Organic Farming Technical Guide

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Organic poultry production for meat

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Foreword

This guide is aimed mainly at those thinking about growing organic poultry for meat for the first time, including conventional producers considering conversion, organic farmers diversifying into a new enterprise and new entrants into farming. While it covers all the key points, it is not intended to be comprehensive. Nevertheless, you should, by the end of it, have a good grasp of what of involved and the key issues you need to think about.

It is vital that you plan carefully before embarking on any new venture, and there are various services available to help you do that. Farming Connect can pay part of the cost of preparing a Whole Farm Plan, to make a detailed assessment, in both financial and technical terms, of introducing or converting an organic poultry enterprise. In addition Organic Centre Wales runs an organic poultry discussion group for producers in Wales, as part of the Farming Connect Organic Development Programme, and the Centre for Alternative Land Use (CALU) provides similar services for free range producers. The group aims to bring farmers together to share knowledge and experience and to promote a group approach to tackling problems. The Organic Conversion Information Service (OCIS) is a free service funded by the Welsh Assembly Government, which: helps you look at the implications of conversion for your farming system; provides a financial illustration to give you some idea of the economic impact of conversion; and helps farmers who do decide to convert to prepare their applications to their chosen organic control body. Call the Organic Centre Wales (OCW) helpline for more details. Other resources and the contact details of key organisations are listed Sections 10 and 11 respectively.

For the most part, the guide is based on the DEFRA Guidance Document on European Union Organic Standards (http://www.defra.gov.uk/foodfarm/growing/organic/standards/pdf/guidance-document-jan2010.pdf). However, different control bodies (formerly known as organic certification bodies) take different views on specific aspects of poultry production. The main differences are highlighted in the text, but you must make sure you are fully aware of *all* the requirements of your chosen control body. Full standards can be downloaded from the control bodies' websites, and you can always contact them directly to clarify any points you are unsure about (see Section 11 for contact details).

The information in this guide is based on a combination of practical experience and the latest research. We would like to acknowledge the contribution of the Institute of Organic Training and Advice (IOTA) to reviewing and collating the research as part of a DEFRA funded PACARes project (Providing Access, Collation and Analysis of DEFRA research in the organic sector). We have listed the research papers we have used in the back, and the superscript numbers in the text (e.g.[i]) indicate the paper that the information comes from.

1 Characteristics of organic poultry systems

An organic production system is all about the relationship between different enterprises, and poultry should ideally be part of a wider organic system. Poultry and cropping systems, for instance, complement each other well; the poultry can occupy the last year of ley before cultivation, allowing the following crop take full advantage of the manure left by the birds; the arable phase of the rotation can contribute to the poultry ration and straw for bedding; and the birds can be fed on vegetable waste or graze the aftermath of vegetable crops. Different livestock enterprises can also interact to the benefit of the system as a whole, for instance establishing and maintaining clean grazing systems. Sheep can help to keep the grass on the range short, thereby encouraging the birds to graze.

All organic systems are free range - organic poultry are never kept in cages – and the range should be well covered with suitable and properly managed vegetation. It must include shelter and other features that encourage ranging. Waterfowl must have access to water. This can be a natural feature, such as a stream, pond or lake, but you can use alternatives, such as cattle foot troughs, that also comply with the standards.

Flock sizes are much smaller than on conventional and most free range farms. Ideally they should be housed in small mobile units that can be moved around farm as an integral part of the rotation as discussed above, although static shed systems are permitted under the UK standards.

Every effort should be made to keep the stress on the birds to a minimum, both in terms of the physiological demands placed on them by the production system and the environment in which they are kept. Slower growing and traditional breeds that are better suited to free range systems are best, and if faster growing strains are used, they must not be slaughtered before 81 days old. Positive welfare (that is the satisfaction of the animal's needs, including behavioural needs, and not merely the avoidance of cruelty) is the name of the game. Mutilations such as beak trimming are banned. Birds should have the freedom to express normal behaviour and have sufficient space, proper facilities and the company of other birds to do so.

In terms of disease management prevention is always better than cure, and bio security is the watchword. For example, houses are cleaned and disinfected between batches and 'rested' for at least two months per year. Certain feeding and water systems are better than others at preventing the spread of diseases. Basic disinfecting facilities and specific working practices also help prevent disease being spread around the farm by workers and visitors. Antibiotics are used to treat a specific problem, but cannot be used routinely.

2 Main issues for consideration

If you are considering establishing an organic poultry enterprise there are many issues you will need to think about. These are some of the most important:

- *soil type:* The soil needs to be relatively free draining. Heavy, wet land not only makes access difficult, it also creates more challenges for the birds;
- *shelter:* Poultry need a sheltered environment. Exposed locations should be avoided if possible;
- *labour:* Organic poultry production is more labour intensive than conventional systems; the birds are housed in smaller groups, often in mobile housing. As the houses are often moved around the farm, there may be instances where the birds are some distance from the farm buildings;
- *infrastructure:* Water should be available in the house (both at the brooding and rearing stages), and preferably also on the range. You will need good access all year round, to feed, observe and manage the birds. At certain points in the rotation, the houses may be some distance from the farm yard, and this may mean a significant amount of travelling, sometimes in less than ideal weather conditions;
- *capital:* A considerable amount of capital investment is required to establish a successful and efficient organic poultry production unit of any reasonable size. This may, depending on whether there are existing slaughter facilities available to you, also require setting up a processing unit on farm;
- *feed:* The move towards 100% organic ration, increasing feed prices and the emphasis organic principles place on home grown feed mean that feed is a major consideration when considering setting up or converting to an organic poultry system.

3 Feeding organic poultry

Poultry producers consistently identify access to organic feed at a viable cost as the biggest challenge facing the sector. Specific feeding requirements and the pro and cons of different feeding systems are discussed later on in relation to brooding (Section 5.7) and growing birds (Section 6.4), but it is covered briefly here.

3.1 Poultry diets and the organic standards

The dietary requirements of poultry are very different from those of ruminant livestock. They are particularly sensitive to dietary quality because they grow quickly and make relatively little use of bulky fibrous feeds such as pasture or hay. They have very specific requirements for essential amino acids, in particular lysine and methionine. In conventional systems, feeds are supplemented with synthetic amino acids. These are not permitted in organic systems, so alternative sources – usually organic soya – have to be found. It is often difficult, and always expensive, to source these products, and they are major contributors to the high cost of feed.

In principle, all organic livestock should be feed on 100% organic diets, but because of the difficulties in sourcing organic ingredients a proportion of non-organic material can be used in pig and poultry feed. At present this proportion is currently 10%, but it will decrease to 5% on 1 January 2010. By 31 December 2011, all feed will have to be organic. In practice, most poultry feed is purchased from feed mills, and the reality is that farmers will buy the cheapest ration that complies with the standards.

3.2 Poultry feeds and feeding systems

Producing as much feed from the farm as possible is one of the guiding principles of organic systems. However, because of the very specific requirements of poultry and the difficulties of providing a finely balanced ration at a cost effective price, most producers rely heavily on purchased feed.

The main cereals grown on farm are wheat, triticale and oats, and they are often grown in combination with a protein crop such as peas. Naked oats are of particular benefit to chickens because they contain high levels of oil and protein, with relatively high proportions of the key essential amino acids. They are also an ideal crop to grow where climate and soils are not suitable for wheat. Where producers are in marginal cereal growing areas (which includes much of Wales), crimping is a very useful technique because it enables you to harvest at moisture contents of 30 to 45%. The grains are passed through a crimping machine that crushes them and adds an acidic preservative. This feed can then ensiled and stored in the same way you would a grass crop. You will probably need to reduce the size of your clamp by putting in a false wall, for example, but beyond that there is no requirement for specialist equipment.

Milling and mixing on farm is an option which helps makes good use of the resources that are available from the farm. You need to analyse each batch of your grain or peas for its nutrient content, and buy a protein balancer and other ingredients to produce a balanced ration. Make sure you use the correct procedures when sampling your grain – the laboratory should be able to provide further advice on this.[i] This can be cheaper if you already have the equipment in place. However, if you are setting up mill and mix facilities from scratch, or using mobile mill and mix, you need to look carefully at the level of investment and the additional time required and compare it to the potential savings made over purchased feed.

Cereals are often fed as a wholegrain which saves on the cost and energy associated with milling. Feeding whole grains also improves the digestive tract of the bird, ensuring good digestion of the grain and a more beneficial microflora.[ii] Feeding experiments have shown that birds select increasing quantities of whole grain as they grow older.[iii] Scattering the grain as a scratch feed can also help them utilise and learn about their range, and the birds will eagerly follow you for an afternoon treat of whole grain. Eating in this way will help develop the natural eating pattern of a chicken, helping young pullets especially to scratch about in the whole range.

Chickens, like other poultry, are quite capable of managing their own diet, and having a mixture of feed types increases the welfare of your flock as it more closely resembles a natural environment in which the birds have to make choices.

The range can make a significant contribution to the feeding the birds. A recent study has suggested that a good diverse range can provide up to 70% of their requirements for lysine and methionine and approximately 25% of their requirements for calcium.[iv] This helps to increase the cycling of nutrients within the system, eases the transition to 100% organic rations, benefits the economy of production and leads to greater dispersion of poultry in the field, there by reducing the risk of nutrient leaching and increasing welfare.[v] Cover crops such as quinoa are potentially very useful and there is much that the poultry sector can learn from game bird producers.

4 Breeds

The DEFRA Guidance Document on European Union Organic Standards states that when selecting breeds or strains, you must take into account the capacity of animals to adapt to local conditions, their vitality and their resistance to disease. In addition, breeds or strains of animals should be selected to avoid specific diseases or health problems associated with some breeds or strains used in intensive production. Preference is given to indigenous breeds and strains.[vi]

In practice there is little consensus about the best breeds of meat birds for organic production systems; many hold the view that traditional British breeds that used to scratch around in farmyards will do the best. Traditional British breeds are mainly dual purpose breeds, suited to small scale systems where the females produce eggs, while the males able to put on some meat in 18-20 weeks.

Specialist meat producers usually need meat-specific breeds that have been developed to finish in 12-14 weeks. There are some, such as the Sasso and Hubbard breeds, that have been developed with organic and free range systems in mind.

Whatever breed you choose, finding an organic breeder that is hatching in large enough numbers and close to home can be a problem.

5. Brooding

Brooding is the most important stage in the production cycle; chicks that start below weight finish below weight. They are particularly vulnerable to stress and disease challenges as their immune systems switch from being passive (provided by their mother) to active (chick's own immune system). Excellent stockmanship is a prerequisite for successful brooding.

5.1 Temperature

Chicks are unable to regulate their body temperature for the first 10 to 15 days. At one day old, the body temperature of a chick is approximately 39°C* (103°F) and by five days, it should have risen to about 41°C (106°F) where it remains throughout adult life.[vii] Chicks are therefore very dependent on artificial heat during this early period, and temperature fluctuations of as little as 1°C will stress them. Failure to maintain the correct temperature can have consequences for rest of the production cycle. Chicks reared under 27°C (80°F) generally have higher mortality rates, poorer feed conversion rates, lower finished weights and more birds are rejected at slaughter compared with chicks reared over 32°C (90°F). Research has also shown that chicks subjected to lower temperatures at brooding have impaired immune and digestive systems, leading to a higher incidence of ascites (a condition caused by hypertension, triggering the accumulation of fluid in the stomach). Too high a temperature can also have adverse effects, including dehydration and kidney failure. Heat stress will also lead to lower feed consumption and even death through suffocation as birds try to avoid the heat and crowd together in cooler areas.

The temperature in the brooder should be gradually reduced (by 1°C over two days or 0.5°C per day) as the chicks develop. Table 1 shows the ideal temperature at different ages during the brooding process.

Table 1. Correct brooding temperatures at chick height

Age of chicks (days)	Temperature at chick height (°C)
1	32-34
2	32-34
4	31-33
7	30-32
14	25-28
21	21-23

The aim during the brooding period is to create a comfort zone where the chick has the ideal temperature and there are three basic ways to do this.

- *Spot brooding:* The chicks have a localised source of heat (either an electric or a gas brooder) and access to cooler areas beyond. The chicks regulate their own temperature by moving between the cooler and warmer areas.
- *Whole house brooding*: As the name suggests, the desired temperature is maintained throughout the whole house. This is commonly used in larger commercial situations.
- *Partial house brooding:* This is similar to whole house except that there is a localised heat source and the birds have a restricted area that is enlarged as they get bigger.

* Temperatures of chicks can be checked using a modern human ear thermometer either rectally or in the navel.

5.2 Batch size and frequency

The number of poultry you rear per year will be determined by a number of factors including:

- the size of your holding;
- the amount of suitable land within the holding;
- the existing nitrogen levels;
- the proposed sales outlet for the finished birds;
- the provision for slaughtering and processing.

Having decided on the total numbers you need to think about the size of individual batches. This will depend on your organic sector body standards, your level of output and the frequency of delivery of day-old chicks. Larger units may have day-old chicks delivered weekly or fortnightly while smaller units may only take delivery once a month. So if, for instance, you intend to kill 100 per week and are getting them in every two weeks, your group size will be 200. If you are getting them in once a month the group size will be 400.

There are two main factors you need to consider when deciding on the frequency of deliveries:

- *Economies of scale:* There can be an economic advantage in purchasing a larger number of birds at once, both in terms of a lower cost per chick and a smaller delivery charge as this is spread over a greater number of chicks. Also, a brooder has to be set up for each batch, so there is a saving in labour associated with less frequent deliveries.
- *Variation in finished birds*: If you are getting chicks in once a month, then the last birds in the batch to be slaughtered will be four weeks older than the first birds, and this can mean a large variation in final weight within the batch. This may not be an issue for you if you are selling direct and it can be a positive advantage if you are onward processing (bigger birds are much better for portioning etc). However, if you are selling into the trade this can be a problem since trade customers require a consistently sized product, normally 2.0 to 2.2kg. Under these circumstances more frequent batches will be necessary. You can also buy “as hatched” chicks, which are not sexed and therefore roughly 50% male and 50% female. If they are delivered once a fortnight, most of the finished males would go in the first week and females in the second, giving a more consistent finished weight. If you are selling direct and buying in un-sexed chicks then a dual purpose production system (and bird) could be considered where both meat and eggs are produced. Males are grown to the desired live weight and then slaughtered according to your needs; the female birds will lay eggs or can be taken for meat depending on relative demand for eggs and meat birds. This has the potential to work well, but you need to consider the additional investment requires for layers and be aware that, individually, both meat and egg enterprises will have lower gross margins compared to a specialised system.

5.3 Brooding systems

Brooding can be either high or low-tech. To a certain extent the system chosen will depend on the numbers of chicks being brooded and available finance, as cost is a major factor at this stage of poultry rearing. High-tech brooding is usually carried out in larger scale enterprises where large numbers of chicks are brooded together and the considerable cost of set up can be justified. This can be carried out to high standards of welfare but care must be taken to minimise physiological stress, injury and trauma during handling and transport to range.[viii] Low-tech brooding can be successfully carried out even in poor weather conditions but labour is greatly increased.[ix]

You can either brood on the range, which means that the chicks are brooded in the same housing that they will finish in, or you can brood indoors.

The main advantage of brooding on the range is that that they don’t have to be moved from an indoor brooder to their finishing house. There are a number of benefits associated with this:

- it reduces the stress on the birds caused by the move. This particularly important in the winter when there is a big difference in temperature brooder and the range, which can lead to disease problems, especially

coccidiosis at the adolescent stage (see section 5.10);
- the amount of labour is reduced, both in terms of the move itself and the associated disinfection process;
- in the summer months, when favourable temperatures often mean shorter brooding times, chicks can be let out on the range earlier. This is easy if they are already in their finishing house, but more difficult if you have to first move them out of the indoor brooding area;
- if birds are introduced to the range earlier then they learn to use it more effectively and spend more of their adult life outdoors.[x] This can reduce poaching problems especially if your house is static and possibly help reduce your feed bill as well as decreasing time spent in house (lowering associated bedding bills) and thus increasing welfare of the birds.

There are, however, certain disadvantages to brooding on the range and these are mainly associated with increased housing requirements and/or the need to modify existing housing to become suitable for brooding. In terms of housing modifications, the houses must be free from drafts and well insulated. It may also be necessary to have a floor in the housing to stop moisture coming up in wet times. However, even with these improvements, it is much more difficult to create ideal conditions for brooding on the range than indoors, particularly with regard to temperature, the implications of which were discussed in Section 5.1.

As well as improved housing, brooding on range requires 30% more housing capacity, and therefore more field area, than if you were brooding indoors. If you are buying in 100 chicks per month you will have three batches (and therefore need three houses on the range) at any one time; one being brooded for three to four weeks; a second on the range growing; and a third on the range being drawn from for slaughter. If you are brooding indoors you only need two range houses (in addition to the brooder).

You should also remember if you are brooding on the range then everything (gas, bedding, food etc) has to be taken out to the birds. This may not be a problem in the summer months but in the wetter winter months, traffic to and from the site may damage the land.

The chicks are also harder to monitor on the range and close attention is absolutely essential during the brooding stage - day old chicks need to be checked four or five times a day. This can particularly difficult at points in the rotation when the brooders are a long way from the main farm. Checking can easily become less frequent and problems become disasters.

Figure 1: Insulated range building suitable for brooding (Photo: Steve Merritt)

5.4 Types of brooder

Brooders come in a variety types and sizes depending on chick numbers.

Electric brooder lamps are generally only suitable for smaller numbers of birds (up to 100 per lamp if an infrared bulb is used and not more than 50 otherwise). They are expensive to run and require costly replacement bulbs.

Gas brooders are generally more reliable and cheaper to run. They can be purchased to suit various bird numbers. In a small to medium scale set up, spot brooding and partial house brooding will tend to be the most cost effective. Spot brooding can be effective when brooding indoors whereas the partial house brooding suits brooding on the range.

Figure 2. A gas brooder suitable for up to 500 chicks (Photo: Steve Merritt)

Under-floor heated brooders: Under-floor heating has several benefits. Heat rises, so if a heat source is suspended from the ceiling, the air immediately around it has to be hotter (by up to 10°C) than the target temperature at chick level to ensure that enough heat gets to the birds. If the heat is rising up from under the chicks, then there is no need for this additional heat, which makes the system 40-50% more energy efficient (and good deal more comfortable for you and your staff!).[xi] You also save up to 50% on bedding because the floor is kept warm and dry However, it is expensive to install; a typical 8-12kW system costs £6,000-£12,000 plus the price of connection to the distribution system, depending on the specifications and location of the buildings. If the cost of installation can be justified you could feasibly use ground source heat, further reducing energy bills and the farm's carbon footprint.

5.5 Building requirements for brooding areas

5.5.1 Building specifications

All permanent housing and many mobile sheds are likely to require planning permission, although details vary from council to council. It is therefore important to speak to the relevant council officials to find out what permission is needed. Typically 6-8 weeks should be allowed for planning permission to go through.[xii]

Brooding areas should be:

- **draught free** at chick level. Make absolutely certain that there are no holes in the building. Choose a sheltered spot because if cold air is blown into the house it will settle at floor level and chill the birds;
- **rat proof**. Rats not only spread disease and consume very expensive starter feed, but also stress and kill chicks;

- **well insulated.** Old stone buildings can be adapted quite well, as the thick walls can retain heat and smooth out rapid fluctuations of temperature. They also tend to be cooler in the summer;
- **easy to clean** and disinfect, right up to the ceiling.
- **well ventilated**. Good ventilation has a crucial role to play in reducing humidity which has important implications for health of the chicks. High humidity speeds up the microbiological breakdown of faecal matter, leading to higher ammonia levels. High ammonia levels in turn, increase disease susceptibility, especially to respiratory problems. Cool air should enter the house and replace the hot, humid air without chilling the birds. Figure 3 and Figure 4 show the desired air flow.

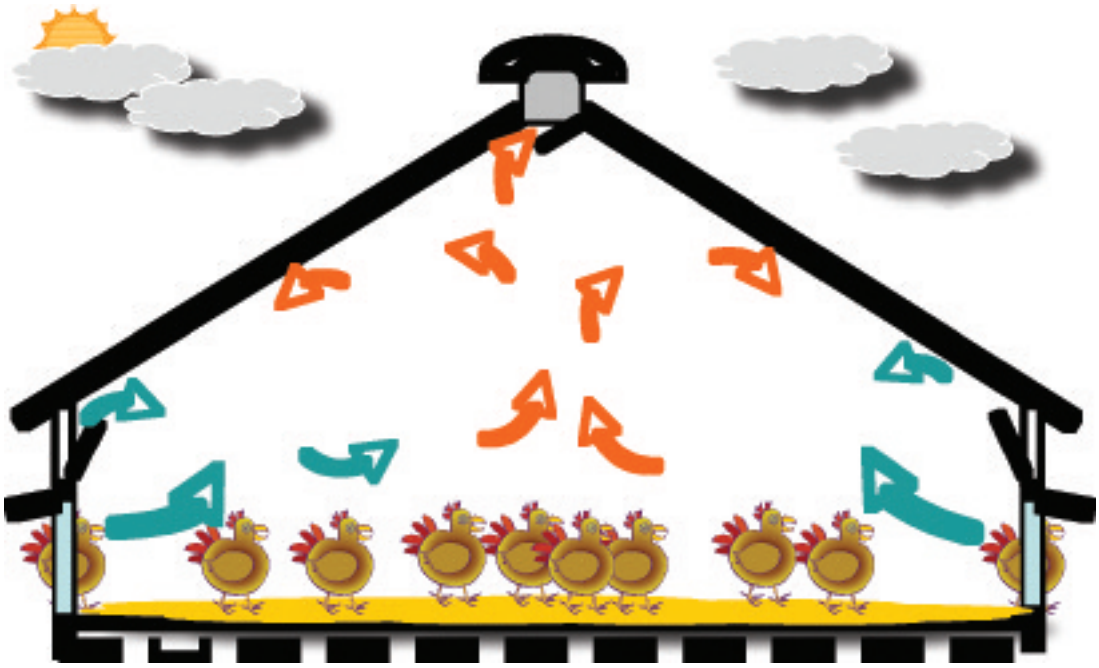

Figure 3. Natural ventilation during the day with the pop holes open (From: Justin Emery, ADAS)

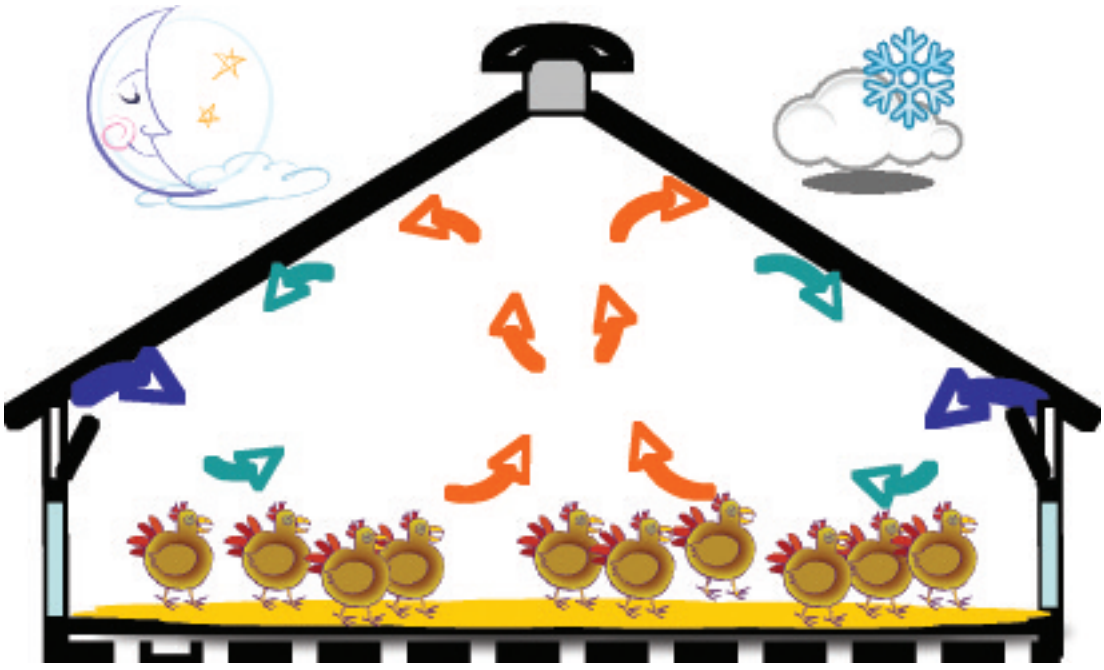

Figure 4. Natural ventilation at night with the pop holes closed (From: Justin Emery, ADAS)

5.5.2 Area requirements

To prevent the build up of disease you require twice the number of brooding areas that you are actually using at any one time. This allows one area to be cleaned, washed and disinfected, or steam-cleaned, and rested while the other is in use. The area needs to be large enough to house each batch up to four weeks of age. At a day old the area required is around 30 chicks/m^2, but by four weeks this will be reduced to 10 chicks/ m^2. If brooding on the range, the house needs to be large enough to accommodate the finished birds. In this situation the house may need to be subdivided for the initial period and a smaller area created to brood within the house; effectively a type of partial house spot brooding.

5.5.3 Lighting

Light is also a factor that needs to be considered. For the first seven to ten days the chicks need to identify food and water sources, and they are better able to do this if the lighting is bright during this period. Control body standards limit the total amount of light (max 16 hours per day), whereas conventional producers will often have 24 hour lighting during this period. It is obviously more difficult to provide artificial light if the chicks are brooded on the range, although solar powered or battery lighting can be used.

5.6 Bedding

Dust-free softwood shavings are an ideal bedding material, and initially should be about 10 cm (4 inches) thick. It warms up well and provides a soft layer for the chicks. Alternatively a thick layer of chopped straw can be used; indeed this is the preferred choice of bedding of the Soil Association, particularly if you have an arable enterprise on the farm. You could consider a combination of the two, using shavings when the chicks are very young and more vulnerable and switching to straw (which is cheaper) as they develop. Paper based bedding is permitted by Organic Farmers & Growers and Quality Welsh Food Certification, but not by the Soil Association. It can help reduce ammonia levels, and resist caking and compaction, and birds raised on paper bedding have less faecal matter attached to their feathers at slaughter, which may have a positive impact on pathogenic bacterial numbers once the birds are at the processing plant.[xiii]

Whatever material you use, use plenty of it to keep the birds dry and warm and the humidity down. Have fresh dry material to hand to deal with water spills etc.

5.7 Feed

The feed can be provided either as a pellet or a mash. While research has shown that birds better utilise pellets, the difference is marginal and, as discussed in Section 3.2, if you have the facilities to mill your own feed, the cost benefits of doing so far outweigh the improvements in growth rates that you might expect from using a pellet. If you are using pellets, they need to be in the form of micropellets, and most proprietary starter rations are in this form.

Chicks, up to the age of four weeks, require a higher protein feed (22-27%) than the growing birds, and this makes organic starter rations more expensive. You should therefore try and limit the amount of starter to 1kg per chick and move them on to a lower protein grower or finishing rations as soon as possible (usually at between three or four weeks old). You need to make the transition over a period of time and if you are brooding indoors you should switch the diets before they are moved on the range so as not to exacerbate the stress caused by the move.

As noted in Section 3.2, in principle all feed should be organic, but because of the difficulties in sourcing certain ingredients a proportion of permitted non-organic ingredients are allowed. This is gradually being phased out, and by 2012 all feed will have to be organic.

5.8 Water

At a week old, chicks require 2 litres per 100 chicks per day, increasing to 18 litres per 100 birds per day at 12 weeks of age. The amount of water consumed is directly related to feed consumption and temperature, and will increase by up to 50% in hot weather, when heat stress can be a serious problem. This occurs when the chick or mature bird cannot maintain the balance between heat production and heat loss. Signs of heat stress include a rapid panting which results in loss of water from the lungs. This needs to be replenished to avoid dehydration, preferably with cool water which helps to increase intake and has a cooling effect. If the chick or mature bird is breathing rapidly and the temperature is correct, this is usually a sign of disease.[xiv] It is therefore important that plenty of clean water is available at all times.

Young chicks will visit their drinker between 30 and 40 times per day so they need easy access, and enough of them, to avoid crowding especially at higher stocking densities and when the birds get older. There are a number of different watering systems available, including nipple, cup or bell drinkers. Nipple systems are probably the most reliable in terms of supplying clean water without the risk of contamination. Soil Association standards stipulate minimum requirements (one nipple or cup drinker per 10 birds, or one bell drinker per 100 birds) but other control bodies, and the DEFRA Guidance Document, do not.

Open water systems can be used, but they carry the risk of spreading disease if they are not kept clean. There is also a risk the chicks will become soaked, which, especially during the first week, can rapidly lead to chilling and increase humidity levels. If you are using these watering systems, you need to initially have small bowls to stop this happening. You can change over gradually (to allow the chicks to find the new water source) at 10 days or so.

5.9 Management of chicks

Warm up the brooder area just before a delivery so that the litter under the heat source is warm and dry when the chicks arrive. Make it as easy as possible for them to locate food and drink quickly. You can help them by do this by covering some of the brooder area with paper laying a trail of food on top it to the feeders and drinkers (Figure 5). Dispensers should be placed around the heat sources without being too close to them. If you are using nipple drinkers make sure that they are not too high. Under normal conditions the birds should be made to reach for the nipple, but in the first few days it is more important that they can locate the nipples easily

It is essential to reduce floor draughts, especially in cold weather. A circular draught guard up to a height of about 30-35 cm (12-15 inches) placed around the heat source, drinkers and feeders can help achieve this. These do not need to be complicated or expensive; a piece of cardboard can do the trick. This also helps to keep heat within a confined area while reducing the possibility of crowding and suffocation in the corners. As the chicks grow the guards can be expanded.

The behaviour of the chicks is your most reliable indicator of the conditions in the brooder. An even distribution and active chicks are what you are looking for (Figure 6). Birds clustered around the heat source and chirping sharply are too cold. If they are around the edge of the brooder area and appear drowsy and panting they are too hot. If they are all on one side of the brooder there is probably a draught.

Figure 5. Day old chicks in a well set up whole house brooder. (Photo, Rebecca Kelly)

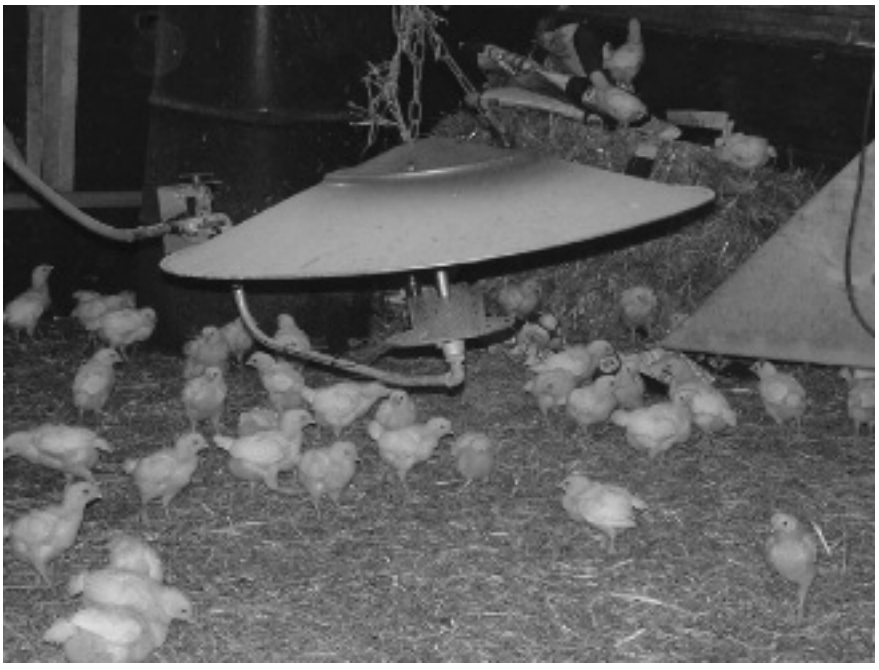

Figure 6. Chicks fairly evenly distributed (Photo: Steve Merritt)

5.10 Disease management

It is important to plan for good health from the start; strategies should be set out in advance of bringing poultry into the system. Control bodies require an Animal Management Plan for each species of animal. These need to be supplied and accepted by your control body before certification is approved. The plan needs to be continually monitored and updated. Any treatments such as worming or vaccinations need to be justified, usually by your vet in writing, and you must set out how you aim to reduce any reliance on these treatments in the future.

There are a number of diseases that can affect the chick, but Coccidiosis is potentially the most serious. It is an ubiquitous parasitic organism that multiples in the gut and is passed through the faeces onto the litter. One of main signs of infection is blood in the faeces. In the main, chicks become infected while scratching through the litter looking for food, but it can also be transferred through the water. If the disease is present at low levels, the birds will build up immunity. However, if when it reaches a critical level, it spreads suddenly, and very rapidly, through the flock.

Control of this problem is down to management. Chicks become particularly susceptible when they are under any form of stress, so minimising stress is an important part of the strategy.

There are specific steps you can take, including:

- make sure that the bedding is always clean and friable. This minimises the risk of picking up coccidiosis from the litter. Wet bedding means that the birds become caked and ingest the pathogen while preening. Dirty bedding will lead to higher ammonia levels making the chicks more susceptible;
- avoid overcrowding, which encourages the spread of disease from bird to bird;
- ensure that the chicks have good access to clean water and sufficient food at all times. If they don't, they will also spend more time scratching through the bedding looking for food, which aids the spread of the disease;
- be extra vigilant when they begin to feather up (usually around 3 weeks) because they are particularly susceptible this time.

In feed medications are not routinely permitted as growth promoters but if an animal is unwell, it must be treated and this can include coccidiostats to control coccidiosis.

It is impossible to overstate the importance of managing the disease at the brooding stage. Problems during this period will lead not only to higher mortality but even if birds survive an infection, they will be less efficient for the rest of their lives. Generally speaking, once the birds are out on the range the risk reduces, provided you take care that they do not take the problem with them. This is mainly because they spend more time on the pasture where the density of birds is much lower although during very wet spells, when the birds spend more time indoors, it can raise its head again.

6 The growing bird

6.1 Moving out on to the range

Once the brooding stage is completed (from about four weeks of age onwards) the organic birds must have access to the range. The standards require that the meat bird spends at least one third of its life on the range (two thirds in the case of Soil Association licensees), but as a general rule the longer you can have the birds out (weather permitting), the better. Minimum slaughter ages vary depending on the type of bird, and whether or not they come organic or converted stock (see Section 7 for details), so if you plan to slaughter earlier, you need to get the chicks out on the range sooner. In the summer months it is perfectly possible to let the birds out well before four weeks. From one week onwards, and in warm dry weather, chicks will happily graze. ADAS research has demonstrated that birds that have access to the range earlier will graze more. If early access to the range is not possible the effect can be simulated by introducing cut grass or other fresh, edible vegetation to the brooder area from day one.

As discussed in Section 5.3 the move is very stressful for the birds and care should be taken to minimise this stress as far as possible:

- the temperature of the brooder should be stepped down gradually to prepare the birds for living on the range (see Table 1) and there should be no heating at all in the brooder in the few days before the move to acclimatise the birds to the ambient temperature;
- make sure the change to grower rations has been completed well before the move (see Section 5.6);
- prepare the range building beforehand, making sure that plentiful feed, bedding, and water are available, and ideally use the same watering system in the brooder and on the range;
- move them as quickly as possible. Try to minimise the change in temperature as far as possible, particularly during the winter months. Moving them in modules or small crates will help keep out wind and rain, and they should be covered if the weather is bad.
- reduce the ventilation initially to allow a quick build up of warmth.

Moving birds may set them back by a few days in the winter months and this is a drawback of indoor brooding in the winter. To some extent this may be offset by the use of lights on the range although it is arguable how beneficial lighting actually is in broiler systems. You will need to monitor the birds very closely after moving. Bear in mind that they are likely to be feathering up fast and, as noted in Section 5.10, they are particularly susceptible to disease pressures at this stage.

6.2 Range housing

To some degree the organic standards dictate the design of range housing, in that they specify the total number of birds, the stocking density, the feeder area required, and the pop hole size. The standards limit the density of birds to 10 birds/m^2 up to a maximum of 21kg/m^2 for fixed sheds and 16 birds/m^2 up to a maximum of 30 kg/m^2 for mobile sheds*. Flock sizes are also limited to 4,800 birds per house, except for Soil Association certified systems where the limit is 1000 per house.

It is possible to rear organic meat birds in static buildings, but you would not benefit from the many advantages of full integration of the poultry enterprise into your system described in Section 1. If you do have a static system, you cannot use the same land for the range continuously, and most people use a paddock system, rotating the birds around blocks of land immediately adjacent to the house.

There are a number of companies that build both static and mobile houses of various sizes to suit individual requirements, but it is also possible to build your own range housing. If you opt for the latter, be very careful to reduce draughts as much as possible. It is very important that the ventilation inlets are well above the birds, and don't forget that after three months of bedding, the birds will be substantially higher off the ground than at the beginning of the growing period. Mucking out and cleaning are very important operations, so make sure you have enough room to get a loader in if it is big house, or a wheel barrow if it is a small one.

The cost of housing will be around £350-400 per 100 birds in materials alone for un-insulated housing and around £550 for insulated. If you intend to brood on the range insulation is essential. If you do not, it is possible use un-insulated houses (Figure 7), but there a number of drawbacks which mean that insulated houses are generally well worth the extra investment. These problems include:

- **heat stress**: This can be a big problem in summer. Thinly clad roofing, especially tin, means that buildings warm up very quickly;
- **condensation**: In the autumn and spring, when there are warm days and cold nights, the change in temperature creates condensation. The bedding gets damp and respiratory problems quickly follow;
- in the winter it is **difficult to maintain heat**. This is a particular problem for birds that have been brooded inside and are then moved out into cold range buildings.

* mobile houses not exceeding 150 m^2 floor space and which remain open at night.

Figure 7. An example of uninsulated range housing (Photo, Steve Merritt)

It is possible to buy and/or build housing with floors, which have the obvious advantage of providing extra insulation. In the winter months this prevents the bedding being soaked with ground water. The down side is that you will have to muck out the building by hand, a time consuming and therefore expensive task, and the space between the ground and floor of the house can provides a perfect home for rats. With floorless housing, in contrast, you can drag the house off the muck and get at it with machinery. Some of the problems of ground water can be dealt with by laying plastic sheeting down before bedding and by positioning the housing carefully in the winter months, ensuring that it is on drier land. If you are brooding on the range, more bedding will also help.

The position of poultry housing in the winter months can be crucial, and care should be taken to avoid the wetter areas. The area around the pop holes can become particularly poached and the birds will then bring mud back into the house, increasing the moisture. Management strategies include chopped straw, wire ladders and gravel pits to clean feet before entering the house. Obviously poor conditions increase the challenges and stress to the birds, which could lead to more health problems as well as making life more difficult for the producer. If the farm is wet it may be worth considering poultry production only in the drier months.

Taking farm equipment into such an area for feeding and cleaning will cause extensive damage to the soil structure. If the enterprise is small enough it may be beneficial to store a small amount of food on the range in a vermin proof container and top the birds up by hand each day. This reduces the amount of trips onto the range with heavy machinery.

6.3 Range management

Access to a well managed range is an essential part of organic poultry production, as the birds use it for food, shelter and for self medication. Getting the right balance of different plant species on the range can make an enormous contribution to the enterprise and the organic system as a whole as well as the wellbeing of the birds. As we noted in section 3.2 a well managed range can provide a significant proportion of the bird's dietary requirements. This helps to increase the cycling of nutrients within the system; ease the transition to 100% organic rations; benefit the economy of production and lead to greater dispersion of poultry in the field reducing the risk of nutrient leaching and increasing welfare.[xv]

It's important that the birds use the whole of the range effectively to reduce poaching and nitrogen build up. The ideal range has a combination of tree, hedge and herbaceous species, which fulfil a number of different functions, and examples are provided in Table 3. Grass should be kept short, and sheep can be beneficial in reducing sward length. In addition, suitable shelters should be scattered over the range. These should ideally be made from natural materials, such as branches and twigs, or wigwams made out of logs, but old trailer can also do the job.

The maximum stocking rate should not exceed 2500 birds/ha, although control bodies have different requirements and these are detailed in Table 2 below.

Table 2. Outdoor stocking rates

Control body	Birds/hectare	Birds/m^2
Soil Association	1000	0.1
Organic Farmers & Growers	2,500	0.25
Quality Welsh Food Certification	2,500	0.25

The range must be rested for as long as possible to reduce the risk of nitrate leaching, maintain the health of the sward, prevent a build up of parasites and to make use of the fertility build up. The standards require that the range is free from poultry for at least two months per year and Soil Association licensees must rest the range for one complete year in every three.

Table 3. Some plant species beneficial to the range and their functions (from: Silvo-poultry: An agroforestry system for organic chicken production at Sheepdrove Organic Farm. Lois Philipps, Organic Research Centre, 2002)

	Species	% of Mix	Purpose
Trees	Ash	18	Timber
	Beech	12	Timber and beech mast
	Field Maple	12	Shelter
	Alder	12	Shelter
	Hornbeam	10	Timber
	Cherry	6	Food and community interest
	Wild Pear	10	Food and community interest
	White beam	10	Shelter
	Apple	5	Food and community interest
	Scots Pine	5	Shelter

	Species	Density	Purpose
Herbs	Quinoa	Medium	Nutritional
	Kale	Medium	Nutritional
	Plantains	High	Anti-inflammatory
	Wild Garlic	High	Antibacterial, Landscape
	Comfrey	Low	Anti-inflammatory
	Aromatics eg Thyme	High	Antiseptic, calming de-wormer
	Vetches	Medium	Vulnerary, N fixation
	Marigolds	Medium	Anti-inflammatory
	Wild Strawberries	Medium	Vitamin C, community interest
	Fennel/dill	Medium	Calmative
	Mullein	Medium	Expectorant
	Wormwood	Low	Anthelmintic

	Species	% of Mix	Purpose
Hedge plants	Quickthorn	30	Shelter
	Field Maple	20	Shelter
	Blackthorn	1	Shelter
	Pea Shrub	10	Shelter and protein
	Hazel	5	Food and Community interest
	Dogwood	5	Food
	Spindle	5	Food
	Holly	2	Food and Community interest
	Vib Opulus	2	Shelter
	Vib Lantana	2	Shelter
	Wild plum	*	Food and community interest
	Crab apple	*	Food and community interest
	Dog Rose	4	Food and community interest
	Elder	10	Food and community interest
	Blackberry	*	Food and community interest
	Raspberry	*	Food and community interest

6.4 Feeding

Depending on the season and breed, a single bird will consume approximately 5.0-8.5kg of finisher[xvi] while it is on the range (plus any losses to rats, wild birds and wastage) so a batch of 100 birds requires up to 1000kg of feed during its time on the range. Consumption rates vary from 7-20kg/day, depending on time of year with less being consumed in the warmer summer months. The cost is reduced by buying in bulk, and you will probably need to invest in feed storage and dispensing facilities. On this scale a 12 t bulk bin should be adequate for storage (Figure 9). A range of mechanical feeders are available, which can be loaded directly from the bulk bin or by conveyors, and taken out on to the range (Figure 8).

Once on the range the feed can be dispensed directly to the birds, and feeders usually have a top hat type of lid to protect the feed, and the birds, from the elements while reducing losses to wild birds. The advantage of such a system is that it persuades birds out of their house onto the range.

Chickens tend to eat in the morning and the evening. Non-laying birds tend to eat most in the morning. It is therefore essential that food is readily available at all times. The amount eaten during this morning feed is related to how much food has been stored in the crop overnight.[xvii]

Guide prices for some important items of feed equipment are given in Table 4.

Table 4. Approximate cost of feed storage and dispensing facilities

Item	Approximate cost
Bulk Bin (12tonne capacity)	£3000
Mechanically dispensing 1 tonne trailer	£4000
125kg feeders	£200
25kg feeders	£22
12kg feeders	£11

Figure 8. A trailed feed hopper (Photo: Steve Merritt)

Figure 9. A 12 ton bulk bin dispensing into trailed hopper (Photo: Steve Merritt)

6.5 Disease management

Disease management on the range is largely down to biosecurity, and preventing the transfer of disease from one batch to another. Chicks can also learn behaviours such as ranging, foraging and where to hide from predators from older hens

Houses should be fully disinfected between batches of birds. Only the following products may be used to clean organic poultry houses, according to the DEFRA Guidance Document on European Union Organic Standards. Individual control bodies may have stricter lists and should be consulted before cleaning commences.

- Water and steam
- Potassium and sodium soap
- Milk of lime
- Lime
- Quicklime
- Sodium hypochlorite (e.g. as liquid bleach)
- Caustic soda
- Caustic potash
- Hydrogen peroxide
- Sodium carbonate
- Natural essences of plants
- Citric, peracetic acid, formic, lactic, oxalic and acetic acid
- Phosphoric and nitric acid (also used for cleaning dairy equipment)
- Alcohol
- Formaldehyde

During production, every effort should be made to keep different batches (or species) separate, to minimise the risk of transferring diseases between them. Ideally they should be kept as far apart as possible, and if you have to have batches close together, you need to erect good fencing. You also need to be careful that you yourself do not transfer diseases around the farm. Try to finish working with one group before moving on the next, rather than going backwards and forwards between batches.

A low stocking rate will reduce pressure on the birds, making them more resistant to disease. Remember that the maximum levels allowed by the organic standards are not necessarily the optimum for your system. This is particularly important in winter or during wet periods, when the birds spend more time indoors. During these periods problems are more likely to arise, and when they do they tend to spread faster.

Wild birds, such as starlings, crows and rooks, can potentially introduce disease problems as can rats, farm pets and ruminants. Crows, in particular, are a source of mycoplasma, which cause respiratory diseases in poultry.

Currently, the rules for *Salmonella* testing only apply to holdings with capacity of more than 2000 chickens present at any one time. They do not apply where the operator supplies small quantities direct to the consumer (i.e. farm gate sales) or via local retailers which only supply the final consumer (essentially householders).[xviii] See Guide to the National Control Programme for *Salmonella* in broiler flocks, available at http://www.defra.gov.uk/animalh/diseases/zoonoses/ncp.htm. Advice regarding Salmonella is available to all farmers from DEFRA and the VLA.

6.6 Bedding

It is important that enough bedding is used and that it is kept fresh. The total amount used will vary from one batch of birds to another and according to season. In the wet winter months the birds are in the house longer and will need more bedding. Straw is the most cost effective material at this stage, although as discussed in Section 5.6 other types of bedding are available. The bedding should be topped up regularly and kept in a dry friable condition. It is well worth investing in a straw chopper, which not only produces much better bedding, but also saves on the total amount of straw used and makes the muck easier to handle when cleaning out.

6.7 Water

The same drinking system should be used on the range as used in the brooding area if possible. Water should be available in the house and preferably on the range as well. Nipple systems are the safest in terms of reducing the potential for the spread of water-borne diseases within the flock and reduce the risk of wild birds introducing a problem. Bell drinkers and trough systems can work well but require more labour to keep them clean.

6.8 Predator control

Losses through predators can be quite considerable. Foxes are the main predators, but feral cats, badgers, crows and birds of prey will cost any poultry producer. There are various ways of minimising such losses.

Electric fencing around the perimeter of the range is effective, but is expensive and requires a high level of maintenance. At least 9 strands are required set at 5-10cm intervals at the bottom with an increasing distance between them up to the top wire. It is advisable to earth every other strand to ensure a shock is delivered at whatever height the fence is challenged. To stop vegetation touching and earthing the wire, a mulch strip can be placed under the wire when the fence is being erected (Figure 10). The fence needs to deliver a large enough shock to deter foxes if it is to be effective; a smaller charge will be constantly challenged. Poultry netting is useful for separating batches of birds from one another, but it only has a small diameter wire running through it and may not pack a hard enough punch to deter predators.

Birds of prey and crows tend to attack smaller birds. However, they do not appear to attack chicks within a fenced area, so restrict the area that the chicks have access to when they are first let out. You can string fishing line over the fenced area which is also effective at deterring attacking birds.

The range shelter discussed in Section 6.3 will help protect birds from aerial attack, as will any hedging that has been included in the range to encourage a wider diet of flora and fauna.

Figure 10. An 8 Strand electric fencing around the perimeter of the poultry field. A mulch strip is placed underneath to stop vegetation earthing the fence. (Photo, Rebecca Kelly)

7 Slaughter ages

The standards set minimum ages for slaughter, depending on the strain of the bird and whether or not the chicks come from organic sources as opposed to being converted. All converted birds must undergo a 10 week conversion period.

If you are using a fast growing strain, you must keep the birds until they are 81 days old. Slow growing non-organic birds must be kept for at least 70 days, so if the chicks are brought in at 1 day old they must be managed as organic and not sold until they are 71 days of age; chicks bought in at 2 days can be sold at 72 days and so on. You can slaughter slow growing organic birds at any age. Poultry are regarded as slow growing if live weight gain is less than 45 g per day. A definitive list of slow growing breeds is being developed, but is not yet available.

Most markets require a finished weight of between 2.0 and 2.2 kg, and on average it takes about 12 weeks to reach this weight, although in summer months this can sometimes drop to 11 weeks.

If you also have layers, you can slaughter the spent hens* (those that have come to the end of their productive lives) and market them as 'stewing birds', or use the meat for soups and pies etc, if you are onward processing. Carcasses can be sold as stock bags and can be made more attractive if you also include any home grown herbs and or vegetables.

* For spent hens to be sold as organic, they must be either from organic parent stock or bought in at less than 3 days old and managed as organic from that point on.

8 Killing and processing poultry

8.1 Regulation

Regulations relating to killing and processing birds (or indeed any other animal) were perceived as complex, inconsistent. However the basic principles are relatively straight forward.
There are two classes of regulation:

- **Exempt slaughter facilities.** The exempt licence was originally created for farmers wishing to raise Christmas poultry, and for reasons not now entirely clear, it was originally administered by the planning officer for the area. Now, more properly, the Environmental Health Office (EHO) has taken this role. An EHO licence only allows you to kill your own birds. It was designed to suit small scale seasonal production, and is limited to 10,000 birds a year. You can sell to retailers but not wholesalers, and only then in your own and the neighbouring authorities (although if you are selling by mail order you can sell to anyone). It does not require a vet to be present when you are killing and requires a relatively low level of investment.
- **Meat Hygiene Service (MHS).** An MHS licence allows you to sell to anyone, anywhere. There is no limit to numbers and you can kill other people's birds. However, a vet has to be present every time you kill or eviscerate, which you have pay for (about £60/hour) and he or she has to be booked a month in advance. The level of initial investment will be higher.

Regardless of which level you are licensed at, there are certain key requirements. These are:

- washable floors and walls with good drainage. Plastic coated cladding and a resin floor are the regulator's materials of choice but they are expensive. A resin paint for the walls and polished concrete floors are cheaper options while still meeting the standard;
- the killing and evisceration processes must be separated to avoid airborne contamination during evisceration. This can either be achieved by space – carrying out the two operations in different areas separated by a door – or time, by carrying them out one after the other and leaving at least 2 hours between the two processes;
- packing and cutting, likewise, must be separated from the evisceration operation by space or time;
- you must have fridges capable of actually reducing the temperate to 4°C as opposed to just maintaining it there.

8.2 Buildings

If you are contemplating converting an existing farm building to a slaughter facility for an exempt licence you should be able to achieve this without requiring planning permission for change of use, on the basis that it is an extension of the farm business, i.e. the onward processing of your birds. However, you should consult or inform your local authority of your intentions to avoid problems in the future

As discussed above the floor and walls must be washable, and good drainage is imperative. In terms of process, you move from 'dirty' through to 'clean' areas. The birds come into the lairage. They then pass through the killing, eviscerating, cutting and packaging areas, strictly in that order, and exit as the finished product. Ideally the whole building should slope down to the dirty area.

It is a misconception that facilities have to be large and complicated. It is possible, for example, to run a 100 bird a day operation in a 40ft old fridge trailer. The walls and floor are adequate and if you partition the far end you can utilise the fridge unit provided it has the capacity to cool warm bodies. There are drawbacks of course; the small size of the container limits the number of people that can work in it and it is slow because you have to separate killing and evisceration by time instead of by space.

8.3 Process and equipment

Some of the main equipment needed for a small scale slaughter facility (up to 400-500 birds/day) is listed in Table 7 below. Prices are for guidance only and assume second hand equipment in good condition.

Table 7. Key items of killing and processing equipment

Equipment	Approximate cost (£)
Carousel (6-cone)	200-300
Stunner	250
Scald tank	2000
Bowl plucker	2000-2500
Dry plucker (for waterfowl only)	2500–3000
Finishing machine	1500-2000
Wax bath (for waterfowl only)	700
Eviscerating table	800
Other equipment (including shackles, stainless steel tables, scales, over wrapper, and knives)	1000

With two people working on this equipment, you can expect to process up to 120 chickens or 40 ducks per hour.

The birds come out of the lairage and are placed head first into a cone on the carousel where they are stunned and bled and put into the scald tank cage. The scald tank maintains water at around 54ºC, and holds six birds at a time. Once all six birds are in the tank, they are rotated through the water for around a minute and a half. From there, they are removed and placed into the bowl plucker, which is a series of rotating rubber fingers, and plucks the birds in about 30 seconds. The wings and legs can either then be finished by hand or with a finishing machine.

The plucked birds are stored on wheeled 'A' frames which, when full, are moved into the eviscerating area. As discussed previously, this needs to be separated from the killing area. Once eviscerated and dressed, they are placed into the chillers. Cutting and packing are best done when the bird is cold.

Waterfowl are slightly different as they cannot go through the wet plucking system described above, because they secrete waterproofing oils. This would require the system to run at a very high temperature, which would damage the skin. Instead, they have to be plucked either by hand or with a dry plucker and then dipped in hot wax. After cooling in water the wax is peeled off, removing any remaining down. It is possible for two people to kill, pluck and wax around 30-40 ducks per hour with this type of equipment.

8.4 Waste

You can either pay for the waste (mainly eviscerate and feathers) to be taken away or you can incinerate it yourself. If you choose the latter you will need to purchase an improved incinerator that has to be licensed by the animal health office at a cost of around £5000-6000. All washings from the facility also have to be tanked and collected or put through a suitable reed bed system.

8.5 Barriers to local processing facilities

Small to medium producers have consistently identified a lack of killing and processing facilities as a major constraint to the development of their businesses. Discussions in the organic Welsh poultry discussion group suggest that the main barrier to developing these facilities is regulatory. Specifically, it is the requirement for MHS licensed premises to have a vet present at killing which makes it prohibitively expensive for small scale operations, and effectively prevents them from killing other producers' birds.

There is an urgent need for a constructive debate on this issue and specifically to ask whether it is possible to change the exempt slaughterhouse regulations to allow small-scale processors (say less than 20,000 birds/ year) to kill other people's birds. Logically this should not cause undue problems to the EHO. The risk to the public is no greater than if a producer only kills his or her own birds and the EHO (in contrast to the MHS) places the onus on the consumer to cook birds properly prior to consumption. This relative minor change would go a long way to addressing what has, up until now, been an intractable problem

9 Financial data

9.1 Trends in the poultry market

Although poultry producers have been adversely affected by the changes in the non-organic feed allowances, the market for organic poultry has continued to grow, stimulated in part by the campaigns against intensive broiler production by Jamie Oliver and Hugh Fearnley-Whittingstall. In late 2007 through to early 2008, organic chicken prices were 550-600p/kg dw or 140+p/bird contract price. Prices rose in summer 2008 to 690-800p/kg dw (direct sales) and 147p/bird (contract sales) as the market continued to grow. It is unclear at present whether the recession has significantly affected demand and therefore prices obtained for organic chicken. Producers considering production should satisfy themselves that demand is present and at a profitable price point.

9.2 Gross margins for organic table birds

9.2.1 Using gross margins and their limitations

The data presented in this section (Tables 6 and 7) are reproduced from the 2009 Edition of the Organic Farm Management Handbook. Gross margins such as these are useful for farm planning, for example when introducing a poultry enterprise into an existing organic system, and for making comparisons between different enterprises on the same farm; between different organic holdings; and between conventional and organic enterprises. However, there are some important limitations to their use, which you should always bear in mind:

- gross margins represent the difference between enterprise output and variable costs. They exclude whole farm and fixed costs. Gross margin comparisons between enterprises with different fixed cost structures can be misleading;
- high individual enterprise gross margins for individual enterprises do not reflect the potentially very different enterprise mix on organic farms and in particular the need for fertility-building crops in the rotation. Taken out of the whole farm context, individual gross margins can be very misleading;
- certain inputs such as organic manures, lime and phosphate are applied on a rotational basis with residual effects on subsequent crops, so it is unrealistic to expect their costs to be carried by the individual enterprise to which they are first applied;
- the interactions between enterprises in an organic farming system make an important contribution to the overall financial performance of the system. For instance, the manure from a poultry enterprise makes a significant contribution to the 'costs' of the following cash crop. It is therefore often inappropriate to consider the economics of a single enterprise, unless the context of the whole farm system is considered.

9.2.2 Assumptions

The calculations in Section 9.2.3 are based on a number of assumptions. It is important that these assumptions are understood with relevance to your own situation, and the likely impact that they will have on the figures for your own system.

Output

- *Price* The market for organic table birds grew faster in 2008/09 than during 2007/08, both through multiple retailers and through direct sales. Producer killing and dressing and direct sales are assumed.

Variable costs

The variable costs are to some extent dependent on the scale of enterprise. For instance, the cost of the chicks, killing and processing costs, and heat and straw costs will all be less per bird in large compared to small operations. These costs assume a 10,000 per year unit.

- *Chicks.* Organic chicks must be used where they are available (and availability has improved in recent years). A derogation to use non-organic chicks still requires that chicks must be less than three days

old. See Section 2.1 for comments on breeds.

- *Feed.* Bulk purchase is assumed. Feed requirements are higher than conventional systems because of longer finishing periods. Costs are higher in winter, especially if finishing in poorly insulated housing. For production under contract, no feed costs are assumed.
- *Range:* Access to range for at least two thirds of the bird's lifetime. The minimum range area is 2500 birds/ ha, (or for birds/m^2). This requirement keeps the N from the manure below the required 170kg N/ha.
- *Housing:* Costs are not included in the calculation. Section 3.2 provides some estimates of housing costs. Depreciation for mobile housing is 15-24p/bird over 10 years and 8-12p/bird for static housing.
- *Finishing:* If you are using a fast growing strain, you must keep the birds until they are 81 days old. Slow growing non-organic birds must be kept for at least 70 days, and you can slaughter slow growing organic birds at any age. Poultry are regarded as slow growing if live weight is less than 45 grammes per day. A definitive list of slow growing breeds is being developed, but is not yet available.
- *Slaughter:* Own killing in a low-throughput abattoir (a maximum of 200 birds/week or 10,000/ year) is assumed. Investment in facilities (converting existing building with new equipment) is estimated at £30,000. If birds are killed elsewhere, costs of £2.00 - £2.50/bird are assumed.

9.2.3 Gross margin calculations

Table 8. Gross margin calculations for organic table birds.

Physical assumptions Finishing period	81 days	10% mortality	
4 batches per year @ 2500 birds = 10,000 birds per ha per year			
Financial data			*£/bird*
Table birds	2.0kg(4.4 lbs)	@ 5.90 £/kg	11.80
Less one day old chick	1.10 chicks	@ 0.70 £/chick	-0.77
Total output per bird			**11.03**
Feed – starter	1.00kg/bird	@ 425 £/t	0.43
Feed – finisher	9.50kg/bird	@ 470 £/t	4.47
Killing and dressing			1.50
Other livestock expenses			0.55
Total variable costs			**6.94**
Gross margin excluding forage			**4.09**

9.2.4 Sensitivity analysis

Business plans must be able to respond to changing circumstances, and you need to be aware of how variability within a number of factors will affect the performance of the enterprise. Table 9 below shows the impact of changes in the prices received and various production and processing costs on the gross margin. This is known as a 'sensitivity analysis'. It is every bit as important as the gross margin calculations itself, but is often overlooked.

The tables can be a bit hard to unpick at first, but they are easy once you get the hang of them. A 'worked example' for the sale price is provided below, and you use the same method for all the other parameters.

The figures for sales price are as follows:

Parameter	Change	Impact on GM (£/ Bird)	Value range	Gross margin range (£/ Bird)
Sale price (£)	0.1	0.2	4.00-6.50	0.29-5.29

This means that for every £0.10 change in the sales price (up or down), the Gross Margin changes by £0.20 (also up or down). The range of prices considered (the 'Value range' column) is between £4.00 and £6.50. At the lowest value (£4.00), the gross margin is £0.29/bird and at the highest value (£6.50) the gross margin is £5.29/bird.

For some parameters, the relationship is positive: if your sales price increases so does your gross margin. For others it is inverse: if your starter concentrate use increases, your gross margin decreases. A minus sign in the 'impact on gross margin column' indicates the latter. It is also likely that more than one factor should be taken into account e.g. feed prices maybe lower but the expected mortality rate may be higher.

Table 9. Sensitivity analysis

Parameter	**Change** *(Up or down)*	**Impact on gross margin (£/bird)** *(Up or Down)*	**Value range**	**Gross margin range (£/ Bird)**
Sale price (£)	0.1 £/kg	0.2	£4.00–6.50	0.29-5.29
Finishing weight	0.1kg	0.59	1.7–2.5kg	2.32-7.04
Starter concentrate use)	0.1kg/bird	-0.04	0.5–1.50kg	3.88-4.30
Starter concentrate price	10 £/Tonne	-0.01	£400-£500	4.02-4.12
Finisher concentrate use	1kg/ Bird	-0.47	8.5-10.5kg	3.62-4.56
Finisher concentrate price	10 (£/tonne)	-0.10	£400-£500	3.81-4.76
Killing and dressing cost	0.1 £/bird	-0.10	£1.00–£2.50	3.09-4.59
Flock mortality	1%	-0.05	5-25%	3.34-4.34

10 Resources

General information and newsletters

A publications list including the above books, other technical booklets and fact sheets are available from Organic Centre Wales. Regular monthly e bulletin and Organic Market Wales can be downloaded from the OCW Website.

Soil Association Technical Guides, Organic Farming magazine and a free book catalogue detailing many other publications relating to organic husbandry is available from the Soil Association www.soilassociation.org.uk

The Organic Inform Newsletter and the Organic Research Centre Bulletin are available from www.organicresearchcentre.com

Books on organic farming

Organic Farming and Growing. F. Blake (1994). Crowood Press; Marlborough, Wiltshire

Organic Farming. N. Lampkin (1990). *Farming Press, Ipswich* (ISBN 0 85236 191 2)

Organic Farm Management Handbook. 8th Edition. N. Lampkin, M. Measures, S. Padel(2009) *Published jointly by Aberystwyth University and the Organic Research Centre Elm Farm. Available from Organic Centre Wales.*

Poultry resources

Organic poultry production: an introductory guide. Soil Association Food and Farming Department Available as a free down load from the Soil Association Website

Poultry Management: R.Kelly. Institute of Organic Training and Advice. Available as a free down load from http://www.organicadvice.org.uk/reviews.htm

Producer guide: Organic and free range poultry (e-book). S. Merritt. Welsh Poultry Centre

Nutrition and feed production

Nutrition and feeding of Organic Poultry (2008) R. Blair. CABI Publishing

Organic arable farming – conversion options. Home Grown Cereals Authority available from *Organic Centre Wales.*

Organic Cereal and Pulse Production. S. Briggs (2008) *Crowood Press; Marlborough, Wiltshire*

Organic poultry nutrition and rations G. Dinnage. Institute of Organic Training and Advice. Available as a free down load from http://www.organicadvice.org.uk/reviews.htm

11 Contact list

Organizations that support organic farmers

Better British Organic Poultry (B-BOP)
Barneys Barn, Berrycroft, Ashbury, Swindon SN6 8NS
E-mail: info@b-bop.co.uk
www.b-bop.co.uk

Biodynamic Agricultural Association
Demeter Scheme Coordinator, 25 Boswall Road, Edinburgh EH5 3RR
Tel: 0131 552 6565; Fax: 0131 552 6565
Email: demeter@ biodynamic.org.uk
www.biodynamic.org.uk

Organic Research Centre Elm Farm
Hamstead Marshall, Newbury, Berks, RG20 0HR
Tel: 01488 658279; Fax: 01488 658503
Email: elmfarm@organicresearchcentre.com
www.organicresearchcentre.com

Organic Centre Wales
Institute of Biological, Environmental and Rural Sciences,
Aberystwyth University Aberystwyth, Ceredigion SY23 3EB
Tel: 01970 6222100
E-mail: organic-helpline@aber.ac.uk
www.organiccentrewales.org

Soil Association Food and Farming Department
South Plaza, Marlborough Street, Bristol BS1 3NX
Tel: 0117 914 2400; Fax: 0117 925 2504
Email: ff@soilassociation.org
www.soilassociation.org

Organic control bodies

Biodynamic Agricultural Association
Demeter Scheme Coordinator, 25 Boswall Road, Edinburgh EH5 3RR
Tel: 0131 552 6565; Fax: 0131 552 6565
Email: demeter@ biodynamic.org.uk
www.biodynamic.org.uk

Organic Farmers & Growers Ltd
The Old Estate Yard, Albrighton, Shrewsbury, Shropshire SY4 3AG
Tel: 0845 330 5122 Fax: 0845 330 5123
Email: info@organicfarmers.org.uk
www.organicfarmers.org.uk

Organic Food Federation
31 Turbine Way, Eco Tech Business Park, Swaffham, Norfolk PE37 7XD
Tel: 01760 720444; Fax: 01760 720790
Email: info@orgfoodfed.com
www.orgfoodfed.com

Quality Welsh Food Certification Ltd.
Gorseland, North Road, Aberystwyth, Ceredigion, SY23 2WB
Tel: 01970 636688, Fax 01970 624049
Email: qwfc@wfsagri.net

Soil Association Certification Ltd
South Plaza, Malborough St., Bristol BS1 3NX
Tel: 0117 9142406
E-mail: goorganic@soilassociation.org

Consultancy companies (with organic poultry expertise)

Abacus Organic Associates Ltd
61 Robey Park Road, Neston, South Wirral, Cheshire CH64 9SW.
Tel: 0151 336 2506
Email: gareth.jones@abacusorganic.co.uk
www.abacusorganic.co.uk

ADAS UK Ltd
ADAS Pwllpeiran, Cwmystwyth, Aberystwyth, Ceredigion, SY23 4AB
Tel: 01974 282229
Email: sian.lloyd@adas.co.uk
www.adas.co.uk

Organic Advisory Service
Organic Research Centre Elm Farm
Hamstead Marshall, Newbury, Berks, RG20 0HR
Tel: 01488 658279; Fax: 01488 658503
Email: elmfarm@organicresearchcentre.com
http://www.organicresearchcentre.com

The Welsh Poultry Centre
Llwyncrychyddod Llanpumsaint Carmarthenshire SA33 6JS
Tel: 01267 253570
Email: sjorganics@btinternet.com
http://www.welshpoultrycentre.co.uk

Government agencies

Farming Connect
08456 000813
www.wales.gov.uk/farmingconnect

Welsh Assembly Government Divisional Offices
Caernarfon Divisional Office, Government Buildings,
Penrallt, Caernarfon, Gwynedd LL55 1EP
Tel: 01286 674144; Fax: 01286 677749
Email: agriculture.caernarfon@wales.gsi.gov.uk

Carmarthen Divisional Office, Government Buildings,
Picton Terrace, Carmarthen SA31 3BT
Tel: 01267 225300; Fax: 01267 235964
Email: agriculture.carmarthen@wales.gsi.gov.uk

Llandrindod Wells Divisional Office, Government Buildings,
Spa Road East, Llandrindod Wells, Powys LD1 5HA
Tel: 01597 823777; Fax: 01597 828304
Email: agriculture.llandrindod@wales.gsi.gov.uk

Welsh Assembly Government Food, Fisheries and Market Development Division (FFMDD)
Caryl Tudor Jones, Organic Sector Manager, Y Lanfa, Trefechan Aberystwyth Sy23 1AS
Tel: 01970 613216
Email: Caryl.tudorjones@cymru.gsi.gov.uk

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[viii] DEFRA (2002) *Effect of breed suitability, system design and management on welfare and performance on traditional and organic birds*. project code OF0153

[ix] DEFRA (2002) Effect *of breed suitability, system design and management on welfare and performance on traditional and organic birds*project code OF0153

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[xi] Cooper, O. (2009) Free-range birds benefit from under-floor heating. *Poultry World*. March 2009: p24

[xii] Cooper, O. (2009)Good advice smoothes the path to set-up. *Poultry World* April 2009: p. 30.

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[xv] Horsted, K. (2006) Increased foraging in organic layers. Ph.D., Department of Agroecology, University of Aarhus, Faculty of Agricultural Sciences.

[xvi] Lampkin,N., Measures, M and Padel, s. (ed) (2008). *2009 Organic Farm Management Handbook 8TH Edition*. ISBN 978 1 872064 44 2

[xvii] D.M.Broom and A.F.Fraser(2007). Domestic Animal Behaviour and Welfare 4th Edition. Oxford: CAB International

[xviii] DEFRA (2009)Guide to the National Control Programme for Salmonella in broiler flocks. www.defra.gov.uk/animalh/diseases/zoonoses/pdf/ncp-guide-salmonella.pdf