Technical Leaflet

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Organic Arable Farming: Information for farmers considering conversion to organic production

1 Introduction

Demand for organic food has never been higher and with agricultural policy redirected towards the environment there are exciting opportunities for conversion to organic arable production.

- Is organic farming for you?
- Is it sufficiently profitable?
- What are the markets?
- Are livestock essential?
- Can weeds be controlled adequately in the long term?
- How do I go about conversion?

This leaflet sets out to answer these questions, explain the options when converting a farm to organic production, and highlights the opportunities and the challenges of meeting the unprecedented demand for organic arable crops.

2 Organic Farming

Organic farming is a sustainable farming system that combines modern science and technology with traditional farming practices to maintain the long-term fertility of the soil and use less of the Earth's finite resources whilst producing high quality, nutritious food.

Organic techniques have been developed from an understanding of and research into soil science, crop breeding, animal husbandry and ecology. The maintenance of soil fertility relies principally on the use of legumes, crop rotations, the application of composted animal manures and ground rock minerals. Pests, diseases and weeds are normally controlled by choice of appropriate crop species and varieties, crop rotation, mechanical cultivation, encouraging natural pest enemies, physical barriers and thermal weed control.

Artificial fertilisers, pesticides, growth regulators and livestock feed additives are generally prohibited because of their negative effects on soil life, the environment or food quality.

3 The Market

The market for organic food in the UK has risen continually for the last seven years, and has grown at an average of just under 6% to over £2 billion a year. Across the EU organic sales have increased by 10.5% and in Denmark organic food sales now comprise 12% of total food sales.

The buoyant UK market for organic cereals and pulses is driving profitable businesses growing crops for human consumption (organic bread and breakfast cereals) and animal feeds to supply the growing demand for organic milk, meat and eggs. There are particularly strong wholesale markets for milling wheat (minimum 10.5% protein) and milling oats as well as feed cereals and pulses; notably wheat, barley, beans

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and peas. There is a good demand for quality feed proteins such as lupins and soya and a smaller demand for some minor crops such as spelt. Market prices for organic and non-organic crops are provided in **Table 1. - Market Prices for combinable crops** below

	Non-Organic	Organic
£/tonne ex farm estimate Harvest 19	£/tonne	£/tonne
Wheat (feed)	144	270
Wheat (milling)	160*	310*
Oats (feed)	115	260
Oats (milling)	125	295
Barley (feed)	130	270
Beans	175	280

Reference: Prices provided by Organic Arable June 2019

* Indicative price as very little crop available as at June 2019

The UK market is considerably influenced by European and world markets; the UK is estimated to be only 35% self sufficient in organic cereals and with the rapid market growth throughout Europe, the US and in the Far East there is a major undersupply situation which is great opportunity for UK arable farmers.

The UK has a well-developed marketing infrastructure with major grain traders, independent millers, national and international feed compounders, co-operatives and several national vegetable packers servicing the organic business. Farmers planning to produce organic crops should discuss their plans with potential markets before conversion and prior to sowing; while combinable crops may be either marketed post harvest or grown on contract the situation is very different with vegetable crops where confirmed marketing arrangements before planting or sowing are essential.

4 Organic arable farming – how does it differ from non-organic farming?

Most importantly, organic farming is dependant on legumes to supply nitrogen, encouraging soil life and wildlife, making best use of manures and compost, using resistant crop varieties, crop rotation, pasture management and mechanical weed control.

Although the field operations of an organic farm may look much the same as those of a non-organic farm, inputs are very limited and the above management practices take their place. This puts much greater emphasis on planning the farming system, particularly the rotation and it requires a high standard of management. It also needs a different approach from the farmer, a willingness to work with a more complex system and less reliance on intensive inputs.

5 Would organic conversion suit your farm?

Organic farming is possible in almost any situation, but some farms are much better suited to conversion than others, and the ease of conversion will affect the investment required and the financial viability of a particular farm.

A history of good soil management is important, including good soil structure, maintenance of soil nutrients and good biological activity.

The capacity of soil to hold nutrient is an important and detailed subject. . A lot of very good detail is also available from reputable sources - see technical information websites at the end of this document.

Soil type will influence the type of crops that can be grown and whilst a very fertile soil is always an advantage and will affect yield, organic arable farming can be successful on Grade 3 chalk downland just as it can be on Grade 1 silts.

Free draining, easily worked soils are particularly straightforward to manage organically, because they provide so much more opportunity for timeliness and mechanical weed control.

Weeds can of course be a problem in organic arable farming and a farm that has been kept reasonably weed free in the past is much easier to convert. High levels of docks, creeping thistle, wild oats, charlock, couch and, on heavier soils, black grass, all make conversion more challenging and may require more costly cultivations for weed control in the long term.

A mixed farm with sheep and/or cattle has the advantage of having the existing infrastructure, expertise, a history of manure use and grass leys that will have benefited soil structure and weed levels. None-the-less there are many examples of all-arable farms that have successfully converted to all-arable or mixed arable/livestock organic systems.

Investment costs need careful consideration before committing to organic conversion. While the farm is likely to have more than adequate crop storage capacity, it may not have the facilities to store several different crops, which may be needed as a consequence of the organic rotation. It is also necessary to consider if the existing machinery is suited to shallow ploughing, accurate manure spreading, fallowing and mechanical weed control.

Farm size generally has little impact on the potential for conversion; large as well as smaller organic farms are quite practicable and there are many successful examples over 700 hectares. Of much greater significance is the expertise, standard of management and commitment by the farmer to making the system work. This requires attention to detail, a willingness to adopt new methods and a tolerance of a higher level of weeds in some situations. It is often linked to a motivation to produce high quality crops and an interest in improving the farm's wildlife.

6 How to convert to organic

The conversion period is normally 24 months from the last use of an agrochemical to sowing an organic crop, but this can be reduced to 20 months if records and a visual inspection show that there has been no use of prohibited inputs during the 4 month period prior to the date of application.

Conversion can be done in stages or the whole farm can be converted at the same time. Many farms, particularly mixed farms have successfully converted the whole farm from the start. The advantages of this are that the grant application forms only have to be completed once, there are none of the problems associated with managing organic and non-organic crops at the same time and there is no need to retain chemical weed control equipment as well as new mechanical weeding machinery.

Staged conversion however, over a period of perhaps three or four years has the advantage of providing time to learn new techniques, finding out which system suits the farm best and spreading risks by testing the market slowly. An important consideration is that, given the need for fertility building crops during conversion, it can be difficult to maintain cash cropping, avoid weed build up and keep cash flow steady if converting the whole farm in one go.

Therefore, it is probably more sensible for larger farms, (which would require major capital investment) and those without livestock to go through a staged conversion, converting perhaps twenty or thirty per cent of land a year. For other farms converting as part of a new processing or marketing venture, it may be important to convert quickly, whilst some may want to maintain the option of selling into both the non-organic and organic markets, in which case they may continue to farm both systems indefinitely on separate areas of the farm.

The conversion period is more than a matter of minimising the risk of residues from previous agro-chemical use; it is primarily a time for building soil fertility, reducing weed and disease pressure, introducing a suitable rotation and investing in appropriate machinery and buildings. Most of all it is a time to learn new techniques. Consequently the conversion period usually involves grass-clover leys – which fix N, build organic matter and reduce weed and disease pressure. With caution it

is possible for a grower to convert arable crops immediately following a non-organic crop if that crop was oilseed rape or legumes. However, it would be vital to give close consideration to the conversion date and the farm's previous rotation.

A conversion plan is essential; not only is it a basis for financial budgeting but it is a requirement of organic certification.

7 Crop Rotations

Organic crop rotations are governed by the need to supply the crops' nitrogen requirements from legumes and to keep control of weeds and diseases; so most rotations will include at least thirty per cent and more usually fifty per cent legumes in the form of clover leys, beans, peas and green manures. There must also be sufficient forage for any livestock as well as consideration of market requirements. An example of a rotation on good arable land would be:

ROTATION - 6 year rotation with sheep*

1. Ley
2. Ley
3. Winter Milling Wheat
4. Spring Milling Oats
5. Winter Beans
6. Spring Malting Barley

* See gross marging details in the case study section towards the end of this document

This rotation may provide forage for livestock but it is also possible to top and mulch the 2-year ley on stockless arable farms. The rotation has a relatively high proportion of cash crops; yields and weed control could be improved by extending the 2-year ley to 3 years or through a shorter 6-year rotation with only 4 cash crops. Ultimately the rotation needs to be designed to suit the particular conditions of the farm, for example a mustard cover crop might be useful for weed control and soil management.

More novel approaches to rotation design include mixed cropping i.e. growing two crops such as wheat and beans together. With careful variety selection, yields can be higher than for single crops. Mixed crops can be harvested separately or taken for silage whole-crop if used for livestock feed.

8 Livestock – are they necessary?

Livestock are not an essential component of organic farming but they can help utilise temporary grass and clover leys within the rotation and return the nutrients to the soil via manure. Manure, particularly when fully composted, has a considerable beneficial influence on soil life and structure.

Organic beef finishing and sheep enterprises are particularly well suited to mixed organic farms, making good use of the forage. Stocking levels are typically 1.4 to 1.6 livestock units per forage hectare on good land.

Pigs and poultry can also fit well, although it is important that a system is established so that they can be moved regularly around the farm, if they are to be properly integrated into fertility building and weed control. Soil type is important here, a light, free draining soil being essential for outdoor pig production.

9 Weed control

Weed control remains the single greatest challenge to organic arable farming; weeds need to be kept under control in both the short and the long term. Rotation, crop and variety selection and use of machinery are all key. While triticale, rye and oats can be excellent weed-competitive crops, wheat and barley are more susceptible, and unless there is good weed control, beans can quickly encourage high levels of dock, wild oat and creeping thistle infestation.

The crop rotation should address the principle weed problems facing the individual farm; docks can be a particular problem on organic farms, others that may be prevalent are wild oats, poppies, creeping thistle, charlock and couch.

Spring-tined weeders are widely and effectively used for annuals, a weed strike pre-drilling is sometimes practical and the use of sophisticated camera guidance inter-row hoes in all crops is becoming more commonplace. For perennial weeds however, fallowing is the most effective solution. This is time consuming, requires repeated weekly passes and needs precisely the right equipment to be effective. Use of row crops, particularly potatoes, can be invaluable for cleaning.

Manure and straw are often sources of weed infestation so it is important to ensure that they have been thoroughly composted before use if there is any risk of contamination.

Whilst weeds can be a real threat, there are many farms that have been organically managed for twenty or thirty years or more which show that, with the right rotation, machinery and skill, organic arable farming can successfully keep control of weeds on a variety of soil types and deal effectively with a wide range of potentially serious weed problems.

10 Soil management

Organic arable farms rely on clover leys and other legumes for the supply of nitrogen; legumes can fix up to 250 kgs. of nitrogen per hectare per year. If the farm has livestock it will use fresh or composted manures to recycle nutrients and they will often incorporate large quantities of cover crops to supply carbon to feed soil organisms; high levels of biological activity, including earthworms, fungi and bacteria will make soil nutrients more available to crops.

Soil analysis is an important tool for organic farmers. It shows how the soil is changing from one year to the next and provides guidance on the need for any mineral rock fertiliser such as rock phosphate, lime and kieserite, which may be used to rectify inherent nutrient deficiencies.

Manure applications are usually light (10 – 15 tonnes/ha) and carefully timed to avoid leaching.

Organic farms may be allowed, subject to certain restrictions, to use manure from extensive non-organic farms, this can be helpful during the conversion period, however in the long term it is preferable to avoid the use of manure from non-organic farming. The availability of anaerobic digestate is increasingly being used as a means of supporting the fertility building leys and returning some nutrients sold off in crops and stock.

11 Pest and disease control

Pest and disease control in cereals and pulses is largely down to the rotation, avoiding the use of similar crops in succession and careful selection of varieties.

The greater natural resistance of organic combinable crops, together with the diversity of cropping and increased predator populations encouraged by good natural habitat, does mean that pest and disease impact is minimised.

Low levels of aphids and chocolate spot, mildew and plant establishment problems may occur and although there is a limited range of natural pesticides permitted by the organic standards, in practice they are very rarely used in combinable crops.

Pest and disease control in potatoes and field vegetables is another matter. These crops are particularly susceptible and packers' demands for cosmetic quality put real emphasis on disease-free crops. The use of permitted inputs such seaweed and sulphur may be needed, in addition to cultural techniques such as fleece covers. Copper for blight control is increasingly restricted and is expected to be prohibited in the near future.

12 What yields can I expect

Crop yields vary widely in organic farming, according to the rotation and degree of fertility building, the soil type, the use of imported manure and the success with weed control; combinable crops are typically 50 – 70% of conventional.

The following Table 2 gives an indication of average yields across a wide range of conditions and management.

Table 2. Average Combinable crop yields, tonnes/hectare

	Low	High	Average
Winter Wheat	3	5.8	4.2
Spring Wheat	2.5	4	3.4
Spring Oats	3	5.5	4.5
Winter Oats	3	5.5	4
Winter Beans	3	3.5	3.2

Reference: average yields from Organic Farm Management Handbook 2017 Lampkin N, Measures M and Padel S.

Well-managed, specialised arable farms on good soils have the potential to consistently achieve yields higher than average.

13 The economics of organic arable farming

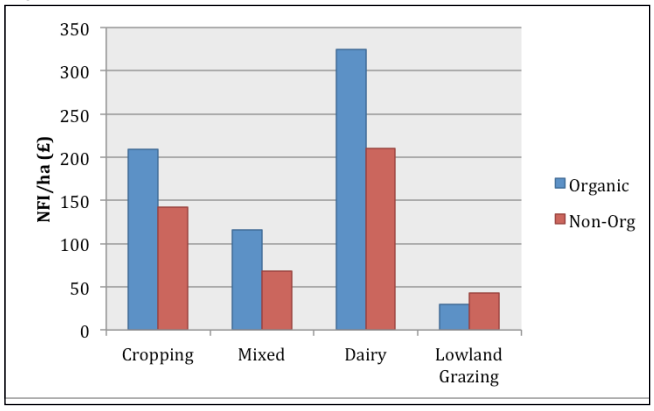
Many farms have run profitable organic arable farming businesses over many years by careful wholesale marketing, premium prices and grant support.

The conversion period is often thought of as being costly and it can initially result in substantially lower crop outputs due to the need for fertility building leys or green manures, unless there are existing leys that can be ploughed for conversion cereals.

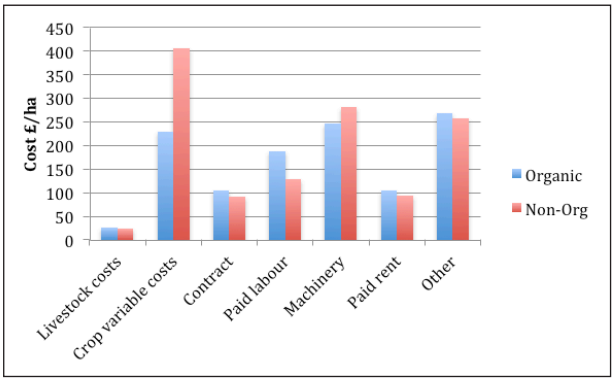
Capital investment in equipment, buildings and livestock may also be requires during the conversion, depending on the individual circumstances. However there is significant Countryside Stewardship (CS) grant aid which is designed to cover these conversion costs; rotational land in England is eligible for £175/ha/year for two years during conversion.

Once individual fields have been through the conversion period they are eligible for an on-going CS organic maintenance grant of £65/ha/year for rotational land and £40/ha for improved permanent grassland.

The profitability of the established organic business is usually as good as a comparable non-organic business and often better. The Farm Business Survey (FBS), funded by Defra compares significant numbers of commercial organic and non-organic farms; it has shown for a number of years better returns for both organic cropping and organic mixed farms. The results, Figure 1 show that in 2016/17 organic cropping farms (those with grains, roots and a small proportion of livestock) had a Net Farm Income (NFI) of £209/ha, significantly more than the non-organic of £142/ha.



This advantage to the organic cropping farms is due to having similar agricultural sales, higher agri-environment payments, and lower variable costs, although slightly higher fixed costs. Figure 2 shows the relative costs, notably the lower crop variable cost and machinery for the organic but slightly higher contract, paid labour, rent and other costs. Total costs are slightly less for the organic at £1163/ha than the non-organic at £1280.



Organic mixed farms (with grains, beef and sheep) in 2016/17 also showed higher Net Farm Income than non-organic farms, again due to higher gross margin and grants, lower machinery but slightly higher other costs and total labour.

Table 3 also shows the significance level of the results and relative performance of organic and non-organic dairy, lowland grazing and LFA grazing farms.

Table 3. Differences in average NFI/ha between organic and non-organic farms by farm type 2016/17.

NFI/ha TAA (£)	Organic	Non-organic	Difference	Significance
2016/17	Mean	Mean		
Cropping	209	142	**67**	*
Dairy	325	210	**115**	**
LFA Grazing	172	128	**43**	*
Lowland Grazing	30	43	**-13**	-
Mixed	116	68	**48**	-
(- not significant, * significant at 10% (slight), ** at 5% (moderate), *** at 1% (strong))				

Reference: Farm Business Survey Organic Farming in England 2016/17 RBR Newcastle University

Working capital requirements for organic farming are usually significantly lower than for non-organic – lower crop storage requirements and lower machinery depreciation, however livestock and associated infrastructure may be higher. FBS survey data for a number of years has shown that tenants capital on organic farms is 20 – 25% less than on non-organic farms.

The profitability of organic farming is maintained by a combination of organic and other agri-environment grants together with organic premiums.

Grants are guaranteed for five years and provide a secure form of income. Price premiums are potentially changeable and subject to consumer demand and market supply. Whilst there is always the possibility of prices dropping due to market pressure, imports or oversupply, the current lack of UK supply and the underlying strong shift in consumer purchasing towards locally produced organic food suggests there is a good business to be made from organic arable cropping.

The opportunities for profitable organic arable cropping are clear; higher gross margins with much lower variable costs, higher grant income, lower total costs and lower capital investment result in better financial performance from organic production. According to the Farm Business Survey reporting the results of real farm businesses organic cropping farms have consistently shown similar, or generally better profitability than non-organic farms for the last eight years.

Included overleaf in this technical leaflet is a case study of an existing organic arable farm, Shimpling Park Farm in Suffolk. The owner, John Pawsey took the business into organic in 1999. Over the years he moved the entire farm into organic production and in recent years has brought livestock onto the holding for the first time since the 1960's.

The case study is in the form a non-organic rotation, an organic rotation without livestock and a full six year organic rotation with livestock.

14 What next – steps to conversion?

1. Familiarise yourself with organic farming: visit organic farms, attend conferences and talk to organic farmers. Is organic farming for you?
2. You might also find it useful to visit a new website for farmers and growers interested in converting to organic, OASIS (Organic Advice, Support and Information Service) at: organicinfo.org.uk
3. Plan an organic rotation and system to suit your farm: take advice
4. Do a financial budget to see if the organic system is a viable option for you
5. Plan the conversion cropping and timescale: see OF&G Conversion Plan forms RD92, 207, 221, 223 and 226
6. Contact OF&G for an Application pack. Complete the application form RD254, and return to OF&G. OF&G will issue an invoice for your first year fee and once paid you will receive your Conversion Pack containing all the forms relevant to your business.
7. Apply to Natural England (NE) for Countryside Stewardship (or your regional scheme) organic conversion grant.

There is a short window during which applications can be made to NE, in 2018 the deadline for requesting an application pack was 31st May and the application form had to be submitted by 31st July. Wales, Scotland and Northern Ireland each have their own application periods.

15 Sources of further information and grants.

Table 2 - Organic Grants

Region	Telephone	
England	Countryside Stewardship (Enquiries Team) 0300 060 3900	Grants for organic farmers are available under Countryside Stewardship. Details of the scheme are available on http://www.gov.uk/government/collections/countryside-stewardship-get-paid-for-environmental-land-management
Wales	Rural Payments Wales 0300 062 5004	The Glastir Organic scheme supports farmers converting to organic production and also existing organic farmers who meet the eligibility criteria. Details of the scheme are available on the website: http://wales.gov.uk/topics/environmentcountryside/farmingandcountryside/farming/schemes/glastir/glastir-organic/?lang=en http://wales.gov.uk/topics/environmentcountryside/farmingandcountryside/farming/schemes/glastir/glastir-organic/?skip=1&lang=cy Applications can only be made on-line through the Rural Payments Wales website: http://wales.gov.uk/topics/environmentcountryside/farmingandcountryside/rpwonline/?lang=en
Scotland	Contact your local Scottish Government office or SOPA	Information on grants available under the Scottish Rural Development Programme can be found at; http://www.scotland.gov.uk/Topics/Rural/SRDP/RuralPriorities/Options/conandmainoforganicfarmin SOPA - www.sopa.org.uk
Northern Ireland	DAERA - 0300 200 Environment + 7842 Farming + 7843	Support measures for organic farmers are available as part of the Environmental Farming Scheme. Details of the scheme requirements are available on the website http://www.daera-ni.gov.uk/articles/environmental-farming-schemes-efs

CASE STUDY

Going organic has released working capital for farmer John Pawsey who farms 1,500 acres on his own farm and 1,500 on other sites nearby in Suffolk.

Input costs -
field operations, seed, diesel all establishment

Crop costs -
contracting, rogueing, etc

Fertility build -
clover earns a rent as is grazed

"Sprayers and the products they use are expensive and use a lot of water. In addition there is service maintenance and training and certificates.

If you're organic you can nail your cost of production. Knowing our costs means contracts are relatively easy to assess where margin brings funds over cost of production. You have the surety of the crop and the margin over the cost of production. "

John Pawsey

Gross Margin Comparison:

3 year Non-Organic Rotation (no greening)

	Winter Oilseed Rape	Feed Winter Wheat	Spring Malting Barley	Milling Spring Wheat
T/ha	3.75	9.1	6.0	6.2
£/t	£315	£150	£163	£150
ENTERPRISE OUTPUT	£1,181	£1,365	£978	£930
Sheep output £/ha				
Environmental payments	£30	£30	£30	£30
TOTAL OUTPUT	£1,211	£1,395	£1,008	£960
Seed	£37	£56	£62	£56
Fertiliser (non-organic) / Green manures (organic)	£208	£221	£125	£221
Crop protection (non-organic) / Weeding/Sundries (organic)	£245	£240	£135	£240
Sundries (non-organic) / Sheep inc. Forage (organic)	£20	£25	£16	£25
VARIABLE COSTS	£510	£542	£338	£542
GROSS MARGIN	£701	£853	£670	£418
AVERAGE GM				**£661**

Source: The Agricultural Budgeting & Costing Book

Organic arable releases working capital

Stephen Briggs – organic farmer and farm advisor -

It costs you to move each and every tonne of your grain. On average it works out to £5 per tonne to move the grain into the store and £5 per tonne to then take out of the store after cleaning and blowing and £5 per tonne to send the grain to the buyer.

Total crop handling costs therefore of £15 per tonne, per year.

With an organic farming business there is typically a smaller tonnage of grain to handle but with a much higher sale value, average figures are 75-90% of conventional yields. Handling and storage costs are therefore reduced as a % of the per tonne sale vale and by reducing overall working capital requirements.

Looking at John's figures with around £310 saved over 100 ha is £31,000 per year you don't have to fund and so you don't have to risk being out of pocket.

Non-Organic v Organic

5 year Organic Rotation without Sheep

Red Clover Ley	Organic Milling Winter Wheat	Organic Spring Milling Oats	Organic Feed Beans	Organic Spring Malting Barley (us)
0.0	4.7	4.0	3.1	3.5
£0	£320	£300	£375	£330
£0	£1,504	£1,200	£1,163	£1,155
£175	£175	£60	£60	£60
£175	£1,679	£1,260	£1,223	£1,215
£98	£92	£84	£102	£135
£0	£25	£25	£25	£25
£0	£48	£13	£25	£13
£98	£165	£122	£152	£173
£78	£1,514	£1,138	£1,071	£1,042
				£968

Source: John Pawsey

6 year Organic Rotation with Sheep

2 Year Grass Clover Ley	2 Year Grass Clover Ley	Organic Milling Winter Wheat	Organic Spring Milling Oats	Organic Feed Beans	Organic Spring Malting Barley
0.0	0.0	5.0	4.5	3.1	3.5
£0	£0	£320	£300	£375	£330
£0	£0	£1,600	£1,350	£1,163	£1,155
£851	£851	£0	£0	£0	£0
£175	£175	£60	£60	£60	£60
£1,026	£1,026	£1,660	£1,410	£1,223	£1,215
£98	£84	£92	£84	£102	£135
£0	£25	£25	£25	£25	£25
£0	£47	£48	£13	£25	£13
£333	£333	£0	£0	£0	£0
£431	£489	£165	£122	£152	£173
£595	£537	£1,495	£1,288	£1,071	£1,042
					£1,005

Source: John Pawsey

ROTATION - 5 year

1. Ley
2. Winter Milling Wheat
3. Spring Milling Oats
4. Winter Beans
5. Spring Malting Barley

ROTATION - 6 year

1. Ley
2. Ley
3. Winter Milling Wheat
4. Spring Milling Oats
5. Winter Beans
6. Spring Malting Barley

Where can I get advice about conversion?

You might find it useful to visit a new website for farmers and growers interested in converting to organic, OASIS at https://organicinfo.org.uk

This website offers accurate information about organic conversion with a simple self-assessment questionnaire to help farmers decide if it's the right choice, along with a step-by-step guide to aid successful conversion. Technical resources are also available for existing organic farmers, to keep up-to-date with the latest research.

Alongside the website OASIS has a helpline to a team of advisors that farmers can call. If organic production seems feasible, there's then the option to purchase an advisory package which includes a farm visit to consider feasibility and to develop an organic conversion plan.

Tel: 0844 800 0091 Email: advice@organicinfo.org.uk

OASIS
Organic Advice, Support and Information Service

16 References

Books

Farm Business Survey, Organic Farming in England 2016/17

https://www.ncl.ac.uk/media/wwwnclacuk/naturalenvironmentalsciencesschoolof/files/organic-farming-in-England-2016-17.pdf

Grassland Management for Organic Farmers David Younie (2012) ISBN 978 1 84797 387 0

Organic Cereal and Pulse Production - A Complete Guide Stephen Briggs (2008) ISBN 9781861269539 The Crowood Press Ltd, Wiltshire

Organic Cereals and Pulses Younie D., B.R. Taylor, J.P. Welsh and J.M. Wilkinson (2011)

ISBN 0-948617-47-0 Chalcombe Publications, Lincoln

Organic Farming Lampkin N (2002). Old Pond Ipswich (out of print).

Organic Farm Management Handbook 2017. Lampkin N., Measures M., and Padel S. ISBN 978-1-872064-46-8. A biennial publication providing a review of the organic market, gross margins, farming costs, prices, certification, grants and sources of information.. Available from Tel: 01488 658298 or email elmfarm@organicresearchcentre.com

Technical information Websites

Agricology, technical information: https://www.agricology.co.uk

DAERA (Northern Ireland): http://www.daera-ni.gov.uk/articles/organic-management#skip-link

Defra Organic Farming Pages: www.gov.uk/guidance/organic-farming-how-to-get-certification-and-apply-for-funding

EU Commission Organic Farming Pages: http://ec.europa.eu/agriculture/organic/index_en

OK Net Arable, technical arable information: http://farmknowledge.org/index.php

Organic Centre Wales: technical information www.organiccentrewales.org.uk

Organic Farmers & Growers: technical information and organic standards www.ofgorganic.org

Organic Research Centre: technical information and research www.organicresearchcentre.com

OSCAR: Cover Crops https://web5.wzw.tum.de/oscar/toolbox/database/index.html

SRUC Scotland's Rural College: www.sruc.ac.uk/consulting/services/i-r/organic/

SRUC Masters course: https://www.sruc.ac.uk/pgorganicfarming

Organic requirements are in addition to other statutory requirements. Statutory information is for guidance only and is correct at time of going to print

OF&G is grateful to Mark Measures for giving us the benefit of his considerable experience in commercial organic arable farming, which has formed the basis of this Technical Leaflet.