

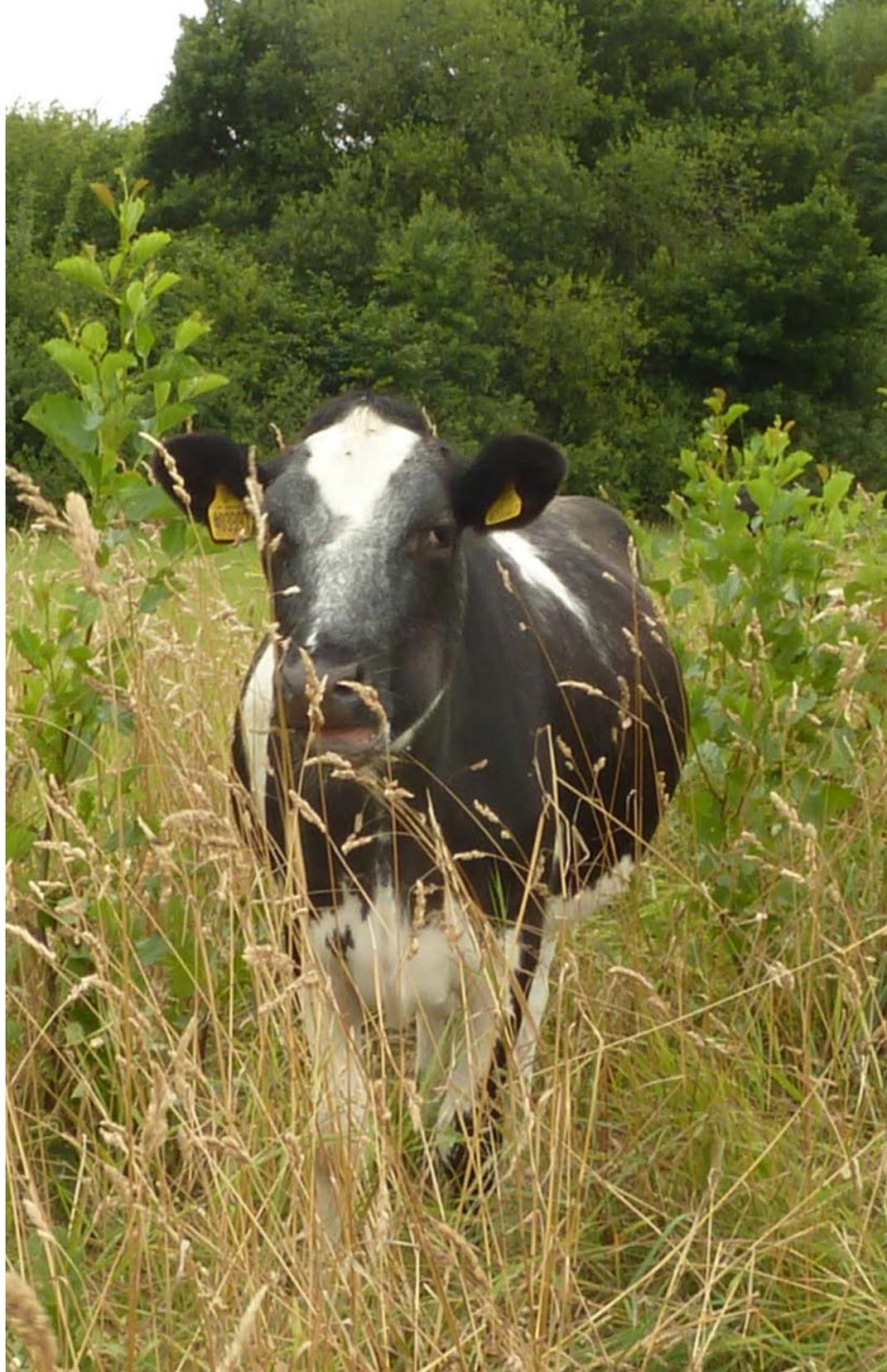


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Cover photo

*Cattle browsing in the silvo-pastoral agroforestry trials, at Elm Farm.
See Sustainable Organic Low-input Dairying article (p10)*



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Organic Research Centre

Bulletin

No. 120 – Spring/Summer 2016



News in brief

Soil Farmer of the Year

Clive Bailye, an arable farmer from Staffordshire, has won the UK Soil Farmer of the Year, organised by Farm Carbon Cutting Toolkit (FCCT) and Innovation for Agriculture (IfA). The inaugural competition aimed to find farmers and growers who were engaged with, and passionate about managing their soils in a way which supported productive agriculture, reduced greenhouse gas emissions and built soil organic matter and carbon. Clive Bailye runs a large scale arable combinable crops operation in Staffordshire, and has spent the last six years transforming the way that he farms to focus entirely on soil improvement. He has changed his cultivation strategy and his rotation, which has resulted in the development of productive soils that are far less dependent on artificial inputs. This has also achieved financial savings for the business, making it more resilient against future risk and volatility.

Second prize was awarded to Iain Tolhurst, an organic grower from Oxfordshire. Iain impressed the judges with his impressive knowledge and understanding of how to maximise soil biodiversity and his innovative use of composts and green manures within his rotation as well as his agroforestry system. Whilst the business has been established over 40 years, it continues to innovate, push boundaries and educate others.

From Uniformity to Diversity

Input-intensive crop monocultures and industrial-scale feedlots must be consigned to the past in order to put global food systems onto a sustainable footing, according to the world's foremost experts on food security, agro-ecosystems and nutrition. The solution is to diversify agriculture and reorient it around ecological practices, whether the starting point is highly-industrialised agriculture or subsistence farming in the world's poorest countries, it was argued.

The International Panel of Experts on Sustainable Food Systems (iPES-Food), led by Olivier De Schutter, former UN Special Rapporteur on the right to food, released its findings in a report entitled 'From Uniformity to Diversity: A paradigm shift from industrial agriculture to diversified agroecological systems'. The report reviews the latest evidence on the outcomes of the different production models, and identifies eight key reasons why industrial agriculture is locked in place despite its negative outcomes. It also maps out a series of steps to break these cycles and shift the centre of gravity in food systems. The experts identified major promise in the burgeoning initiatives now forming around alternative food and farming systems, from new forms of political cooperation to the development of new market relationships that bypass conventional retail circuits.

Farm Health Online

Duchy College's Rural Business School have teamed up with the most highly regarded food label in North America, Animal Welfare Approved, to produce a comprehensive web-based resource, www.farmhealthonline.com, aimed at providing practical knowledge and guidance for farmers

committed to the highest standards of animal welfare and sustainability. The website contains information on many disease management and health and welfare issues for a range of species, as well as answering key contemporary veterinary questions. The website was first developed, back in the late 90s, specifically for organic farmers, as Organic Vet, but is now opened up to all farmers who wish to achieve the very best for their animals. Much time has been spent distilling the main findings of over 2,000 scientific references into easily accessible pages packed with relevant and practical information.

ORC and SRUC partnership

ORC and Scotland's Rural College (SRUC) will formally join together to deliver one of the country's few postgraduate courses in organic farming. SRUC has been running the distance learning Organic Farming MSc since 2002, and for the last nine years ORC has been involved in its delivery. The two organisations will now deliver the course in partnership, a development that will enhance the educational experience for the organic farming students.

SRUC Programme Leader, Lou Ralph, says: "Now that the Organic Research Centre has a more formal role in course delivery, students have direct access to even more organic research, thus gaining increased and significant benefits".

Sustainability assessment

The final report of the Ekhaga Sustainability Assessment project has been published. In recent years there has been a great deal of interest in assessing the sustainability of agriculture in terms of its social, environmental and economic impact and a number of indicators and tools are used. As part of this project, a review of tools, indicators, themes and sustainability assessment methods was carried out. Results from the project have illustrated that choosing the most promising indicators for the organic sector needs to be driven by the importance of the sustainability theme as well as using a suitable method. The inclusion of indicators that assess areas within social sustainability and good governance (e.g. corporate social responsibility) should be encouraged within existing tools. Areas of sustainability that are perceived by those within the organic sector as being potential strengths were identified, including: biodiversity, ecosystem diversity, soil quality and greenhouse gas emissions. These could be used to communicate the benefits of organic production.

Download the full report at <http://orgprints.org/29959/>

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About us

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Phil Sumption

The Organic Research Centre

is a leading, independent, research charity working for better farming, food and health, promoting environmental sustainability, quality food and health and wellbeing for all. We work in the UK and internationally to: research and develop practical, sustainable land management and food production systems based on organic and agro-ecological principles; foster knowledge exchange with and between current and future producers, food businesses and related professionals; and influence policy and public debates on the future of food and farming based on sound evidence.

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Editorial: Will Brexit fix it or wreck it?

I write this with a heavy heart as the referendum results come in on Friday morning. The EU has been a central part of my life, both personally and professionally. It represents for me a unique attempt to build bridges between countries, breaking down barriers, with richer countries helping poorer countries to rebuild, ensuring peace through economic stability and interdependence. For me, the intolerance towards others less fortunate that has marked recent political debate, not only in the UK, rings alarm bells for future conflict.

But the result is what it is. I know there are some also in the organic community who will welcome it – the divisions in the country are also closer to home. The big question is what comes next? And what will it mean for the food, agricultural, health and environmental values that we cherish, for the development of organic farming in the UK, and for the work of the Organic Research Centre?

It's impossible to provide a clear answer, given both the short-term political uncertainty following the referendum, as well as the lack of knowledge about the process we will now go through and the final outcome. There are some who argue that the departure of the UK from the EU will still not happen, because the political shake-up that will now come, and the pressures to reform and rescue the EU will be such that a solution will be found. But what if it doesn't? Sadly, it looks like, realistically, there is no turning back.

Like it or not, the EU has had a big impact on the development of organic farming and the environmental sustainability of agriculture in Europe.

The EU has provided a regulatory framework supporting the development of the organic market since the early 1990s. We may not like the EU organic regulation, we may be frustrated by some of its provisions, but the market success of organic food has undoubtedly been underpinned by its legal status, and this needs to be maintained. Like many other non-EU countries trading with the EU, including Norway, Switzerland and Turkey, will the UK have any choice but to continue implementing the EU organic regulation so that our trade in organic products can continue?

The EU has provided a policy support framework for organic farming that has helped share the risks for farmers converting to and continuing in organic production, recognising the environmental and other benefits for society that organic farming delivers. Will this support continue in a UK policy context that is much less committed, to organic farming and to the environment, than other EU countries?

The EU has also provided a framework to support research and knowledge exchange for organic farming, enabling learning and sharing of ideas and innovations across borders that has helped improve the technical, environmental and financial performance of organic farms. Of course, Switzerland has proved that non-EU states can do even more in this respect, but how likely is it that the UK will follow the Swiss role model in this context?

The EU has supported active communication with consumers and citizens, including the Organic Trade Board-led promotional campaigns in recent years. With UK scepticism about the benefits of organic farming, benefits that are much more widely accepted elsewhere in Europe, how much poorer will UK popular awareness and understanding of the potential of organic and agroecological approaches be in future?

The UK failure to invest in organic and agroecological approaches has been a significant barrier to realising our full potential, contributing to the decline in organic land area and food sales over the last few years which leaves us now with little more organic land in the UK than we had 15 years ago. The contrast with other EU countries, including Denmark, Germany, France and Austria, that have invested much more strongly in organic farming in the same period, is very marked. Without the support frameworks that the EU has provided, how much worse will things be in the UK in future? Or will there be a renaissance following the political shake-up that will come?

The result of the referendum undoubtedly creates very real challenges for the Organic Research Centre, potentially impacting on our survival as an independent organisation given our reliance on European research funding. But even more critical now is that the organic community – and others sharing significant agroecological common ground with us – come together to ensure that the positive vision that we hold for agriculture, food, health and the environment survives the transition. We at Organic Research Centre will commit fully to supporting this process, working not only with our friends and allies in the UK, but also with our many partners elsewhere in Europe and across the world.

Nic Lampkin



ORC staff news

Another end of an era at ORC

In April 2016 one of ORC's longest serving members of staff, Alison Day, moved to pastures new. Alison had been with ORC for 17 years as Finance Officer and had dealt with just about everyone's salaries and expenses in that time, as well as everything financial in between. Alison was a popular member of staff; entertaining at times with her 'Scottishness' and her sense of humour, and was known to enjoy many an ORC social event! Whilst Alison is a hard act to follow, Margit Demiriz has taken on the challenge and we look forward to having her on board as ORC's Finance Officer.



Alison, in 2006



Margit Demiriz

Atul Srivastava



Atul joined ORC in March as Major Donor Officer. Atul has been working in fundraising for 14 years, mainly for environmental organisations including Greenpeace, Friends of the Earth, Environment Agency, The Conservation Volunteers and Campaign to Protect Rural England. He works part-time and is developing our associations with High Net Worth Individuals who are able and

willing to provide significant support our work with a focus on donations of £5,000 plus. He also support the Trusts and Foundations, Corporates and Legacies fundraising programmes, as well as our Celebrity Engagement programme. Outside of ORC he works as a fundraising consultant for environmental organisations, and does salsa dancing, plays volleyball and in the summer enjoys the beach life in Bournemouth.

Oliver Rubinstein

Oliver joined ORC at the start of April from the NFU, where he worked in the Food Chain team and had organics as part of his remit. His work focuses on two main EU projects: *Distribution of the added value of the organic food chain* and *Innovation for sustainable sheep and goat production in Europe*. Oliver was a Soil Association Future Grower at Daylesford, where he discovered a real passion for organic vegetables and also learnt how to use a spiraliser to make unique and exciting salads. Prior to Daylesford he completed an MSc in Sustainable Agriculture at Harper Adams, where he conducted a glasshouse trial that looked at the effects of biochar on a crop of spring barley. Before that, he worked in the Economy team at Devon County Council after having studied Geography and International Relations (with proficiency in kitesurfing) at Exeter University.



In his spare time he enjoys growing vegetables in the garden and has just taken on an allotment in Newbury. He also enjoys various watersports when the conditions allow and is in the process of joining the Royal Navy Reserves.

Stefano Orsini

Stefano joined ORC in March 2016 as a Senior Researcher in Organic Market and Business. He has a PhD in Rural Development from the University of Bologna and an MSc in Agriculture Science from the University of Pisa. He is currently working on two EU-funded projects *Distribution of the added value of the organic food chain* and *Innovation for sustainable sheep and goat production in Europe*. Stefano loves the beach lifestyle, wild-swimming and food – not only Italian wine and olive oil but food and recipes from around the world!



Samantha Mullender

Samantha joined ORC as a Sustainability Researcher at the start of April. This follows a BA in Natural Sciences (specialising in Ecology) at the University of Cambridge and an MSc in Environmental Economics and Policy at Imperial College, London. Her work on sustainable food production will cut across ORC's different research areas, with current projects including iSAGE (Innovation for Sustainable Sheep and Goat Production in Europe), SustainFARM (innovative and sustainable intensification of integrated food and non-food systems to develop climate-resilient agro-ecosystems in Europe) and work on sustainability assessment and monitoring in organic/ecological agriculture alongside FiBL in Switzerland. Outside of work she is a keen competitive swimmer and enjoys both swimming and coaching at her local swimming club.



Nic Lampkin and Mark Measures awarded

Nic Lampkin, Director of ORC and Mark Measures, Director of the Institute of Organic Training and Advice (IOTA), have both been recognised for their contribution to UK agriculture by the award of Associateship of the Royal Agricultural Societies.



The Awards recognise the contribution of many individuals to agriculture and related research in the UK, with specific mention made in these cases of their contribution to research, advice and policy development for organic farming. The Awards were presented by the Duchess of Wessex at a ceremony in the House of Lords on 10th February 2016. Associateship and Fellowship Awards are made annually by the Council for Awards of Royal Agricultural Societies on behalf of the four Royal Agricultural Societies in the UK.

Nic Lampkin said: "We are very honoured to have received this recognition, but it is also recognition of the role that organic farming now plays in UK agriculture, and of the efforts of the whole team at the Organic Research Centre to apply research and evidence to the sound development and communication of organic and agroecological approaches to agriculture."



New projects at ORC

Introducing iSAGE

Innovation for Sustainable Sheep and Goat Production in Europe (iSAGE) is a four-year EU Horizon 2020 project which aims to make the European sheep and goat sectors more sustainable, competitive and resilient. ORC is part of the consortium of 34 organisations from seven countries, including from the UK: the National Sheep Association, Scotland's Rural College, AHDB and Yorkshire Dairy Goats.

The project basis is a strong collaboration between industry and research institutions. In this collaboration, the sheep and goat sectors in Europe are identifying the challenges and opportunities. Together industry and research partners are thoroughly assessing the sustainability of the sector and developing strategies to respond to the identified challenges and opportunities.



iSAGE will assess the sustainability of the sheep and goat sectors in Europe in the light of future challenges such as climate change, food security, resource use efficiency and rural deprivation in marginal regions. Following the sustainability assessment, iSAGE will develop strategies to meet or prevent these challenges. Such strategies will include all levels of industry including farmers, local populations, consumers, processors and retailers. Industry and research working together will ensure that relevant issues are addressed and the project outcomes are applicable in practice.

ORC's role within the project is:

- Leading work on sustainability assessment;
- Leading work on surveying farmers and retailers;
- Leading survey of best-practice within the supply chain;
- Leading a literature review on climate change and small ruminants;
- Assisting with the development and testing of innovative, holistic production systems.
- Assisting with the development of genetic resource and management solutions to help address current and future challenges.
- Assisting with the dissemination of the knowledge and insight gained from this research, to a wide range of stakeholders.



Value added

ORC is a core partner in a DG AGRI-funded project which aims to identify and analyse the distribution of added value in the organic supply chain in the European Union.

The project is co-ordinated by the German Thünen-Institute. Other partners are Università Politecnica delle Marche (Italy), Forschungsinstitut für biologischen Landbau (Switzerland) and partners in six other countries.

The study will assess three main questions:

1. How much added value is created by the organic food supply chain and who are the market players that are benefiting from this added value?
2. How is added value distributed in the supply chain among market players and how much of it returns to agricultural producers, in particular?
3. What factors influence added value formation and distribution for each relevant actor in the chain, including agricultural producers?

Three product supply chains for apples, milk and pasta are investigated, each one in six different countries with markets that are characterised by imports (e.g. apples in the UK and milk in Spain), emerging markets (e.g. apples in Estonia and Hungary or milk in the Czech Republic) or markets that are mainly supplied by domestic products (e.g. milk in Germany and apples in Italy).

ORC has responsibility for data collection in the UK, to carry out a literature review and to develop the answer to the first of the three study questions.

SustainFARM

See article on page 13



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UK organic market potential not yet fully exploited

Demand for organic produce in the UK continued to grow for the third consecutive year, increasing by 4.9% in 2015, yet the organic farmed area is in decline. Here, **Oliver Rubinstein** and **Stefano Orsini** look at the latest Defra organic farming statistics for 2015.

Key trends:

- Latest Defra figures point to 5% decline in total UK organic land area from 2014-15.
- Increase from 2014-15 in in-conversion land area (+4.9%) but long-term trend is steep decline in new organic land (-44% from 2011-15).
- Increase in organic vegetable cultivation (+10%), organic woodland (+2%) and unutilised organic land (+14.6%) from 2014-15, but long term trend is decline in all land-use types since 2011, except for herbaceous & ornamental crops (+9%).
- Increase in organic pig (+5.5%) and organic poultry (+6.3%) numbers, despite long-term decline in all livestock numbers since 2011 (-14%).
- Trends are not uniform across the UK, with some areas recording an increase in organic land (North East +4.9%, North West +1.2%, Yorkshire & Humberside +0.1%).

Background

Defra's annual release of organic farming statistics¹ uses data from the UK's certification bodies to provide an estimate of the UK land area farmed organically, as well as the number of livestock, operators and composition of organic land use. Although the data released back in May 2016 represents the situation on the 31 December 2015, it provides a useful insight into the makeup of the UK's organic sector.

Total organic land area

The decline in the UK organic land area continued in 2015, with total organic land area dropping by 5% from 2014-15. For the first time since 2011 there was an increase (4.9%) in in-conversion land from 2014-15 but generally the sector is still characterised by a marked lack of new organic land. Overall, total UK organic and in-conversion land has fallen by 29.8% since its peak in 2008. This is in contrast to the majority of other European countries, where the UK, Greece and Hungary are the only countries to have seen a decline in organic land area from 2005-14². For example, according to Agence Bio in France (2016), the total organic land area grew by 23% from 2014-15, providing an idea of the pace of growth in other countries³. However, it is worth looking more closely at the trends in individual countries (see Figure 1). There has been a decrease in all four countries of the UK from 2014-15, with the more marked decrease in total organic land area in Wales (-13%), followed by Scotland (-7%), Northern Ireland (-6%) and only a small decline in England (-1%). The lack of in-conversion organic land is a major barrier to growth in the organic sector as it's impossible to increase the organic farmed area if no new land is starting the conversion process. However, between 2014-15 there was a slight (+0.9%) increase in in-conversion land, largely driven by a 130% increase in Wales and a 50% increase in Northern Ireland, which has counteracted the fall in England (-20%) and Scotland (-67%).

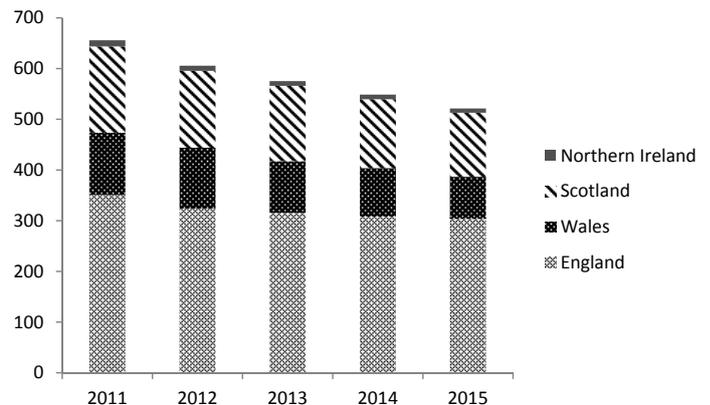


Figure 1: Total in-conversion and organic land 2011-15 (000ha) based on Defra stats

Crops & horticulture

Most crop categories declined in area in 2015. This is especially true for herbaceous and ornamentals (-27%), fruit and nuts (-9%) and permanent pasture (-6%), whereas vegetables including potatoes and un-cropped land increased by 10% and 15% respectively. This is encouraging to see, as horticultural crops are the second most important product category in the UK organic market after dairy, and their market share increased by 3.5% in 2015⁴.

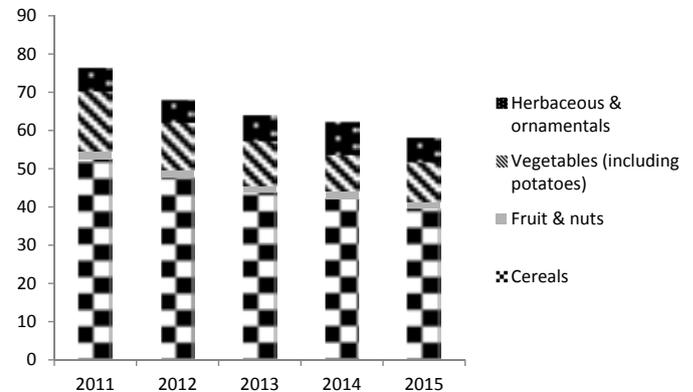


Figure 2: Total organic and in-conversion crops and horticulture 2011-15 (000ha)

Livestock

In 2015 there was a decline in organic sheep (-12%) and cattle (-4%) on the one hand – continuing a steady decline in livestock numbers since 2011 – and an increase in organic pig (+5.5%) and organic poultry (+6.3%) on the other. These figures partly reflect UK market trends, with organic poultry increasing in market share by 13.1%, while red meat decreased by 8.1%⁴.

Operators

The number of producers of organic food fell for the fifth year (-3% in 2015), decreasing by 23% from 2011. Unlike organic producers, processors entering the organic food business sector increased by 8% from 2011 (6% in 2015), which appears to be a direct response to growth in demand for organic produce in the UK.

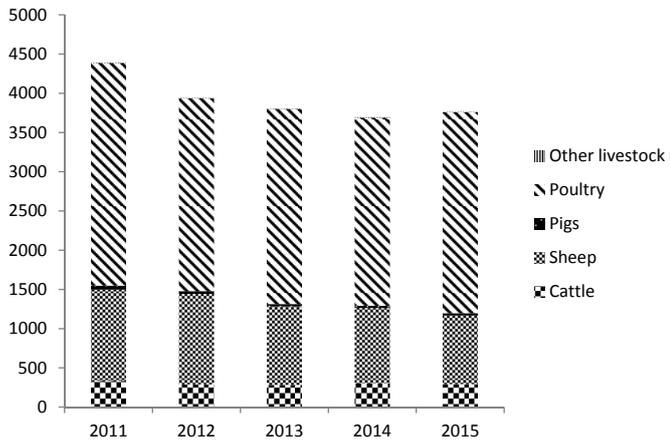


Figure 3: Total UK in-conversion and organic livestock 2011-2015 (000ha).

Conclusions

So, what do these figure show? Well, it's clear that the strong growth in organic production experienced elsewhere in Europe is not (yet) occurring in the UK. Despite the third consecutive year of growth in sales of organic products in the UK² and a continuous erosion of conventional prices, UK farmers are still not taking up the opportunities offered by organic market growth.

The recent increase in payment rates for organic options within the Countryside Stewardship Scheme offers eligible farmers £75/ha for conversion of improved grassland and £50/ha for unimproved grassland. Rotational land can receive £175/ha, with horticulture attracting £400/ha and top fruit £450/ha. Hopefully this will help to make organic conversion more attractive to producers. However, there remain issues for farmers who are part of an existing stewardship agreement and want to convert to organic, which may be holding this back.

Overall though, it's clear that the UK agricultural sector is not adequately taking advantage of the opportunities that the organic market offers. Governments in other countries are setting themselves ambitious targets to increase their organic land area - for example in France doubling the share, in Germany and Denmark setting a growth target of 20% and 15% - and putting action plans in place to support this.

With production now growing again in other countries, there is a clear risk that the UK organic market will continue to become increasingly dependent upon imports, despite consumers caring more about the provenance of the products that they buy⁵.

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Joan Loraine, 1924-2016

Joy Greenall looks back at the life of Joan Loraine, who died in February at the age of 91.



Photo: Tim Deane

It was with sadness that I learned of Joan Loraine's death. She was a remarkable woman who led a remarkable life. Our first meeting was more than twenty years ago, towards the end of my time working as a Farm Conservation Adviser. Joan was then over 70, yet full of verve and enthusiasm for three of her great loves: her beautiful garden in Somerset, all aspects of nature conservation, and the support and promotion of organic farming and growing so that healthy food could be produced and native wildlife protected.

In the third year of her inspirational and generous scheme to give grants, through a Trust Fund she had established, to aid the working together of nature and profitable husbandry, I was invited to join her in helping to identify the most deserving candidates and holdings. This entailed three of us visiting hugely varying places around the country, learning how people were growing their crops and rearing livestock, and most importantly discovering rare plants, insects or habitats being conserved as an integral part of farming and growing.

Joan masterminded much of the itinerary herself, requiring of us long days and a great deal of perseverance. She had huge reserves of energy, a great sense of humour and at times, a fair degree of obstinacy. She had no hesitation in saying what she did not like to see when being shown around holdings, particularly ones purporting to be small, struggling concerns when actually part of bigger businesses, and also farms where the wildlife was fenced off from the production in a sort of environmental apartheid. She particularly disliked this segregated approach, along with great lengths of expertly laid hedges being fenced with sheep netting (still today a requirement of Defra grants!) Her guiding principle was for production and nature to be genuinely working together.

Helping Joan to develop her criteria and produce really personal annual reports on holdings we assessed, over a period of several years, was a real privilege and totally fascinating. She was not a farmer, but a very keen gardener and an expert botanist and she grasped new concepts at speed. She asked extremely searching questions, rarely rested in her quest to explore and challenge, and was excellent company. She greatly valued the input of her fellow assessors over the years, but any thought that we could change her mind on the most worthy enterprise was fruitless. She knew what she was looking for and wanted to nurture and support: high nature conservation interest usually won the day if there was a difficult decision to be made, alongside people's real efforts to work in partnership with nature in their food production.

Joan's establishment of the Loraine Trust means that her influence will continue far into the future and will ensure that her great loves and the many enterprises she helped to foster, will all provide a lasting memorial to the enormous amount she gave to others and to our earth through her lifetime.

Organic farm incomes compare well with conventional in 2014/15

Continuing the long running series of annual reports on the financial performance of organic farms in England and Wales, **Simon Moakes, Nic Lampkin and Catherine Gerrard** summarise their latest findings.

Data on organic farms is collected annually through the Farm Business Survey in England and Wales. We analysed the data from 167 holdings with more than 70% fully organic land in 2014/15, to generate results by farm type. To allow for a like to like comparison with conventional farms, the organic holdings were matched with clusters of comparable conventional holdings; utilising data from 701 conventional farms. The clustering process ensures farms have a similar resource base e.g. similar land area, farm type, region and other factors.

Farm Business Income results

Farm Business Income is used as a measure of income that is broadly equivalent to profit in farm accounts. The results for two samples are presented - a full sample of all the organic farms in 2014/15 and a more limited identical sample of the same organic farms in 2013/14 and 2014/15 to enable year-to-year comparisons. Figure 1 shows the Farm Business Income (£/ha) results for the full sample by farm type compared with conventional. For the first time in many years, all farm types show organic producing comparable or better results. However, this is not true for horticulture – see our report for more details.

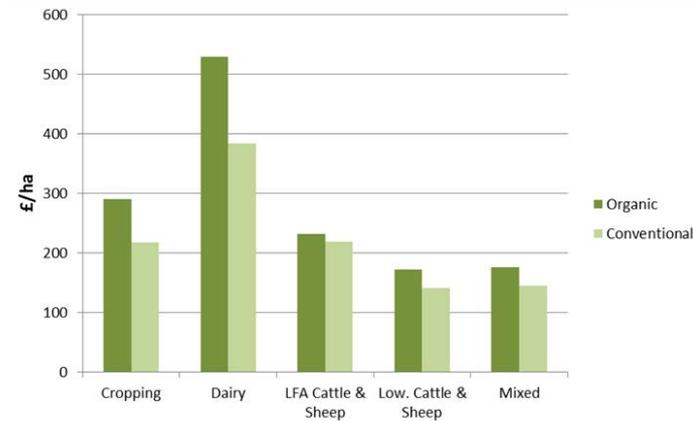


Figure 1: Organic and conventional Farm Business Income (£/ha, full samples, 2014/15)

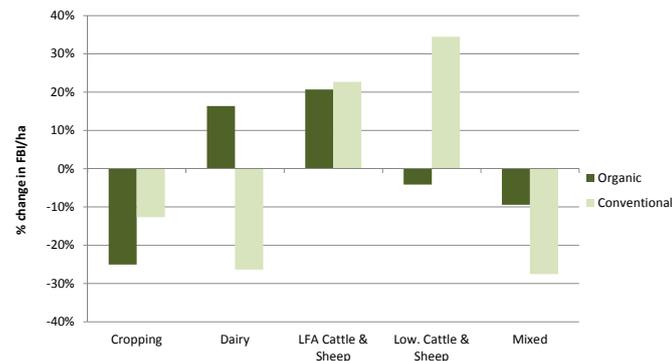


Figure 2: Change in Farm Business Income per ha (% , identical samples, 2013/14 and 2014/15)

The relatively good performance of dairy farms is a consequence of improved organic incomes (due to higher milk prices) and reduced conventional incomes compared with the previous year, as can be seen from the identical sample results in Figure 2. This highlights a mixed year for organic farms with dairying and Less Favoured area (LFA) cattle and sheep seeing increased profitability whilst other farm types saw decreasing returns. Conventional cropping and mixed farms also saw decreased profitability, but incomes on cattle and sheep farms increased.

Figure 3 shows the total income and component sources in £ per ha for organic (O) and conventional (C) farm types. It can be seen that although organic farms received greater agri-environment payments per hectare than conventional holdings, the majority of their income originates from livestock and cropping outputs. The figure also indicates a high level of support payments (Single Farm Payment (SFP) and agri-environment) compared to total income for both organic and conventional cattle and sheep holdings.

Figure 4 shows total costs and component source in £ per ha for organic (O) and conventional (C) farm types. Total costs were lower or similar for most organic farm types except cropping. For all farm types, crop input costs such as fertiliser and crop protection were lower, as were livestock costs. for all types; other costs varied by farm type.

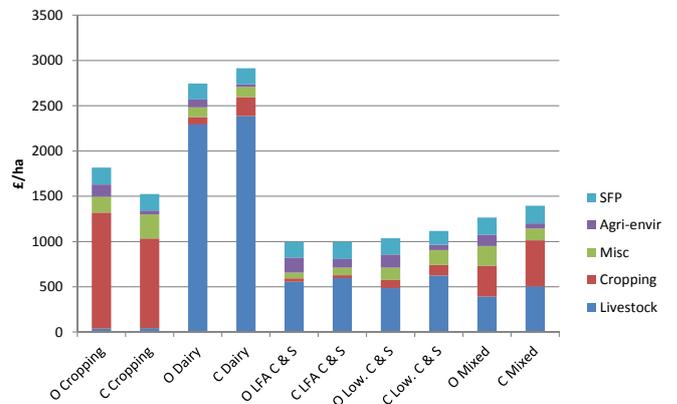


Figure 3: Organic and conventional farm income sources (£/ha, full samples, 2014/15)

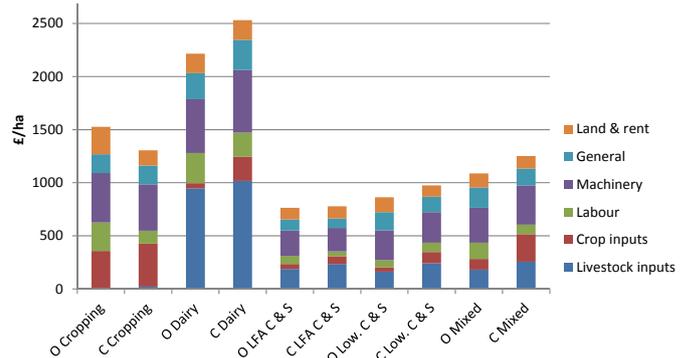


Figure 4: Organic and conventional farm input costs (£/ha, full samples, 2014/15)



Enterprise gross and net margins were also calculated for organic and conventional systems. Summary data are shown in Tables 1 and 2. The organic livestock net margins are characterised by similar financial output (less output volume but sold at a higher price), lower variable costs (due to feed and fertiliser savings) but higher fixed costs per head (due to lower stocking rates). Both organic and conventional net margins after actual costs were negative for beef and sheep, but positive for dairy. The inclusion of imputed costs and support payments resulted in a superior organic financial performance for all livestock categories. The crop gross margin results in Table 2 indicate a generally positive result for organic enterprises, but the inclusion of fixed costs resulted in poorer and even negative net margins in some cases. Organic cereal crops had lower (financial) output, but organic potatoes showed a greater output, representing the combination of lower yields and higher prices.

Organic crop variable costs were generally lower, but fixed costs were similar or higher, with similar costs per ha spread over reduced yields. Overall, after all costs and with the addition of support payments, organic crop net margins were usually greater than conventional crops.

Summary

The analysis of 2014/15 data showed that organic farms achieved higher or similar profitability to comparable conventional farms, with a marked improvement in the relative performance of organic dairy farms. At the enterprise level, organic livestock margins were usually ahead of conventional, but still negative in some cases. Cropping enterprises showed a positive position for most organic activities. With the addition of support payments, organic farms are performing at a similar or better level than comparable conventional farms.

Acknowledgements

We gratefully acknowledge access to the data from Defra's Data Archive and financial support from the Welsh Government. Neither Defra nor the Welsh Government are responsible for our interpretation or any errors of analysis.

Reference

Moakes S, Lampkin N and Gerrard C (2016) Organic Farm Incomes in England and Wales, 2014/15. Organic Research Centre, Newbury.

This and previous reports, including an analysis of long-term time series, can be found on the ORC website (Research/Socio-economics) as well as at www.orgprints.org.

Table 1: Organic and conventional livestock enterprise net margins (£/head, 2014/15)

All values £ per cow or ewe	Dairy		Sheep LFA Higher output		Beef			
	Org.	Conv.	Org.	Conv.	Suckler stores LFA		Suckler finishing Lowland	
					Org.	Conv.	Org.	Conv.
Output	2291	2183	99	88	813	774	1058	1247
Variable costs	944	1023	41	49	338	423	487	601
Gross Margin	1347	1160	58	39	475	352	571	645
Fixed Costs	971	860	70	47	607	576	1116	900
Total actual costs	1915	1883	111	96	945	999	1603	1502
Net Margin after actual costs	376	300	-12	-8	-132	-225	-545	-255
Imputed costs (IC)	397	432	37	41	359	432	608	677
Net Margin after all costs	-20	-132	-49	-49	-491	-656	-1153	-932
Support payments*	228	168	50	33	619	501	819	541
NM (incl. support payments)	208	36	1	-16	128	-155	-334	-391

*= also includes miscellaneous output e.g. forage sales

Table 2: Organic and conventional crop enterprise gross and net margins (£/ha, 2014/15)

All values £ per cow or ewe	Dairy		Sheep LFA Higher output		Beef			
	Org.	Conv.	Org.	Conv.	Suckler stores LFA		Suckler finishing Lowland	
					Org.	Conv.	Org.	Conv.
Output	2291	2183	99	88	813	774	1058	1247
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*= also includes miscellaneous output e.g. forage sales

Ann Wolfe 1938-2016

Many familiar with the work of the Organic Research Centre will know or have heard of Wakelyns Agroforestry, which for many years has been the centre of our crops and agroforestry trials. Ann played a key role alongside Martin in the establishment of Wakelyns Agroforestry from the mid 1990s, encouraging and supporting us in carrying out many ground-breaking and innovative projects. Ann was also very committed to environmental causes, once active in the Cambridge Green Party and later playing a key role in saving the Metfield village shop and organizing the volunteers.

Born in Birmingham, she spent her early life in South Africa. Trained as a teacher, she and her then husband John Harris became active in politics campaigning against apartheid, and her husband was executed in 1965 by the then South African government. Her son David, now a trustee of ORC, was born the year before and Ann and David lived with the Hain family for more than a year during this difficult period. Excluded from teaching by the Education Department, Ann left South Africa to take up teaching in Uganda before moving to the UK where she met and married Martin.

Several current and former ORC staff attended the special event on June 4th that Ann's family organised to remember and celebrate her life, and to bury her on the farm at Wakelyns. For those of us who knew Ann only in her later years, when Parkinson's Disease had taken hold, it was a wonderful opportunity to discover more about the strength and resourcefulness of this inspiring individual.

Nic Lampkin

Sustainable Organic and Low Input Dairying: main outcomes of a pan-European dairy research project

The five-year Sustainable Organic and Low Input Dairy (SOLID) project has taken a holistic perspective of dairy farming and addressed an important set of questions related to dairy cow nutrition, breed choice, environmental impact, biodiversity, farm management and strategies to increase sustainability for the supply chain and consumers. **Konstantinos Zaralis, Mark Measures, Susanne Padel and Pip Nicholas** present some of the outputs.



In work led by ORC on participatory research we started by asking farmers and stakeholders to identify problems and key issues of the organic and low-input sector from their point of view. Further discussions narrowed this down and farmers, SME partners and researchers jointly engaged with 18 participatory projects, including six in the UK) evaluating some potentially innovative solutions. Not all topics and themes initially suggested could be investigated, because only a limited number of studies could be carried out. Three major participatory research approaches were used:

- Farm case studies or comparative farm case studies that were based on monitoring certain aspects on one or several farms, using a variety of data collection methods both quantitative and qualitative;
- On-farm trials in which a specific treatment (e.g. use of new feed resources) was compared with a control group or with the performance before the treatment was introduced; and
- Group discussion or 'field labs' where farmers' experience and other knowledge sources were shared with the aim to improve practice.

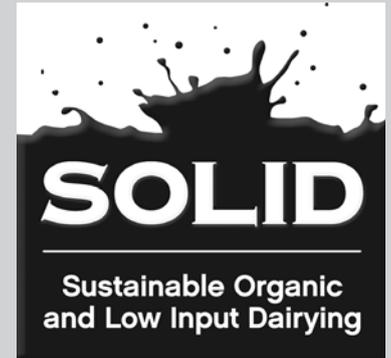
Such participatory research is normally effective in generating a better understanding about and adapting new technologies for a range of farming conditions. However, it is not always easy. One problem can be lack of treatment replication, and differences in management practices between farms participating in on-farm trials or in comparative case studies can limit the statistical power of the research. Sometimes, if farmers feel that the system/treatment does not work for their farm, the business might take priority over the experimental procedures. Nonetheless, the majority of the farm trials in the SOLID project produced valuable information and some will result in scientific publications. A selection of the results is presented in the Farmer Handbook (see next page).

SOLID also carried out research using more traditional scientific methods. The diversity of low-input and organic

Introduction to SOLID

SOLID was a European project on Sustainable Organic and Low Input Dairying (cows and small ruminants - sheep and goats), financed by the European Union.

For five years (2011 to 2016) agricultural scientists and farming experts from 25 institutions in ten European countries worked together in order to develop new knowledge and methods to improve the sustainability of the organic and low-input dairying systems in Europe. Nine of the project partners were SMEs working with low-input and organic dairy farmers (co-operatives, including OMSCo in the UK, advisory services and one organic certification body). The project was co-ordinated by the Institute of Biological, Environmental and Rural Sciences at Aberystwyth University, UK.



SOLID partners in the UK, Denmark, Austria, Italy, Belgium, Finland, Greece, Spain, Romania, Germany.

The results and full details of the project are available online on the SOLID website <http://farmadvice.solidairy.eu>



dairy cow systems throughout Europe implies that the livestock should also be adapted to the specific conditions. Results from a trial with adapted breeds suggests that cow breeds perceived as being better adapted to low-input and organic systems did not necessarily show clear advantages over conventional breeds. In contrast, a large dairy goat study in Greece involving indigenous and imported breeds indicated breed-specific advantages, especially in terms of milk quality, which are important to future dairy goat breeding programmes.

Nutritional studies demonstrated the potential for a range of novel and local feed sources to be important sources of energy and/or protein in the future, for example vegetable by-products like tomato silage were fed to milking goats in Spain and other by-products (e.g. Camelina meal) were used as protein supplements for dairy cows in Romania. A decision support tool was developed to assist farmers to evaluate the balance of feed supply and herd requirements on dairy farms. The potential use of the tool includes simulations, for prototyping, education or scientific modelling, but it has not been widely tested under UK conditions.

An environmental toolbox to support organic and low-input dairy production was also developed. The work demonstrated that it is important, and also possible, to include carbon sequestration and biodiversity in Life Cycle Analysis (LCA) studies to help further underpin the environmental strengths of low input and organic dairy production systems.

Supply chain and consumer surveys helped to further understand which types of innovative production strategies are acceptable to dairy supply chain participants, from the farmer to consumer. Of three novel strategies tested, alternative protein sources to soya were a priority for farmers but not with consumers. In contrast, consumers liked the idea of rearing calves on cows whereas this was not popular with the farmers. The organic dairy farmers responded cautiously to using agroforestry on dairy farms, with main concerns centred round a lack of information about the wider implications. The studies suggested that to avoid bottlenecks in innovation uptake within the organic and low-input dairy supply chains, increased collaboration and information-sharing activities along the whole supply chain are important.

Data from the European Farm Accountancy Data Network (FADN) were used to establish a definition of 'low-input' (LI) dairy production based on the costs of external inputs, relative to grazing livestock units on a farm. The diversity is substantial, so tailor-made farm planning is required to maximise competitiveness of an individual farm. This builds on the unique combination of farmer and entrepreneur to make smart decisions, whether this is related to farm management practices and/or most appropriate routes to adding value along the supply chain.

The project showed that organic and/or low-input dairy cow and goat production systems are competitive but for future sustainability attention must focus on continuous improvement in farm management with close attention to animal welfare and the production of high quality milk. More effective and shorter supply chains will also help to improve the collaboration, competitiveness and sustainability of these dairy systems.

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An overview of the SOLID Farmer Handbook

ORC produced a series of technical leaflets in which we present key results and recommendations of the work undertaken in SOLID, aimed at farmers. The handbook covers three major themes:

1. Feeding forage-based diets;
2. Animal production and health and welfare; and
3. Wider environment and economic impact.

It includes results derived from the participatory research but also from more traditional scientific experiments carried out as part of the SOLID project.

The SOLID work on cow nutrition reported in Technical Note 1 *Energy requirements and ration planning for low-input cows* confirms that energy requirements of breeds adapted to low input dairying e.g. Norwegian Red are similar to Holstein cows, so existing feed rationing systems are appropriate. However, it was also found that the energy requirements for maintenance of cows on high forage diets typical for organic and low input herds are greater than those of cows on low forage diets. This will require some adaptation of feed rationing programmes, particularly in France and Germany.

A notably successful example of addressing the need for home grown protein was demonstrated by Finnish organic farmers in the SOLID project, who grow and process their own oilseed rape, consequently being entirely self-sufficient, no soya and no imported proteins (see Technical Note 2).

Table 1: List of SOLID Technical Notes

Technical Note	Topic
	Feeding of ruminants with forage-based diets
1	Energy requirements and ration planning for low-input dairy cows
2	Feeding home-grown protein and novel feeds to dairy cows
3	Use of diverse swards and 'mob grazing' for forage production
4	Minerals and trace element management for dairy cows
5	Vegetable by-products for feeding dairy goats
	Animal management for health and welfare
6	Breeding cows suitable for low- input and organic dairy systems
7	Low-input antibiotic strategies: improving animal health & welfare
8	Rearing calves on milking cows: key points to consider
	Wider issues of the environment and economics
9	Carbon footprint and biodiversity assessment in dairy production
10	Profit on low-input and organic dairy farms
11	Strategies to increase sustainability for the supply chain & consumers
12	Agroforestry for livestock systems





Technical Note 3 covers results of two UK studies on the *Use of diverse swards and 'mob grazing' for forage production*, showing a clear potential for diverse, multi-species swards also on dairy farms. The grazing system that involves long grazing intervals and high residuals advocated as 'mob grazing' seems to result in an increase of the soil organic matter as evidenced in a case study, but the study was not able to confirm all of the claimed benefits attributed to this grazing system. Nevertheless, this is an area that attracts the interest of many organic and conventional farmers and more research is needed in this respect.

The Technical Note 4 on *Minerals and trace element management for dairy cows* provides a summary of the role and supply of all trace elements and emphasises the importance of taking a whole-farm approach and the need for regular monitoring of mineral levels in cows. The work that SOLID did on Iodine (UK participatory study led by ORC) is of immediate importance in view of recently published papers on low levels of iodine in organic milk. The SOLID milk data analysis from 2014 and 2015 has shown that although iodine levels in organic milk vary between farms more than is desirable, the overall average is in fact well within the optimum range for cow and human health. However, milk iodine concentrations in some of the study farms were systemically low and this requires attention. The most significant factor affecting iodine levels was found to be the use of iodised teat dips. In practice this means that where post-dip teat disinfectant is used the iodine concentrations in milk do not serve as a robust indicator in identifying shortfalls in iodine intake. To avoid the health status of the animals being negatively affected by low iodine intake, urine samples can be used to monitor the cow's iodine status (See ORC Bulletin 119).

The section on *Animal management and health and welfare* is covered by Technical Notes 6, 7 and 8. Technical Note 6 on *Breeding cows suitable for low-input and organic dairy systems* addresses some important points on breeding selection criteria and the use of genetic indexes. Surprisingly, the experimental work of the project found that breeds perceived as being better adapted to low-input conditions did not always perform better than conventional breeds, but nonetheless there are advantages under some conditions. The potential for crossbreeding was confirmed by the project but the variability in cow size was highlighted as a potential management problem. Breeding strategies should be farm specific; there are no 'one size fits all' solutions. Technical Note 7 provides an overview of on-farm practices used to improve health and welfare without relying on antibiotics, including the use of herbs in grass and the field lab on using liniment mint oil cream against mastitis. TN 8 discusses the challenges of rearing calves on cows based on case studies carried out on farms in the UK and Denmark, and a study tour to The Netherlands visiting six different farmers who have been rearing calves this way for several years. It is concluded that calves allowed to suckle drink more milk, but according to the Finnish farmer who attended the final SOLID conference in January, "Every litre of milk invested in the calf is returned in the form of higher milk production by the cow she grows into".

The Farmer Handbook section on *Wider issues of the environment and economics* is covered by Technical Notes

9 to 12. Technical Note 9 deals with *Carbon footprint and biodiversity assessment in dairy production* and shows evidence that organic farms generally have higher soil carbon sequestration, due to a higher proportion of grassland and greater use of manures, instead of synthetic fertilisers. Likewise, organically managed fields generally have higher biodiversity compared to conventional. These two factors – soil carbon and biodiversity – are not normally included in the environmental LCA of milk, resulting in a biased comparison of organic and conventional milk, but the project has developed an approach showing how both could be more widely included in LCA studies.

Technical Note 10 *Profit on low-input and organic dairy farms* shows that across the EU member states, the low-input dairy farms (LI) compared to high-input (HI) are smaller, less specialised, have a larger share of forage and grassland in their utilised agricultural area, and grow less maize, but differences between countries exist. They also have more family labour, a lower productivity and less intensive production. Organic dairy farms need to be seen as a separate group.

Technical Note 11 on supply chain strategies highlighted consumers' liking for 'prolonged maternal feeding'. Claims relating to animal welfare always score high with consumers, but the willingness to pay on top of an organic premium is not necessarily there. Technical Note 12 describes the agroforestry trials carried out at Elm Farm (ORC) and Wakelyn's Agroforestry, which have shown that multifunctional land use approach balances the production of commodities with non-commodity outputs such as environmental protection and cultural and landscape amenities. Tree fodder may offer nutritional benefits to livestock that complement other feed sources, but the feed value will vary depending on tree and animal species.

E-Learning tutorials

The project produced four e-learning tutorials that present selected project results in a different and more interactive format. This allows the users to advance and also to test their knowledge and understanding of the subject. The e-learning tutorials are available on-line on the SOLID website <http://farmadvice.solidairey.eu> and are covering the following topics:

- Genotypes for low-input and organic dairy systems
- Life Cycle Assessment of dairy products
- Novel and underutilised feeds for European organic and low-input dairy farms
- Participatory research in organic farming systems

Other resources

The project has also produced reports, held workshops as well as developing E-learning materials and the activity of publishing selected results in scientific publications continues. All of this can also be accessed via the project website www.solidairey.eu and via <http://farmadvice.solidairey.eu>.

For proceedings of the *Future sustainability of organic and low-input milk production: Challenges and solutions* conference, held in Bristol 26-27 January go to: <http://tinyurl.com/SOLID-UK-event>



Integrating food and non-food production: making better use of on-farm resources including woody features, waste and co-products

ORC recently hosted a workshop to investigate ways to increase the value and quality of material coming from boundary hedges - for use as a fuel, as well as other uses or products such as compost, livestock bedding and tree fodder. This workshop was part of a new European project SustainFARM, which aims to investigate the economic and environmental performance of a network of traditional and innovative farming systems that integrate food and non-food production. **Jo Smith and Sally Westaway report.**

Systems to be investigated include both:

- 1. Traditional systems** which are currently managed primarily to produce food but have the potential to produce non-food biomass and additional co-products from existing on-farm resources. In the UK we will look further at producing woodchip for bioenergy from boundary hedgerows, and our Italian partners plan to investigate the use of olive processing residues to produce bioenergy, biogas, fertiliser and olive paste for animal feed.
- 2. Innovative systems** which are multifunctional systems in which food production is fully integrated with biomass production to be used as a renewable energy source, for example, agroforestry systems where short rotation coppice is integrated with arable or livestock production in an alley cropping design to fully exploit the positive interactions between the tree and crop components.

In the UK, ORC will focus on two case study farms: the traditional hedgerows and innovative silvopastoral systems on Elm Farm, Newbury, and the traditional hedgerows and innovative silvoarable systems at Wakelyns Agroforestry, Suffolk. These case studies will provide data for modelling the environmental and economic performance of integrated systems as well as trial sites for investigating the management and production of multiple non-food products including woodfuel, woodchip compost and animal bedding. ORC will also lead work to develop a list of agronomic, environmental and economic indicators to evaluate the sustainability of these systems, developing the existing Public Goods sustainability assessment tool to fully integrate the non-food component.

Local stakeholder groups are associated with each of the case study sites, consisting of farmers, foresters, advisors, bioenergy companies and conservation organisations. The workshop held on 9th May at Elm Farm brought together a good cross-section of stakeholders. Building on the work carried out in the TWECOM project (www.twecom.eu) the workshop aim was to identify research priorities for testing and comparing different harvesting, chipping and processing techniques to increase woodchip quality from traditional (hedgerows) and innovative (short rotation coppice) agroforestry systems, and to look at alternative uses of the woody material. Workshop participants were asked to identify and then score their top priorities for further research under six different headings. The results of this initial prioritisation can be seen in the table opposite.

Key conclusions from the workshop were that we need to consider the whole supply chain not just the individual parts and that a major challenge is how to facilitate the adoption of new management techniques by farmers and landowners; what are the barriers and how do we overcome them? The next step is to use this to help inform our trials at Elm Farm and Wakelyns Agroforestry in autumn and winter 2015/16.

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Top 3 priorities chosen for further research in each category

Harvesting	1	How to select appropriate machinery and methods
	2	More trials for specific machines e.g. 360 degree tree shears, Bracke felling head
	3	Hedge restoration methods and guidance on species choice
Chipping	1	Chip green and store vs store and chip (use of Toptex)
	2	Timing of harvesting and chipping (ground conditions etc.)
	3	Collecting machines for flailed material
Adding value	1	Fruit, berries, flowers, nuts (elderberries/flowers)
	2	Use of chip as a soil improver/mulch
	3	Drying, pellet production and torrefaction
End use	1	Boiler technologies including pyrolysis and suitability of hedge material
	2	How to connect supply with markets - is there a critical mass?
	3	Analysis of saved opportunity costs
Wider impacts	1	Selecting and maintaining standard trees (biodiversity and landscape)
	2	How to create resilient tree-scapes
	3	Ecosystem services - how are they monetised?
Parameters to measure	1	When to cut? Productivity curves - SRC, hedges, woods
	2	Length of rotation depending on species - to optimise yields
	3	Whole farm economics



SustainFARM is funded through the FACCE SURPLUS ERA-NET Co-funded formed in collaboration between the European Commission and a partnership of 15 countries in the frame of the Joint Programming Initiative on Agriculture, Food Security and Climate Change (FACCE-JPI). ORC is funded in the UK by Defra.

Celebrating 20 years of agroforestry research in Europe

Julian Gold, Farm Manager on the Hendred Estate, recently attended the 3rd European Agroforestry conference 'Celebrating 20 years of agroforestry research in Europe' which was held in Montpellier, France, in May 2016. During the three day programme delegates from around the world shared the latest knowledge on agroforestry systems through presentations, poster sessions, networking and practical field visits. Here are his reflections.

Slow uptake of agroforestry

During the initial sessions we were reminded that although agroforestry has the ability to provide many useful functions in the agricultural environment, its uptake has been limited to date, partly due to unfavourable CAP policies, but also through farmer resistance due to perceived negative associations when mixing trees and agricultural crops on the same land area. This slow uptake may now start to gather momentum as CAP policy now allows for Pillar 1 payments on agroforestry land (with some European countries, notably France, also including agroforestry in Pillar 2 environmental payment schemes).

Increasing environmental problems such as climate change, soil erosion, water quality issues and flooding events have also brought agroforestry increasingly into the spotlight as a tool to aid 'sustainable intensification' of agricultural production.

Agroforestry takes many forms

During the conference, farmers and researchers from around the world shared their experiences of working with agroforestry systems. The stand out message from these sessions was that there is no blueprint for a standard agroforestry system; rather there are myriad diverse ways to integrate trees and agricultural production.

Examples of ways of integrating trees on farms ranged from simply using lines of trees as windbreaks, riparian buffer strips to stop soil and nutrients entering water courses, plantations of willows adjacent to extraction fans on intensive poultry houses trapping dust and absorbing ammonia emissions, through to grazing hogs amongst box bushes on marginal ground.

The traditional image of agroforestry, consisting of tree lines in fields with crops growing in between, was also represented at the conference, with an almost infinite combination of tree species, alley crop species and row spacing described in different systems.



Pines and vines agroforestry, Restinclières



Vezenobres vegetable agroforestry

Re-brand farmers as 'ecosystem managers'?

The overriding message was that we need to become comfortable with managing much more complex agricultural systems rather than the monocultures that we are familiar with. One delegate suggested farmers should re-name themselves as 'ecosystem managers'.

The practice of farming a more diverse landscape should help alleviate some of the pressures we are now facing with increasing resistance of pests to insecticides and the continuous withdrawal of chemical products from the armoury due to the change in the re-registration process in Europe. In theory, the more diverse the environment we are farming, the less chance of a single pest getting out of control, as there will be a more mixed population of pests and beneficials around at all times.

The holy grail of a successful agroforestry system is to be farming a land area where the land equivalent ratio is more than 1 (i.e. the combined yield of the tree crop and intercrop is higher than if they were grown on separate land areas), and at the same time to provide multiple positive ecosystem services such as carbon sequestration, habitats for beneficials, etc.

Documenting the benefits of agroforestry

Many of the researchers at the conference have been experimenting to discover whether the perceived benefits of agroforestry systems actually exist and also to understand the negative interactions between the trees and crops. Researchers have been looking at many aspects such as carbon sequestration, effects of shade on crop yields, microclimate effects of the tree rows, windbreak effects, quality and growth effects on trees in agroforestry systems, and interactions of tree phenology with different crop types, to name but a few.

Much of the French research has been carried out at the Restinclières experimental site near Montpellier, which we visited during the conference. The agroforestry trials here



have been going on for 21 years and provide a fantastic research platform for tree/combinable crop systems as well as vineyard/tree systems.

Many of the research results from Restinclières and elsewhere have been as expected, for example negative effects of shade on crops and increased carbon sequestration in agroforestry systems. However there were a few examples of some more unexpected results presented; researchers monitoring root growth in a 4 m soil pit have found that the trees' structural roots continue to grow in the winter when there are no leaves on the trees. Another researcher found that alley crop yields of various crops were, as expected, lower than control yields close to the tree rows but higher than control yields in the middle of the alleys, giving an overall small yield increase in the agroforestry systems (not taking into account the land lost to tree planting).

The general consensus coming across from the many presentations seemed to be that there were no large positive or negative interactions occurring between the crops and trees and it is obvious that agroforestry is not a get-rich-quick scheme, but rather a longer term, more resilient and sustainable way of farming, that attempts to emulate nature in a small way by reintroducing diversity into agricultural systems. The crucial element to get right to ensure a final positive economic result is to choose the correct tree species which will interact successfully with the crops being grown and will have a good yield of marketable timber, fruit or nuts when harvested.

Bringing it back home

I came away from the conference enthused by the general principle of agroforestry and how it might fit into the arable and grassland landscapes of the UK.

I think it is becoming obvious that our agricultural methods of the past few decades – effectively trying to beat nature into submission with horsepower and chemicals – have brought us to crisis point and left us grappling with degraded soils and resistant weeds, pests and diseases. At Hendred Estate we have always tried to operate a sustainable system. We have a diverse six-year rotation and focus heavily on improving soil structure and organic matter levels, the former by operating a 10 m controlled traffic system and the latter by returning crop residues, growing cover crops, applying compost and scratch tilling to reduce oxidation of soil organic matter. In the future it would be nice to think that some form of agroforestry may be the next logical step in our quest for a profitable but resilient and environmentally friendly farming business.

Julian received a bursary from the Farm Woodland Forum to attend the EURAF Conference in Montpellier.

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Alexia Stokes in the soil pit at Restinclières.

OK-Net Arable: exchanging knowledge, enhancing farming

The OK-Net Arable project promotes exchange of knowledge among farmers, farm advisers and scientists with the aim to increase productivity and quality in organic arable cropping in Europe.



Since the start of the project in March 2015, the following has been achieved:

- **Scientific analysis of constraints in organic arable cropping.** Based on most recent scientific literature, OK-Net Arable identified the barriers for increasing productivity in organic arable cropping and made recommendations in the areas of soil fertility and nutrient management, weed control and pest and disease control.
- **Farmer innovation groups share common challenges.** OK-Net Arable works with 14 farmer innovation groups, located in 10 countries distributed throughout Europe. These are groups of organic arable farmers engaged in research and innovation. OK-Net Arable brought together the common challenges identified by the groups in a report. These include weed management, soil fertility, and pest and disease control. Data from the farmer innovation groups show a wide range of crop yields. This indicates there is need, but also a clear potential to improve farm yields. The report gives a good overview of the challenges faced by organic arable farmers in Europe and presents solutions that the farmer innovation groups have been working on.
- **Best methods for learning and knowledge exchange.** OK-Net Arable has analysed how farmers and farm advisers access information. The findings show that the use of printed media is still widespread and that physical meetings (e.g. field days) are preferred to anonymous online courses. Nevertheless, it was also found that social media is changing the way information is spread and highlights the importance of online videos in the exchange of knowledge across borders.

Share your innovative solutions

The findings mentioned above are now being used to identify advisory materials and solutions that respond to the farmers' challenges. The farmer innovation groups will be fully involved in this, but you are also invited to contribute.

Share your innovative solutions for enhancing arable farming. Please complete the template (link from website below) and send it to Bram Moeskops (email bram.moeskops@ifoam-eu.org). The ideas and information collected will be made available on the OK-Net Arable knowledge platform which will be launched in the autumn.

Find out more at <http://www.ok-net-arable.eu/>



Innovative Farmers - allelopathy and potato blight

Innovative Farmers is a not for profit network giving farmers research support and funding on their own terms. Through trialling, testing and hands-on research, we're helping farmers find lasting solutions to practical problems. Innovative Farmers is part of the Duchy Future Farming Programme, funded by the Prince of Wales's Charitable Foundation. The network is backed by a team from ORC, LEAF (Linking Environment and Farming), Innovation for Agriculture and the Soil Association, and supported by Waitrose. Phil Sumption reports.

Blight-resistant potatoes

An Innovative Farmers field lab tested heritage varieties of potato and found that all varieties, including newer breeds, performed well for yield and blight resistance. A taste test also found that all tasted good when cooked as chips and mash.

Ben Raskin, head of horticulture at the Soil Association, said: "Late blight is likely to challenge all potato growers as conventional chemistry becomes more restricted. There are some systems and management strategies that can help, for instance agroforestry planting can slow the spread of the disease across a field, and plant tonics and stimulants can help boost the crop's natural resistance. However these are limited and the reality is that most certified organic growers either top the crop (using a burner or a flail mower) when late blight arrives, or use copper to control its onset and spread.

"The most dangerous current strain of blight is the 13_A2 and traditionally resistant varieties such as Cara and Lady Balfour are now no longer able to withstand the disease. Breeding by the Sarvari trust and Agrico has helped increase the number of blight resistant varieties available but not all match the appearance and taste specifications favoured by the majority of the market."

The field lab involved a small number of growers across the UK (two growers in Gloucestershire and one in Scotland) as an introductory trial. The group tested the performance of up to 11 varieties of potato against blight, and then performed a taste test to help convince consumers and retailers that different varieties can also be good to eat.

Andy Dibben of Abbey Home Farm, who was involved in the field lab said; "I have been growing blight resistant varieties for a while now and have seen categorical evidence that blight resistance can be achieved through good plant breeding. Some of the Sarpo varieties have had astounding blight resistance but have lacked a little in taste; however each time I try a new variety the taste gets better.

"Achieving great taste alongside blight resistance appears to be the real challenge for potato breeders. Field labs are a great way for farmers to find well-trialled solutions to problems that affect their production, and crucially trials often involve testing techniques rather than products.

"Lots of research and development goes into new products as they can be sold for profit; less research seems to be done on using existing products and equipment in a different way as there is no commercial incentive and because it's harder to sell a new technique than a new product. Field labs are great way of ensuring this kind of research progresses."

Full results are available on the Innovative Farmers website and there are plans for further trials into taste and yield at Abbey Home Farm.

Grower field labs

The Organic Growers Alliance (OGA), alongside the Land Workers' Alliance (LWA) have been given special status to enable members to participate in particular field labs to be coordinated by ORC. The topics that have been identified are:

Allelopathy

Allelopathy refers to the production, by a plant, of chemicals (allelochemicals) which can influence the growth and development of another plant. This can be used for weed management through the inhibition of one plant (the weed or weeds) by another (usually the crop) through the production of allelochemicals. There are many crops that have been reported to show allelopathic properties, including wheat, barley, oats, rye, brassicas, red clover, vetch, yellow clover, trefoil, lucerne and buckwheat. It can be difficult to distinguish true allelopathic effects from the effects of suppression due to competition. There has been a lot of anecdotal evidence to show that using buckwheat in a rotation can work well against couch grass. Would you be interested in taking part in a field lab on this topic?

Using mesh covers for potato blight

Trials at the Biological Husbandry Unit in New Zealand using mesh covers to exclude Tomato Potato Psyllid (TPP) (*Bactericera cockerelli*) had an unexpected side effect. There was a slight reduction in potato blight spores under mesh, and the actual occurrence of blight was slightly reduced in one trial. Could this be an option for UK growers and could it be economic? If you would be interested in trialling mesh covers in your potato crops and recording any differences in blight, this summer, do get in touch.

Soil amendments (GREATsoils)

We are working on an AHDB funded soil health project <http://horticulture.ahdb.org.uk/great-soils> and have a grower very interested in looking at comparing a range of soil amendments and their effect on soil health, for instance: woodchip, green waste compost, biochar, biostimulants. Ramial chips are woodchips made from trees and brush, from branches up to about 4 inches in diameter with or without leaves. They contain a high percentage of thin young bark, young wood, and sometimes leaves and are purported to have a positive effect on growth patterns and pathology of the crops.

Growers can either replicate some or all of the trials or just form part of the group that is interested in the results.

Contact Phil Sumption: phil.s@organicresearchcentre.com
www.innovativefarmers.org/



Agricology open day at Daylesford Organic Farm

*Agricology was created, with funding from the Daylesford Foundation, to encourage the exchange of information about practical, sustainable farming. On the 28th June around 140 farmers and experts came together to do just that at Daylesford Organic Farm in Gloucestershire. **Beth Cullen** and **Phil Sumption** report.*



Welcomes and introductions in the Dairy Barn

Since we launched www.agricology.co.uk in November last year, we have been steadily expanding the breadth and variety of information on the site through our resource library, farmer profiles, blog and news. To provide this information we have been building on alliances with our partner organisations, farmers and growers, and other key players in the industry.

Talks, organised around farm tours covered many topics including: dairying, diverse cropping systems, renewable energy, soil health, pest management, reduced tillage, conservation grazing, animal health and Countryside Stewardship. There was a range of speakers from organisations such as Defra, Natural England, the GWCT's Allerton Project, Innovation for Agriculture, Linking Environment and Farming (LEAF), FAI Farms, Innovative Farmers, ORC and Fit for the Future.



Susanne Padel kicks off the day



Stephen Roderick of Duchy College introduces Farm Health Online



Richard Smith, Farm Manager at Daylesford



Scrumping in the strawberries



Grower Jez Taylor explains the production of micro-greens/herbs using home-made compost as growing media



Sophie McGovern, Fit for the Future, shares best practice on energy management



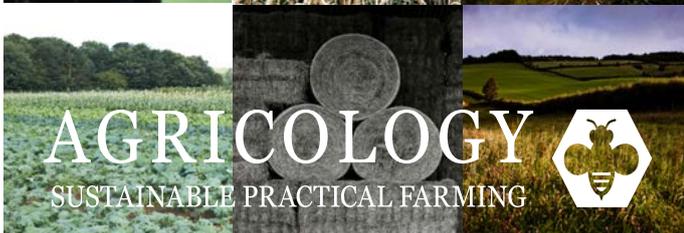
Gloucester cattle



Ian Wilkinson, Cotswold Seeds on sainfoin and diverse swards



Nic Lampkin closes the day



FOR MORE INFORMATION VISIT US AT AGRICOLGY.CO.UK

@agricology   



Interns at ORC, past and present

ORC has run an Intern Programme since 2010. To date, we have hosted 34 students from a range of countries including the USA, France, Germany, Italy, Spain and Belgium. Their gender balance is a little skewed with 28 of the interns being female and only 6 male. They have worked across all of our research and information programmes, while undertaking their own projects, living on site and getting stuck in on the staff allotment. We hear from a selection of interns, past and present, on what the interning experience has meant for them.

The programme was initiated as part of the TransAtlantic Partnership (TAP) project with The College of Atlantic (COA), USA and The University of Kassel, Germany. In the first year we took three students from COA. One returned to the US for personal reasons, soon after arriving, but the remaining two (Stephen Wagner – see opposite) and Natalie Barnett quickly became part of the team and we learned a lot about how to work with interns and what to expect. The following year was a planning year with a single intern from COA (Polly McAdam) coming to ORC during the summer of 2011. We used this time to plan though and in 2012 we hosted 11 students from the EU. Since then we have reduced the numbers to a more manageable level and have hosted about half a dozen students each year split between the spring/summer and summer/autumn periods.

As an organisation and as individuals we have gained hugely from working with these intelligent, inquisitive and engaging young people. They challenge and inspire us in equal measures and from the feedback we get from them they gain as much from us. If you are interested in interning with ORC the basic information is in the box below.

ORC's intern programme

We operate an intern/student's programme linked to our research programmes and projects and it operates in one of three ways:

1. Funded intern positions that are advertised as paid employment above (if there are none advertised we do not currently have any funded internships available).
2. Interns who have secured their own funding under other programmes i.e. Erasmus+, bursaries etc.
3. Graduate or postgraduate students spending time as part of their course undertaking a research project at ORC.

If you meet one of these criteria and are interested in interning or undertaking research as part of a degree with us please contact Dr Bruce Pearce: bruce.p@organicresearchcentre.com.

Present interns

Charlotte Kling

I am a Masters student of Organic Agriculture at HNE Eberswalde in Germany. My project is on 'Shade tolerant sward mixtures for poultry agroforestry systems,' as part of Agforward, a large European project. I have learnt about the whole process and pitfalls of project work from planning, ground preparation, sowing, field assessments, data analysis to report writing. I structure the days and weeks myself, working independently, though I can always get support when needed. I appreciate the value of good teamwork at ORC, be it motivating me to do my project or through nice chats over lunch after Monday's fitness class. In addition I have certainly improved my MacGyver skills by using available tools and equipment to fence chickens out of plots or make a quadrat for plant assessments. Thus my internship at ORC provides a good balance between days at the desk and practical work that I can also find in ORC's organic vegetable garden.

Andrea Tosoroni

I came to ORC after graduating (Bachelor in Agricultural Science) from the Università Politecnica delle Marche, Ancona in Italy, for an Erasmus Traineeship post-graduation project. That was thanks to one of my professors that knew ORC. I came here because of my deep interest in organic agriculture and joined the Crops team to learn as much as possible about the projects they are involved with. Thanks to ORC, I've discovered what it means to work on a research project, gaining many skills that weren't taught at University. After almost two months here I can definitely say that it is very challenging and stimulating to work here and it will be very useful for me in the future.

Jessica Bach

I'm 21 years old and studying for a Bachelor's degree in Geocology at Karlsruhe Institute of Technology in south-west Germany. It's part of my university course to do a three-month internship. This is funded through the ERASMUS+ foundation. I found out about ORC on the internet. My projects are mainly to do with hedges. One task is to take microclimate measurements. I go outside to the hedges and measure, for example, air temperature and compare the data from the cut and uncut hedge plots. I also help doing vegetation surveys and putting out pitfall traps for invertebrates. Every week I have to check if I captured some and then identify them with a microscope and a key. I also assist with the dormice project and go out check the boxes. It's very varied work which never gets boring. You learn something new every day. I also enjoy staying in the farmhouse with the other interns.



Jessica Bach, Charlotte Kling and Andrea Tosoroni at FAI Farms



Past interns

Steve Wagner

I was an intern at ORC in the spring of 2010, whilst at the College of Atlantic in Maine. Besides a love of cider and English footpaths, ORC also gave me a memorable lesson in the value in working across disciplines and diverse perspectives to arrive at creative solutions for complex problems. My experience exploring policy solutions to expanding the commercial use of ORC's composite-cross wheat populations was, looking back, the foundation for my current career in food law. Since my time at ORC, while obtaining my undergraduate and law degrees, I explored the intersection of law and sustainable farming, including stints at Slow Food USA (Brooklyn, NY), Center for Food Safety (San Francisco, CA), and Maine Farmland Trust (Belfast, Maine). I am now an attorney at BCM Environmental & Land Law, PLLC, where I practise environmental law, land use law, government relations, and food law.



Mary Crossland

I graduated in Environmental Science before undertaking a three-month internship with ORC in 2013. I first heard about the programme after meeting the lovely Dr. Jo Smith, Principal Agroecology Researcher at ORC, and was inspired to apply. During my internship I was responsible for producing a literature review on the 'Ecosystem Service Provision by Hedgerows in Northern Europe' under the hedgerow woodfuel project TWECOM. The internship also gave me an opportunity to gain skills and confidence in fieldwork activities, from botanical identification to hedgerow surveys, and to attend a project meeting in Germany. My time at ORC certainly benefited my career. I joined the Elm Farm research team as an agroforestry researcher between 2014 and 2015 and I am now an MSc Agroforestry student at Bangor University.



Vincent Delobel

I was an intern at ORC from February to June 2014, during my MSc in Development and Rural Innovation at Wageningen University (The Netherlands). I worked mainly on participatory research approaches and agroforestry but I also helped out with many other projects covering grass management, wheat breeding, pig feeding, farm sustainability assessment, etc. I really enjoyed working with ORC and meeting so many colleagues. Since then, I took over our family organic farm and I am milking 75 goats. We make raw milk cheeses of various kinds (soft, camembert, feta, hard) that I sell on a weekly market in Tournai (closest town) and to restaurants, farm shops, consumer associations, etc. Our goats are served home-grown flattened spelt-triticale-oats-rye-peas-vetches twice a day, during milking. They graze diverse leys on sunny days and receive hay all year round.



Back on the farm, I'm always experimenting... Maybe I've got the ORC bug? We planted hedges for browsing that include worm-killing species around permanent pastures as well as a mini-Wakelyns agroforestry system on one arable field. We constructed a direct-drilling cereal driller and are trying some reduced-tillage methods. We do trials on wheat populations (CCPs) in partnership with a university, multiplying old wheat varieties with Réseau Semences Paysannes.

Cathy Bouffartigue

I was born on a little farm in Southern France and studied agronomy and agroecology before coming to the ORC in 2013 to carry out my Masters thesis. I was working with Jo Smith and Sally Westaway on the Co-free (Innovative strategies for copper-free low input and organic farming systems) project and the aim of my thesis was to compare the functional biodiversity of insects trapped in pan-traps and of the flora in an agroforestry system compared to an apple orchard. I reinforced my skills in ecology, agroforestry, English and climbing. After travelling in South America, I started a PhD last September, on participatory breeding of trees and co-design of agroforestry systems with a focus on chestnut in Ariège (South-West of France). I recently met up with Sally and Jo at the EURAF conference (see p14). I would say that my stay at the ORC was very positive, from a professional and a personal point of view.



Daria Erić

I am in the final year of my Master of Science in Organic Farming at the University of Zagreb in Croatia. I was an intern at ORC between June and September 2014. I was involved in a variety of activities, but what I draw from this experience is the trust that staff give to their interns, who are truly integral parts of the team. I liked to work alongside other interns with diverse backgrounds, interests and experiences, as well as to meet other like-minded people at ORC's events. I loved the team that I worked with and I found everyone really supportive and engaging. My internship went by so quickly because the experience was very positive and I think that it is a crucial part of securing post-graduation employment. Overall, interning with the ORC - good for the environment and educational, fun and rewarding for me!



Erika Gurinova

I came to ORC from Slovakia, in February 2014, for a 3-month Erasmus internship, working mainly on agroforestry and cover crops. I undertook soil and biomass sampling, made a soil sampling protocol and worked on a leaflet helping farmers to test their own cover crop mixtures. I recall with gratitude all ORC's staff for their goodwill and professional attitude. Now, I am involved in the EU pesticide authorisation process at the Water Research Institute in Bratislava, but still dream about having a thriving agroforestry farm somewhere in Slovakia.



Developing new cropping systems based around cover crops, catch crops and living mulches for use in low-tillage agriculture

Results from a major EU-funded project (OSCAR) suggest that systems built around cover crops, catch crops and living mulches can reduce the economic risk potential of crop production by stabilising crop yields. Any profit reductions due to yield drops are often counterbalanced by reduced production costs in low-tillage systems. However, longer term results are needed to improve the validity of this economic evaluation. Sally Westaway and Bruce Pearce summarise some of the key results, outputs and recommendations from the project.



The four-year, EU-funded OSCAR project, *Optimising Subsidiary Crop Applications in Rotations*, finished in March this year and involved twenty partners from nine European countries, plus Morocco and Brazil. The project brought together scientific researchers, agronomists and small businesses with the aim of developing new cropping systems based around the use of cover crops, catch crops, living mulches and other subsidiary crops and optimising these systems for use in low-tillage agriculture.

Subsidiary crops are plants that are grown for the ecological services they provide rather than as a cash crop. They include cover crops, catch crops and living mulches and have multiple benefits including contributing to soil fertility, soil health, biodiversity and potentially the economic stability of a system.

The core of the project's experimental programme was a set of coordinated field trials in twelve different environments, ranging from Scandinavia, through central Europe and the Mediterranean, to North Africa. These experiments investigated the climatic and environmental conditions under which different subsidiary crop species are best suited and the best approaches for using such crops. In addition two key objectives were the identification of new species and genotypes of subsidiary crops and the development of new farm technology and machinery to facilitate their cultivation. Running alongside these trials was a screening programme carried out in two Mediterranean and one temperate environment, to test and identify novel species and genotypes for use as cover crops or living mulches. The trials aimed to increase the range of subsidiary crop species and the availability of more adapted species/varieties to fill niches in crop rotations.

ORC's role was to lead the dissemination activities in OSCAR and to develop a toolbox for using cover crops and living mulches. We also hosted trials at Wakelyns and on farms.



Undersown medic

In general subsidiary crops (see definition in OSCAR box) were found to promote soil microbial biomass and activity. There are direct and strong positive effects on soil life and high value soil organic matter (e.g. composts) as well as on soil structure and health and thus, the soil's ability to suppress disease. However, deteriorated soil structure (e.g. compaction, waterlogging) counteracts this suppressiveness in the field. Reduced tillage combined with the use of cover crops or living mulches clearly contribute to an increase in soil organic matter and improved soil structure and thus to the soil's potential to suppress pathogens. Subsidiary crops were found to interact with tillage, enhancing the benefits for soil aggregates. It was shown, that erosion control can be remarkably improved by choosing appropriate subsidiary crop species such as hairy vetch or subterranean clover, the latter especially if used as living mulch.

However, the performance of cover crop species on soil quality improvement was found to be strongly related to climate, hence choice of cover crop species based on environmental conditions is essential.

Technology in terms of availability of appropriate machinery is not generally a limiting factor for the application of subsidiary cropping systems; there is a wide choice of equipment on the market. The use of such machinery requires trained and experienced users and tractor operators, as there is no general or generic solution. Each situation is different, so training and extension is crucial for successful application. However, in spite of



this wide availability, results demonstrated a challenge in obtaining satisfactory weed control, without using herbicides, in reduced tillage systems. Although use of subsidiary crops in most cases reduced weed growth, results clearly showed the need for the development of innovative techniques for weed control in organic cropping systems based on reduced tillage and subsidiary crops. Two new prototype implements, that cut shallow growing roots or rhizomes of weeds either vertically or horizontally, were developed during the project period. Both implements cause minimal disturbance to the soil and to subsidiary crop growth. The effectiveness of control depended on weed species and conditions; both implements showed promise in the control of two significant perennial weeds, couch grass (*Elymus repens*) and perennial sow-thistle (*Sonchus arvensis*). These two new implements are not yet commercially available, but further development is continuing in a new follow-up project.

The screening trials identified several new *Vicia* and *Lathyrus* species which perform as well as or better than the current commercial varieties of *Vicia sativa* and *V. villosa*, in terms of biomass, N fixation, seed production and weed suppression. Both very early and very late flowering species and varieties were also identified. Traits such as early flowering are important if alternative means for cover crop control, such as use of the roller crimper, are to be explored.

Cover crop and Living Mulch Species database

A major project output is a database detailing the results of the screening trials as well as currently used commercial species and varieties of cover crops and living mulches. Using individual species/accessions as entries, this database was explored. Relationships between plant traits were investigated, traits were plotted against one another to look for patterns and identify gaps in our current knowledge. Traits investigated included biomass, weed suppression, canopy height, flowering time, determinateness. This analysis has identified some interesting relationships and gaps in our current knowledge and in the availability of cover crop species. It has also revealed some species and cultivars with potential for improving cropping systems that might be of value to develop as commercial seed. Key conclusions and recommendations include:

- Species which showed good potential in the screening trials and may be worthy of further commercial development include *Lathyrus clymenum*, *Lathyrus ochrus*, *Vicia benghalensis* and *Vicia villosa* and the cultivar Bernina of *Vicia sativa*.
- There appeared to be a gap, with fewer commercially available cover crop species in Southern Europe compared to the other geographic regions considered. A closer look at the market would confirm this.
- A potential gap was identified for species with low canopy height but high biomass production; this is particularly important when considering cover crop species suitable for undersowing.
- A slight negative relationship between biomass and persistence suggests there may be a gap for a species with high biomass and high persistence. *Trifolium repens* and *Medicago sativa* score relatively highly for both traits and could fill this gap.

comment@organicresearchcentre.com



Lathyrus clymenum, one of the species showing good potential

Conclusions

There is a need to actively support the use of subsidiary crops and the breeding and selection for new subsidiary crops to increase overall system biodiversity and resilience. The overall benefits of such practices go beyond agriculture, as this will reduce dependence on external inputs, soil erosion, and problems with surface and ground water quality, which are clearly benefits to society. Specific recommendations are;

- The use of subsidiary and cover crops should be encouraged as their use can result in a reduction in fertilizer and herbicide use as well as enhance soil microbial biomass and improve soil erosion control.
- Obstacles to the introduction of new legume crop species need to be addressed, for example the list of admissible legume species for the current 'EU greening' programme currently contains only a few species, thus impeding biological diversification, and needs expanding.
- Support breeding of cover crop species with focus on the selection for disease resistance and for combining ability of main crops with living mulches.
- Support training for farmers. The use of machinery requires trained and experienced operators, as there is no general or generic solution. So training and extension is crucial for successful application.
- Make information easily available to farmers, which could be addressed by maintenance and further development of the toolbox.
- Research in the field of automation, sensor technology and robotization should be supported.
- Raise the minimum requirements concerning the use of subsidiary crops (especially legumes) in organic farming and conventional farming.



Project team visit to screening trials at Technical University, Munich

The OSCAR Cover Crop and Living Mulch Toolbox




The performance of different cover crop and living mulch species will vary according to geographic location and on-farm growing conditions (soil type and fertility status, rainfall, previous crops etc.). One challenge farmers face in planning diverse cover crop systems is this variable performance of subsidiary crop species according to conditions. To address this challenge and to summarise the results of the OSCAR project the Cover Crop and Living Mulch Toolbox has been developed by the Organic Research Centre, together with the Technical University of Munich, Germany, who gave technical assistance and led the development of the cover crop database. All Partners of the OSCAR project contributed with their results.

The Toolbox aims to present the results of the OSCAR screening trials and to help improve knowledge and drive the use of Conservation Agriculture practices and subsidiary cropping systems throughout Europe. The Toolbox will help you to:

- Identify suitable cover crop and living mulch species, varieties and appropriate species mixtures.
- Access the best current practical advice about management issues.
- Identify economic considerations when planning cover crop and living mulch-based systems.

It provides tools for everyone; from farmers, scientists and advisors, to seed producers, plant breeders, NGOs, manufacturers of agricultural equipment and members of the general public. The Cover Crop and Living Mulch Toolbox content draws on scientific literature, technical information and results from the field trials. It is presented as a series of web based tools: a Wiki; a Decision Support Tool; and a Species Database

1. The Wiki

This OSCAR Wiki is an interactive user-fed knowledge source of regionally relevant information concerning leguminous and non-leguminous cover crop and living mulch species, machinery and farm case studies. Information can be in the form of text, images, videos and links to other relevant webpages.

Information included in this Wiki comes from a variety of sources including personal experience, advisory services, scientific literature, and from the experiments conducted in the OSCAR project. The Wiki is a living document that evolves through input from participants. It depends upon contributions from registered users modifying and adding new entries. The OSCAR Wiki can be accessed via the Cover Crop and Living Mulch Toolbox or directly here:

http://web3.wzw.tum.de/oscar/wiki/index.php/Main_Page



2. The Decision Support Tool

This tool, aimed at farmers, researchers and other stakeholders, allows you to search the cover crop and living mulch database for information on leguminous and non-leguminous species throughout Europe. The Tool aims to assist with the decision making process and enables you to discover cover crop and living mulch species on the basis of characteristics that fit with your own site specific cropping systems.

3. The Subsidiary Crop Database

This interactive database allows you to search for information on leguminous and non-leguminous cover crop and living mulch species throughout Europe. It includes detailed information on new species and accessions trialled during the OSCAR project screening programme. You can search for information on species by scientific name, or by the common name in either English or German.

The Cover Crop and Living Mulch Toolbox is available at www.covercrops.eu

Accompanying the Toolbox the OSCAR Project Facebook page (www.facebook.com/The-OSCAR-Project-643571612380744/) has up to date information on related events, news items and links to relevant reports from other projects.

Acknowledgement:

OSCAR is a collaborative research project in agronomy, supported by the European Commission under the Seventh Framework Programme for Research.



Sustainability and productivity of organic protected cropping systems

The European project COST Action BioGreenhouse (FA1105) was completed in April 2016. Since its start in 2012, the project partners from over 25 European countries have collaborated in this network on the sustainability and productivity of organic protected cropping systems. The network has published numerous technical guides, factsheets, books and booklets, as well as scientific reviews and papers about major issues in Organic Greenhouse Horticulture (OGH). **Anja Vieweger** summarises some of the outputs relevant for UK growers.



The vast diversity of outputs from this project is an important collection of information on organic protected cropping. All publications and documents are available for free and are accessible on the project's website: www.biogreenhouse.org. Apart from the more detailed books and booklets on subjects such as the sensible use of primary energy in OGH, composting and compost use in OGH, soil fertility, water management or sustainability tools for OGH, the project has also produced a series of very compact and informative factsheets. These two-page summaries cover a vast range of relevant and specific subjects, from companion plants for predatory beetles, the conservation of lacewings, food sprays for predatory mites, flowering plants for supporting hoverflies, to adapting greenhouse climate for enhanced biocontrol, or potential food hazards in OGH. There are 17 factsheets in total, 6 books and booklets and 10 scientific reviews and papers.

The project organised an International Symposium on OGH, in close collaboration with the International Society for Horticulture Science (ISHS), held from 11-14 April 2016 in Izmir, Turkey. The BioGreenhouse website also hosts more than 50 presentations from the various sessions in the technical and scientific programmes of the Symposium, a comprehensive collection on the most recent issues and latest research in organic protected cropping.



Rob Meijer, Chair of BioGreenhouse, hands over a pioneering set of publications on organic protected horticulture to Prof Dr Uygun Aksoy of IFOAM International and Roger Hitchings, representing IFOAM EU, at the Organic Greenhouse Symposium in Izmir, Turkey.

COST Action FA1105 BioGreenhouse, supported by COST (European Cooperation in Science and Technology)

www.biogreenhouse.org

comment@organicresearchcentre.com

BioGreenhouse factsheets

1. Food sprays for predatory mites
2. Supplemental food for supporting predatory bugs in greenhouse crops
3. Use of banker plants for *Entomophthorales*-caused epizootics in aphid populations
4. Companion plants for predatory bugs
5. Conservation of lacewings
6. Flowering plants for syrphids
7. Conservation of predaceous *Coccinellidae* species in greenhouse ecosystems
8. Omnivorous predators as biological control agents
9. Training natural enemies to enhance their biocontrol efficacy
10. Pesticide side effects
11. How to integrate biopesticides
12. Adapting greenhouse climate for enhanced biocontrol
13. Induced plant responses and natural enemies
14. Natural enemies for invasive pests
15. Viruses transmitted by whitefly *Bemisia tabaci*
16. Recommendations for future research



Food safety factsheet: Potential food hazards from organic greenhouse horticulture

BioGreenhouse books and booklets

- Handbook for composting and compost use in organic horticulture
- Sensible use of primary energy in organic greenhouse production
- Guidelines for experimental practice in organic greenhouse horticulture
- Soil fertility management in organic greenhouses in Europe
- Impact of water quality and irrigation management on organic greenhouse horticulture
- Sustainability assessment tools for organic greenhouse horticulture





Events and announcements - details at www.organicresearchcentre.com

Save the dates!

1-2 February 2017: 11th Organic Producers' Conference. Aston University, Birmingham

ORC's annual Organic Producers' Conference is the event where organic and other producers interested in ecological approaches to sustainable food production come together with researchers and advisers to share ideas on making agriculture perform better, for their businesses and society.

Other events

19 July 2016: Innovative Farmers Green Manures Farm Walk. Curlew Call Farm, Droitwich, Worcs.

20 July 2016: Soil Fertility in Organic Agriculture. Innovative Farmers webinar with Prof Dr Urs Niggli.

23-24 July 2016: Seed Co-operative AGM, social, workshops and optional work day. Gosberton Bank Nursery, Spalding, Lincs www.seedcooperative.org.uk

10 August 2016: Using Compost to Build and Maintain Soil Health. Innovative Farmers webinar.

13-14 August 2016: OGA Summer get-together at North Aston Organics, North Oxon.

2-4 September 2016: British Permaculture Convergence at Nell Bank Centre, Ilkley, North Yorks.

7 September 2016: Making Agroecology work in practice: a global perspective. Innovative Farmers webinar.

14 September 2016: Growing Innovation Open Day Rijk Zwaan/Soil Association event at Huntstile Organic Farm, Somerset

19 September 2016: Innovative Farmers Soil Health Farm Walk. Roundhill Farm, Highworth, Wilts.

29 September 2016: Farmer Innovation Day. Innovative Farmers' networking day at Sheepdrove Organic Farm, Lambourne

Information Officer at ORC

(Grade 7: £28,135 - £33,563)

ORC is looking to appoint an Information Officer as Project/Content Manager for the development of practical information resources related to agroecology, sustainable and organic farming.

For more information and to download the application form go to: <http://tinyurl.com/ORC-jobs>

Closing date for applications: 9:00 am on Wednesday 13th July 2016. Interviews: will be held at ORC, Elm Farm, Berkshire on Thursday 21st July 2016.

Join ORC's Farmer and Business Supporters' Group

ORC is at the forefront of UK research on organic and other agroecological approaches to sustainable and healthy food production, including knowledge exchange and policy advocacy on behalf of organic farmers and businesses.

While much of this work is supported through project funds from the EU, governments and foundations, we rely heavily on donations from individual supporters to provide vital underpinning for our activities.

Regular monthly or annual donations help us to plan ahead with greater confidence about our ability to undertake new initiatives on behalf of organic farmers and food businesses.

Will you join the growing band of farmers and businesses willing to support us like this?

We're not just asking for your support – we're offering something in return to say thank you!

FAB supporters have:

- The opportunity to attend an annual open day to hear about current activities, with space to discuss your priorities for research, information and policy initiatives;
- Opportunities to participate in bids and funded projects;
- Networking opportunities and events;
- Pre-publication access to research reports, technical guides, bulletin articles, conference papers and other publications, with an invitation to feedback comments where appropriate;
- Access to the research team and a quarterly update on progress and staff news, with links to on-line resources, for each of the main areas of ORC activity;
- Links to and (optional) membership of relevant on-line discussion forums;
- Discounted access to ORC conferences and events, including our next annual conference, 1-2 February 2017 in Birmingham;
- Free subscriptions to ORC's quarterly printed bulletin, monthly e-bulletins and the Organic Farm Management Handbook every two years or so.

Please give us your support and sign up today!

To join the ORC FABs group, please pledge a regular annual donation (or monthly equivalent) of at least:

£100 (Supporter) £250 (Bronze) £500 (Silver)
£1000 (Gold) £5000 (Platinum)

We are keen to recognise the different levels of support, but all supporters will receive the same benefits.

To register, please contact Gillian Woodward at ORC.

01488 658298 ext. 554