



Organic arable farming – conversion options

Autumn 2008

Demand for organic produce is growing rapidly.

Worldwide sales of organic food and drink in 2006 rose by 16% to £19.3 billion. UK retail sales rose 22% in 2006 to around £1.9 billion with an average growth of 27% a year over the past decade. The UK is now Europe's third largest organic market, after Germany and Italy.

The UK has a large demand for organic cereals for both human and livestock consumption, yet is only 40% self-sufficient in organic produce. This contrasts with a Defra target of 70% self-sufficiency.

EU regulations govern organic production. Each Member State implements regulations through a 'competent authority'. In the UK, this is Defra, advised by the Advisory Committee on Organic Standards (ACOS) which sets production standards, registers and approves the nine UK organic certification bodies, and monitors procedures.

To become organic, a producer must register with a certification body and the land must be 'converted'. Conversion typically takes two years, during which land is managed under an agreement specifically excluding inputs prohibited under organic standards. It may be possible to reduce the two year conversion period by between four and twelve months, depending on historic land management practices and agri-environment agreements.

In January 2007, about 3% of the total UK agricultural area was managed organically. Permanent and temporary pasture accounts for 85% of this area, with the rest being made up of cereals and other combinable crops, vegetables including potatoes, set-aside, and woodland.

The number of all-arable (stockless) organic farms is increasing. Some have now operated successfully for over 20 years demonstrating that livestock are not essential in developing an organic system.

This booklet aims to help farmers, managers and land owners who are considering organic conversion.

Contents

UK production	3
Market demand and farm income	4
The organic supply chain	5
Conversion: aims and funding	6
Sources of soil fertility	7
Conversion: cropping and fertility building	8
Choosing strategies for conversion	9
Organic cropping	10
Further information	11
UK Organic certification bodies	12

What is organic farming?

Regulated production using balanced rotational systems that largely avoid or exclude synthetic inputs.



Can all farms be organic?

Most can. Well-managed farms are best for conversion. Problem weeds, poor soil structure, inadequate drainage etc can limit success. Land under longterm set-aside may not be suited to conversion because of high levels of pernicious weeds.

Mythbuster

Organic standards are less demanding in other countries.

All EU member states operate to a baseline organic standard, although the UK has a dispensation to convert only part of a farm. Some standards differ due to climate or farming system.

UK production

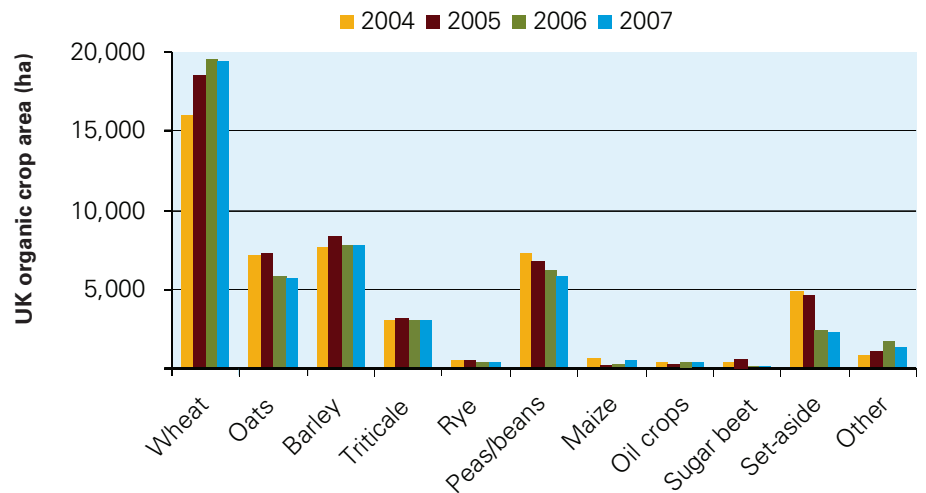
Organic cropping

In the United Kingdom, organic combinable crops accounted for only 1% of grain production in 2007 – about 50,000ha. Domestic production is important for both human consumption and livestock feed.

England's total organic arable area in 2007 was 37,114ha. The total area included 8,412ha of land in conversion and 28,702ha of organic cropped land.

Scotland's total arable area was 7,534ha including 4,228ha of organic land and 3,246ha of land in conversion.

Wheat is the largest organic arable crop in the UK



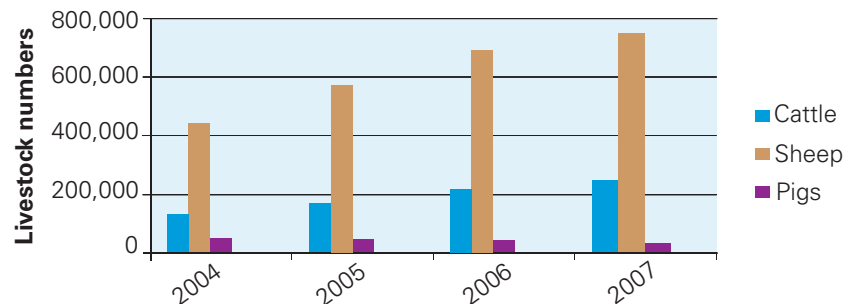
Source: Soil Association Organic Market Report 2007 & Abacus Organic Services Ltd data

Organic livestock

UK's total organic livestock numbers (excluding poultry) have risen over recent years.

According to the Soil Association, poultry numbers almost tripled between 2003 and 2006 to reach 12.4 million table birds.

Growth in organic livestock (excluding poultry)



Source: Defra statistics

Mythbuster

Older wheat varieties are better as organic crops.

Organic trials show that some modern cereal varieties can outyield older ones. Performance varies according to locality, disease pressure, soil fertility and rotation. It is important to match varieties to individual farms.



Will cleavers be a problem?

High nitrogen encourages cleavers. Fertility building crops in organic systems lead to a more gradual release of N, so cleavers are far less competitive.



Market demand and farm income

Demand

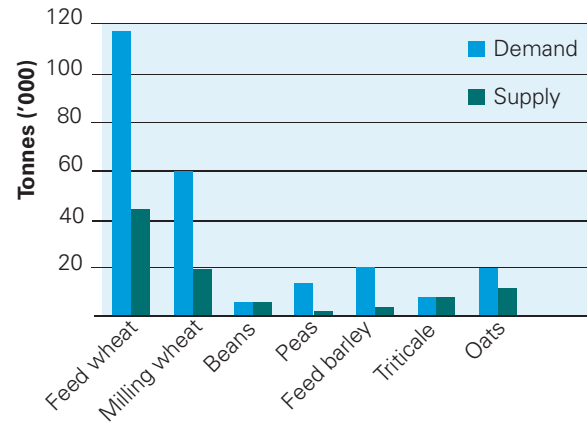
Organic grain production can only be estimated as Defra does not separate organic and non-organic cereal production data.

EU organic standards require all organic ruminants to be fed on rations made from 100% organic ingredients (pigs and poultry – 90%). This requirement, together with rising livestock numbers and increasing food demand, means demand for organic cereals and proteins rose to over 100,000 tonnes. In the absence of domestic production the shortfall must be met from imported grain.

Farm income

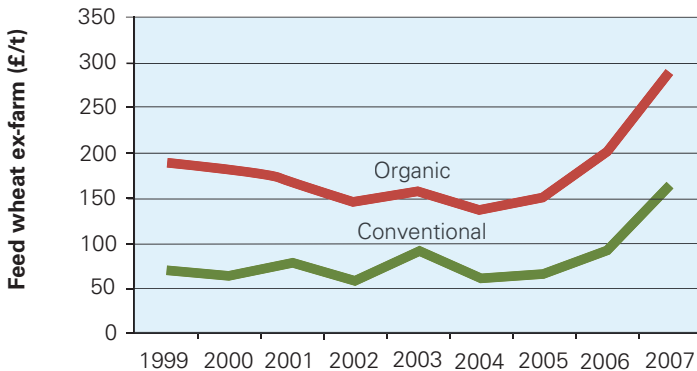
Over recent years organic wheat prices have followed conventional markets.

2007 UK demand vs supply



Source: Norton Organic Grain

Organic and conventional wheat prices 1999 – 2007



Source: Organic Grain Link – profit from sustainable cropping

Limited historical data indicates high returns from organic systems.

Q Will black-grass be a problem?

A Only a very small proportion of black-grass seeds survive over three years in soil. Rotations with fertility breaks and a mix of spring and winter cropping limit seed build up. Many farmers find black-grass less of a problem under organic management.

Q What is the minimum area that can be farmed organically?

A The area should support a sustainable crop rotation and produce marketable loads. As a guide a minimum of 28–40ha is workable.

Net farm incomes on matched organic and conventional farms, average of two years (2004/05 and 2005/06)

	Net farm income		
	Farms (number)	£/farm	£/ha
Cropping only			
Organic	9	34,038	260
Conventional	54	5,046	40
Lowland dairy			
Organic	11	36,278	302
Conventional	76	29,680	279
Lowland cattle and sheep			
Organic	12	11,428	155
Conventional	108	5,649	63
Mixed farming			
Organic	6	21,738	165
Conventional	29	7,819	60

Source: Agriculture in the United Kingdom 2007, Defra

Mythbuster

It's impossible to farm organically without livestock.

Wrong! Stockless organic farms have been operating successfully in the UK for over 20 years.

The organic supply chain

'Growing for the market' is important for all farmers.

For feed, the main demand for cereals is from compounders serving mainly the south-west. But demand is increasing in other livestock areas.

For human consumption there are relatively few buyers. Thus location is important to avoid high transport costs.

Despite the small volumes of organic grain traded, there are many routes to market.

While many mainstream grain traders can deal in organic cereals, it will be a minor part of their overall business.

Currently, only one co-operative is dedicated to organic produce.

There are neither futures markets, nor any significant export opportunities.

Details of buyers and merchants can be found at www.hgca.com/organic

There is growing demand for organic pulses (peas, beans and lupins) for animal feed as well as a small market for frozen vining peas. Currently no market exists for organic rapeseed.



Routes to market		
Market	Mechanism	Characteristics
Wholesale	Selling via trade intermediaries	<ul style="list-style-type: none"> – mainly grain merchants and co-operatives – spot market values – contracts can include: <ul style="list-style-type: none"> – minimum-maximum over a time period – tracker – fixed forward price
Direct	Direct contracts (millers, maltsters, feed compounders etc)	<ul style="list-style-type: none"> – contracts can include: <ul style="list-style-type: none"> – minimum-maximum over a time period – tracker – fixed forward price
Farm-to-farm	Direct sales	<ul style="list-style-type: none"> – agreed price with, or without, market tracking
Collaborative ventures	Arrangements between two or more parties	<ul style="list-style-type: none"> – share farming – linked arable and livestock farms – pooled marketing activities – sales normally negotiated for the joint parties using any of the above arrangements
Specialist markets	Direct contracts between farmers and end-users	<ul style="list-style-type: none"> – buy-back contracts with seed merchants – pharmaceutical, or human consumption, markets – normally based on fixed forward price, premium over base or other contracts

Mythbuster

Cereal diseases will be difficult to manage.

Careful selection of resistant varieties, reduced availability of nitrogen and more open crops generally result in far lower disease pressure.

Q Do I need to buy new equipment?

A This depends on current machinery on the farm. Ploughing may be necessary but can be done using owned machinery or by a contractor.

A harrow comb or other weeder may be a useful addition.



Conversion: aims and funding

During conversion, land should be 'rested' from crop production, eg by planting a grass/clover ley. This helps improve soil fertility and structure. It also makes it easier to manage some pests, diseases and weeds.

When converting large areas some cropping may be undertaken.

The year of harvest determines the marketable status of the crop.

- **In year one**, no harvested crop can only be sold as organic.
- **In year two**, both harvested forage and grain crops have 'in conversion' status for livestock feed.
- **In year three**, harvested arable crops can only be sold as 'organic' provided seed was planted into land certified as organic. Forage crops achieve organic status once the conversion period is complete.

Organic seed must be used where available. Growers need permission from the certification body to use non-organic seed. All seed – organic or non-organic – must be sown free from seed treatments containing prohibited materials.

Research is ongoing into treatments suitable for organic seeds.

Agronomic targets during conversion include the need to:

- supply sufficient nutrients for planned rotation
- enhance soil structure
- suppress weeds
- achieve a break from pests and diseases.

Economic considerations during conversion include the need to:

- generate gross margin over planned rotation
- balance risk
- provide return on investment
- manage cash flow during conversion period.

Organic advice is available from the Organic Conversion Information Service (OCIS) which operates in England. Scotland, Wales and Northern Ireland have similar provision (see page 11 for contact details).

Independent advisers also provide advice.

Mythbuster

Organic cereal seed is full of disease.

Recent research by NIAB found that seed-borne disease levels were no higher in organic seed.



What are the sources of P and K?

Phosphate and potash can be supplied from a range of sources, such as rock phosphate, gypsum, kieserite and potassium sulphate.






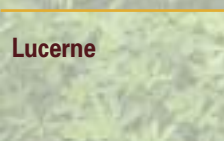

Note: many of the allowed inputs are slow-acting minerals.

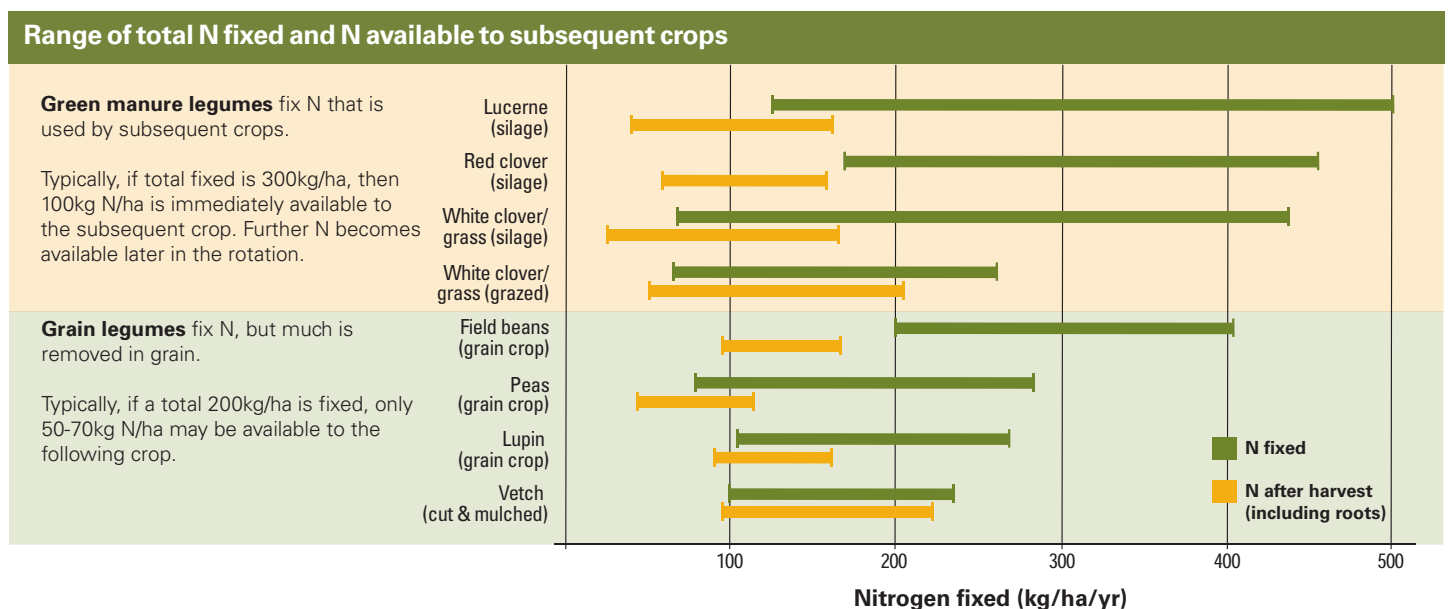
Organic agri-environment scheme funding

Agri-environment schemes have encouraged renewed interest in organic conversion.

Agri-environment schemes in the UK				
Country	Scheme	Term	Payment	Run by
England	Organic Entry Level Scheme (OELS)	5 years	Area payment plus conversion top-up in years 1 and 2	Natural England <i>Can be combined with Higher Level Stewardship</i>
Scotland	Rural Development Contracts - Rural Priorities (Organic Conversion)	5 years	Payment depends on land use	Scottish Government Rural Payments and Inspections Directorate
Wales	Organic Farming Scheme (OFS)	5 years	Payment depends on land area and farming system plus advice	Welsh Assembly Government <i>Can be combined with other schemes</i>
Northern Ireland	Organic Farming Scheme (OFS)	Under review	Area payment plus funds for training, advice and certification	Northern Ireland Executive

Sources of soil fertility

Options for supplying nitrogen				
Legume species	Soils	Nitrogen fixed (kg/ha/yr)	Benefits	Disadvantages
 Red clover	Most types	300-400	High yielding Deep rooting Primarily used in silage mixes Can be used as green manure	Productive for 3 years Stem eelworm susceptible Livestock issues: fertility and bloat problems
 White clover	Most types	100-200	Good protein content Viable for 5-9 years Primarily used in grazing mixes	May be slow to establish
 Peas	Light, free draining pH5.9-6.5	50-100	Agronomy well understood Potential cash crop for animal feed Prone to predation by birds	Poor competitiveness against weeds
 Beans	Medium to heavy	100-200	Agronomy well understood Potential cash crop for animal feed Prone to predation by birds	Poor competitiveness against weeds
 Common vetch	Most types	Up to 200 (if cut and mulched)	Can be grown as a summer or 12 month green manure Smothers weeds well Can be grown with cereal for arable silage	Avoid 'green bridge' if peas in the rotation Can become a weed if left to seed
 Lucerne	High pH	Up to 500	Deep rooting Productive for 5 years Can be used as pure sward or within conservation mix	Slow to establish Prone to over-winter dieback
 Trefoils	Most types	100-200	Low bloat risk Evidence of worm control benefits Cold and shade tolerant Include in grazing mix	Low yielding Slow to establish Does not withstand heavy grazing



Source: OF0316 The development of improved guidance on the use of fertility building crops in organic farming, Defra

Conversion: cropping and fertility building

Rotations

Converting all-arable farms to organic production requires careful planning to establish a viable system and maintain farm income, especially during the two-year conversion period.

Research at the University of Nottingham compared a 'typical' two-year red clover/ryegrass green manure with six alternative strategies containing various proportions of fertility building and cash crops. These strategies were chosen to reflect a range of perceived risks to agronomy, economics and soil fertility.

Conversion strategies assessed in trials

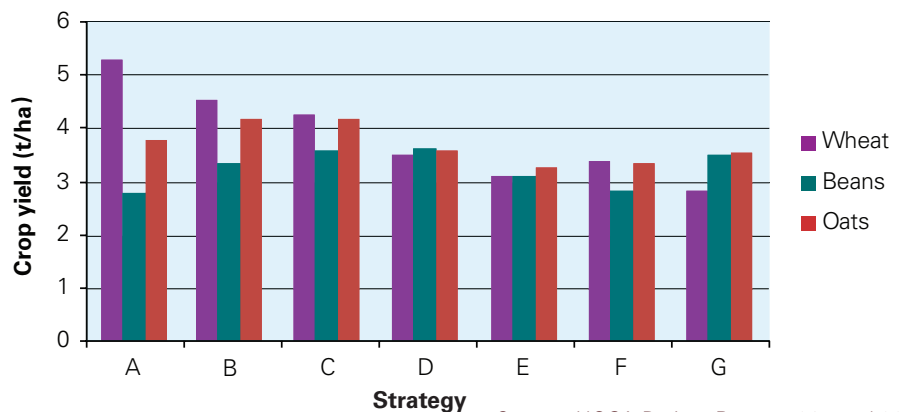
Strategy	Year 1	Year 2	Years 3–5
A	Red clover/ ryegrass	Red clover/ ryegrass	A full organic rotation of the following winter crops: Year 3 – wheat Year 4 – beans Year 5 – oats
B	Red clover seed	Red clover	
C	Spring wheat red clover undersown	Red clover	
D	Vetch	Vetch-rye	
E	Spring wheat	Winter beans	
F	Spring oats	Winter beans	
G	Spring wheat red clover undersown	Spring barley/ peas	

Yields

The seven conversion strategies were followed by organic crops of wheat, winter beans and winter oats, which were monitored for growth, development, yield, weed burden and soil fertility.

Conversion strategy influenced yield throughout the first three years of organic rotation.

Yields in first three years after conversion

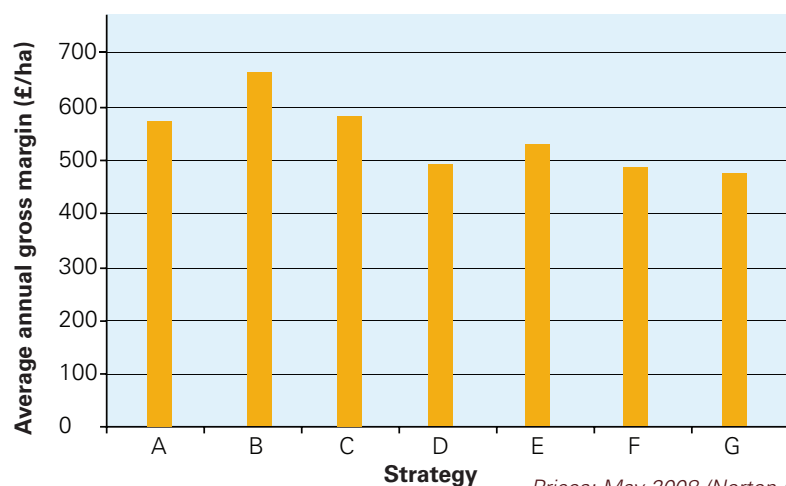


Source: HGCA Project Reports 307 and 389

Returns

Averaged over the conversion period and three years of organic crops, annual gross margins (GMs) were greatest for fertility building strategies, especially those with red clover. Strategy B (red clover seed followed by clover) gave the highest average margin; strategy G (spring wheat followed by red clover followed by spring barley/peas) the lowest.

Gross margin: two-year conversion plus three-year organic rotation

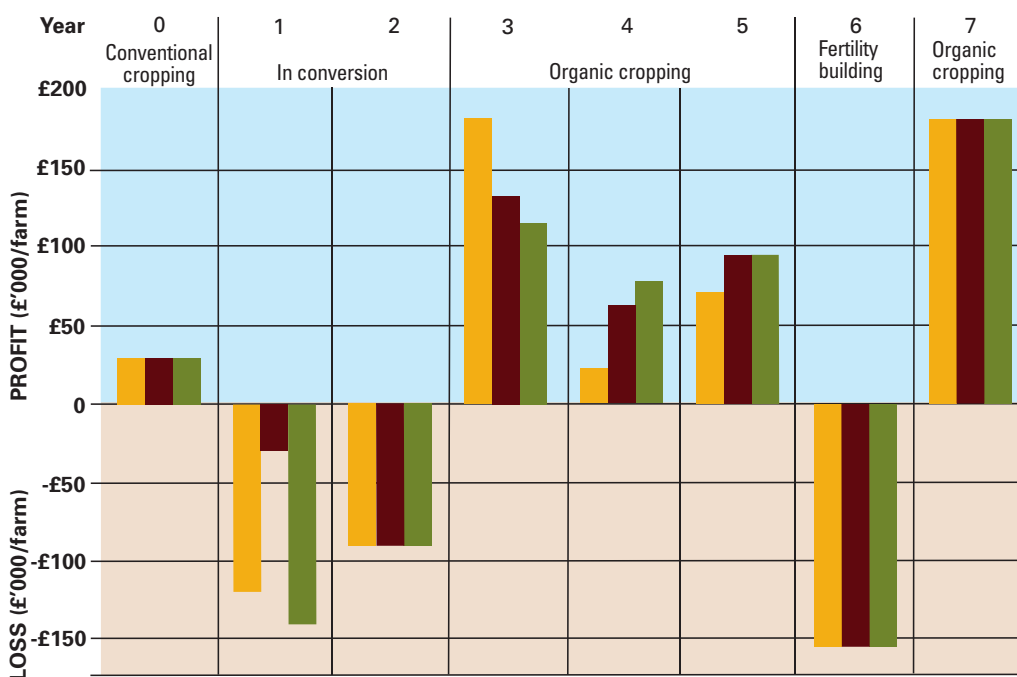


Prices: May 2008 (Norton Organic Grain)

Choosing strategies for conversion

Features of three sample strategies

Strategy A – low risk	Strategy B – high risk	Strategy C – medium risk
Red clover/ryegrass + red clover/ryegrass <ul style="list-style-type: none"> – 2nd highest GM over 5 years – No cash crop income during conversion, but offset by subsequent returns 	Red clover seed + red clover <ul style="list-style-type: none"> – Highest GM over 5 years – Highly variable clover seed yield – Need to secure seed and markets – Potential income during conversion 	Undersown spring wheat followed by red clover <ul style="list-style-type: none"> – 3rd highest GM over 5 years – Provides experience of organic crop production during conversion – Potential income during conversion
Provides greater certainty of costs and returns to suit a risk-averse grower.	Provides income and builds fertility, but securing approved seed, achieving seed yield and finding a market makes this high risk.	Provides income during conversion, but can incur financial penalties if marketable yield is low in first year.



Whole farm conversion

This gains fastest access to organic markets. However, it demands rapid adoption of new skills and incurs heavy losses during conversion as the figure, for each of the three sample strategies, shows.

Q How much land do I need to convert in a year?

A The minimum arable area to convert each year is 20–40ha depending on field sizes.

Phased conversion incurs far less dramatic swings in profit and loss

Year	0	1	2	3	4	5	6	7
Cropped area								
Conventional	100%	75%	50%	25%	-	-	-	-
In conversion	-	25%	50%	50%	50%	25%	-	-
Organic	-	-	-	25%	50%	75%	75%	75%
Fertility building	-	-	-	-	-	-	25%	25%
Profit/ Loss (£ '000/farm)								
Strategy A	28.9	1.6	-25.8	-9.3	-1.5	45.2	28.8	28.8
Strategy B	28.9	24.3	-3.1	1.2	18.7	48.7	32.3	44.5
Strategy C	28.9	-4.0	-31.4	-31.3	-9.8	48.4	32.0	48.4

The table shows profit and loss for the three sample strategies as 25% of the land enters organic conversion in years 1 to 4. Fertility building on 25% of land begins in year 6.

Benefits of phased conversion include:

- buffers change
- time to learn new skills
- reduces cashflow pressure.

Organic cropping

Rotation design

A successful rotation uses cropping sequences that:

- match nutrient availability with requirement – crops with high nutrient demand should closely follow fertility building crops;
- grow crops with different rooting depths and structure to efficiently utilise nutrient reserves;
- disrupt weed, pest and disease life cycles.

Cropping sequences are affected by soil type, location and markets.

Longer intervals in the rotation are required for some crops to avoid pest or disease build-up, eg to avoid stem nematode infestations, 5-6 years are needed between red clover crops.

Crop types and varieties

Vigorous growth characteristics are important to out-compete weeds during establishment.

Crops with poor ground cover, eg peas and lupins, may be grown with a companion crop to smother weeds.

Some crops, eg brassicas, may adversely affect beneficial mycorrhizal fungi which aid phosphorous supply. Such crops should not be grown too often in the rotation.

Crop establishment

Timely soil management is important to achieve good seedbeds. This aids good crop establishment and so minimises weed competition.

Higher seed rates, typically 10-15% above conventional, are used to achieve denser crop and suppress early weed growth. Additional seed costs must be balanced against yield lost to weeds.

Any missed, or poorly established, areas should be re-drilled quickly to avoid weeds thriving in bare ground.

By the end of conversion, soil fertility should reach a level that will sustain a planned rotation, which must contain a balance of fertility building and cash crops.

Examples of balanced organic rotations



Key

Fertility building	Cash cropping
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Further information

HGCA-funded reports

For information on completed and ongoing HGCA-funded research and useful information, see www.hgca.com/organic

Research Review 45 (2001) Current practices and future prospects for organic cereal production: survey and literature review

Project Report 304 (2003) Production of organic wheat: trials on varieties, seed rate, weed control and the use of permitted products

Project Report 307 (2003) Organic conversion strategies for stockless farming

Project Report 389 (2006) Investigating the long-term impact of stockless organic conversion strategies

For reports on research funded by Defra/MAFF and through LINK programmes see:
<http://randd.defra.gov.uk/>

Defra-funded reports

Many aspects of organic farming, both with and without livestock, have been investigated through Defra-funded projects. The following are examples of work relevant to this publication:

OF0190: Economics of organic farming (extension to OF0125)

OF0301: Extension to OF0145: Testing the sustainability of stockless arable organic farming on a fertile soil

OF0316: The development of improved guidance on the use of fertility building crops in organic farming

OF0318: Assessing the sustainability of a stockless arable organic rotation

Ongoing HGCA and Defra-funded research (selected projects only)

LK0951: Developing new management options for soil-borne pests of organic systems

LK0960: Better organic bread: Integrating raw material and process requirements for organic bread production

LK0970: Sustainable production of organic wheat

Books

Blake, F. (1994) *Organic Farming and Growing*. The Crowood Press

Briggs, S. (2008) *Organic Cereal and Pulse production*. The Crowood Press

Davies, D.H.K., Welsh, J.P. and Wilkinson, J.M. (2002) *Organic Cereals and Pulses. Weed Control in Organic Cereals and Pulses*. Chalcombe Publications

Lampkin, N. (2002) *Organic Farming*, Old Pond Publishing, Farming Press

Lampkin, N., Measures, M. and Padel, S. (seventh edition 2007) *Organic Farm Management Handbook*. University of Wales

Organic conversion

Organic Conversion Information Service (OCIS)

Tel: 0800 980 0048 (England)

Farmers and growers in England can request a free visit for impartial advice on organic production and marketing relevant to the business.

Similar arrangements apply in other parts of the UK:

Tel: 01224 711072 (Scotland)

Tel: 01970 622100 (Wales)

Tel: 028 9070 1115 (Northern Ireland)

Other useful websites

Abacus Organic Associates:
www.abacusorganic.co.uk

Defra Organic Farming Pages:
www.defra.gov.uk/farm/organic

Institute of Organic Training and Advice:
www.organicadvice.org.uk

Organic Centre Wales:
www.organic.aber.ac.uk

Organic Eprints: www.orgprints.org/
(archive of papers on organic research)

Organic Europe:
www.organic-europe.net

Organic Farmers & Growers
www.organicfarmers.org.uk

The Organic Information Service (Defra-funded):
www.organicinform.org

Organic Information Service (Natural England):
www.naturalengland.org.uk/planning/farming-wildlife/ocis

The Organic Research Centre, Elm Farm:
www.organicresearchcentre.com

SAC:
www.sac.ac.uk/consultancy/organic/

Scottish Government:
www.scotland.gov.uk/Topics/Agriculture/AgriculturalPolicy/15869/3748
also:
www.scotland.gov.uk/Topics/Rural/SRDP/RuralPriorities/Options

Soil Association Food and Farming Department:
www.soilassociation.org/foodandfarming

Acknowledgements



This guide was funded by HGCA and Defra as a knowledge transfer project. It was written by Stephen Briggs and Lois Philipps, Abacus Organic Associates Services Ltd and Dr Debbie Sparkes and Dr Paul Wilson, University of Nottingham.

HGCA is grateful to many experts who have commented on draft versions of the guide, including: Dr Pete Berry, James Clarke and John Spink, ADAS; Lucy Barnard, Defra; Michael Marriage, Doves Farm Foods; Jane James, Environment Agency; Phil Sumption, Henry Doubleday Research Association; Dr Clare Kelly, Prof Graham Jellis, Marsha Ribeiro and Jack Watts, HGCA; Gerard Dinnage and Mark Measures, The Institute of Organic Training and Advice (IOTA); Dr Colin West, MAGB; Nick Cooper and Matthew Heaton, Natural England; Guy Gagen and Clare Smith, NFU; Trevor Drew and Steven Jacobs, Organic Farmers & Growers; Simon Tubbs, Norton Organic Grain; Gillian Woodward and colleagues, Organic Advisory Service; Andrew Trump, Organic Arable; Roger Hitchings, Organic Research Centre - Elm Farm; Oliver MacDonald, PSD; Professor Rod Blackshaw, University of Plymouth; Robert George, Soil Association; and Christine Watson, SAC.

Edited by Dr Clive Edwards, HGCA and Geoff Dodgson, Chamberlain.

Design: Chamberlain.

Photographs:



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HGCA Guide 43 (G43)

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UK Organic certification bodies

Organic Farmers and Growers Ltd. (UK2)
The Old Estate Yard, Shrewsbury Road, Albrighton,
Shrewsbury, Shropshire, SY4 3AG
Tel: 01939 291800
Website: www.organicfarmers.org.uk

Scottish Organic Producers Association (UK3)
Scottish Organic Centre, 10th Avenue, Royal Highland
Centre, Ingliston, Edinburgh EH28 8NF
Tel: 0131 335 6606
Website: www.sopa.org.uk

Organic Food Federation (UK4)
31 Turbine Way, Eco Tech Business Park, Swaffham,
Norfolk PE37 7XD
Tel: 01760 720444
Website: www.orgfoodfed.com

Soil Association Certification Ltd (UK5)
South Plaza, Marlborough Street, Bristol BS1 3NX
Tel: 0117 914 2406
Email: goorganic@soilassociation.org
Website: www.soilassociation.org/certification

Bio-Dynamic Agricultural Association (UK6)
The Painswick Inn Project, Gloucester Street,
Stroud GL5 1QG
Tel: 01453 759501
Website: www.biodynamic.org.uk

Irish Organic Farmers and Growers Association (UK7)
Harbour Building, Harbour Road, Kilbeggan,
Co Westmeath, Ireland
Tel: 00 353 506 32563
Website: www.irishorganic.ie

Organic Trust Limited (UK9)
Vernon House, 2 Vernon Avenue, Clontarf,
Dublin 3, Ireland
Tel: 00 353 185 30271
Website: www.organic-trust.org

Quality Welsh Food Certification Ltd (UK13)
Gorseland, North Road, Aberystwyth,
Ceredigion SY23 2WB
Tel: 01970 636688
Email: mossj@wfsagri.net

Ascisco Ltd (UK15)
South Plaza, Marlborough Street, Bristol BS1 3NX
Tel: 0117 914 2406
Email: goorganic@soilassociation.org
Website: www.soilassociation.org/certification