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The Fiddling Standards Agency

That excellent organisation GM Freeze recently found the presence of unapproved and therefore illegal GM contamination in a loaf of bread purchased at a Marks & Spencer's shop. The discovery wasn't too surprising as the material has also been found in various other European countries this year.

What should have been surprising but wasn't, is that the organisation responsible for monitoring, alerting and regulating such contamination in the UK, did not know about the incident and when they found out did nothing; no action; no press release and no "Food Alert" to warn companies or the public that an illegal substance was abroad in the supply chain.

The increasingly inappropriately named Food Standards Agency might have been taking a lead from their senior partner in maladministration, the European FSA, who also failed to find and act on the contamination. Though that's hardly an excuse, especially as the material in question – Canadian GM Flax seed called Triffid (it's not known if the name is ironic, in bad taste, or God help us, aspirational) – was deregistered with all stocks supposedly destroyed in 2001.

The FSA's failure to detect contamination and alert all stakeholders has happened before. Between 2005 and 2008 similar incidents occurred with Maize and Long Grain Rice. In the later case the FSA was criticised in a High Court judgement for its failure to issue alerts to local authorities and the public. It obviously regards itself above such things.

We regularly receive glossy publications from the FSA telling us what a good job it is doing. A recent one highlights its forthcoming attempt to "do something about" the public's perception of GM. I'm not sure what the correct word is – evaluate, analyse, modify, manipulate, fiddle?

Meanwhile its failure to fulfil its obligations to prevent GM contamination of the food chain and to alert stakeholders including the public when it happens is literally glossed over. The FSA's birth, at the start of the new Labour era, was accompanied by a great deal of goodwill, much of which has been squandered. Its role was to provide effective and impartial regulation; it was not supposed to promote some and imperiously fiddle around others.

Lawrence Woodward

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The Day (or is it years?) of the Triffid

Pete Riley, Campaign Director of GM Freeze, reports on the latest incident in the spread of GM contamination and highlights the failure of the Food Standards Agency to act.

Products containing flax seed have been found to be contaminated with an unapproved and illegal GM trait in 36 countries this autumn.

GM Freeze has confirmed its presence in the UK in a loaf of bread purchased at Marks & Spencer. Despite this, the Food Standards Agency (FSA) has refused to issue an official Food Alert informing UK food businesses of the need to monitor their supplies. Nor has it sent out reminders that it is illegal to sell even trace levels of GM material not approved in the EU.

The doctrine of Substantial Equivalence; "triffic" or horrific?

The original source of the contamination has been traced to Canada and a variety of GM flax disturbingly named CDC Triffid. This was approved for commercial use in 1998 and was grown on a limited scale until 2001 when it was deregistered. The same flax was approved in the USA but subsequently cultivation was also halted there. Remaining stocks were supposed to have been destroyed but apparently not all were.

As with all GM applications in North America, Triffid made it onto the approved list with the minimum of safety data assessment because it was declared "substantially equivalent" to other non-GM flax varieties, apart, of course, from the GM protein which was deemed to be safe.

Thus there is little information on the food safety of Triffid. However the GM construct in Triffid includes antibiotic resistance genes used as markers for ampicillin, streptomycin and kanamycin. The presence of these resistance genes precludes approval in the EU because of the increased risk of the genes jumping into pathogenic bacterium and concerns over the development of antibiotic resistance.

The FSA's Minimalist GM Policy

Despite these facts and very real concerns the FSA has maintained its "do nothing about GM" policy and has not sent out any notices or alerts that this unapproved, illegal and potentially hazardous material is in the UK and EU food chain.

This response from the FSA is in line with its reactions to previous GM contamination incidents involving Maize (Bt10) and Long Grain Rice (LL601 and Bt63) in 2005-08. All these incidents have a number of things in common;

- The GM traits were unapproved.
- The true cause of the contamination was not known.
- Contamination was only detected after the ingredients had entered the food chain.
- There was a dearth of data on the safety of each crop.
- Contamination occurred after the GM crop was developed and had ceased being tested outdoors.
- The FSA failed to issue a Food Alert in the early stages to ensure that companies could clean-up their supply chain as swiftly as possible.

FSA indolence over LL601 rice led to a judicial review brought by Friends of the Earth. The judgement highlighted several failings in the way they handled the incident. These were;

- Failure to issue any Food Alerts to local authorities.
- Failure to notify the public of which batches of rice were contaminated.
- Failure to provide legal guidance to local authorities at the start of the incident.

Keeping GM Out of the Food Chain

In a 2007 report, GM Freeze highlighted the risk of GM contamination in flax from Canada and called upon regulators to prevent GM contaminated cargoes leaving ports of entry by instigating rigorous monitoring for GM prior to unloading. This is the most cost effective approach because once cargoes are split up monitoring and control costs escalate.

Despite this and an internal review of the LL601 rice incident, the FSA has again been found wanting. GM Freeze is calling for a Parliamentary Committee to scrutinise the FSA's performance on a regular basis.

Finding something that was withdrawn from the market and supposedly destroyed in 2001 spreading through the EU food system in 2009 should cause great concern in the FSA, government circles, the retailers and the media. That it hasn't is a massive dereliction of duty.

FSA GM process accused of negligence

The Advisory Committee on Novel Foods and Processes (ACNFP) which is based at the FSA and is its "scientific watchdog" on risks associated with GM crops and foods has been accused of negligence by GM-Free Cymru.

In a letter to the ACNFP, Dr Brian John highlights three examples where they have failed to examine new evidence relating to the health risks posed by GM crops. He asks for "careful consideration" of this evidence and the publication "without delay" of "fully reasoned and scientifically based responses"

One example relates to three varieties of Maize (MON810, MON863, NK 603) where French researchers discovered adverse health effects during 90 day animal feeding trials. They found that all three "contain novel pesticide residues that will be present in food and feed and may pose grave health risks to those consuming them".

See: Vendômois JS, Roullier F, Cellier D, Séralini GE. A Comparison of the Effects of Three GM Corn Varieties on Mammalian Health. Int J Biol Sci 2009; 5:706-726. http://www.biolsci.org/v05p0706.htm and http://www.gmfreecymru.org/news/Press_Notice14Dec2009.htm

Is the GM Plaster coming unstuck?

As the UK government supported by vested interests in the scientific establishment and a supine media push GM, there are signs that flaws in the technology and its application are beginning to emerge. GM has been called a "sticking plaster" approach. Prof. Dr. Hardy Vogtmann and Lawrence Woodward look at where the plaster might be coming unstuck.

The most extensively used herbicide worldwide is Roundup. Developed and owned by Monsanto, crops tolerant to Roundup (Roundup Ready) dominate the GM market. Roundup is critical to Monsanto, accounting for some 48% of its total corporate sales and it could be argued that the company's efforts to protect its business following the expiry of its patent on Glyphosate (the active ingredient in Roundup) in 2000 has shaped and powered the development of GM cropping to date.

It might be a little flippant but essentially correct to note that this technology, which it is now claimed was developed to save the world from hunger, primarily came about to be a sticking plaster to cover the financial problems of one relatively small company.

Originally, Glyphosate was launched as "once in a lifetime" herbicide; it was claimed to be biodegradable and therefore safe to the environment, animals and humans. Furthermore, it was argued that because its action killed the whole plant systemically weeds would not develop resistance.

In fact problems with Glyphosate began to emerge quickly. During the early eighties researchers began to discover problems when it was used in and around watercourses. Prof. Kickuth at the University of Kassel in Germany found a decline in trout populations in river eco-systems when Roundup was used.

He discovered that even in trace amounts it functioned like a sex-hormone substance for fresh water shrimp; irritating the male shrimp and thereby preventing reproduction. Consequently the main food chain for trout was broken and the population significantly reduced. The discovery of such indirect ecological effects led to the prohibition in the use of Roundup in water eco-systems. (1)

Nonetheless such early warnings of problems with Glyphosate were generally ignored and sales of Roundup went from strength to strength. Using tactics that many people think are miles away from any notion of "responsible capitalism" and a greasy-slick PR/lobbying operation Monsanto overcame its patent problems and Roundup based systems dominate the GM cropping industry.

But just when it seems some regulatory authorities in Europe may be giving in, are things beginning to come unstuck for Monsanto and the other GM companies? A number of things are emerging to encourage that thought.

First of all, evidence of health risks are now coming to light. For example, a recent French study has shown that liver cells of humans are significantly damaged by Roundup herbicides even when the herbicide is at levels well below the legally maximum tolerated level for food and animal feedstuffs.

The researchers also discovered defects on the genetic disposition of these cells and their hormone metabolism.(2)

Weed resistance to herbicides, including Roundup, is developing dramatically in GM cropping systems. There are now 16 weed biotypes around the world resistant to Roundup and in response farmers are using more herbicides.(3)

United States Department of Agriculture figures show that since 1996 the rate of application of Glyphosate per crop year in the US has increased three fold on cotton, doubled for soybean and increased by 39% in the case of corn (Maize).(4)

Added to this there is growing disquiet about the tactics of Monsanto and other GM companies which aim to bind farmers to them in a dependant relationship; using contracts, legal challenges, and the manipulation of supply chains from the control of seeds through to centralised storage and logistics. Social and environmental lawyers are examining ways these can be challenged.(5)

Adding the health, environmental and social factors together, some are even demanding a preliminary total prohibition of glyphosate not just in GM cropping.

If the plaster gets picked at enough we might yet see the true extent of the sore beneath.

References:

(1) Kickuth, R (1982). Ökotoxikologische Probleme bei der Anwendung von Pestiziden. In: Die ökologische Landwirtschaft, pages 89-99. C.F. Müller Verlag, Karlsruhe.

(2) Celine Gasier, Coralie Dumont, Nora Benachour, Emilie Clair, Marie-Christine Chagnon and Gille-Eric Seralini (2009): Glyphostate-based herbicides are toxic and endocrine discruptors in human cells. In Toxicology, Volume 262, Issue August 3rd, 2009, pages 184-191.

(3) Resistance is Growing GM herbicide tolerant crops and resistance in weeds www.gmfreeze.org

(4) Impacts of Genetically Engineered Crops on Pesticide Use in the United States: The First Thirteen Years. www.organic-center.org

(5) www.aadeaa.org.ar

Resources

The following websites are worth looking at for information on GM research and regulations

- www.gmfreeze.org
- www.organic-center.org
- www.gmfreecymru.org

Sustainable organic OAT systems links to coping with climate stress

The Organic Research Centre has been the organic partner in the OatLINK project. Overall, this four year project - led by IBERS Aberystwyth - was designed to incorporate important traits into the oat crop through combining 'conventional' phenotypic selection with molecular marker technologies. Key traits of oats for human consumption and poultry feed were focused on to meet the needs of millers and the poultry industry within sustainable agriculture systems, including organic production. The project was sponsored by Defra and SEERAD under the Sustainable Arable LINK programme.

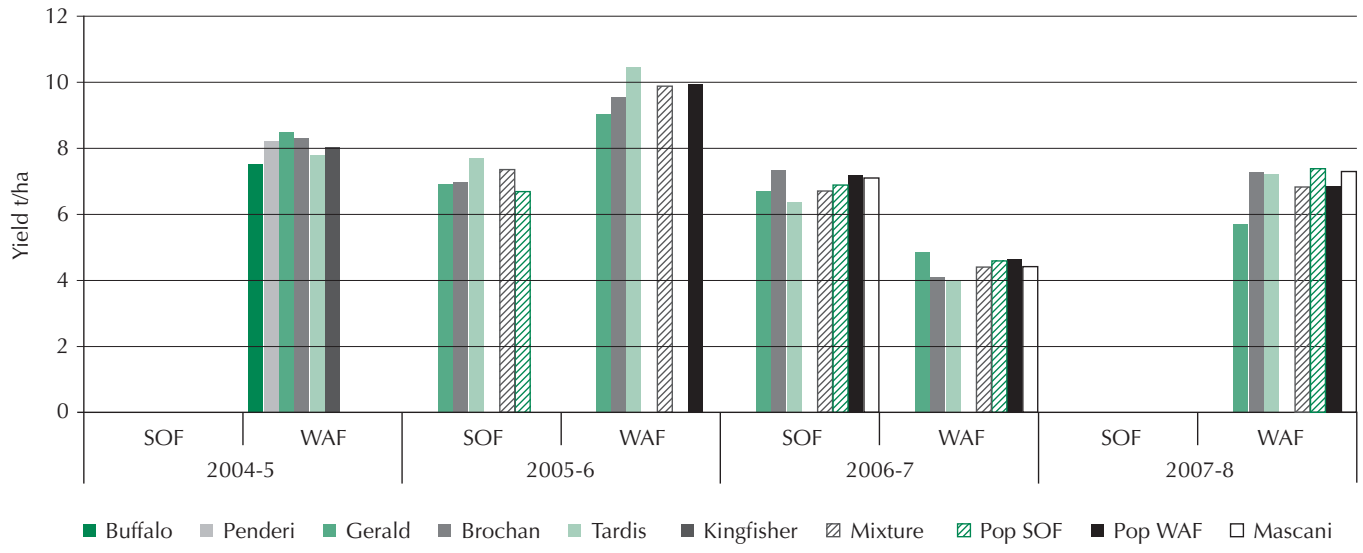
At the outset of OatLINK the research team acknowledged that the emphasis of breeding objectives for oats in organic systems are likely to be different from those for oats in conventional systems. Oats are the preferred second cereal in an organic rotation, but economic performance and performance as a source of on-farm feed needs improving. Moreover, agronomic performance in organic rotations may be improved by selecting oat types that are well-suited to the requirements of second cereals in organic systems. Grain quality requirements are similar or the same in both systems, whilst for organic producers in particular, straw is a useful product in their mixed farming systems.

After four years of field trials and extensive statistical analysis, the project concluded;

- That there was a similar performance between both older and more modern varieties of oats within organic farming systems.
- Variety mixtures, either two or three-way, generally performed better than the sum of their component varieties would have indicated and this method of production for organic farmers could be one promising route for the future. Populations of husked oats were grown over three seasons on two sites and showed similar results to the mixtures.
- Crucially for organic arable system design, the position in the rotation from 1st to 2nd cereal showed that oats perform well in a second cereal position albeit with a small loss of yield compared to a 1st cereal position. This loss of yield is probably not significant at a farm level for husked oats but the yield depression is large for naked oats and may be important in this already lower yielding crop.
- Crop yields varied greatly between years and between sites for both husked and naked oats. Generally it was found that the shorter straw varieties yielded less than taller ones and it is suggested this could be due to weed competition. As a result these varieties were generally removed from the later trial years. The full data set was collected from a range of agronomic assessments with some - but inconsistent differences - found in such factors as crop establishment, Leaf Area Index and yield.
- New lines of husked oats were trialled and although the collected data was limited they appear to show promise with indications that they will perform as well as - or better than - current varieties.
- One area of disappointment was in undersowing. The sowing of oats with an undersown legume (in this case clover) was not successful, with the clover failing to establish in three out of four trials. Where it did establish the benefits were limited.

It should be noted that all the trials within the organic element of the OatLINK project were sited on working organic farms

Figure 1: The yields of the varieties and mixtures of Husked Oats trialled over the project on the organic sites.



and undertaken within a fully functioning organic rotation. The loss of a number of trials and the variability amongst others clearly demonstrates some of the problems that are experienced when working within an environment where factors such as weeds and fertility cannot be easily standardised and controlled.

Overall yields of Oats

Over the four trial years of the project, a number of old and new varieties were trialled. A small number of trials were lost due to bird damage or weed infestation. Performance between sites and over years varied.

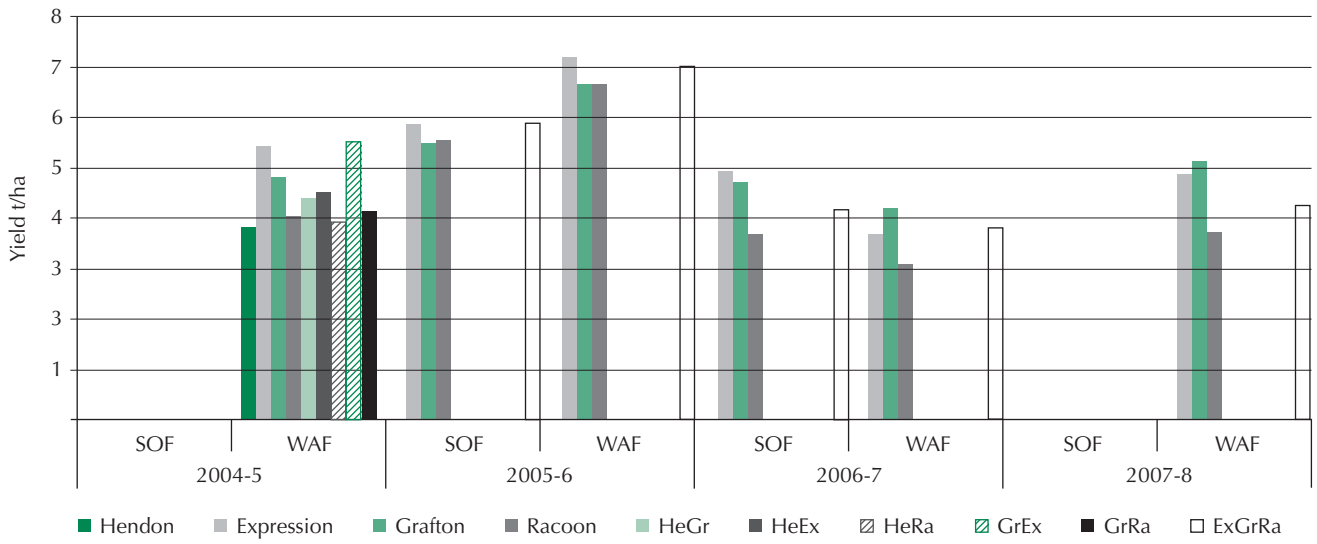
A range of agronomic assessments were undertaken throughout the growing season including emergence, establishment, plant survival, crop cover, leaf area index, weeds, disease with others taken at and post - harvest.

An overview of the trials of Husked Oats can be seen in Figure 1(page 4). There was variation over years of the project and between the two sites with yields ranging from over 10t ha-1 down to 4t ha-1. No single variety performed significantly better over the period. But Brochan, Tardis and Gerald all performed well.

Although Oats are generally grown as a second cereal within organic rotations in the UK the project looked at the possibilities of positioning them as a first cereal. This provides an indication of the crops potential.

Naked oats yielded less than husked varieties, as would be expected, with a yield range across years and sites of over 7t ha-1 to around 3t ha-1. No specific variety stood out from the rest but Expression, Grafton and Racoon all performed well. (Figure 2).

Figure 2: Mean yields (t ha-1 at 15% moisture content) of naked oat varieties grown as 1st cereals in organic trials at SOF in Berkshire and WAF in Suffolk.



Mixtures, populations and breeding line performance.

Yields of 1st cereal mixtures of oats were also assessed. They included two-way and three-way mixtures of both husked and naked oats. The more comprehensive trials were with the three-way naked oat mixture.

Yields were generally higher than those expected from the predicted yields from the component varieties. This could be due to a number of factors but the mixtures had less disease than the average of its component varieties (18% in 2006/07 and 25% in 2005/06).

Populations of husked oats were grown on both trial sites. These populations were grown for three years and showed a consistent performance during the trials with yields generally on the higher side.

A number of breeding lines were introduced throughout the project. Tardis and Brochan both entered the trials as lines but were subsequently named. Other Husked Oat lines were trialled (00-186ACn13, 01-47ACn9, 01-03ACn4 and 00-01Cn2).

There is limited data but these lines do look promising with performance and yields being greater or similar to the best of the current varieties.

Position in rotation

Trials were established as both second and first cereals in the rotation. The difference in performance can be seen in Figures 3 and 4 (page 6).

The average yields of the husked and naked varieties as a second cereal were 97 % and 81 %, respectively, of the first cereal yields. The rankings of the varieties were similar in both rotational positions with the husked varieties Tardis and Mascani, and the naked varieties Expression and Grafton yielding well. Mixtures generally yielded similarly to the means of component varieties but the husked and naked mixtures had 18 % and 12 % less disease, respectively, than the average of the component varieties.

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With Climate Change in Mind

One of the most important observations to come out of the project is that good organic oat varieties produce stable and high yields under stressed (or non-optimal) conditions. Stress conditions are dynamic within and between seasons but include nutrient resource and weed competition variables, which interact with other stress factors such as lack of rainfall.

Figure 3: Husked Oats – Rotational Position

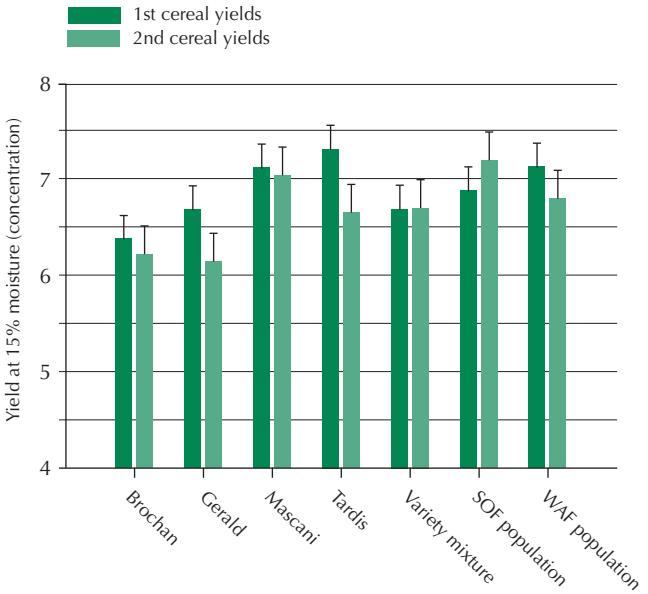
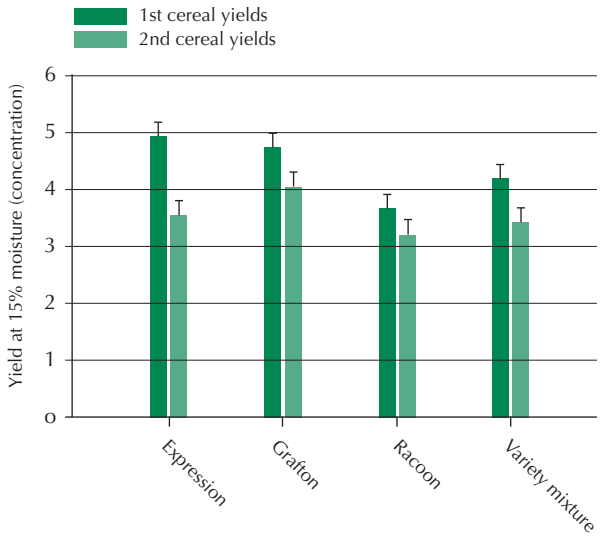


Figure 4: Naked Oats – Rotational Position



In a possible future scenario where oil based agro-chemical inputs are scarce and there are more volatile climatic conditions, crops and cropping systems that provide stable agronomic performance under stress or non-optimal conditions may be far more important than they are now.

Making on-farm anaerobic digestion a realistic option

A lot is heard these days about anaerobic digestion (AD) with coverage everywhere from the Archers to Defra to the farming press and back to the BBC. But the real costs and benefits remain somewhat obscure and mirage-like. ORC researcher Laurence Smith outlines the current situation and the prospects in 2010.

AD is not a new technology, it has been used in this country since the 1800s, and is a common feature of sewage processing plants. The process itself is very simple; biodegradable material is placed inside a sealed, gas tight container. Naturally occurring micro-organisms then digest this material, releasing methane which can be burnt for heating or cooking purposes or used in a gas engine to provide electricity and heat.

As the methane is captured and burnt, instead of being released to atmosphere, AD can help reduce fossil fuel use and greenhouse gas emissions. An added benefit is that the material left at the end of the digestion process (the digestate) can be used as a fertilizer and soil conditioner.

Farmers can create an income source from heat and electricity sales and also from gate fees for material such as food waste brought onto the farm to be digested.

Studies have also shown that the increased nitrogen availability of digested slurry can help to reduce leaching by encouraging plant uptake.

So does it make sense to invest in this technology? As usual the answer is not simple. Most systems that are currently on the market are aimed at larger farms and waste management facilities. These cost at least £250,000 and up to £1 million or more. Banks are understandably taking a cautious approach and for AD plants accepting food waste they will typically expect a unit to have secured a long-term contract with a waste supplier. Some banks will also want to ensure the unit is generating a pre-determined amount of gas per year.

Slurry based systems are much simpler and cheaper in terms of required investment, but without gate fees, it is more difficult to achieve payback. For an average sized dairy herd in the UK (112 cows) producing biogas from cattle slurry would generate an income of £8-9000 per annum. As the current price of digesters for a herd this size is in excess of £80,000 this is not an overwhelmingly attractive option.

Supplementing slurry based systems with crops grown specifically for AD can boost gas yield.

This raises issues about food versus energy production in the long term but there are land use approaches where this conflict does not apply; for example, utilizing grass/clover leys in stockless organic rotations comes to mind.

Renewable Obligation Certificates (ROCs) introduced in 2002, are helping to increase the viability of AD at all scales. These Certificates are provided to renewable energy generators for each mega-Watt-hour of electricity they produce. The certificates can then be sold to electricity suppliers who must accumulate a certain number of ROCs to meet their Renewables Obligation (RO) or pay a fine.

However, the amount paid for a ROC can fluctuate according to market demand for electricity and the total amount of fines paid.

Feed in Tariffs (FITs), planned for introduction in April 2010, aim to increase the uptake of small-scale renewable generation and help overcome the complexity, and lack of price certainty associated with ROCs. The mechanism provides renewable generators with a 20 year guaranteed per unit support payments (p/kWh) for electricity generation, and avoids the need for smaller scale generators to get involved in trading in the energy market.

Of course another way to make this technology more attractive would be to reduce the cost. There is a real gap in the market for a smaller scale, more affordable anaerobic digestion systems. The technology does exist (see picture) but it needs more development.

The Organic Research Centre is currently in communication with a number of organisations who are trying to address this and we hope to be able to report on these developments in the near future.

Small anaerobic digester on Trevor Lea's organic dairy farm in Wales. The biogas is used to supply hot water to the milking parlour, dairy and farmhouse.

Homoeopathy results that demand attention

Since 2001 Homoeopathy at Wellie Level (HAWL) has been at the forefront of training farmers in the use of homoeopathy. Courses are designed to equip farmers to incorporate classical homoeopathic methods in to daily farm management. HAWL organiser Chris Lees has been following up the impact these courses have had on actual farm practice. Here, she reports on a recent survey she has carried out.

While on one hand there is much debate about homoeopathy generally, and its use in food producing animals specifically; on the other there is anxiety about increased food chain contamination and antibiotic resistance. Homoeopathy is often recommended but little research has been done to investigate how and with what knowledge farmers use it or their perception of its effect.

Homoeopathy At Wellie Level (HAWL) organises a three day teaching course, run over three months, offering interested farmers a basic understanding of the responsible use of homoeopathy as part of their management programme. Between 2001 and 2009 nearly 300 farmers have completed these courses.

HAWL courses are based on Classical Homoeopathy and demand a very different way of looking at a patient, described in farming terms as looking at the beast not the bug. Effective homoeopathic practice is dependent upon applying homoeopathic principles which can be summarized as follows.

1. Like cures like (symptoms of the remedy must match symptoms of the patient).
2. Totality of the case, (everything about the animal, its history its surroundings and its reactions to all these).
3. Minimum dose (the least necessary to effect a cure).
4. One remedy at a time.
5. Vital force (the ability of the body to heal its self).
6. Susceptibility (to stresses, what affects one another will not notice).
7. Obstacles to cure (maintaining causes removed where possible).
8. Direction of cure. (Follows Herrings Law, indicates if you are on the right track).

To find out if these methodologies of classical homoeopathy can be incorporated into daily farm use and the effect of this on general animal health, information was collected, by questionnaire, from thirty five farmers (organic and conventional) who had all attended a HAWL three day basic training course. No distinction was made as to individual farm size or enterprise.

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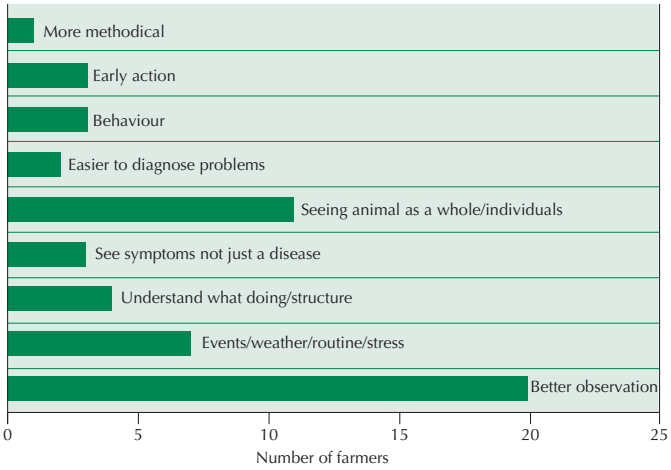
The general feeling of the farmers was that they used homoeopathy as a management tool, that they had found it improved their observation and consequently the way they handled their animals generally, they observed animal health to have improved and individual remedies to have had an effect. (Figure 1).

Figure 1. Farmer description of how HAWL courses changed the way they looked at their animals.



All said that they were now able to be more pro active and felt considerable satisfaction.

16 farmers offered comparative farm figures before and after taking the course most showing some improvement in cell count, antibiotic use, vet costs, culling rates, calving interval and lambing percentage.

Table 1 summarises the reported improvements.

Although from a very small sample these results are notable with some very interesting figures behind them. For example Table 2 provides more information in the improvement in "Vet and Med" costs.

The whole premise of HAWL is that learning and using the principles of homoeopathy will help the farmer to improve farm animal health. The responses of this small study would indicate that farmers have found this to be so and that the approach of classical homoeopathy can be part of daily farm management.

From an agricultural point of view this pilot study seems to confirm that improvement in farm animal health can be achieved by farmer's who understand and apply classical homoeopathy.

From a homoeopathic point of view it shows that farmers who have had a basic training in classical homoeopathy

a) are able to use this methodology and

b) do feel it can improve animal health.

Further training for farmers rather than further research into farm homoeopathy would seem to be an effective way of increasing understanding and effectiveness of homoeopathy on the farm.

To obtain further information on this study or about the HAWL courses contact Chris Lees on chris@hawl.co.uk or visit www.hawl.co.uk.

Table 1. Summary of reported changes following HAWL course.

Farm Ref	1	4	5	7	11	12	14	15	17	19	23	24	25	27	29	35
Enterprise	D	DB	M	D	DB	M	M	D	DB	M	D	M	BS	S	D	S
Org/Conven.	C	O	O	O	O	C	O	O	O	O	O	O	O	O	O	O
SCC	‡	‡	‡	‡	‡			‡	‡		‡	‡			××	
Cull %	‡		‡	‡	‡	==	‡	‡	‡			==			==	
Vet/ Med	‡		‡	‡	‡	‡		××^	‡	××		××*		‡		‡
Antibiot		‡	‡	‡	‡	‡	‡	‡	‡			?	‡	‡		‡
Calf int	‡	××	‡	‡			‡	××	‡		‡	××	‡			
Lamb %			‡			‡							==			‡

Key.
O: Organic
C: conventional
D: Dairy

DB: Dairy and Beef
M: Mixed.
BS: Beef and Sheep.

Empty cell means figures not given.
‡: Improvement.
××: No improvement or worse.
==: No Change.

° Excluding TB
* increased vaccinations.
^ Increased PD.

Table 2. Reported vet and med costs (£ per cow or total annual bill).

Farm	1	5	7	11	12	15	17	19	24	27	35	Yes	No
Pre	30pc		50	25			1500	High	5000				
Post	22pc	Less	30	27*	Less	Up^	450	high	6000*	Less	Less		
Imp	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes	Yes	8	3

* Increased vaccination costs.

Can food production ever really be reconciled with the protection of biodiversity?

Is it possible to balance the need for increased food production with the maintenance and restoration of farmland biodiversity? These are amongst the key land use questions of our time and they will become sharper as climate change intensifies and natural resources are put under increasing stress. ORC's Agro-forestry researcher, Dr Jo Smith, examines these and other key questions.

Room for wildlife?

The FAO predicts a doubling in demand for food, feed and fibre to meet the needs of a growing world population. A major concern is that this will put greater pressure on marginal land and protected habitats, plus intensify existing agricultural practices. The impact of the last 50 years of agricultural intensification on biodiversity and the environment has been well documented (Donald, Green and Heath 2001, Robinson and Sutherland 2002, Skinner et al. 1997). Many species once common in farmland are now threatened or rare, with spatial, temporal and technical intensification leaving little 'space' for wildlife. For those species with specific habitat requirements, protected habitats such as native woodland and wetlands are needed, but these are often isolated within the agricultural matrix with little connectivity between patches.

Should food production and nature conservation be geographically integrated or segregated?

While the biodiversity benefits of alternative agricultural practices such as organic farming are widely accepted (Fuller et al. 2005, Hole et al. 2005), several authors believe that lower yields from these systems compared to conventional, high input systems lead to a trade-off between food production and nature conservation (Gabriel et al. 2009, Green et al. 2005). Green et al (2005) identifies two alternative management strategies for conservation of biodiversity; 'land-sharing' (biodiversity managed on agricultural land; organic farming falls under this approach) or 'land-sparing' (biodiversity managed on areas separate from agricultural land).

The 'best' strategy depends on the balance between a species population size and farming intensity, so that if a slight decrease in farming intensity (and subsequent drop in productivity) causes a considerable increase in population size, land-sharing is the optimal strategy. Conversely, if a large decrease in intensity resulted in minimal population gains, land-sparing is the best option.

Biodiversity and ecosystem services

This 'land-sparing' approach is alarming for several reasons; in particular, it fails to recognise that biodiversity is an integral part of the agro-ecosystem (and surrounding ecosystems). If we promote separation of 'biodiversity' and 'production' into different areas of the country, as increasing fuel and agro-chemical costs necessitate a move from high intensity towards low-input farming, the lack of a biodiverse agroecosystem structure will impact future food production.

Biodiversity has a key role in the delivery of many essential 'ecosystem services' – ecological processes that sustain human well-being. Four classes of ecosystem services have been identified (Kremen and Ostfield 2005):

Provisioning services – the production of food, fibre, fuel, genetic resources, biochemicals, natural medicines, pharmaceuticals, ornamental resources and fresh water from ecosystems.

Regulating services - including air quality regulation, climate regulation, flood control, water quality and pest regulation.

Supporting services - services that are necessary for the production of all other ecosystem services including soil formation, photosynthesis, primary production and nutrient cycling.

Cultural services – aesthetic, spiritual and recreational benefits

Recent work by researchers in New Zealand quantified the economic value of ecosystem services provided by organic and conventional arable systems, and found that the total economic values of ecosystem services in organic fields were considerably higher than in conventional fields (organic fields ranged from US $1610 to US $19,420 ha-1 yr-1; conventional fields from US $460 to US $14,570 ha-1 yr-1 (Sandhu et al. 2008)).

This work demonstrated that conventional farming results in a decline in ecosystem services when compared with organic systems, and highlighted the need for farmers to extend their role from primary producers of food and fibre to managers and providers of ecosystem services.

Is it possible to increase agricultural productivity while conserving biodiversity?

As we have seen, organic agriculture can reconcile food production with nature conservation. But is it possible to increase food production to meet the demand for food security, while maintaining biodiversity and ecosystem health? One approach is to design farming systems that mimic the structure and function of natural ecosystems, based on the hypothesis that natural systems are eco-efficient, with internal cycling of nutrients and energy and protection of the resource base.

Agroforestry, a land-use system that integrates trees and shrubs with crops and/or livestock production, builds on this idea of ecological design to optimise beneficial interactions between the woody and other components. These interactions can lead to higher productivity compared to conventional systems and provides a wide range of services including soil management, microclimate modification, weed control, natural fencing, carbon sequestration and nutrient recycling.

The biodiversity of agroforestry systems is generally higher than in monocultures (McNeely and Schroth 2006) and the provision of tree products from agricultural land alleviates resource-use pressure on natural forests (Bhagwat et al. 2008).

Continued...

Trees on farmland also increase the structural diversity of the agricultural landscape, enhancing the connectivity of natural or semi-natural habitat 'islands'. This is of particular importance to those species that need to shift their ranges to adapt to climate change – agroforestry has the potential to increase the 'permeability' of the hostile agricultural landscape and thus facilitate species dispersal (Manning, Gibbons and Lindenmayer 2009).

Here at the Organic Research Centre, we have recently started an exciting new research programme investigating the value of agroforestry for sustainable production of food, fuel and fibre. Currently unsupported by agri-environment schemes in England, one of our aims is to target policy makers to bring about a more sympathetic policy framework for agroforestry.

Are agri-environment schemes worth it?

Agri-environment schemes (AES) currently pay around £400 million a year to farmers in England to implement environmentally-sensitive farming practices. A recent review of the effectiveness of AES by Natural England highlighted a number of successes, including a significant increase in breeding populations of some nationally scarce farmland bird species (Natural England 2009). However, the cost-effectiveness of AES has often been questioned, and the report identifies a number of limitations of the scheme, such as relatively low uptake of the more valuable but tricky in-field options.

In addition, the abolition of compulsory set-aside in 2007 may have offset some of the benefits of AES, and the recent launch of the Campaign for the Farmed Environment, a voluntary approach, aims to secure the environmental gains of set-aside by increasing the uptake of Environmental Stewardship from 66 to 70% by March 2011.

This may be a real test of the commitment of the farming community as stewards of our natural environment.

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Age of Stupid 2; Soil-less Organic Production

It sounds insane; it is insane; but the organic sector's latest fetish for suicidal, self-harm has not yet been stamped out. As the Organic Advisory Service's Head Advisor, Roger Hitchings explains below, it is becoming mixed up with the very real need to produce good standards for organic protected cropping.

Most EU Member States take the view that organic production must be soil-based. However, Finland has for some time allowed out of the soil organic production, albeit subject to strict conditions. Other countries in that region seem to take a similar view and Denmark has recently sanctioned production in so-called demarcated beds.

These 'beds' can take different forms. In Finland the 'beds' are essentially large peat slabs with much of the fertility applied during the growing season – these are approved for use in organic systems. In Denmark and Sweden large beds running the length of the house are constructed with wooden boards on a concrete floor – these are then filled with an approved substrate. The substrates vary but the ingredients must come from "sustainable sources" and there should be a minimum proportion of organic ingredients. In the case of Denmark this is 75% and all inputs must also be organic. Applied water does not leach into the environment as it is collected and recycled within the system.

Arguably there are some favourable points here if such systems are considered in isolation but in my view they fly in the face of the principle and practice of the organic regulations.

There are numerous references to soil in the regulations. These include Article 5 of 834/2007 which states that organic farming shall be based on the following principles: "(a) the maintenance and enhancement of soil life and natural soil fertility, soil stability and soil biodiversity preventing and combating soil compaction and soil erosion, and the nourishing of plants primarily through the soil ecosystem." Article 12 says something very similar when considering plant production rules.

This seems very clear to me but is it possible to use a definition of soil that includes biologically active substrates that may contain mineral soil taken from the holding?

Every definition of soil that I have been able to find rules this approach out. An authoritative definition comes from the Soil Science Glossary of the Soil Science Society of America. Soil is "The unconsolidated mineral or organic material on the immediate surface of the earth that (a) serves as a natural medium for the growth of land plants; (b) has been subjected to and shows effects of genetic and environmental factors of climate (including water and temperature effects), and macro- and microorganisms, conditioned by relief, acting on parent material over a period of time……." This definition is quite clear – soil is part of the earth's surface, its creation involves a number of climatic, biotic and environmental factors, and it takes time.

It is hard to see how it is possible to interpret the organic regulations not to mention organic principles in a way that allows cultivation of crops in a demarcated container or bed using a mix of materials that bears little or no resemblance to the definition of soil.

Unfortunately, the issue of out of soil production has arisen at the same time as the European Commission appears to have resolved to improve the Organic Regulations for Protected Cropping which in itself is a complex matter.

Just as horticulture covers a wide range of crops and cropping systems, protected cropping covers (sic) a wide range of production techniques. These range from the simple use of fleece and mesh right up to the almost industrial glasshouses featuring a bewildering array of systems and equipment.

Covers, cloches and mini-tunnels can be excluded from the discussion – these are essentially aids to the management of open field cropping.

The next step up is the basic polytunnel, single span in many cases but often extending to twin or triple span, and often quite sophisticated. They are in theory temporary structures but in practice stay put for many years. Not so the Spanish and French tunnels – these are designed to be moved with the crop although once again this may not be the case. In general the unheated basic tunnels are managed in a way that is consistent with the standards; with rotations the norm, green manures used where possible and moderate levels of fertility brought in. This can also be the case with unheated glass where multiple crops are grown.

Although some clarification of the regulation would be useful, the above systems can be managed, inspected and certified within the existing standards without too much trouble. The problems start when we move up to the top level of protected cropping, the long season heated glasshouse designed for a single crop. Some multispan tunnels can also fall into this category especially when southern Europe is taken into account.

There is very little within the EU Regulation or in the standards of the great majority of certifying bodies that can be applied to systems that require heating for a good part of the year, enrich the atmosphere with carbon dioxide, are often crop specific (therefore no rotations), have a short break of weeks between successive crops, and cost a small fortune to erect and maintain. There are some good examples of such systems operating within the spirit of the standards but the lack of detail in the regulation means that this sort of good practice cannot be imposed across the EU.

In these sorts of cases there is great potential for and in practice widely varying degrees of interpretation between Member States. This is not a new issue – the Technical Committee of UKROFS (predecessor to ACOS) was working on this the best part of 10 years ago. It produced a draft set of standards working with producers, certifiers, Defra, etc, but the time was not ripe – there was little appetite for amending the old regulation (2092/91).

So what has changed? The main driver for change arose out of the European Organic Action Plan which among other recommendations proposed that the much amended 2092/91 be completely rewritten to produce a clearer and more inclusive document. The Commission has worked through a long process of re-drafting and consultation, and the outcome has been two new regulations that came into force on January 1st this year. The first (834/2007) sets out the principles that underpin organic production while the second (889/2008) provides a set of implementing rules.

Despite the huge amount of time and effort that went in to the drawing up of these new regulations it is recognised by the Commission that there are still gaps which they are keen to fill and horticulture is very much next on the agenda. Work could start early in 2010.

The original regulation (along with the early private organic standards) was essentially written for mixed farming systems and they have been adapted in various ways for all other forms of production. The key area for consideration is protected cropping although it is hoped that other aspects of horticulture will also be considered such as the various forms of perennial cropping. There are also different views on lighting, heating and fertility management.

One significant step forward has been the adoption of specific standards on organic protected cropping by Iceland. Although not a member of the EU Iceland is part of the European Economic Area and has been working to 2092/91 for a number of years and will adopt the new regulations. The Icelandic standards owe much to the work of the UKROFS Technical Committee and to input from the Organic Advisory Service.

There is now a flurry of activity on a number of fronts and Defra is keen that the UK takes a leading role in the drafting of protected cropping standards. ACOS and its Technical Committee are actively discussing the matter and a consultation document is in preparation. The Horticultural Standards Committee at the Soil Association will also be carrying out a consultation on the matter in the near future.

The really worrying part of this story is that there are indications that some representatives of the Commission appear to think that soil-less, Scandinavian systems might be compliant with organic regulations.

Things may get fraught from early on in 2010.

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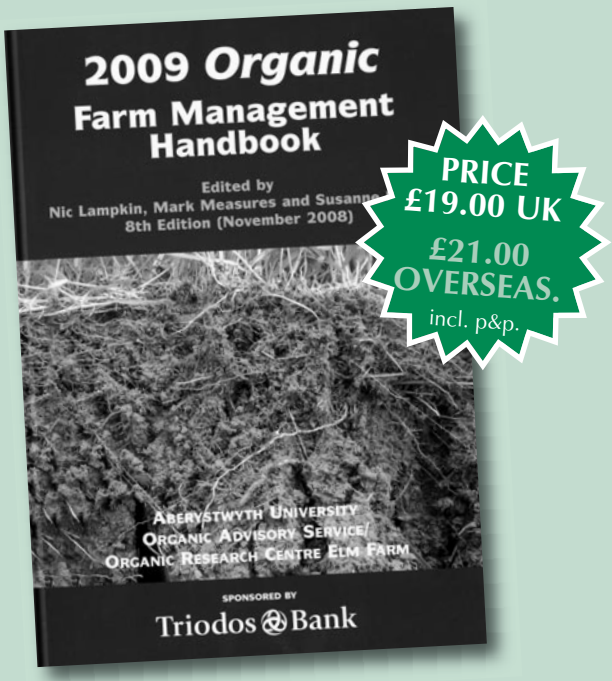

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