelleted feedstuffs for poultry, pigs and in aquaculture. MCS state 'one of the main impacts associated with industrial fishing is the removal of large quantities of species from the base of the food chain. For example the sandeel fishery in the North Sea, the largest single-species fishery in the area accounting for over 50 per cent by weight of total fish landings, has been implicated in the decline of breeding success in seabirds such as kittiwakes, and reducing food availability for marine mammals and other commercial fish species such as cod and haddock'. So although most industrial fisheries take species not eaten by people, in general they effectively undermine the fish food chain that supports all life in the oceans.

Peas, beans and other pulse crops

Peas and beans are important crops for livestock feed, with the potential to play an even bigger role. Agronomically, they are well suited to the UK climate, and, as leguminous (ie nitrogen fixing) crops, can be a key part of an arable rotation. Organic yields can be the same as non-organic, if weeds are not a major problem.

Issues with key organic feed ingredients

With a protein content of 21 to 25 per cent, double that of cereals and half that of soya, pulse crops can provide for the protein requirements of most ruminant stock within an organic system, but their relatively low levels of some essential amino acids and bioavailability issues means that they have a limited role for pigs and poultry. It is possible to oversupply pulse crops in the diet to get to the required levels of essential amino acids, but this will have adverse effects. First, there are anti-nutritive factors in most pulse crops which may cause ill health in livestock if fed at more than 10 to 20 per cent of the total ration on a dry matter basis. Second, the metabolic and digestive stress of dealing with and excreting excess crude protein can be a health and welfare problem. Third, the resulting manure will contain higher levels of nitrogen and phosphate, considered by policy makers to be environmental contaminants, though organic farmers keen on recycling nutrients via manure, will have a different view.

Some of the issues discussed under the cereal section, of the tendency to rely on world markets for reasons of price or convenience, or poor market information leading to either an over reliance on imports, or, more likely in this case, an avoidance of UK grown pulses by feed manufacturers, are also relevant here.

Farmers may also lack confidence in both growing and using pulse crops in home mixed feed on farm. Peas have a reputation of being difficult to harvest, though this can be overcome by using more erect varieties and/or by growing with a small amount of barley to help the crop stay off the ground. Beans are an open crop in the early stages of growth, and, being late harvested, can allow a build up of weed beneath the canopy, the seed from which can be a problem in subsequent crops.

Lupins and vetch are two other pulse crops which may have a role to play in overcoming some of the problems raised here. Lupin husbandry is on the increase, but the crop still seems unreliable in UK conditions.

Maize

Maize silage can be viewed as almost a cross between a forage and a concentrate feed. Unlike the planting of (nitrogen-fixing) legumes on which most organic systems depend, maize requires high levels of soil fertility and is exhaustive rather than fertility building in the rotation. As a silage, it contains both the mature cob and vegetative material, and thus has a relatively high energy value compared with clover/grass silage or hay, but a lower protein content. Critically, it also has much lower levels of the beneficial fatty acids than clover/grass forage, that lead to the potential human health benefits conveyed by the livestock products fed on clover/grass. The high level of maize in some continental organic dairy systems is likely to be the reason why the potential health benefits from organic dairy products demonstrated in the UK, have not been reliably replicated in all other countries. It also has a lower trace element profile, increasing the need for vitamin and minerals as well as protein supplementation if fed at significant levels in the diet.

Maize is not an easy crop to grow organically in the UK: the seed must be undressed and is therefore very vulnerable to birds pre and early post emergence; it can be hard to keep weeds to tolerable levels; and the UK climate only allows reliable production in the South of the country. It is also known to be strongly attractive to badgers, and this, along with its poor nutritional profile, is thought by some to be one of the factors in the spread of bovine TB. As a grain feed, usually in the form of maize gluten, it has a moderately high protein content at around 21 per cent but with a rather unbalanced amino acid profile it is not suitable for pigs and poultry, and is not widely available organically in any case.

Rapeseed (canola)

The meal of the crop we know as oil seed rape has chemically similar properties to soya, but is less palatable to livestock. The advent of low erucic acid varieties has led to a rapid rise in its use in conventional cattle and to a lesser extent, pig, rations, but very little indeed is grown organically and so the meal is not available to feed, unless grown and processed on farm.

Case studies

Dairy

Ed Goff: Hindford Grange, North West Shropshire

Ed Goff believes that "organic farming is about process not product" and so he farms and feeds his dairy herd based on that principle. Ed rears New Zealand Friesians – 80 milkers and some followers – on his 190 acre farm in Shropshire. The breed does well on a high forage diet, especially summer grazing, which suits his system. He moved to spring calving 10 years ago so he could use more of what he produces on the farm to feed his cattle.

Now 98% of the feed used is produced on farm. He grows 24 acres of triticale (10 acres for wholecrop) and 14 acres of spring beans for feed. This goes towards winter rations of red and white clover silage, which are topped up with a small amount of bought-in concentrate to make up the protein. "I think organic standards should require that 90% of animal feed come off a farm's own holding – it makes sense in terms of feed security and biodiversity. There's no difficulty for the vast majority in growing their own cereals. Grass needs to be reseeded every few years, so why not give it a break for a year?"

Poultry

John Newman: Abbey Home Farm, Gloucestershire

As a small scale mixed system, Abbey Home Farm is well suited to on-farm production of feed. Of the 650 hectares, about half is under arable production – with the rest given over to raising chickens, pigs and ruminants as well as horticulture. The farm keeps 350 laying hens, a mix of Black Rocks, Silver Links and Redco, and 700 or so Ross Cross Hubbard broilers (raised for meat production). The breed used has stayed the same throughout the changes in feeding systems that they started in October 2009 and John says that contrary to the advice of many, they have adapted well to change. "When I first started looking into different feed options, several nutritionists said a new system wouldn't work. There is an impression that you have to be very exact when feeding monogastrics (chicken and pigs) – but they are more adaptable than you think."

After seeking independent advice they have found a workable solution. All the chickens are fed the same ration of 50% cereal from the farm (made up of 50% whole grain triticale or buckwheat and 50% rolled cereal) and 50% imported protein balancer. The system is better aligned with the organic principle of avoiding external inputs and it has worked out a lot cheaper – the new ration costs £100 less per tonne. John admits that thinking outside the box can be daunting. "Forward planning is essential, you need to get your infrastructure right. But it isn't as bad as you think it is going to be."

Beef and sheep

Adrian Dolby: Barrington Park Estate, Oxfordshire

Barrington Park Estate comprises over 3,000 hectares of land, of which 2,600 hectares is in an arable rotation and 400 hectares are under permanent pasture. The farm is home to 100 Angus cross South Devon suckler cows, a flock of 2,500 Lleyn ewes, and a flock of 8,600 chickens. The estate is dedicated to supplying local markets – and to on-farm production of feed. After they expanded their flock of sheep in 2005, and reviewed their production costs, an extensive system of management was seen as the best way forward. No concentrate or external forage is fed to ewes or lambs – the lambs, born in May, are reared outdoors entirely on clover leys, with ewes only grazing permanent pasture between weaning and lambing.

Adrian Dolby believes there is no justification for use of concentrate feed in a lowland flock, even with better lamb prices. "The cost of these leys may seem high at £80–£120 per hectare but such an investment is providing an excellent return in earlier lamb sales. The sheep receive no grain, the grassland receives no fertiliser. This is an efficient process of converting forage into meat."

The farm follows the same principles when it comes to feeding their cattle. The suckler cows calve in April with cows and calves turned out to grass within 24 hours of calving. Cows are housed from November and fed barley straw with silage introduced two to three weeks prior to calving with the cows being grouped according to their condition score.

Conclusions and recommendations

The Soil Association believes that there a number of important questions about organic animal feed that deserve debate among all those involved in organic meat and dairy production, processing, retailing and consumption.

Those raised in this paper include:

- How can we slow the trend on some organic farms towards greater use of grain and protein-based animal diets and maize silage?
- All farm animals could be doing more to help us store carbon in grassland soils, recycling our waste food, providing nutrients to grow our crops; organic farming's reliance on grazing and outdoor systems gives us a head start, but is there more we could do?
- Of the current ingredients in animal feed, soya production in particular drives rainforest and grassland destruction – so is there more we can do to ensure that organic soya continues to be sourced from countries where these problems do not arise, or to reduce soya use?
- Wherever soya is sourced from, GM soya poses major problems for organic and non GM soya users, in maintaining the integrity of supplies. This integrity has also been threatened by contamination by melamine in Chinese organic soya – so do we need to do more to ensure the integrity of organic soya?
- Scientific evidence to show that beef and dairy cattle fed on entirely or mainly grass and conserved grass produce meat and dairy products of a better nutritional quality than those fed on grains and protein, or from the increasingly popular (among non-organic farmers) maize silage. Do we need to do more to maintain this key difference by ensuring a higher use of grass and conserved grass, and not move to use maize silage, in organic systems?
- Pigs and poultry require high quality protein, especially key amino acids – so is there more we can do to ensure organic diets continue to meet their needs?
- Wheat, barley, oats, triticale and by products from flour milling or brewing, are all readily available from UK sources, but imported grains are frequently used. How can we change this?
- The EU decision that fishmeal will not be deemed an 'agricultural ingredient' may lead to an increase in the use of fishmeal in organic feeds; while the availability of fishmeal means that 100 per cent organic diets will not lead to health, welfare and performance problems for pigs and poultry, there is concern that despite the difficulty of ensuring that fishmeal comes from truly sustainable sources, the use of fishmeal in organic animal feed may increase
- Is there more we can do to encourage the use of other UK crops, like lupins and vetch, which may have a role to play in some of the problems raised here?

Conclusions and recommendations

What can we do?

The Soil Association welcomes comments and criticisms of this paper. We think that there is more we could do to help, and some possibilities are listed below.

Advice and support

- Provide better market information and/or encourage others e.g. co-operatives to make the most of UK sourced material.
- Technical support for farmers growing peas and beans and novel protein crops.
- Spread best practice in producing organic animals without the use of soya and maize, through good use of forage and pulses.

Market measures

- Encourage some companies and co-operatives to acts as pioneers in terms of UK sourcing, moving away from soya, and using only soya sourced in the EU. There could be market advantage for feed manufacturers as well as processors and retailers. The Soil Association could support and publicise those that take early proactive action.
- Establish and promote the health benefits of grass/clover only fed ruminant meat and dairy.

Lobbying

- Encourage a review of the ban on swill feeding, at least at the small, local scale.

Standards

- Consider, after further public consultation, raising Soil Association standards on key issues, for example on the proportion of home-grown feed that needs to come from the farm or linked farms, and on the use of fishmeal.
- Introduce rules on feed sourcing, for example on sustainable soya, not from South America.
- Consider raising the forage component of ruminant diets, to 70 or 80 per cent.
- Consider the phasing out of maize in ruminant diets.

Of course, any changes to our standards require considerable deliberation and consultation, and would go through the normal consultation processes, and consideration by our expert committees and independent Standards Board.

While acknowledging there are some shortcomings in organic production in regard to sustainable feed supplies. No system of farming has higher levels of animal welfare standards than organic farms working to Soil Association standards. For biodiversity, a 2005 review found that on average there is 50 per cent more wildlife on organic farms than on non-organic farms, and for the climate a recent study found that organic arable farming practices produce 28 per cent higher soil carbon levels than non-organic farming in Northern Europe, and 20 per cent for all countries studied.[12] The aim of this paper is to promote a discussion about possible improvements to organic production in the UK in terms of animal feed with the aim of producing further climate- and animal-friendly outcomes.

Endnotes

1 World Resources Institute: Earth trends Meat Consumption per capita (earthtrends.wri.org/searchable_db/index.php?step=countries&cID%5B%5D=189&theme=8&variable_ID=193&action=select_years)

2 Chairman, IPCC, Director-General, TERI, London, 8 September 2008 (http://www.ciwf.org.uk/includes/documents/cm_docs/2008/l/london_08sept08.pps#1)

3 http://www.defra.gov.uk/foodfarm/farmanimal/diseases/atoz/bse/science-research/cattle/bse-origin.htm

4 FAO (2006), 'Livestock's long shadow – Environmental Issues and Options', FAO, Rome, Italy: as quoted in Garnett T (2009), 'Livestock-related greenhouse gas emissions: impacts and options for policy makers', Environmental Science and Policy, P494

5 'What's feeding our food? The environmental and social impacts of the livestock sector', Friends of the Earth, December 2008 (www.foe.co.uk/resource/briefings/livestock_impacts.pdf)

6 Van Gelder *et al*, 'Soy consumption for feed and fuel in the European Union, October 2008 (from: www.foe.co.uk/resource/briefings/livestock_impacts.pdf)

7 'What's feeding our food? The environmental and social impacts of the livestock sector', Friends of the Earth, December 2008 (www.foe.co.uk/resource/briefings/livestock_impacts.pdf)

8 Defra (2009), 'Agriculture in the United Kingdom' (page 105) (http://www.defra.gov.uk/evidence/statistics/foodfarm/general/auk/latest/documents/AUK-2009.pdf)

9 John E. Hermansen, Vivi Aarestrup Larsen, Bent Hindrup Andersen (2002), 'Development of organic pig production systems' (http://orgprints.org/197/1/Microsoft_Word_-_Organic_pig_production_systems_UK.pdf)

10 Pelagic fish often occupy the open waters between the coast and the edge of the continental shelf in depths of 20–400 metres. These areas are highly productive and supply nutrients for the growth of plankton which forms the food for the smaller pelagic species. They include the highly migratory species of tuna, herring and mackerel, and smaller species such sardines and anchovy (http://www.marlab.ac.uk/Delivery/standalone.aspx?contentid=314)

11 Purse seining is a type of fishing in which a long rectangular net with a weighted bottom edge and a buoyant top, floated by the cork line, is run around a school of fish to contain it

12 Soil Association (2009), 'Soil Carbon and organic farming: A review of the evidence of agriculture's potential to combat climate change' (http://www.soilassociation.org/LinkClick.aspx?fileticket=BVTfaXnaQYc%3d&tabid=574)

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