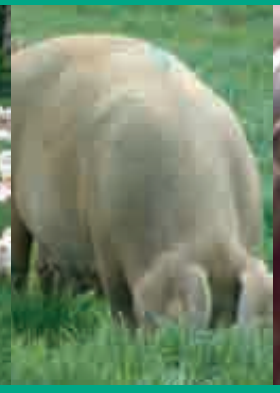
Guidelines for Organic Farming



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NATIONAL DEVELOPMENT PLAN

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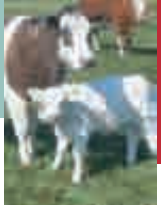

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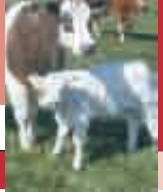


Introduction to Organic Farming

Organic farming can be a profitable alternative to conventional farming. At EU and global level the industry is experiencing rapid growth. Currently more than 31 million hectares of farmland are under organic management worldwide. The EU land area under organic management stands at 4% or six million hectares of the total area farmed. In Ireland the sector is growing steadily, yet remains relatively underdeveloped with less than 1% of the total farming area now farmed organically. At the end of 2007 1,121 organic operators were registered with the Department of Agriculture, Fisheries and Food and the area farmed organically was approximately 40,000 hectares.

What is Organic Farming?

Organic farming is a system of farming which avoids the use of soluble fertilizers, pesticides, growth regulators, feed additives and other chemicals. The organic farmer relies on the use of crop rotations, animal manure, clover, low stocking rates and good animal husbandry for producing outputs. The natural immunity of plants and animals are used to combat disease whenever possible.

The organic tillage farmer and vegetable grower aim to have a high level of organic matter and a high level of biological life in the soil. Excellent husbandry, farm management and planning skills are required, as quick fix chemical and pharmaceutical solutions are no longer an option.

Regulations

A major factor distinguishing organic farming from other approaches to sustainable farming is the existence of internationally acknowledged standards and certification procedures. The standards for organic production within the European Union are defined and enshrined in law by Council Regulation (EEC) No 2092/91.

With effect from 24 August 2000, Council Regulation 1804/99, which supplemented Regulation 2092/91, brought organic livestock and livestock produce within the ambit of EU rules. These standards have been developed to provide organic producers with clear rules as to how organic food should be produced to meet consumer demand.

Regulation 2092/91, which is backed up by Statutory Instruments 112 of 2004 and 698 of 2007, creates a framework defining in detail the requirements for agricultural products or foodstuffs bearing a reference to organic production methods. The rules not only define the methods of production for organic crops and livestock but also regulate the labelling, processing, inspection and marketing of organic products within the European Community and the importation of organic products from non-member countries.

In Ireland, the Department of Agriculture, Fisheries and Food is the competent authority for regulating the organic sector and ensuring that the obligations and requirements of Regulation 2092/91, as amended, are adhered to. The EU legislation allows

Member States to use private inspection bodies to carry out the inspection and licensing system of organic operators. Two certification bodies carry out this work in Ireland: Irish Organic Farmers and Growers Association (IOFGA) and Organic Trust Ltd.

Farmers considering the organic option should read the standards relating to their farming enterprises in detail and discuss the options with an agricultural adviser. By studying the standards, farmers and growers will be able to see which practices on their farms do or do not meet the organic regulations. To avail of the price premiums and financial supports for organic produce, a farmer must have his farm certified by one of the Organic Certification Bodies (OCBs) and must farm in accordance with organic standards. Some of the main requirements of these standards are outlined below.

The Standards for Organic Food and Farming in Ireland

- A two-year conversion period is required before a farm is given organic status.
- Soluble mineral fertilizers are prohibited, but some fertilizsers are permitted, such as lime and rock phosphate.
- Clover and other legumes supply nitrogen. The balance between fertility building crops, such as grass, clover lea and exploitative crops such as cereals and potatoes is critical in a tillage rotation.
- Most manufactured agro-chemicals (e.g., herbicides) are prohibited.
- Ruminant livestock must be fed a diet which is at least 60% roughage. Tillage crops should be considered on organic farms as it may be cheaper to grow than to buy-in concentrates. Cereals also produce straw for bedding, provide an opportunity to re-seed ground to a clover lea and to have clean grazing for young stock.
- The highest standards of animal welfare are obligatory. Housed animals must be provided with bedding. Good ventilation and a generous floor area for each animal are required.
- Routine preventative treatment of healthy animals is not allowed. The emphasis is on prevention rather than cure, through management techniques. Obviously, sick animals must be treated, and treatment is also allowed in the case of a known farm problem e.g., blackleg (permission is required in this case).

Applying the Standards

While the organic standards may appear difficult at first glance, there are many farms that could change to organic production without much difficulty. Mixed farms with suckler cows, sheep and some tillage are ideally suited to organic farming. The most critical element in a successful organic farm is the farmer. He or she will need excellent livestock and crop husbandry skills, have good foresight and planning ability, keep good records and successfully market the farm's produce.

Getting Information

Information on organic farming is

obtainable from any of the OCB's and your local Teagasc adviser. It is advisable for farmers to visit organic farms in their area first, to learn from the experience of other farmers and to see the changes required to convert to organic farming. Details of organic farms to visit can be obtained from the OCBs or the Teagasc organic advisers. There is a series of organic demonstration farms walks each summer and short courses in organic farming and growing are provided by Teagasc, the Organic Centre in Leitrim, County Wexford Organic Centre and An tIonad Glas in Limerick.

Relevant Organisations

1. Organic Certification Bodies

Ireland has two Organic Certification Bodies:

- Irish Organic Farmers and Growers Association (IOFGA); and
- Organic Trust.

These bodies are approved by the Department of Agriculture, Fisheries and Food (DAFF) to provide a licensed inspection and certification scheme, under Council Regulation (EEC) 2092/91, as amended. Farmers, growers and processors must register with one of the two organic associations in order to produce and market a product to organic standards. This is also a requirement under the Organic Farming Scheme.

2. Department of Agriculture, Fisheries and Food (DAFF)

In Ireland the Department of Agriculture, Fisheries and Food is the competent authority for regulating the organic sector and ensuring that the obligations and requirements of Regulation 2092/91 as amended, are adhered to. The DAFF Organic Unit is based at Johnstown Castle Estate. Applicants must register as organic operators and complete the DAFF Form ORG 1. DAFF also operate the Organic Farming Scheme and the On Farm and Off Farm Schemes of Grant Aid for the Development of the Organic Sector (outlined in Chapter 2).

3. Teagasc

Details of services provided to organic farmers by Teagasc are outlined in Chapter 13.

4. Producer Support and Marketing Groups

There are several groups of producers who aim to promote and support organic farming. Some also market their own produce. Such groups are a valuable support for those involved in, or considering, organic production. (See Chapter 14 for contact details of relevant organisations)

The Two-Year Conversion

One of the specifications of the Standards for Organic Food and Farming in Ireland is that a two-year conversion period is required before a farm is given organic status. In exceptional cases the Organic Certification Body may, with the approval of the Department of Agriculture, Fisheries and Food, decide to extend or reduce the conversion period. In all cases at least 12 months of the conversion is subject to inspection. During the conversion period the rates of payment under the Organic Farming Scheme are doubled. This is to take account of costs associated with converting and the fact that the produce is not yet certified for sale with an organic symbol. Some of the main changes required when converting to organic farming are as follows:

- Introduce additional clover into the pastures;
- Modify existing buildings or add new buildings;
- Cease using chemical fertilisers and sprays; and
- Avoid routine veterinary treatment of animals.

Good management is crucial to becoming a good organic farmer. Planning in advance and paying good attention to detail are important factors. The Standards require the drawing up of a detailed conversion plan.

The Conversion Plan

The conversion plan should be drawn up in consultation with an agricultural adviser who is familiar with organic standards. The plan should include:

- A detailed description of the farm and management practices;
- The changes required to meet the standards;
- An animal health plan;
- Livestock housing and feeding system;
- Details of crop and grazing rotations;
- Soil analysis results;
- Details of soil fertility maintenance plan;
- Faecal analysis from 10% of the herd/flock;
- Farm maps plus sketch of buildings, the plan, application form, ORG 1form, accompanying documents and licensing fee must be submitted to the OCB of your choice, and an inspection of your farm will be arranged soon afterwards. Following successful inspection, a conversion licence is issued.

Each year the farm is inspected by an inspector from the OCB and a licence is granted, provided that the standards are adhered to. The OCB charges an annual fee for this service. After two years of successful conversion the farm is granted a symbol (organic) licence. Crops harvested and sold in the first year of conversion must be marketed as 'conventional'. In the second year of conversion the produce may be sold as 'in-conversion to organic production'. No livestock or livestock products may be sold as 'organic' until the land has achieved full organic status.

Maximising Payments

Practically all those converting to organic production will either join the REPS scheme or already be in the scheme. Under the National Development Plan 2007- 2013 (NDP), The Organic Farming Scheme is now a stand alone scheme. The On-Farm and Off-Farm Schemes of Grant Aid for the Development of the Organic Sector are also run by the DAFF to help fund developments for producers and processors.

Horticulture Only Holdings

Organic horticulture only producers, with one hectare or more, are eligible for the following payments provided that at least 50% of the area eligible for organic payment is cropped each year (excludes green manure):

REPS and the Organic Farming Scheme

The relationship of REPS and organic payments has changed under the NDP 2007 -2013. Under the old NDP, the Organic Scheme was part of REPS, now it is separate. Under the NDP 2007 - 2013 if a farmer is already in REPS 3 and wants to join the Organic Farming Scheme, he must now change to REPS 4 if he wants to continue in REPS. If a farmer is already in REPS 4; he can join the Organic Farming Scheme at his convenience.

Under the Organic Farming Scheme there are some minimum requirements:

- A minimum stocking rate of 0.5LU/ha is required to avail of full payments (otherwise payment is pro rata);

Table 1: Rates of payment for horticulture holdings

	Horticulture Area ≤ 6 ha	Horticulture Area > 6 ha and up to 55 ha	Horticulture Area >55 ha
In conversion	€283/ha	€212/ha	€30/ha
Full organic status	€142/ha	€106/ha	€15/ha

On all other holdings, applicants with 3 hectares or more of utilisable agricultural area are eligible for the following payments:

Table 2: Payment rates for other holdings

	Farmed Area of ≥ 3ha up to 55ha	Farmed Area > 55ha
In conversion	€212/ha	€30/ha
Full organic status	€106/ha	€15/ha

- For crop production (non-livestock systems) at least 50% of the area eligible for payment must be cropped each year. For mixed farming systems, payment for crop production will be based on the area cropped;.
- The maximum stocking rate is limited to the terms and conditions of the Nitrates Directive;
- Farmers with commonages or grazing rights may be allowed to participate in the Organic Scheme but will not get organic payments on the commonage;
- Partial conversion is allowed, thus giving more flexibility; and
- In REPS 4, participation in the Organic Scheme will now be paid on land that is also attracting payment for Conservation of NATURA 2000 and Other Priority Sites (formerly Supplementary Measure A).

Additional Option

Stockless non-REPS farmers applying green cover during the conversion period may qualify for an additional payment of €240/ha per year up to a maximum of 40 ha.

Grant Aid

There are now two grant schemes available to help the development of the organic sector:

1. The On-Farm Scheme of Grant Aid for the Development of the Organic Sector; and
2. The Off-Farm Scheme of Grant Aid for the Development of the Organic Sector.

The schemes aim to promote the development of the organic sector. These schemes provide 40% funding for on farm and off farm facilities, and equipment for production, grading and storage of organic products. The schemes also fund the modification of existing livestock housing on the farm. For further information contact a local Teagasc adviser.

Table 3: Accumulation of aid under REPS 4

Organic Payment	**Plus**	REPS basic payment **Plus**	Owned Natura **or** Any one of: Linnet Rare Breeds Traditional Orchards Riparian Zone

Table 4: Total payments on organic farms also in REPS 4

Area	Basic REPS Payment	REPS + In conversion	REPS + Full Organic
20 ha	**€4,680**	**€8,920**	**€6,800**
40 ha	**€8,780**	**€17,620**	**€13,020**
55 ha	**€10,010**	**€21,670**	**€15,840**
85 ha	**€10,310**	**€22,870**	**€16,590**

Soil Fertility

Appropriate soil management and the maintenance of soil fertility are fundamental to the success of organic farming. Management of organic farms should ensure regular inputs of manures and a level of microbial and earthworm activity sufficient to breakdown organic matter and ensure continuous and efficient nutrient cycling. Keeping soils at a pH that facilitates organic matter breakdown and nutrient recycling is essential for successful organic farming.

Lime

Many Irish soils are naturally acidic. Our high rainfall makes surface acidity very common. Liming is the best way of keeping soils at pH 6.0 – 6.5. Lime provides the very basis of soil fertility and works in a number of ways:

- Lime corrects soil acidity. Acid soils generally tend to be unproductive;
- Liming leads to the release of nutrients in the soil such as nitrogen, phosphorus and potassium. In acid soils these nutrients are in forms that are unavailable to plants; and
- Lime is a soil conditioner allowing the breakdown of organic matter. It increases microbiological and earthworm activity and improves soil structure, which leads to increased soil pore size which in turn allows air and water to pass through the soil more freely.

Lime requirement is the amount of lime required to change the pH of the soil from where it is to a pH of 6.5 for grassland. Soil testing indicates the amount and frequency of lime application needed. There are situations where this ruling on pH should be modified:

- Lime use should be restricted on soils with high molybdenum status;
- pH should not be raised above 5.5 in peat soils;
- On very extensively run organic farms with very low stocking, little or no lime may be needed; and
- On heavy carboniferous soils lime must be used very sparingly in order to avoid poaching.

Phosphorus (P) and Potassium (K)

Phosphorus is an essential element for plant and animal life. In animals phosphorus is essential for bone formation. Low phosphorus levels in the diet can cause depraved appetite in cattle and are also associated with poor fertility. Recent research at Johnstown Castle suggests that low soil phosphorus can lead to poor and very slow establishment of cereal and grass crops. A satisfactory potassium level in soils is essential for nutrient movement within plants and when soil levels are low the productive grasses tend to die out. Clover is particularly sensitive to low soil potassium and where levels are low clover can become very scarce in the sward. This means nitrogen (N) supply could be very poor. The target for soil P and K levels are outlined in Table 5.

(overleaf)

Table 5: Target P and K levels in organic soils

	Phosphorus (P)	Potassium (K)
Soil Nutrient Level (mg/l)	Index 2: Grassland: 3.1 – 5.0 Tillage: 3.1 – 6.0	Index 2: 51 – 100

Maintaining Soil Fertility

The aim of organic farming is to maintain soil fertility levels by efficient recycling of farmyard manure, slurry and or compost that is normally generated on the farm. The efficient storage and spreading of farmyard manure, slurry or compost is vital to organic farming. On productive organic farms, significant quantities of milk, meat and or cereals are sold off the farm. These products contain nutrients, for instance: 1,000 litres of milk or 100 kg of beef contain approximately 1 kg of phosphorus. If this phosphorus is not returned to the soil it will become impoverished over time. This must not be allowed to happen. It is this logic that led to the allowance of limited fertiliser use in organic farming.

Use of Fertilizers

Fertilizers are a nutrient and should be regarded as a supplement to, and not a replacement for, nutrient recycling within the farm. They should be used only to replace the nutrients that are removed by the farming system. The first option for replacing these nutrients is to bring in manures from other farms and compost them on the users holding. These manures must be declared GMO-free and must come from non-intensive production systems. After these options are exhausted, certain types of fertilisers can be used. In the Organic Standards mineral fertilizers and supplementary nutrients are divided into two categories: permitted and restricted. If the product does not appear on either list (e.g., CAN, super-phosphate, 10:10:20) farmers can assume it is prohibited. A full list of these is available in the organic standards. Examples of permitted products include rock phosphate, limestone, ground chalk, calcium sulphate, epsom salts and herbal sprays. Examples of restricted products include rock potash (subject to chlorine analysis) basic slag, seaweed, fish meal and trace elements (boron, copper, iron, manganese, molybdenum and zinc), following the submission of soil, leaf or blood analysis. In all cases permission from the OCB must be gained before restricted products can be used.

Grassland Management

While many of the basic principles of farming organic grassland are the same as for conventional grassland there are some important differences which influence organic grassland management. Most fertilisers familiar to the conventional farmer and routine worming of livestock are not allowed nor are herbicides for weed control. Management practices must be adapted to suit the system.

Fertility

The three main nutrients needed for a productive sward are nitrogen, phosphorus and potassium. Phosphorus and potassium have been dealt with in the previous chapter.

Nitrogen (N) can come from three main sources on organic farms:

- Clover;
- Microbiological activity in well managed soils can provide 60kg–80kg N/ha/year by releasing nitrogen from decaying organic matter; and
- Farmyard manure/slurry can contain considerable quantities of nitrogen but much of this can be lost depending on spreading time and method.

Clover in Organic Grassland

Clover drives successful organic farming by fixing nitrogen from the atmosphere and is therefore the key way for the organic farmer to get more nitrogen into the soil. There are two main types of clover that are most useful on Irish farms: white clover and red clover. White clover can greatly increase sward productivity by providing up to 100 kg N/ha. A sward without clover or artificial nitrogen can grow approximately 5,000 kg of grass dry matter (DM)/ha/year, which could support a little less than one livestock unit. On the other hand, a good clover sward will support a stocking rate of 1.5LU/ha or more.

Red clover can fix up to 200 kg N/ha, twice the potential of white clover. When sown with perennial ryegrass it can achieve yields of 11,000 kg to 13,000 kg DM/ha/year. When used for silage it can lift the stocking rate as high as 1.7LU/ha or more. It is a short-term crop, producing well for two to four years after which time it is generally followed by a cereal or root crop or reseeded. Grazing doesn't suit red clover and it will die out of a sward much more quickly under grazing than when used for silage.

Clover-Rich Swards

On many farms it is difficult to achieve adequate levels of white clover in the swards. In mid-August 50% of the dry matter should be made up of clover. This will appear as almost 100% ground cover. The advantages of a clover-rich sward are:

- Clover maintains its digestibility throughout the grazing season;
- Intakes by stock are higher than on nitrogen-based swards;
- Mineral content is significantly higher than in high nitrogen swards; and
- Clover enhances biological diversity in the sward.

Establishing Clover-Rich Swards

There are several ways to establish clover-rich swards, including ploughing and reseeding, minimum cultivation and surface seeding.

Plough and Reseed

This is the most reliable method of establishing clover. It has several advantages:

- Pests and diseases at or near the surface are buried;
- The existing sward is buried and this allows the sown sward to establish without competition from the old sward;
- The ploughed soil can be easily cultivated to provide the ideal seed bed;
- The opportunity can be taken to level land during the tillage operations; and
- Organic manures and lime can be worked into the rooting layer of the soil, rather than just placing them on the surface.

However, there are also some disadvantages to ploughing. Deep ploughing can bury soil nutrients, especially phosphorus, which tends to remain near the surface of the soil. Ploughing should only be to a depth of approximately 15cm. In grassland, ploughing can leave furrows that are difficult to level out afterwards. As the seeds are small a firm, fine seedbed is essential to ensure close contact between the soil and seed. A light harrowing and firm roll will ensure that the seed is in close contact with the soil, it also presses down stones and helps retain soil moisture. The grass/clover seed mixture can be under-sown into a cereal crop or arable silage crop in the spring or sown directly in spring or autumn.

Minimum Cultivation

In conventional agriculture, the principal way of reseeding without ploughing is to kill the existing sward with a herbicide, prepare the seed bed with a power harrow or tilling equipment of various kinds, and add the seed. As herbicides are not allowed in organic farming, it is critical to establish the seeds rapidly before the existing sward or weeds can compete with the new seedlings; this is difficult to achieve.

Management must be geared towards minimising the growth of the existing sward and encouraging the growth of the new seedlings. One method of doing this is to take a high yielding silage crop off the site immediately prior to reseeding, so that the seeds are being sown into a 'brown stubble', as opposed to a 'green stubble'. regrowth of the existing sward after silage harvesting is always slower than regrowth after grazing. Cutting the sward close to the soil surface slows the regrowth of the existing sward. Liming improves the chances of success as it neutralises acidic conditions due to the decay of the old sward. After the silage is removed, the soil can be tilled with power machinery. The seeds can also be drilled directly into the soil, using specialist equipment, such as the Moore,Aitcheson, or Hunter drills.

Surface Seeding

White Clover can be successfully added to existing swards in the conditions

listed below:

- Presence of bare ground and absence of a dense mat of grass on the soil surface. For successful establishment, there must be contact between the seed and soil;
- The existing sward needs to be curtailed for as long as possible after clover addition. A heavy, closely harvested cut of silage is the surest way of ensuring this;
- Reseeding in damp weather increases the chances of success;
- Use 4 kg to 5 kg of clover seed/ha;
- Lightly roll after sowing to ensure seed soil contact; and
- Graze regularly after sowing in order to prevent the existing sward from competing with the new seedlings.

Timing of Sowing

A warm soil and sufficient moisture are necessary for seed germination. The optimum time for sowing is from early April to the end of May and from mid-July to mid-August. Sowing of grass or clover seeds during the months of June and early July should be avoided, as the risk of drought is considerable during this period. In organic farming spring sowing is more successful than autumn sowing.

Seed Mixtures

Farmers must make every effort to use only organically certified seed. Where such seed is unavailable specific derogations for use of untreated non-organic seeds may be sought. Perennial ryegrass and white clover will make up the most part of seed mixtures for Irish organic grassland. Only when stocking rates are pushed significantly above 1.5lu/ha does red clover become justifiable as part of a two or three cut silage system.

Perennial Ryegrass

Perennial ryegrasses have been proven to be well suited to Irish conditions as they:

- Produce in early spring and late autumn;
- Grow rapidly in the April to July period to give high silage yields;
- Produce large quantities of leafy grass in mid-summer without too much topping;
- Are persistent and high tillering, yet are compatible with clover thus giving a good long-term sward; and
- Are palatable to animals thus giving good intakes and high production.

Given these strengths perennial ryegrass should be included in all mixtures and a strong case must be made to include other grass species at its expense.

Other Grass Species

Apart from perennial ryegrass some other grass species may have a role on organic farms.

Timothy produces leafy grass in mid summer but has poor spring growth. It is very palatable if not let go to seed. It is well suited to wetter heavier land and if used should be included at a rate of 2 kg/ha.

Meadow Fescue is slow to establish but performs well when successfully established. It can be quite leafy in mid-summer and combines well with Timothy in wetter areas.
Cocksfoot is deep rooting which makes it drought resistant and beneficial to soil structure. It becomes very fibrous when mature which reduces its feeding value and regular topping is necessary to maintain its feeding value in grazing.
Italian Ryegrass is suited for short-term leys which will be cut for silage three to four times per year. It doesn't fit in well with other grass species as it reaches cutting stage mush quicker than they do.
Hybrid Ryegrass is a cross between perennial and Italian ryegrass and offers some of the advantages of both species. It is best suited to short term leys for silage but is not as short-lived as Italian and more productive than perennial ryegrass.

Forage Herbs

Forage herbs are deep-rooted, mineral rich plants which can increase the mineral intake of livestock as well as enrich the upper layers of the soil. Their tap roots make them more drought resistant than grasses and may lead to a more open soil structure. They tend to be overlooked in practice, however, as they tend not to last in good swards due to competition from dense grass/clover swards. Because of this some farmers grow them in herb strips at field margins. The upright growth habit of Timothy makes it a good companion grass for forage herbs. Forage herbs are very palatable and are selectively grazed by livestock which may be part of the cause of their poor persistence.

Since herb seeds add extra costs to reseeding and limited mineral supplementation is allowed for livestock under organic standards herbs may not be as important in the sward as once thought. It should be noted that grass clover swards tend to be higher in mineral content than high nitrogen pure ryegrass swards.

General Purpose Grazing/Silage Mixtures

Grass seeding rate should be in the order of 20kg/ha to 22 kg/ha, while the white clover seeding rate should be 3kg/ha to 4kg/ha. Many grass seed mixtures have only 1kg/ha of white clover, which is much too low. Red clover may be included at 1kg/ha.

Red Clover Silage Mixtures

Red clover can be sown as a mixture with perennial, Italian or hybrid ryegrass. For leys intended for less than two years Italian ryegrass may suit but for longer than that perennial or hybrid will suit best. Red clover seeding rates vary from 3 kg/ha ryegrass to 13.5 kg/ha. Higher rates

will give good production for longer. At Johnstown Castle13.5 kg red clover plus 13.5 kg perennial ryegrass per hectare were sown and gave good silage yields for four years. White clover can be added to the mixture at a rate of 4.5 kg/ha and often becomes dominant when the red clover dies.

Management of Organic Swards

The following management hints can help achieve the best from organic swards and maintain high productivity and high clover levels:

- Aim to have a 28-day rest period between grazings rather than the 21 days commonly used for conventional swards;
- Maintain soil pH between 6.0 and 7.0;
- Maintain soil phosphorus (phosphate) levels between 3.1mg/l and 6.0mg/l soil;
- Maintain soil potassium (potash) levels between 75mg/l and 120mg/l soil;
- Graze bare (5cm) in autumn;
- Do not poach, as poaching damages the clover stolons, which ensure survival from one year to the next;
- Alternative cutting and grazing helps clover survival by:

— ensuring a relatively open sward which greatly benefits clover

— prevents the build up of too much nitrogen in the soil which can discourage clover;

- Tight grazing in spring ensures that the emerging clover plants are not shaded by the rapidly growing grass;
- Use a mixture of medium and large leaved clovers; and
- Clover survives better in a rotational rather than set-stocked grazing regime.

Silage

Cutting dates for organic swards will generally be later than for conventional swards to allow for later growth. The yield of a white clover/perennial ryegrass sward cut in mid-June would be expected to be 70 to 80% of a high nitrogen perennial ryegrass sward cut at the end of May. Digestibility should be about the same for both silages, however. This is mainly because clover tends to hold its digestibility at a higher level and for longer than grass. Both red and white clovers are lower in sugars than ryegrass and are, therefore, harder to ensile. This means extra care has to be taken to ensure that high clover silages are well preserved. A pre-cut test for sugars is a big help in deciding if wilting or additive is needed. Molasses is the only freely available additive which is permitted.

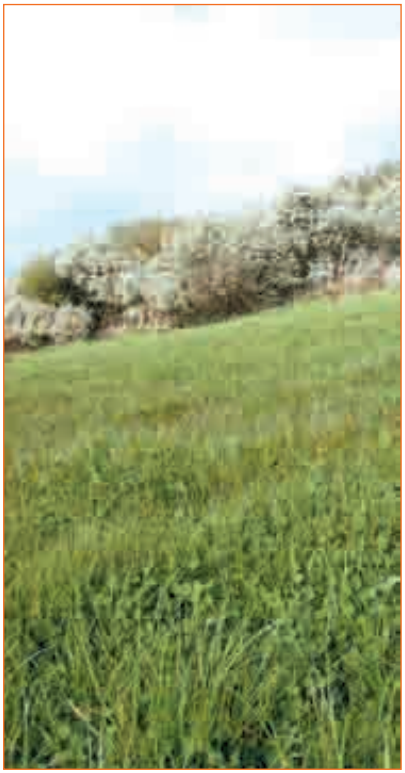
Weed Control

Herbicides are prohibited in organic farming but most weeds can be controlled to a reasonable extent by careful grassland management. Listed below are some of the more troublesome weeds and the control measures that can be used against them.

- Docks rarely make up more than 5% of herbage mass and their impact is therefore mainly visual. They flourish in high potassium, often compacted soils and are

therefore often found in fields which receive slurry in the winter. Good slurry and FYM management can therefore reduce dock build-up. The root reserves of established dock can be exhausted by topping at flowering but before seeding.

- Thistle and nettles should be topped at flowering as for docks.
- Drainage should be considered where rushes and creeping buttercup are a problem.
- Bent grass infestations can be reduced by more sequence of silage cuts or severe grazing. Under the low soil nutrient status common on organic grassland these measure eliminate the growth point of the bent grass and open up the sward.
- Ragwort is poisonous to animals and should not be allowed to seed. It should be removed from the field by pulling or cutting and gathering for safe disposal.



Beef Production

Beef systems on organic farms vary. Suckler farms, particularly along the western seaboard, tend to produce weanlings for sale. These weanlings are bought by finishers either through farm to farm sales or through organic marts. Depending on breed these cattle may be finished between 20 and 30 months of age. Some beef-only producers buy stores for finishing over the summer grazing period. This saves on housing costs but good linkages are needed to ensure a supply of organic animals when buying-in. Many organic weanlings are sold as conventional and leak out of the system. Some organic farmers operate a suckler to beef system taking their own calves to finish.

This system has a number of advantages:

- The farmer has complete control over the calving time and breed type of his/her stock;
- A closed herd policy can be operated, thus allowing the herd to build up resistance to the pathogens on the farm and reducing the chances of bringing in disease;
- The farmer gets the full benefit of any premium for organic beef ; and
- The stress of transport, marts and introduction to a new farm is eliminated thus reducing the likelihood of stress-related health problems.

Breeding

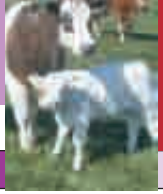
There is a market for both traditional and continental animals and most breeds are suitable for organic farming. Soil type and location will affect the choice of breed. Traditional low maintenance breeds are well suited to poorer soil types while better soils with more productive grassland can suit continental breeds better. Animal performance should be as good on a well run organic farm as on a conventional one. When breeding suckler cows the organic standards recommend the use of easy-calving bulls. Problems at birth may give rise to delayed re-breeding and the use of hormones is prohibited. Artificial insemination is permitted.

Feeding

- It is preferable that all feed be produced on the farm. Notwithstanding this, a minimum of 50% of the annual feed must be obtained from the unit or in cooperation with other organic farms. Derogation from the 50% may be permitted in exceptional circumstances.
- Post weaning, at least 60% of the daily dry matter intake must consist of fresh or dried fodder, roughage or silage

Housing

Housing can be the most expensive part of converting to organic beef production depending on the farm



situation. It must meet the animal's behavioural need as regards appropriate freedom of movement and comfort. It is not compulsory to house animals under organic standards, and where soil conditions are suitable, animals may be out-wintered. Out-wintering animals is subject to the restrictions of the Nitrates Directive. Having only slatted housing on the farm is not permitted; at least half of the total floor area must be solid and bedded. Straw, rushes or untreated wood shavings are acceptable bedding materials and these need not be organic. All animal housing is subject to inspection and approval by the OCB. Table 6 shows the minimum area per head for animals depending on weight. Approximately two and a half times more space is required per animal compared to conventional housing. Therefore, if it is intended to retain existing animal numbers on the farm then existing farm buildings will require extensions. Straw-bedded extensions may be added onto existing slatted houses allowing the animals to be fed on the slatted area. If stock numbers are to be reduced to accommodate the existing shed then half of the slatted area must be replaced with solid floor such as reinforced concrete slabs. A grant is available for these alterations through the On-Farm Scheme of Grant Aid for Development of the Organic Sector.

Table 6: Minimum housing area per head and by weight.

ANIMAL	Minimum Indoor Areas (net area available to each animal)	
	Live Weight Minimum (kg)	m^2/head
Calves; Beef Cattle; Bull Beef; Suckler Cows	Up to 100kg Up to 200kg Up to 350kg Up to 500kg Over 500kg	1.5 2.5 4.0 5.0 min. 1 m^2 /100kg
Dairy Cows	Up to 600kg Over 600kg	6.0 min. 1m^2 /100kg
Breeding Bulls		10m^2; (plus 30m^2 separate outdoor exercise area)

Animal Health

A healthy herd is achieved by a combination of good management, sound nutrition and good animal husbandry skills. Veterinary treatment is considered an addition to and not a substitute for good management. Homeopathic and naturopathic treatments are preferred to conventional drugs. Where there is a known farm problem, permission may be obtained from the OCB to treat the animal, for example for vaccination for blackleg. Five-year permission may be granted for such vaccinations.

Good management and planning of grazing rotations will generally control stomach worms by ensuring that younger animals are given the cleanest pasture which is fully grazed after them by the older stock in a 'leader-follower' system. The older stock has a higher level of immunity and help to reduce the numbers of worms at pasture and thus allow a gradual build-up of resistance by the young stock. If conventional treatment is required for worms or fluke then either a veterinary certificate or laboratory analysis showing proof of a problem is required to get permission for treatment. Where individual animals require a treatment then permission is not required, but the treatment must be recorded and withdrawal periods observed.

In any 12-month period only one course of antibiotic treatment is allowed for meat producing animals

while two courses are allowed for breeding. Any more than this and the animal must either re-enter a conversion period or be sold conventionally. In general the withdrawal period for most treatments is twice the legal withdrawal period. For mastitis treatment it is three times the legal withdrawal period. Where no withdrawal period is specified on the product a 48-hour withdrawal is imposed.

Sheep Production

Sheep production can fit in well on a mixed organic farm but can prove difficult, or even impossible, if run as the sheep-only unit. This is because parasites will be very difficult to control where clean grazing is not available for at least part of the production cycle. If sheep are run as a minority enterprise on the farm, with the larger proportion of the land taken up with cattle and/or tillage, they will be much easier to manage successfully.

Sheep can help improve the performance of beef and dairy enterprises by improving sward quality and helping to control weeds. In mixed grazing with cattle they also improve overall efficiency by eating grass which cattle leave behind, i.e., around dung pats.

Breeds and Breeding

A crossbred ewe is ideal and a cross of any two existing breeds can produce good quality ewes. If a farmer is aiming for a high lambing percentage, the Belclare breed has a big advantage. Research has shown that the Texel breed has substantially better resistance to parasites than the Suffolk. This gives the Texel a distinct advantage in organic production and the breed also produces a lean carcass. The Belclare breed carries a proportion of Texel genes and therefore also has advantages over the Suffolk in parasite resistance.

If aiming to lamb ewes early (December to January) it is an advantage to have Suffolk cross ewes. To produce lambs to sell as carcases suitable for the French market, the ram can be Suffolk, Texel or Charollais.

Breeding own replacements and thus keeping a closed flock is of great benefit as it reduces the chances of introducing disease into the flock and helps build up resistance to pathogens on the farm. If replacements with a high lambing rate are required, a Belclare ram should be used on about 40% of the flock. However, the progeny will have slower growth rates compared to those from Suffolk, Texel or Charollais rams.

Grazing

Grass on its own is a complete feed for ewes and lambs and is a small fraction of the cost of organic concentrates. The most common system of sheep farming in Ireland is mid-season lamb production, that is, ewes lambing in March, and the aim is to sell all lambs off grass. If lambing is earlier, such as in January, it will result in a lower stocking rate, more concentrates being fed to ewes and more consumption of creep feed by lambs, all of which increase costs.

For March lambing ewes, grass is the cheapest and best diet for a suckling ewe. It is uneconomical and inefficient to feed concentrates to a suckling ewe on good grass. However if grass is scarce, concentrates should be introduced. In most cases it is uneconomical to creep feed lambs on good grass.

A rotational grazing system is

preferred to set stocking as it is easier to control grass quality; a rotation with three to four paddocks or fields, which need not be the same size, is best.

After weaning, lambs should continue to graze good quality pastures, preferably silage aftermaths, which provide clean grazing. Lambs perform excellently on pastures with high clover content.

Silage

Two-thirds of the weight gain of the unborn lamb takes place during the final seven weeks of pregnancy. This means that from four weeks after mating to week 14 of pregnancy, the ewe will get by on a maintenance diet of silage or hay. A lowland ewe will eat 5.5 kg of silage per day or 1.5 kg of hay per day. The quality of the silage does not have to be excellent; silage with a DMD of around 65% is adequate so this can be easily obtained from one cut of silage taken in early June.

There is no difference between pit silage and baled silage as a feed for in-lamb ewes. However, ensure that baled silage is adequately wrapped and that bales are not damaged as this could result in mouldy silage. This causes a disease known as listeriosis in sheep. If troughs are used for feeding it is good practice to clean them out every 10 days to avoid the build up of mouldy silage.

Concentrates

In the final six to seven weeks of pregnancy, silage or hay alone is not adequate to satisfy the extra demands of the ewe due to the rapidly growing unborn lambs. During this period feed 25 kg of an 18% crude protein ration. Start at 0.1 kg/ewe/day six to seven weeks pre-lambing and gradually build up to 0.7 kg/ewe/day at lambing. This is critical to avoid weak lambs, ewes with no milk and to prevent twin lamb disease. High crude protein intake in the last three weeks of pregnancy is essential for a good supply of quality colostrum and milk.

In the case of ewes lambing from early March onwards it is hoped that grass would be available making meal feeding unnecessary and uneconomical. In general December and January born lambs should be creep fed, do not creep feed lambs after early February.

Housing

Sheep housed for the winter must be provided with a bedded solid floor area. Up to 50% of the total area can be slatted. Plenty of straw should be used to keep the lying area for the ewe dry at all times. The space required per ewe is 1.5m2 (16 sq. ft) minimum. Adequate ventilation is essential, if not, sheep are liable to get pneumonia. Also make sure there is no draught under the sheep. A minimum of 50cm of trough space per heavily pregnant ewe must be provided. Any house type is okay provided it meets the above requirements.

Flock Health

Disease prevention is the key to good flock health. Measures such as

operating a closed flock, double fencing boundaries and good general hygiene will reduce the risk of infection from various sources. Stress is a big cause of ill health in sheep, so at all times try to avoid anything that stresses your sheep.

Stomach worm infestation in lambs during their first summer is the biggest health problem, in particular nematodirus in May. Grazing new pastures each year gives good control of nematodirus. Weaning the lambs in late June onto silage aftermath will greatly reduce or eliminate the stomach worm burden in summer and autumn.

Regular foot-trimming and zinc sulphate footbaths are the recommended way to control lameness. Other foot bathing products, such as copper sulphate, are permitted but formaldehyde is prohibited. The foot rot organism will only survive in the ground for about 12 days without sheep being present. After foot bathing the flock should be put onto ground where sheep have not grazed for the previous 14 days.

Fluke should be controlled by draining, planting or fencing off wet areas but where fluke is a known farm problem one fluke dose per annum or a specific strategic fluke control regime with veterinary confirmation is permitted. Routine regular dosing for fluke is prohibited.

Regularly dagging to reduce the risk of flystrike is recommended. Cyromazine is permitted for prevention and deltamethrin as well as shearing affected areas and removing maggots is the recommended treatment for cases of flystrike.

Vaccines are not recommended but permission may be given for their use following a written confirmation by a veterinary surgeon that there is a known farm problem.

Organic Dairying

The organic dairying sector is at an early stage of development in Ireland and anyone considering organic dairying should first ensure that they have an outlet for their milk. There is one main processor handling most of the organic milk being produced and they have plans for substantial growth in the volume of milk they are processing. For the foreseeable future it is likely that organic dairy farmers will have to produce winter milk, with most if not all cows calving in autumn, to ensure a premium price for their milk. Important issues in organic dairying include grassland management; concentrate feeding; housing, cow health and producing replacements.

Grassland Management

In Ireland we are in a good position to produce milk off grass, and organic dairy farmers should make the best use of grazed grass and clover for as much of the year as possible. Clover drives the whole system. The stocking rate may be lower in organic than conventional dairying but the output per cow need not be.

Cows must be kept well fed and at the right body condition score to produce well and stay fertile. Keeping enough grass/clover in front of the cows during the grazing season and extending it as far as possible is the key to profitable organic dairying.

Silage

If white clover/perennial ryegrass is used over the entire farm a one-cut silage system is most suitable. Because clover is a late-starter in the spring this silage is not likely to be ready for cutting before early June. Some organic farmers graze all their grassland in the spring before closing the silage ground. This means they can get cows out earlier and save on expensive concentrates. Also, cow health will generally be better outdoors in the spring. Grazing silage ground will push back the silage cutting date but quality should not suffer as clover does not lose quality with age as much as grass. If a farmer wants to push stocking rates beyond 1.5LU/ha a multi-cut red clover system will almost certainly be part of the plan.

Concentrate Feeding

Concentrates are the most expensive part of a cow's diet. Organic meal is much more expensive than conventional so meal feeding must be watched carefully and good grass/clover swards and silage must be used to the maximum to keep costs down.

On some farms home-grown cereals may be feasible and could be a useful way to establish clover/perennial ryegrass swards as part of a rotation. Cereals will make up most of the concentrates being fed but they are too low in protein on their own and a good protein source is essential to balance the ration. Protein crops such as peas, beans and lupins can be grown or bought in, but supply is limited at the moment and they are more difficult to grow than cereals.

Housing

In organic farming cattle must be allowed more floor space than on most conventional farms. At least 50% of the floor area must be solid and bedded i.e., not slatted. For many farmers a combination of a bedded lying area and a slatted feeding area may offer the best solution (see Table 6).

Cubicles

Cubicles are allowed if they are big enough. They should be made to fit the largest cow in the herd. For a 600kg cow three square metres is needed. A cubicle bed that is 2.5m long by 1.2m wide would be adequate. Most existing cubicles on conventional farms are smaller and will need substantial modification. Sizes must be pro rata for smaller stock such as weanlings. Cubicle beds must be clean and dry and sufficiently well-bedded to give comfortable lying conditions. Concrete beds are allowed provided they are fitted with mats or other cushioning material and have a layer of bedding material on top.

Herd Health

The basis for a healthy herd consists of good nutrition, good conditions, good hygiene and good management. Providing enough feed in a balanced diet, to meet the needs of the animal at all stages of its growth and production, is the first step to good herd health.

The main components of a balanced diet are clean water, energy, protein, minerals, trace elements and vitamins. Forage supplies most of the animals needs and concentrates will generally supply any shortfall in energy or protein and may meet all the vitamin and mineral needs. In some cases, and at certain parts of the production cycle, essential minerals, trace elements or vitamins may be lacking. Using a diverse range of plants in the sward may solve some mineral and trace element problems as certain plants have higher mineral levels than perennial ryegrass/clover swards. However some soils are naturally deficient in particular minerals (such as copper, iodine, selenium and cobalt) or may have high levels of minerals, which block the uptake of others (such as molybdenum). In these cases testing of blood, herbage or soil should be carried out and, based on these and veterinary opinion, the animals should be supplemented as necessary.

Mastitis

Mastitis is the single most frequent animal health problem on dairy farms. Prevention should always be the first choice in controlling the disease. A good mastitis control programme is essential and its components are listed below.

- Test the milking machine each year and maintain it properly.
- Avoid stress on the cow and use the correct milking routine.
- Teat dip immediately after milking.
- Ensure clean, dry, comfortable housing, yards and roadways.
- Dry off gradually not abruptly, restricting feed, reducing milking to once-a-day and then to once every two days. Keeping cows outdoors will reduce the risk of infection.

- Routine checking for infection at milking time will ensure prompt detection of clinical cases. A mild case may respond to treatment by stripping regularly between milkings and massaging with cold water. Various non-conventional therapies have been suggested. To avoid suffering in serious cases treatment with antibiotics may be necessary. Two courses of treatment are allowed within a 12-month period. If this is exceeded the animal should be sold conventionally or should undergo a further 15 months conversion.
- All cows should be regularly tested for Somatic Cell Count (SCC). Those with consistently high counts should be culled.

Rearing Replacements

The recommended practice is for calves to be suckled, but bucket rearing is permitted. Calves should receive colostrum as soon as possible after birth and should be suckled on the mother for at least five days. They can then be trained to buckets or artificial teats and must be fed milk twice per day for at least nine weeks or longer if they are not eating enough solids to be weaned. A dry clean bed must be provided and housing should be well ventilated but not draughty. Outdoor rearing of calves will reduce the risk of infection.

Using the leader-follower system with the calves grazing ahead of the one to two year-old animals should control parasites. Clean grazing should be used for the younger stock as much as possible. Bulls with good EBI figures

for survival and calving interval should be used for breeding replacements. Cross-breeding may also be useful in producing replacements with hybrid vigour.

Arable Production

Introduction

Organic arable production represents a significant 'step up' in farm management skills compared with non-organic arable. This is because the organic aim of preventing rather than curing problems means that much better integration of all the farm's systems is required. This is mainly achieved through a well-designed and continually adjusted rotation, which in turn is supported by specific practices. While at first this can appear daunting for those considering and/or starting organic production, once the new systems have bedded-in, day-to-day management can be as straight forward as non-organic systems, and, looking back, the process is often considerably easier than first thought.

Rotations

Rotations are the foundation of successful organic crop production. The role of rotations is to:

- Replenish soil N by growing legumes, principally clover, as part of pasture, but also green manures and cash crops;
- Manage weed, pest and disease levels by introducing ecological diversity in space and time;
- Maintain soil organic matter and structure, principally through a pasture phase, but also by using green manures;
- Allow a diversity of crop and animal enterprises to spread financial risk (stress-proof the farm business); and

Rotations have traditionally been viewed as having a pre-ordained fixed order, but in practice, they are highly flexible and adaptable with changes made yearly according to field history, market demands and other factors.

In most cropping rotations, N supply is the factor limiting crop growth. In the majority of organic rotations legumes are the only practical means of importing N onto the farm unless there is a ready supply of off-farm certified organic manure. While green manures and leguminous cash crops do fix N, their short duration, removal of considerable amounts of N in harvested seed or overwinter growth period, means in practice only small, e.g., 50 kg/ha of N are retained. In comparison clover and grass pasture which is two years old or older can import large amounts of N, with up to 300 kg/ha/year N fixed by red clover. A two-year clover dominated pasture is therefore indispensible for maximising N imports, and such pasture is also superior at improving soil structure, organic matter levels and general soil health than any short term restorative measure.

Soil Management

The foundation of maintaining a productive healthy soil is a two year or more clover and grass pasture phase in the rotation. This is because grass roots are the best at improving soil structure while clovers provide the nitrogen to optimise growth and thus organic matter production. This in turn is critical for maximising earthworm populations which are themselves immensely beneficial for maximising soil quality. To maintain the healthy soil produced by pasture, tillage (cultivation) must be kept to the absolute minimum, as all tillage damages soil and reduces its quality. This is principally through direct disturbance effects, but also by the compaction associated with soil traffic.

Ploughing is the most damaging form of tillage, followed by deep tillage, so non-inversion shallow (minimum) tillage is best as long as this is not to the detriment of other aspects of crop husbandry e.g., crop establishment or weed management.

After pasture and minimising tillage, the maintenance of green cover 'cover cropping', especially overwinter, is the next most important aspect of maintaining a healthy soil. Cover crops can be any plant species that will grow enough to cover the ground, and include cash crop species and crop volunteers. Probably the most valuable effect of cover crops is to capture soil N that would otherwise be lost by leaching, but they also protect the soil from rain impact and erosion and provide fresh organic matter, which, coupled with wet soil conditions, can result in huge earthworm populations. Weeds can be used as cover crops with two provisos: that they will not set seed before they are killed and that they produce sufficient vegetation to effectively cover the soil.

Plant Nutrient Management

Maintaining optimum soil fertility/plant nutrients and hence soil health is the foundation of organic farming. Unlike non-organic production where fertilisers are applied to maximise individual crop yields, organics aims to 'feed the soil to feed the plant' with soil nutrient levels maintained at optimum levels for healthy crop growth and yield. In practice, this means that crop nutrients are replaced according to soil analysis results and nutrient budgets. Nitrogen is replaced by legumes, while phosphorous, potassium, and all other nutrients are replaced by importing, either, allowable forms of mineral/rock fertiliser, or organic matter. It is vital to get up to date information from your adviser and/or to check with your certification agent prior to importing any nutrients.

Regular, field-by-field, soil nutrient tests and nutrient budgets are therefore essential management tools for organic farming. The nutrient content of farm products and manures varies widely depending on a large number of factors and there is increasing evidence that organic manures and products have different nutrient contents to non-organic equivalents. For the most accurate information, testing of the nutrient content of your manure and farm products is essential.

Weed Management

Effective weed management in organic agriculture is achieved through a whole system of preventative approach, rather than the curative approach of attempting to kill weeds that emerge in the crop, as is typical of non-organic production. There are four legs to this integrated weed management 'stool':

- Rotation design;
- False and stale seedbeds;
- In-crop weeding; and
- Minimising weed seed 'rain'.

Rotations with a sufficiently long pasture phase, ideally three or more

years, allows the 'weed seed bank' to decline dramatically, with losses of up to 95% of seed each year due to predation and death. The cropping phase can also help eliminate perennial pasture weeds such as dock, rush and buttercup as these cannot survive repeated tillage. Therefore, rotations can control the overwhelming majority of weeds, even before they germinate, for little cost.

False and stale seedbeds both initially rely on creating a final planting tilth, but then delay crop establishment to allow weeds to emerge. For a false seedbed, the weeds are killed by extremely shallow tillage, while in the stale seedbed they are killed by a non-tillage technique such as flame (thermal) weeding. Very importantly, both techniques are highly effective at reducing intrarow (with the crop row) weeds which are the most difficult and expensive to control and the most competitive with the crop. Compared with in-crop weeding, false and stale seedbeds can dramatically and cheaply reduce in-crop weed populations and should be attempted whenever crop timing and weather permit.

Farmer experience indicates that Ireland's unpredictable rainfall means in-crop weeding tools that require dry conditions to effectively kill weeds, e.g., spring tine harrows, do not achieve sufficiently reliable results. Therefore, more aggressive knife-blade interrow hoes are recommended. The last five years has seen the emergence of computer vision guidance systems which have revolutionised in-crop hoeing as this has permitted very large machines which can achieve forward speeds and precision far greater than any human.

The seeds of annual weeds can survive in the soil for many years, even decades, while the plants live for just a few months. Therefore, preventing weed seed rain is a very efficient way of preventing weeds in following crops. Unfortunately, in arable systems there are currently few economic means of preventing established weeds setting seeds so minimising the seed rain in arable systems is mostly dependent on minimising in-crop weed populations, i.e., the purpose of killing in-crop weeds is as much to manage weeds for the following decades as it is to reduce competition with the current crop.

While these are the four main legs of the weed management stool there are a huge range of supplemental and supporting techniques, for example ploughing, competitive cultivars and sowing dates to name a few. All these must be understood and used to achieve successful weed management.

Pests and Disease Management

Pest and diseases are generally not such significant problems in organic as in non-organic arable crops. The main protection is by planting resistant cultivars, rotations and targeted biodiversity. The relatively low incidence of diseases on organic cereals is also due in part to the hardier and more open type of growth due to the lower amounts of soluble soil N which in non-organic crops results in 'soft' growth more prone to pests and disease. This effect can be bolstered by selecting cultivars with a high disease-resistant rating from the main DAFF Recommended List.

Natural predators, particularly insects such as beetles, ladybirds, lacewings, and parasitoid wasps can also be highly

effective at reducing insect pest populations. These can be encouraged by maintaining a metre wide strip of tussocky grass, e.g., Yorkshire fog and coltsfoot, around field edges and planting floral food sources such as buckwheat and phacelia. To minimise barley yellow dwarf virus (BYDV) infection in winter cereals, sow late in the year, for example late October/early November and for spring cereals, sow early.

Crops and Yields

Farmer experience has found considerable variation in how easy different crops are to grow organically in Ireland. This has primarily been due to difficulties with weed management, which the advent of computer-guided hoes may well significantly improve. However, crops that are poor weed competitors, such as spring barley and many legume crops, (e.g., peas and lupins), are avoided by experienced farmers unless fields are particularly weed free. Crops that are good weed competitors, such as triticale, winter wheat and winter oats, can be kept as weed free as non organic crops.

Yields of organic arable crops, particularly cereals are generally lower than non-organic production, primarily due to using legumes to supply N rather than synthetic N fertilisers. However, as for non-organic agriculture, yields are quite variable, both from year to year and farm to farm. At present there is only limited data on organic cereal yields. Generally yields are 50% of conventional crops but it depends on the crop, position in rotation, land type etc. Ideally this should be discussed with your Teagasc adviser

Conclusion and Outlook for the Future

The expansion of organic farming and the end of derogations for non-organic livestock feeds should ensure a good market for organic grain and seed will continue. Present ex-farm prices are in excess of €350/t for barley/wheat/triticale, which, with the ongoing demand means that organic arable production should be a profitable enterprise for the foreseeable future. Conversion to organic arable production will be easier for existing mixed farming systems, as fewer structural changes to the farm will have to be made. However, it is just as feasible to convert livestock or all arable holdings with the necessary alterations. Organics requires a high standard of management and husbandry - it is not the easy option, nor should it be attempted if the underlying farm business is struggling. However, for those farmers with the necessary skills organic farming is a highly rewarding and profitable enterprise.

Horticulture

Introduction

The market situation for organic horticultural produce is even more acute than organic arable crops as there are very few Irish organic horticultural producers. This means nearly all produce is imported, especially that sold through the multiples, which, coupled with the continued strong growth in demand and policy pressure represents significant and ongoing business opportunity.

While there is great demand for organic horticultural crops, marketing of vegetables, fruit and ornamentals is considerably more complex than for arable crops. It is therefore essential to have a clear-cut market outlet before even considering growing a horticultural crop, especially as many have a narrow harvest window and complex storage requirements which means the whole crop could be lost if a purchaser is not ready and waiting.

Rotations

With the greater production intensity of horticulture-only operations there is often a desire to extend the cropping phase of the rotation as much as possible at the expense of the restorative pasture phase, especially where land area is limited. The higher value of horticultural crops means that it can be economically viable to import materials, such as compost, as a substitute for putting the land down to clover and grass pasture. However, most imported biological (organic) materials will have to be hot composted which significantly reduces their N content. In addition, most horticultural crops are similar in their weed ecology, even though they differ in their pest and disease ecology, i.e. most are spring planted, so horticultural systems suffer from a build up of spring-germinating annual weeds. Hence attempting to cut down on the restorative phase of the rotation is likely to be a significant false economy in the longer term.

There is considerable value, therefore, in integrating horticultural crops into arable and/or livestock based systems, as this will diversify the overall rotation with many benefits for all the production systems.

Soil Management

Vegetable yield and quality are considerably more sensitive than arable crops to sub-optimum soil types, structure, nutrient levels and overall health. While vegetables can be grown on a range of soil types, large numbers and/or sizes of stones present a major impediment to successful in-crop weeding. Heavy soils such as clays can be fertile and therefore productive, but when wet, field access can be impossible. Field operations often have very narrow time window so if wet weather prevents field access then delays can be very costly. Nutrient tests should be conducted at a minimum of every three years, and a full 'horticultural' analysis that includes all the minor nutrients should be purchased.

The vegetable bed system is the only recommended form of field

traffic/compaction management and detailed consideration should be given to using specialist horticultural tillage equipment such as bed-formers. While it is possible to adopt a minimum tillage approach for foliage crops, root crop production inevitably results in substantial soil disturbance, particularly at harvest which in wet weather can easily result in major soil damage. Detailed soil management strategies are therefore required to achieve optimum crop production.

Crop Nutrition Management

All crop nutrients apart from N should be maintained though the use of mineral fertilisers or imported organic material according to the results of soil analysis and nutrient budgets as described in the section on arable production above.

If vegetables or other annual crops are included in a livestock or at the start of an arable rotation with good clover based pastures, nitrogen levels are likely to be more than sufficient for optimum production. In a dedicated horticultural rotation, especially if it is maximising the cropping phase, then N may decrease below optimum levels, even for less 'hungry' crops. Brought in organic matter will help boost N supply, but gains may be modest, as most material will have to be composted. Leguminous green manures can help increase N levels, but as most land will be under cash crops during the summer months this only leaves the less productive winter months when biological N fixation will be lower. Therefore, while a minimum of a two year (ideally red) clover based pasture stage in horticultural rotations may superficially appear 'wasteful', its value for importing N, as well as its myriad other benefits for soil health, weed pest and disease management are a very valuable investment.

Pest and Disease Management

As for arable production, a good rotation is essential for effective pest and disease management, especially soil-borne pathogens such as club root. Good on-farm biodiversity (such as maintaining tussocky grass field margins of a metre width and providing a continual supply of flowers such as phacelia and buckwheat), will increase the populations and effectiveness of beneficial insects (e.g. carabid beetles and parasitoid wasps) by providing them shelter and food. However, there are a small number of pests and diseases that escape the control of such 'broad-brush' approaches and will need specific intervention.

These include aphids, typically at the start and end of the season, caterpillars on large areas of cabbages/brassicas, carrot root fly and some fungi such as potato blight. Controls include physical barriers such as insect mesh crop covers which can be practically 100% effective, or permitted sprays such as Bacillus thuringiensis (BT) sprays for caterpillars, and copper and sulphur based fungicides. However, permission to use allowable pesticides and fungicides will almost certainly have to be obtained from certification agents. In all cases, a detailed

understanding of the biology of the pests and diseases coupled with a pre-planned management strategy is essential.

Weed Management

In dedicated horticulture systems, the similarity of crops in terms of their weed ecology (mostly spring sown, autumn harvested with low weed competitiveness) and only short pasture breaks mean that rotations can be considerably less effective means of weed management than in-cropping systems. This means that much greater effort needs to be put into the remaining three legs of the weed management stool (see arable chapter) of false and stale seedbeds, in-crop weed control and prevention of weed seed rain. Fortunately the higher value and greater intensity of horticultural crops means that the greater cost of such techniques represents a much lower proportion of production costs compared with arable production, therefore allowing considerably greater levels of weed management than would be economic under all-arable systems.

Every effort must be made to maximise the use of false and/or stale seedbeds as far as weather and crop timing will allow. For in-crop weeding, 'precision' is the key, with all aspects of tillage, sowing and planting being meticulously implemented so to minimise the intrarow (unweeded crop row) area. Computer vision and GPS systems are a major advantage in achieving this. With Ireland's unpredictably wet climate the horizontal axis brush hoe is likely to be an essential tool as it can kill large weeds under very wet conditions making it a critical backup to the faster but less aggressive, knife blade hoes. There are now also a small, but increasing, number of intrarow weeding tools. Finally, the cost of physically removing weeds from the field just prior to setting viable seed is likely to be considerably less than trying to control the weeds that would germinate from such seeds, therefore such activities should be a regular part of weed management.

Plant Raising

For most organic horticultural crops, the use of transplants is highly beneficial, primarily due to the competitive advantage over weeds, but also for ensuring correct spacing/populations and optimum land use. Considerable management, planning and infrastructure are required to ensure its success. The use of approved/certified organic compost is now mandatory and organic seed must also be used where available or a derogation obtained.

Fruit Growing

There is a vast difference between growing a few fruit or other perennial crops as part of a widely diversified holding compared with a specialist organic fruit production enterprise. For diversified holdings, fruit can be grown in most parts of the country but areas with low summer rainfall are considerably more favourable as fungal diseases thrive under wet conditions. For dedicated perennial crop production units only the best soils and climates are recommended.

Perennial crops also present unique soil, nutrient, pest and weed management issues that require thorough planning and advanced crop husbandry skills.

Protected Cropping

Ireland's wet and cooler climate makes protected cropping, e.g., polytunnels and glasshouses, an attractive option. These structures can greatly enhance and stabilise the financial returns of any size holdings due to reduced risk of crop failures because of the weather, although they are particularly valuable on smallholdings. They also provide a means of extending the season for produce and thereby provide a continuity of supply for customers and an improved cash flow for the grower.

Conclusion and Outlook for the Future

Vegetables and fruits are the main consumer entry point for purchasing organic produce and they continue to be the area in shortest supply with no imminent change in sight. Marketing opportunities vary from direct-to-customer sales, e.g., farmers' markets, all the way up to multi-year contracts with wholesalers and the multiples. Fruit and vegetables are therefore an ongoing profitable business sector, which, for those horticulturalists with the requisite skills, offers a financially and professionally rewarding enterprise.

Introduction to Poultry Production

Overview

For full interpretation of the rules and regulations governing organic poultry farming it is essential for prospective producers to study the full text of the standards document.

The poultry industry is divided into two distinct production sectors – meat and eggs. Within these areas there are several separate enterprises including breeding, fattening, pullet rearing and egg production under intensive, barn, free range and organic systems.

Organic production is a very small part of total poultry production. The conundrum is whether lack of supply inhibits demand or lack of demand inhibits supply. Reading the signs seems to indicate that a promotion and marketing effort would generate an increase in demand.

While the standards for conventional commercial production and free range production have been controlled to exclude all animal by-products and fishmeal from the diet, the standards for organic production are somewhat more demanding on the producer than those for free range.

General Guidelines

Organic poultry must have continuous and easy daytime access to pasture/range for at least 1/3 of their lives. Range shelters must be provided, either natural (such as trees and shrubs) or artificial or a combination. Feed must be certified organic. Non-organic feedstuffs may be fed, with permission, up to 10% of annual intake with a maximum daily intake of 25%. This will decrease to 5% by 2010 and by 2012 non-organic inclusions in the diet will be completely prohibited. All organic operators must apply for permission to purchase and feed non-organic feedstuffs. No synthetic amino acid inclusions or genetically modified raw feed ingredients are permitted. Beak trimming of birds is not allowed as a routine management procedure. The permitted numbers of birds in a housing unit are 3000 for layers and 4,800 for broilers and 2,500 for turkeys. It is still permitted to use conventional straw and non-treated wood shavings as bedding.

Organic Egg Production

Free range production now accounts for over quarter of the market. Within this sector there is a market for organic eggs. The management of a laying flock does not vary significantly from one system to another. Nutrition, lighting, health, welfare, egg quality and biosecurity are the main issues of concern.

Table 8: Housing and Facilities for Organic Egg Production – abbreviated

Maximum stocking rate	6 birds/m^2
Maximum slatted floor area	2/3 of floor area
Perch space	18cm/bird (30 cm apart)
Feeding space	10cm trough space
Drinkers	1 circular drinker/100 birds
Nest boxes (individual)	8 birds/nest
Communal Nests	120cm^2/bird
Range Area	4m^2/bird available in rotation
Pop-holes to exterior	4m/100m^2 floor area

Sourcing Stock

It is important to state at the outset that certified organically reared pullets are not readily available. To surmount this problem derogations/permission protocols are in place. Put simply, when organic pullets are not available, then, subject to prior authorization from the certification body, conventional pullets for egg production, not more than 18 weeks old, can be brought onto an organic holding provided they have been reared in such a way that their feeding and veterinary routine **was in full conformity with the standards for organic production.** This assurance as regards conformity with the standards for organic production can take the form of a written statement from the conventional pullet producer to the organic egg producer. The above derogation will remain in place until such time as organic hatchery standards have been agreed at EU level. Work on these standards is at an advanced stage and it is anticipated that the derogation will be removed as soon as these standards are introduced. Thereafter, only organically certified pullets for organic egg production can be brought onto an organic holding.

For holdings undergoing a two-year conversion period, existing layers fed on a certified organic diet for the last six weeks of their conversion period may produce organic eggs from the date organic status is awarded to the land.

Vaccination is permitted in organic farming systems where it is known that a disease risk has already been included in the animal health plan for the organic holding.

Management of Layers

- Keen observation of bird behaviour will tell a story.
- Bring pullets into lay only when they have reached a level of physical maturity capable of supporting good egg production coupled with marketable egg size. This bodyweight will vary with the strain but will not be much less than 2kg for organic production.
- Observe the basic two-part commandment as regards lighting for layers:
- Never increase day length for

growing pullets; and

- Never decrease daylight hours for pullets once they have been stimulated into production.
- As feed is 70% of direct production costs, use well designed feeders to prevent wastage.
- Keep vermin under control – they eat, feed and carry disease.
- Wet litter increases ammonia levels – set drinkers to avoid water spillage and have adequate ventilation and insulation.
- Maintain clean nest boxes, collect eggs frequently and store below 15oC in dedicated storage area. Damaged and dirty eggs are second quality and of little value.
- Have fresh, good quality water available to the flock at all times .
- The range should be divided into rotational paddocks to minimise ground wear. Land selected for range should be free draining.
- Keep summer grass growth under control by 'topping' if necessary.

- The productive laying cycle is approximately one year and termination will often be governed by egg shell quality.

Observations and Experience

- While the organic requirement for nest boxes is one nest box per eight hens, our recommendation for good

Table 9: Housing and facilities for organic meat production - abbreviated

	Broilers	Turkeys	Ducks	Geese
Max. stocking rate	10 birds/m^2 (21kg/ m^2 max. liveweight	2 birds/m^2	10 birds/m^2	2 birds/m^2
Max. slatted floor area	2/3	2/3	2/3	2/3
Range area m^2 /bird available in rotation	4	10	4.5	15
Pop-hole area (Length)	4m/100m^2	4m/100m^2	4m/100m^2	4m/100m^2
Minimum age at slaughter for non-slow growing strains.	81 days	140 days	Depends on breed: Pekin 49 days; Mallard 92 days	140 days

flock management is one nest box per five hens. This has implications for egg quality and flock welfare .

- With regard to feeding layers, non-supplemented diets cannot supply the balance of nutrients that years of scientific research has decreed as optimum. This can lead to stress, particularly in the 18 – 35 weeks age period, when egg production is expected to go from 0 – 90% + peak production, egg size is increasing and the bird's body weight is increasing by a further 25%.
- The extra stress on the birds can cause feather loss and cannibalism.
- Feed consumption is significantly increased.
- Hens perform best at a house temperature of 20°C. It therefore pays to insulate the poultry house. Ventilation is essential to provide air changes throughout the house, to get rid of dust, vapour and gases.

Egg Marketing Regulations

Under EU regulations, organic eggs may only be sold to shops or wholesalers by registered packing stations. The Department of Agriculture, Fisheries and Food registers and regulates production and marketing of all eggs.

Organic Poultry Meat Production

In conventional production, growth rates for table birds have increased substantially due to the ease with which selection for body weight can be achieved and flocks are slaughtered by seven weeks. Where these bids are grown organically their lifespan must be at least 81 days.

Sourcing Stock

As with layers, supplies of organically certified stock are not readily available. However, the standards require that operators should endeavour to make use of slow growing, organically certified stock. Non-organic chicks can be purchased at less than three days of age and must undergo a ten-week conversion period.

Observations and Management Hints

- There is no register/list/definition of slow growing strains. All except the two modern strains used in commercial production are regarded as slow growing for organic purposes.
- Experience at Mellows Centre shows that meat birds perform well under organic regimes.
- Purchase stock from a reliable source.
- Avoid feed wastage.
- Maintain dry litter.
- Manage range area with rotation and topping long grass where necessary. (Long grass is not conducive to range use and can cause crop and gizzard impaction).

Returns from Organic Farming

Data from Organic Demonstration Farms suggest high margins are achievable where management is strong in terms of efficiency and marketing.

As with conventional farming, the financial return is dependent on the level of efficiency and the product price received. Any farmer thinking about converting to organic farming must consider a number of factors:

- The likely gross output;
- The likely price achievable or the price premium over conventional product; and
- The level of costs including additional costs associated with conversion.

Reduced Output

Normally gross output will fall as stocking rates and crop yields will be substantially lower. The level of reduction in output will depend on management and the existing level of output. On many cattle farms stocking rates are already well below what is achievable in an organic system. Many farmers have already reduced stocking rates in response to the introduction of the decoupled Single Farm Payment and participation in REPS. Compliance with the Nitrates Regulations may also have the effect of pushing stocking rates closer to a level consistent with organic farming. Many beef farms, especially those participating in REPS, have a stocking rate of 1.4LU/ha or less. At this stocking rate there may be little or no reduction in output following conversion. On intensive cattle/sheep farms stocking rates may have to reduce more. On intensive dairy and tillage farms, the reduction in output can be substantial.

As a guide, when converting to organic farming the following reduction in output is likely:

- Beef 0%-20%
- Dairy 20%-30%
- Tillage 30%-50%

Costs

During conversion extra costs will be incurred especially with respect to the conversion of existing buildings and clover establishment. A number of capital grant schemes are available including the On-Farm and Off-Farm Schemes of Grant Aid for the Development of the Organic Sector. When the organic system is up and running, variable costs will reduce as there are no fertilizer or chemical inputs, but the cost of straw and concentrates will increase.

Price Premium

There is wide agreement amongst marketing agencies that the following premiums would fit market expectations and leave the producer with a reasonable margin:

Meat and Dairy Products	20%-25%
Cereals	60%-100%
Vegetables	40%-100%

In recent years this level of price premium has been achieved or surpassed. A variation in price premiums is to be expected and on occasions when

an organic outlet is unavailable, some produce may have to be sold on conventional markets. The price premium is often obtained by selling direct to the consumer. This means that organic producers must put a greater effort into marketing. Organic vegetables are not subject to the same price fluctuations as conventional vegetables particularly in mid season. The Organic Farming Scheme payments will contribute substantially to profit. The payments are worth up to €11,660 a year during conversion and up to €5,830 when fully organic (see Chapter 2).

Examining the Enterprises

Cattle and Sheep Production

This sector has very good potential particularly on suckler/sheep farms where the progeny is carried to slaughter. Extra REPS 4 payments and the organic price premium for livestock generate additional income. A significant boost in net margin is achievable where management is good and a secure organic outlet has been identified.

Organic Milk Production

A premium of up to 35% is currently obtained for organic milk. While output per cow can hold up reasonably well with good management, output per hectare generally falls. The system is best suited to dairy farms which already have a low stocking rate and farms with a low milk quota per hectare.

Crop Production

Yields can fall dramatically during the conversion period due to the absence of artificial nutrients and herbicides. Over time techniques are developed to control weeds and conserve nitrogen and result in a more modest yield decline. With good husbandry the price premium compensates for the drop in yield. Yields can be quite variable and organic tillage presents a greater challenge than other enterprises.

Market Prospects for Organic Produce

The organic market offers a viable opportunity for both the Irish farm and food sectors. It is very important that any farmer who considers producing an organic product should first of all identify a suitable outlet for the product. Organic products can be sold directly to customers via country markets, door to door selling or indirectly through speciality shops or bigger retail outlets.

Where direct selling is feasible it offers the possibility of a higher margin but there are many limitations. All costs including the time and effort required in marketing, distribution, promotion need to be considered. Selling the product on for further processing may be necessary as with meat or dairy products and it may be desirable in terms of developing the business.

If selling to a processor, it is important to discuss production plans and to get some commitment from the processor that it is possible to sell this product into the future. While there is considerable consumer interest, the development of the organic market will require more processing to achieve scale of economics and greater retailer promotion.

World Market

The total world market value of retail sales of organic produce in 2006 was over $40 billion. Organic farming in the EU is rapidly expanding with average growth rates of up to 25% per year. Germany is the largest internal market with a share of about 30% of the total EU market; other large markets for organic products are the UK, Italy and France. North America dominates the market for organic products outside Europe. Bord Bia estimates that in 2007 the total Irish organic market is estimated to be worth about €76 million with market growth estimated at 15 – 20% per annum. Approximately 70% of the organic food sold on the Irish market is imported; highlighting the fact that demand for organic produce in Ireland is far greater than domestic production.

Fruit and Vegetables

In Ireland the market for organic fruit and vegetables is relatively well developed accounting for approximately 45% of the total market. In the vegetable sector produce is largely sold through local markets and through supermarket chains. There are still considerable volumes imported so there is an opportunity for Irish producers to satisfy this market. Also, there is potential for the production of organic field scale vegetables.

Meat

Lamb and beef marketing is largely conducted through the supermarket chains and through well established local butcher businesses. There are also a number of prominent producer groups including SROM (Shannon Regional Organic Meats) and North-West Producers' Group who have organised a marketing promotion through local meat companies. There is considerable opportunity for Irish

beef and lamb producers to develop this market in consultation with both processors and retailers.

Dairy Produce

The organic milk sector in Ireland has been slow to develop with less than 30 substantial producers at present. Growth in the sector is dependent on growth in processing. Although Glenisk, currently the main processor of organic milk and a number of smaller processors have indicated an intention to expand none of the major players in the liquid milk industry to date have shown an interest in processing organic milk.

Developing the Home Market in Ireland at present, there is considerable consumer interest in all organic foods. However, there is a need for the various outlets to drive the development and marketing of organic products if the growth rates which are common in Continental Europe are to be achieved here. If the home market is to develop and if Ireland is to develop a 'foot-hold' in the export market it is necessary to have a minimum scale of production.

The Teagasc Taskforce Report on Organic Farming in Ireland suggests the scale of production to be as follows:

- A minimum of 160 milk producers with an average of 40,000 gallons;
- 2,500 lamb/beef producers selling an average of 20 finished cattle and 40 lambs each; and
- 600 hectares of vegetables which will provide 25% of the market.

This scale will provide processors and retailers with the volume necessary to drive the development of the industry. The Department of Agriculture, Fisheries and Food will provide producers and processors with assistance in the form of grant aid schemes.

Teagasc Services for Organic Farming

Training, advice and research are essential if organic farmers are to provide products efficiently and to a high quality. In recent years Teagasc has devoted personnel, land and time to provide the backup needed by the organic sector. Teagasc provides services in training, advice and research.

Training

Six training courses have been developed in consultation with the organic organisations and have been accepted for FETAC certification. Any individual who completes these short courses can apply for certification and build up credits which can be added to when further courses are completed. These courses can be provided at any location where an interested group, with a minimum of 15 people, is prepared to attend.

The courses are:

1. Introduction to Organic Production
This is a short course setting out the principles of organic farming, dealing with organic standards and assessing the suitability of different enterprises for organic farming.

2. Organic Drystock Production
This course is aimed at farmers who are interested in organic drystock production and deals with the principles applying to conversion as well as livestock management, pasture management and parasite control on drystock farms.

3. Organic Crop Production
This short course is aimed at people producing crops and deals with the principles of organic crop production, rotations and management of individual crops.

4. Organic Dairying
This short course is aimed at organic dairy farms and deals with the management of dairy farms, dairy cow management, pasture management, winter feed production and parasite control.

5. Introduction to Organic Poultry Production
This course looks at the essential flock management and the economics of the enterprise.

6. The Rural Environment Protection Scheme for Organic Farmers
This course deals with grassland management, nutrient management plans, associated environmental requirements and producing an agri-environmental plan in the organic context.

Teagasc Trials and Demonstrations

Three Teagasc research centres have farms involved in organic production. These farms are at Mellows Development Centre, Athenry, Co. Galway; Johnstown Castle Environment Research Centre, Co. Wexford and Crops Research Centre, Oak Park, Co. Carlow. They will be used in conjunction with courses and open days.

Advisory Services

Each Area Unit has advisers who have received training in the basic principles of organic farming. These advisers are available for consultation with anyone interested in organic farming and are backed up by specialised organic staff, working in organic advisory, training and research. Specialist advisers are located at Oak Park, Moorepark, Grange and Mellows Development Centre (see Chapter 14 for details). The local advisers in each county act as a first contact for farmers. The specialist staff will provide advice to farmers in production either on the telephone or through individual visits.

Research

Research on organic production is conducted at three Teagasc centres in conjunction with mainstream research on enterprises and crops. Oak Park conducts research projects on organic cereals and pulse crops. The pulse crops are grown to provide a cheap source of protein for organic concentrate rations. Research on organic drystock and dairy production is carried out at Johnstown Castle and Mellows Development Centre.

Demonstration Farms

Teagasc deliver demonstrations annually on 21 demonstration farms strategically located throughout the country. These farms are run in partnership with the Department of Agriculture and Food and details of demonstration dates can be viewed on the Teagasc website at www.teagasc.ie and on the Department of Agriculture and Food website at www.agriculture.gov.ie.

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Other Organic contacts

"The Organic Guide to Ireland" is a publication produced by the Organic Centre with support from The Organic Unit at the Department of Agriculture Fisheries and Food. This guide will include listings of producers, retailers, wholesalers and manufacturers of certified organic goods in the Republic of Ireland and Northern Ireland. It will also include certification bodies, organic sector NGO's and relevant government agencies. For a copy contact Organic Centre Publications, The Organic Centre, Rossinver, Co. Leitrim.