



Resource Pack

Get Your Hands Dirty

A guide to growing plants and keeping animals in schools





Introduction

Get Your Hands Dirty outlines some of the potential for using growing plants and caring for animals in your school to enhance learning opportunities and raise standards. It has been written by people with many years of experience, all of whom have started small and progressed to keeping large farm livestock as their knowledge, skills and available resources have increased.

This resource is useful for all teachers, whether you are thinking of starting to grow plants or wanting to start more complex activities. Whatever you are currently doing outside the classroom is already very useful for your pupils: be proud of anything you have achieved so far, and take inspiration from how others have been able to offer their pupils even more.

This resource is aimed at helping you consider:

- What you are currently providing in your school
- What opportunities there might be for new activities
- The issues you need to consider before embarking on a new venture
- Where you can find more information and support.

First, we help you '**Make the case**' for introducing growing plants and caring for animals into your curriculum.

Your options are then outlined in seven different sections. Each section explains:

- **Uses:** How your pupils and school will benefit
- **Choosing:** The appropriate types of plants or breed of animals
- **Housing and equipment:** What you will need
- **Considerations:** Any special health and safety or licence issues.

Get Your Hands Dirty seeks to guide you through the whole process in easy-to-manage stages and should therefore provide you with what you need, whatever stage you are at, whether you are just starting the process of planning or are looking to build on your current experience.

It will also give you ample information about the range of vegetables, fruits, reptiles, birds and farm animals you could care for in your school grounds, depending on the space and level of resources and skills you have available, or might acquire.

How to use this resource

The best way to use this pack is to work your way through the seven different sections progressively. Each section provides details about a different stage of growing, starting from small-scale gardening through to a fully-fledged farming enterprise.

Some sections cover a number of different, equivalent activities, any of which might be appropriate for you to implement at your school. The skills and knowledge you gain from each section will help you tackle any challenges you might encounter as you develop your school growing project.

The 7 sections are complemented by a number of other useful resources:

- Unfamiliar terms can be found in the **Glossary**
- Further details on subjects such as health and safety can be found in **Useful information**
- A **Bibliography** shows where the most useful practical information can be found
- Useful contact details for further information are provided in **Support & advice**.

Before you start...

- Get a team together to support you. Involve Governors and the PTFA as well as other teachers – they can be invaluable allies and have useful contacts
- Involve pupils in the decision-making process too – if they take ownership of the project, it can help to make the whole experience a more positive one for all concerned
- Secure funding from either the school or external sources if you need it (it is likely that you'll need some funding, if only for such things as tools, compost and seeds).

Please note: In some sections only England and Wales official contact details have been provided, e.g for Defra responsible for animal health. The guidance applies in all countries but the reader will need to check country-specific references.

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For further information and support, contact:

The School Farms Network,
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Sections

1. Gardening without land

- Containers and mini projects



2. Growing in small areas of land

- Plant sales
- Composting
- Small ponds



3. Simple horticultural activities and small animal care

- Unheated protected cultivation
- Large ponds
- Easy exotics
- Rabbits and guinea pigs



4. Growing in a heated greenhouse and rearing poultry

- Growing in a heated greenhouse
- Using experimental plots
- Advanced exotics
- Poultry keeping
- Incubators



5. Enterprise horticulture and more sophisticated animal care

- Enterprise horticulture including use of a commercial greenhouse or polytunnel
- Bees
- Calves
- Goats
- Piglets
- Sheep
- Pigs (young piglets or weaners)



6. Rearing alpaca, cattle and pigs

- Adult cattle
- Alpaca
- Pigs
- Growing animal feed



7. Small-scale farm enterprises

- Equines
- Small-scale farm enterprises





Making the case

Making the case for growing plants and caring for animals in your school



All schools, regardless of size, location or status, can benefit from using the natural world as a school resource.

Whatever activity levels your school can accommodate – from creating a small growing area to running a school farm – these activities can create huge benefits for:

- Young people, who get a chance to learn in new, more relevant real life and exciting ways
- Teachers, who can broaden and deepen their teaching skills and subject knowledge, while working with more motivated pupils
- The school, which can use these new resources and approaches to raise achievement
- The wider community, as sites become a resource for extended provision and community involvement and knowledge about food production, sustainability issues and the environment is spread.

For many young learners, it is not sufficient to acquire knowledge without seeing its relevance to themselves and the world around them. Young people learn better through practical experience and acquire knowledge and understanding through real life tasks that stimulate their natural curiosity. In this way, knowledge, skills and understanding take on a deeper meaning and help to raise achievement.



There is also a real need to re-engage young people with two of the basic needs of life - how we feed ourselves and look after our well-being. Fewer and fewer young people have the opportunity to experience this world first hand, and many of them only see food stacked on supermarket shelves, so the connection between source and pre-packed product is often not made. Pupils from all backgrounds, urban and rural, need to learn more about food, farming and the countryside and about the interdependence between the rural and urban environments.

There is, of course, no more accessible and available a resource for schools than that which exists on their own doorstep and within their immediate environment, i.e. the whole school campus and the surrounding natural environment. There is a strong case for using this resource to re-engage young people with the natural world and its processes, by giving young people a greater understanding of plants and animals (including a better awareness of farming

and the origins of food), while importantly improving motivation, behaviour, attitudes and values, and therefore raising achievement as an essential part of a strategy for school improvement. Schools have found that their pupils respond well to such first-hand learning experiences, significantly increasing their sense of achievement, confidence and enthusiasm, as soon as they get their hands dirty!

The value of learning outside the classroom

The value of learning outside the classroom has been recognised by the Department for Education (DfE) with the publication of the Learning Outside the Classroom Manifesto, which opens with the following statement: "We believe that every young person should experience the world beyond the classroom as an essential part of learning and personal development, whatever their age, ability or circumstances."

Learning outside the classroom is about raising achievement through an organised, powerful approach to learning in which direct experience is of prime importance. This is not only about what we learn but importantly how and where we learn.

As we are all aware, education is more than the acquisition of knowledge. Improving young people's understanding, skills, values and personal development can significantly enhance learning and achievement.

There is strong evidence that good quality learning outside the classroom adds much value to classroom learning. It provides a context for learning in many areas: general and subject based knowledge; thinking and problem solving skills; life skills such as co-operation and interpersonal communication.

Much has been learnt about how the brain works and the different ways in which we prefer to learn. Research suggests the need to re-engage learners with the world as they actually experience it.

This is often called 'experiential' or 'authentic' learning. It reinforces what good teachers have always known - the most meaningful learning occurs through acquiring knowledge and skills through real life, practical or hands-on activities.

When these experiences are well planned, safely managed and personalised to meet the needs of every child they can:



- Improve academic achievement
- Improve young people's attitudes to learning
- Make learning more engaging and relevant to young people
- Provide a bridge to higher order learning
- Reduce behaviour problems and improve attendance
- Stimulate, inspire and improve motivation
- Develop active citizens and stewards of the environment
- Nurture creativity
- Provide challenge and the opportunity to take acceptable levels of risk.

Growing plants and keeping animals – a powerful context for learning

This desired better understanding of the natural world, plants and animals, food production, farming and the countryside and the interdependence between the rural and urban environments, could be acquired at three very different levels of learning:

1. Listen and talk or theoretical, classroom-based learning, where teaching and learning is a largely academic activity, e.g. a theoretical understanding of reproductive systems of plants and animals can be gained from a textbook.
2. Listen, talk and look where the learner is provided with an opportunity to observe reality, and then discuss, clarify and learn from that experience. In this way, understanding of reproductive systems could be enhanced by simple observations of plants outside the classroom or exhibits.



3. Listen, talk, look and do, where the practical engagement of the learner with real life tasks develops a deeper knowledge, a greater understanding through the development of skills and an increased ability to think critically. At the same time valuable, informal learning takes place and encourages the development of positive values. Deep and long-lasting knowledge and understanding of reproductive systems can be achieved through hands-on involvement in actually growing plants and keeping animals (i.e. through practical horticulture or farming).

Quality learning in a garden or farm setting therefore adds great value to classroom learning and most National Curriculum subjects can be taught in this special outdoor environment. It provides a fresh and powerful context for accessing learning across an enriched curriculum, including literacy and numeracy.

Learning through the use of plants and animals is not just an end in itself - it also provides many different opportunities for personal and social development.

- It offers ways for students to learn about real life skills such

as taking responsibility for others and how to co-operate in a group

- It produces more rounded individuals with better personal and social skills. Many children, including victims of bullying or those with low esteem, gain self-esteem and a wider understanding through responsibility for tasks such as caring for animals or nurturing plants.

The benefits are clearly not confined to students - a school garden or farm allows teachers to take a more innovative and creative approach to delivering the curriculum, which helps to further their passion for their subject and their confidence in using the outdoor classroom. Teachers also find they develop improved relationships with their pupils - benefiting from being able to interact with them in an often more relaxed, informal environment.

Identifying the opportunities for raising achievement and school improvement

Creating a school garden or farm can have an impact beyond simply providing a more stimulating



outdoor learning environment within the school.

In order to improve motivation and to make the curriculum more accessible to a wider range of learners, teaching and learning needs to be more relevant, personalised and provide greater vocational opportunities.

This clearly links to Every Child Matters and the Government's aim that every child, whatever their background or their circumstances, should be provided with the support they need to: be healthy; stay safe; enjoy and achieve; make a positive contribution; and achieve economic well-being.

How do we find the space to grow?

Even in the most unlikely school setting, surrounded by an asphalt desert, it is possible to take steps to bring the natural world a little closer. You can find space for window boxes, hanging baskets or planters filled with edible plants such as herbs and tomatoes. It only takes a little more effort to create raised growing areas or establish borders around the edges of buildings or the boundaries of the school grounds.

And what about an area of rarely used land on school grounds which could be converted into a growing plot, a part of the playing fields that is underused or a courtyard which would benefit

from some greenery? If there is nowhere available on school grounds it need not be a problem; a nearby field or allotment could be utilised.

You don't have to grow alone

Your growing resource does not have to be managed solely by the school or from within its own financial and personnel resources. The local community can be a rich source of support. Try to develop partnerships with local organisations such as allotment associations, community gardens gardening clubs, city farms, young farmers clubs, etc, and local farmers and growers.

These willing partners can often provide a school with specialist expertise and skills, enthusiastic volunteers, on the job training for teachers and support staff, as well as tools, equipment, machinery and temporary 'loans' of livestock.

You can also learn from colleagues in other schools who have already developed their school grounds.

Finally, there are local, regional and national organisations able to provide support and advice to schools, including:

- Learning through Landscapes
 - The Royal Horticultural Society
 - Garden Organic
 - The Federation of City Farms and Community Gardens
 - The School Farms Network
 - Farming and Countryside Education (FACE)
 - Countryside Classroom
- to name just a few.

There has never been a better time to start!



Gardening without land



Section 1

What this section covers

- The use of containers in which to grow plants

Unfamiliar terms can be found in the **Glossary**. Further details on subjects such as health and safety can be found in **Useful Information**. The **Bibliography** shows where the most useful practical information can be found, and useful contact details for further information are provided in **Support and advice**.



Where next?

- Sections 2 – 7 of this resource introduce more complex horticultural activities and animals for you to consider rearing in your school grounds.

You can grow plants even if you have no land to cultivate. Many schools have very limited space, especially those located in urban areas, but there is still plenty you can do. Container gardening is the easiest solution – hanging baskets, pots, planters and grow bags, or even plants grown in old wellies, can all add up to a flourishing growing area.

The value of this first experience is immense. Activities can be run indoors, provide links to recycling, art and design, brighten school grounds with temporary displays, provide opportunities for competition, parental and community engagement and fundraising. No matter how advanced your school growing projects become, you will find yourself returning to container growing again and again.

Container gardening

How can your container garden be an educational resource?

A container garden is very useful:

- At all Key Stages in the areas of science related to plant growth and development.
- Growing food crops relates to the School Food Plan
- It improves the school environment
- It is a useful component in achieving Eco-Schools status
- It can be a fundraiser (your excess seedlings and produce can easily be sold)
- At secondary level, plant cultivation can be used as part of the teaching of BTEC Horticulture, NVQ Horticulture, GCSE Food Technology and foundation level Skills for Working Life, amongst other qualifications.



- Most importantly, children love producing their own crops that they can take home and eat!

Designing your growing space

One of the big advantages of container planting is that you don't have to worry about long-term impact. Instead, each year you – and a new group of children – get to start afresh.

As growing plants in containers has little permanent impact on a school's infrastructure, it is unlikely that you would need to get permission to start your garden from the local authority or any other body – apart from the school itself, of course.

Try to ensure your most attractive displays are at the front of the school and clearly visible to visitors - they can help create a really good impression of the school.

Choosing plants and containers

Even if you don't have soil beds, you can still grow a wide range

of plants. All you need is a dash of ingenuity – potatoes, for instance, can be grown in barrels in the greenhouse as late as at the start of the autumn term. That way, they can even supply the Christmas table and they command a better price than summer spuds into the bargain.

Most crops can be grown, or at least started off, in pots made from re-used and recycled materials. Cardboard tubes, pop bottles, margarine tubs and yoghurt pots really come into their own here. Use food grade plastic to plant edible crops in.

Tomatoes come in a range of colours, shapes and sizes. As long as you start them early enough



in the warmth of the classroom, they could be cropping up against a sunny wall well before the summer holidays. Tumbler tomatoes can even be grown in hanging baskets.

Summer bedding plants in pots are easy to grow and do well with minimal maintenance. Hanging baskets, however, require rather more care and thought. Try to choose plants like geraniums that cope well with little watering, if this is likely to be a problem.

Grow bags are useful for a range of crops up against a sunny wall. Regular watering is important here, but with luck you will have a team of willing volunteers. Come the autumn, grow bags can often be purchased very cheaply from garden centres and supermarkets as they clear out old stock to make way for the new season's arrivals. These marked-down bags can do just as well as the full-price variety – just add a little fertilizer.

Window-boxes are relatively easy for older children or parent helpers to construct and again can improve your school's appearance. If possible, use preserved wood and galvanised fixings for the construction – your boxes will last much longer.

Shops often throw away seeds at the end of the season as they all have a 'sell-by' date. Apart from a few varieties – parsnips, for instance – most seeds will still be viable long after their sell-by date has expired, so this can be a cheap way to get started. There's also a case to be made for letting a small sample of your crop 'run to seed'. Not only can children then see the whole lifecycle of the plant, the seeds can be used for planting the following year. Be aware, though, that if you grow the more expensive F1 varieties, these will not grow 'true to type' from seed – but are a fascinating way to introduce genetics into your teaching.

A classroom window-sill is an excellent place to start seedlings off, particularly if you put them in an open-fronted box lined with silver paper. Set the box facing the window so that the light is reflected all around the seedlings – it will prevent them from getting 'leggy'.

Other considerations

Watering

The biggest challenge with this sort of garden is watering, especially during the school holidays and in hot weather. Small containers dry out much more quickly. There are a few tricks that will help avoid the disappointment of returning to a withered crop.

All school gardens can have water butts close to where the water is needed, which is a much more environmentally-friendly option than using tap water. A helpful site manager may be able to spare the time to water during the holidays; many are happy to get involved, especially if they have been consulted on the project from the early stages.

If you are leaving pots and baskets at school during the summer holidays, it is a good idea to relocate as many as possible to a spot near the water supply. Hanging baskets can be placed in empty pots to make watering less of a chore. Sub-irrigation planters are easy to make from pop bottles and old food containers and will allow plants to self-water. Pupils and staff can take home smaller pots for the holidays. You could also consider selling your planters in July when they are still looking good. That way, you can raise some income for the following year as well as reduce the need for watering.

Another option is to go high-tech and invest in a watering system. These can be run either from the mains or from collected water with a solar pump and timer and

are the best way of ensuring good results with minimal input from you.

Health and safety

Ensure that all hanging baskets are securely attached to walls, particularly in areas of pedestrian activity.

Watered containers are heavier than dry ones. If funds permit, stands with wheels can be made or purchased for large pots to assist with moving them safely when necessary. A useful alternative might be the caretaker's sack truck.

Very few plants that you may choose to grow have any risk attached to them. Any seeds sold that do have a risk will be clearly labeled. Be aware of the fruit of the potato plant (which looks like a green tomato), rhubarb leaves, sweetpea pods and the leaves of parsnips (which can react on the skin with sunlight to produce a rash). Choose thornless cultivars of raspberries and blackberries.

As with all practical activities, children should be encouraged to wash their hands after handling plant material or compost.





Growing in small areas of land



Section 2

What this section covers

- Growing in a small area of land
- Plant sales
- Composting
- Small ponds



Unfamiliar terms can be found in the **Glossary**. Further details on subjects such as health and safety can be found in **Useful Information**. The **Bibliography** shows where the most useful practical information can be found, and useful contact details for further information are provided in **Support and advice**.

The information in this section is based on the assumption that you already have the level of knowledge and skills covered in previous section.

Where next?

- Sections 3 – 7 of this resource introduce more complex horticultural activities and animals for you to consider rearing in your school grounds.

Many school gardens were first started during the Second World War as part of the 'Dig for Victory' Campaign, but then fell into disuse with the introduction of the National Curriculum. Now, with their value as educational and socialising tools starting to be recognised, many are being reinstated.

You can be part of this growing movement. If you have access to a little land that can be cultivated, or a small grass area into which you could introduce some other plants, read on and get growing!

Growing plants in a small area of land

How can growing plants be an educational resource?

- Growing plants is extremely useful at all Key Stages in the areas of science related to plant growth and development
- Growing food crops relates to the School Food Plan
- It improves the school environment
- Is a useful component in achieving Eco-Schools status
- Can be a fundraiser (your excess seedlings and produce can easily be sold)
- At secondary level, plant cultivation can be used as part of the teaching of BTEC Horticulture, NVQ Horticulture, GCSE Food Technology and foundation level Skills for Working Life, amongst other qualifications
- Working in school gardens has proved a very effective tool in a school's inclusion policy, particularly with regard to disaffected boys
- The teamwork required in gardening within the school is an effective socialising activity



- There are many good experimental science activities that can be carried out through plant cultivation (see case studies)

If your produce is good, why not show it at the local vegetable show or school open day? Try growing unusual vegetables, or those used by different cultural groups within your school. They are no more difficult to grow in many cases than traditional varieties, and it can be fun for the children to tell you and their classmates how they are grown and prepared for cooking.

A good way to start plant cultivation in your school might be through an after-school club. As well as giving you the opportunity to carry out the time-consuming initial developments without encroaching on teaching time, it is also easier to get the support of parents and governors outside of the teaching day.

Most importantly, children love producing their own crops that they can then take home and eat.

Designing your growing space

Choosing the right site for your school garden is really important, although it may of course be restricted by what you have

available. If possible, try to use a site that is in full sun for much of the day.

Avoid trees – not only will they shade your area but their roots will be a problem for you during cultivation and will rob your plots of water and nutrients.

Avoid sites adjacent to public paths – fresh, growing vegetables can prove too tempting for some. If you have neighbours' houses near where you are working, don't forget to talk to them before you start. They can become your severest critics if you don't and wonderful allies if you do.

Your site should be reasonably close to the classroom and have a water supply – although you can manage with water butts.

Try to choose a site that is not too overgrown or full of perennial weeds. These can be dealt with, but it will delay the process.

Soil type is not usually an issue. Even very heavy and light soils can be improved with liberal amounts of compost or manure in time. Speak to your local council; it now has an obligation to recycle organic waste and because this is generally composted, it could potentially be available to schools. Some grounds departments also shred their prunings, which can also be used as a mulch or soil

improver. Don't forget you will also quickly build up your own compost supply in time as you work your plots. You can also create 'no-dig' beds, layering organic materials on the surface of your growing site and creating your own soils as your plants grow.

Raised beds are ideal for schools, as they provide a clearly marked area, don't rely on existing soil conditions and can be designed to suit your needs.

Even urban schools without access to a suitable area onsite may be able to find suitable unused allotments not too far from the school. These can be rented at very reasonable rates; allotment groups are only too happy to see empty plots brought back into cultivation.

Before you start

- Check with the landowner, such as your local authority Grounds and Estates Department, that the site you intend to use is suitable and that you don't need to seek specific permission to cultivate it. Make sure there are no drains or services beneath where you intend to cultivate, and that there are no future



building plans. You may need to have the ground tested for previous contamination.

- Also inform whoever has the grounds maintenance contract of your plans. You may be making their work more difficult if your development means they cannot use gang mowers on your part of the site – if you have lots of narrow grass paths, for example. You can also ask them to stop using chemical pesticides and herbicides in that area.

Next steps

Once you have chosen your site and have checked with all the relevant bodies that it is fine to use, you have to bring it into a state where the pupils can cultivate it.

If you are starting from grass or a weedy area, you have three options:

1. If you are not short of time, the easiest thing to do is to cover the whole area with something to exclude light. Black polythene sheeting will do if well anchored down, or old carpets – while not pretty – will do the job equally well and are often freely available. Excluding light and water will kill all but the most persistent weeds in a season.
2. If you have plenty of labour, then weeds can be dug out and grass stripped as turf from the soil. Weeds can be composted and the turf stacked to make loam to be returned to the soil as soon as it has decomposed.
3. If you want to get growing fast and don't have time for heavy labour, choose a no-dig approach. This can be done by building raised beds and filling these with compost. Alternatively, you can add layers of organic mulch

(cardboard, newspaper, straw, manure, leaf mould, grass cuttings and top with compost to create a 'lasagne' that will suppress weed growth, feed crops and build soil fertility.

Ideally, each plot should be narrow enough to allow your pupils to reach to the middle. Many schools surround plots with concrete slabs, which means once they are dug, the plots can be cultivated from the side whatever the weather and without the need for a change of footwear. Slabs can often be obtained free, or very cheaply secondhand.

An attractive alternative to slabs (and one which is also reasonably cheap) is to use bark chippings for your paths. These work particularly well if you make your plots into raised beds as the bark will be retained by whatever you use to raise the beds.

A cheap way to create raised beds is to use half round preserved fencing rails. These can be made to any convenient height and thus used to great effect by pupils in wheelchairs. If you are using railway sleepers to create your raised beds then make sure that they are not impregnated with creosote, as this is no longer legal for use in schools. Untreated or safely preserved sleepers are the best option.

If you add organic matter to the soil each year then it will become wonderfully productive, allowing much closer cultivation than traditional methods. As well as producing more crops, this also helps reduce weed growth.

Choosing plants and tools

The choice of what to grow is entirely up to you and the children. Most vegetables and fruit are well within children's capability to grow, although you may struggle to produce a well-



headed cauliflower! The great fun is looking through the seed catalogues (seed companies will happily send your class sets if you tell them what you are up to) and there are lots of great maths and science activities involved in planning out how many rows to sow, how far apart, and so on.

When you are deciding which varieties of vegetables to grow, choose those that mature earliest. If started early and chosen well, most vegetables can crop before pupils leave for the summer holidays, which avoids the disappointment of returning to school in September to find they have run to seed. Many vegetables like brassicas, lettuce and members of the onion and bean families can be started early in pots in the greenhouse or the classroom, and planted out when the soil warms up. It is common to grow more plants than are needed - selling off the excess more than covers the cost of seed purchase.

If you have the space, a cold frame makes a useful half way house to harden off plants before planting into their final positions. Simple cold frames can be constructed from boxes covered in polythene left open during the day when it is warm enough and covered over at night.

Trees and shrubs can be useful and easy plants to grow in the school, providing perennial crops, supporting wildlife and being lower maintenance. They are easy to obtain cheaply or free from many charitable initiatives and, when grown in a tree nursery, can in a few years provide a source of saplings for your wildlife area, or for sale. You can also create a forest garden, which provides an abundance of different crops year round by performing like a young woodland and can show how plants grow at different levels, from ground cover to canopy.

Bulbs can be raised for display or sale. Bulk sacks of bulbs are the cheapest way to source plants, while trade suppliers are the best way to source the pots in which to grow them. Producing hyacinths or paper white Narcissus for Christmas can be great fun and lead to plenty of good science activities. Start in September or early October, and put your bulbs somewhere dark and cold to simulate winter growing conditions.

In November, put them in a cool light place and then when you want them to flower, simply bring them into the warmth.

Tools

You may be lucky and have a few tools donated to start you off. Local DIY stores will often support you in this way. Do not be tempted to buy cheap tools. Good-quality tools will last a lot longer and are therefore more cost-effective in the long term. Basic requirements are a spade, a fork, a hoe, a hand trowel and fork, a watering can and a wheelbarrow.

Other considerations

Because plants grown in the soil require much less watering than container-grown plants, holiday care is not such an issue here. Using a mulch around your growing plants (try leaf mould, grass cuttings or chopped bark) will help reduce weed growth and retain moisture throughout the summer.

Health and Safety

Very few plants that you may choose to grow have any risk attached to them. Any seeds sold that do have a risk will be clearly labeled. Be aware of the fruit of the potato plant (which looks like a green tomato), rhubarb leaves, sweetpea pods and the leaves of parsnips (which can react on the skin with sunlight to produce a rash).

Daffodil and tulip bulbs are poisonous and should be labeled and stored carefully.

Choose thornless cultivars of raspberries and blackberries.

Check existing trees, shrubs and plants and be aware of any poisonous parts (for example, yew or laburnum).

Cats and foxes can contaminate freshly dug soil. It is worth doing a quick check before gardening activities commence. If it is a recurring issue, consider using netting on frames to keep them off growing sites.

As with all practical activities, children should be encouraged to wash their hands after handling plant material or compost, even if they have been wearing gloves.

Plant sales

How can plant sales be an educational resource?

Growing plants or vegetables for later sale can add a new dimension to a school garden. Pupils derive great pleasure from recognising that a plant which they have nurtured can then be sold to parents or members of the public.

Previously unmotivated pupils can respond well to growing plants for sale and their involvement at the point of sale can be reward in itself.

Plant sales also have much to offer as a tool for developing confidence and team work. They can form part of an enterprise study, develop financial and other business skills, or call on design creativity to build attractive marketing displays and promotion. Certainly, there can be no better marketing or promotional activity for the school than pupils enthusiastically selling plants they have nurtured for several months.

Choosing plants

- Grow some seeds or plug plants for sale as part of an enterprise scheme that looks at inputs and outputs
- Grow vegetables, wall flowers, sweetpeas, seedling trees and other plants which require no protection from the elements
- Grow some bedding plants for your school garden, and sell any excess plants
- Sell early flowering or forced bulbs at Christmas time
- Early or late varieties of

potatoes can be planted in term time for harvesting before the end of the summer term or during the autumn term.

What is the best time to sell?

If it is your intention to sell your surplus seedlings, bedding plants, pot plants or produce, then you might consider coordinating your sowing or planting out times. For example, there is no point having a glut of produce in the middle of the summer holidays, when few people will be in school.

Look at your school calendar. Does your school have a Christmas, spring or summer fair when parents are in attendance? Could you sell plants during a parents' evening?

Some schools hold a plant sale in the middle of May, where the idea is to sell hanging baskets and bedding plants that are ready for sale at this time.

Working back, gauge how long it will take for the seedlings or plug plants to reach a saleable stage and then plant them accordingly. You can manipulate growing times by using heat or choosing varieties that are faster or slower growing.

Issues to bear in mind

- Let people know that you have plants for sale
- Price them reasonably and label them well
- Only offer healthy-looking plants
- Always involve young people as your sales persons.

Other considerations

- Look for support from other colleagues, parents or governors
- Keep a record of all your input costs and your sales

- Decide who will water your plants during term time, half-terms or weekends
- Involve students as much as possible.

Composting

Composting provides an easily accessible illustration as to the effectiveness of bacteria and fungi in the breakdown and recycling of organic materials. All schools produce waste organic materials, whether these are apple cores, paper towels or waste paper. The trick is to get the ratio right.

The organisms that break down the material in a compost heap need oxygen and water in the right proportions in order to function efficiently. Air spaces should be provided by including comparatively rigid material such as cardboard or small twigs. The heap needs to be humid, but not wet. Normal household organic material, garden waste and rain will usually provide sufficient water, but if the heap is very dry, it can be supplemented.



Mixed with soil, the compost is a rich source of nutrients for plants and adds humus to the soil. Producing compost saves money, reduces the quantity of waste sent to landfill and is satisfying.

Composting can be either 'cool' or 'hot'. Both forms can be carried out in a variety of containers or bins, either home-made or purchased, although hot composting is probably more effective in plastic bins.

How can composting be an educational resource?

The process of composting provides a context for pupils to acquire, develop and apply a broad range of knowledge, understanding and skills about issues relating to their everyday lives. The study and practical activity involved in making compost provides broad scope for the delivery of most subjects, through topics such as recycling, ecology and habitats, interdependence, improving the environment, minibeasts, food production and soil fertility.

Choosing tools and equipment

You will need:

- Compost bin(s): plastic ones can be bought, or you can make your own from wood
- Collection bins
- Garden fork for digging plus hand forks and trowels
- Protective clothing (gloves and overalls or tabards)
- Scales for weighing the different types of material to put into the bin
- (Optional) a data logger and temperature probe, along with magnifying glasses to observe the variety of species you encounter.

Designing your composting area

It is best to place a compost bin on bare soil or grass, so that worms can get in and excess liquid can drain. Placed in a sunny spot, the composting process will be speeded up; it will still take place in a shady area, albeit more slowly. Place the bin somewhere that is easily accessible, but not too close to buildings or play areas, and preferably near where you might grow plants. Consider that you may need to expand the number of bins as the benefits of composting are accepted.

If the bin cannot be placed on soil, then consider a contained drum or a wormery. Or you can shred compostable material and use it directly as a mulch, or bury it in trenches alongside your nutrient-hungry crops.

Hot composting

Fill the bin at one go, making layers of:

- Grass clippings
- Shredded paper or scrunched-up newspapers and ripped cardboard
- Used paper towels
- Egg boxes, toilet-roll tubes.

The drier material will create air pockets and prevent the mixture from rotting. Cover the bin with a lid to keep the heat in.

Once the bin is filled and sealed, heat will quickly build up – temperatures of 70°C and higher can be reached!

When the bin starts to cool (usually after a few days) the material must be turned, and preferably turned a further three or four times after that. This ensures that everything in the bin gets composted and it aerates the mixture. When turning the heap, you can add small amounts of moist or dry ingredients if the original mixture needs adjusting.

Hot compost bins need quite a lot of monitoring but, with regular turning, a very nourishing, fine compost can be produced in as little as 6-12 weeks.

Cool composting

As this is a slower process, best practice requires more than one bin (ideally three). This way, one bin can be composting whilst the second is being filled.

Similar types of material to the hot method can be used and more material added to the bin as it becomes available. The compost decomposes over time, helped by worms, bacteria and fungi. As this happens, the material will reduce dramatically in volume, which will allow you to add more material. The top of the bin should be covered with a piece of old carpet; this gives easy access to the heap, but prevents it drying out – or flooding.

Cool heaps need to be dug through and turned only two to three times per year. They need roughly equal amounts of moist and dry ingredients. Compost will be produced in around 12 months.

Composting activities

Below is a demonstration of aerobic and anaerobic respiration using data loggers to monitor temperature changes.

Method

Fill two black plastic bin liners (the thicker the better) with equal amounts of fresh lawn mowings. Squeeze as much air out of one bag as possible, insert temperature probe and seal.

Leave the second bag unsealed and open to the air. Insert a second temperature probe.

Use a third probe, if you have one, to monitor the ambient air temperature.

Set the data logger to record every two hours for seven days.

After one week, the open bag will have the familiar look and smell of a rotting pile of grass mowings. The sealed bag (anaerobic respiration) should smell sweet and resemble silage. It is in fact 'pickled' grass – the anaerobic bacteria produce lactic acid as they feed on the sugars in the grass, thus pickling it. This can be confirmed by recording the pH. The graph produced by the data logger will obviously show the ambient temperature – usually high in the day, cooler at night.

The aerobic bag should reach quite a high temperature of 60°C plus, with a series of peaks as different populations of micro-organisms reach maximum respiration. The sealed bag should remain cool throughout, with very little temperature fluctuation.

There are a number of variations on this experiment that can be tried. For example, many farmers are switching from black to either green or white bale wrap. Can an experiment based on the above method shed any light on this change, assuming there is no difference in price?

Other considerations

Good-quality compost will improve the plants you grow in school, reduce the cost of buying in plant food and demonstrate life-cycles to everyone in the school.

Health and Safety

Only use plant wastes (not cheese, meat or cat and dog faeces, which can contain harmful human pathogens). You should also ensure that children with asthma or other breathing or immune deficiency problems keep away from the heap when it is being turned (fungal spores are released, which may cause a reaction in susceptible people).

Turning a compost heap regularly



will deter any animals from taking up residence in there.

Don't use cardboard that is printed with coloured ink (black and white are fine), as they release toxic substances when they break down.

Small ponds

Where better than a pond to start off the lesson which asks 'Why does life on Earth need water?' Apart from our need of water to sustain life, it has, of course, been a vital resource since human life began. Our need of water today is as vital as ever for washing, drinking, transport, recreation, relaxation and generating energy. It is also an environmental resource which needs to be managed in a way which is sustainable. Demonstrating all this is quite a lot to ask of a small school pond, you may think, but the point is that it can act as a stimulus for greater things.

Health and Safety is likely to be an issue for concern here, but if the correct procedures are followed, then your school pond can be just as relaxing, enjoyable and as educational as it should be.

How can your school pond be an educational resource?

Pond work can link into several parts of the curriculum. Science (ecology, capture/recapture, data logging, identification of organisms, classification) is an obvious one but also languages (naming animals, plants and areas of the pond), maths (calculating volume and taking measurements), artwork etc.

Designing your space

Once you have come up with the idea of 'Shall we have a pond in the school grounds?' your pond group will need to discuss and find answers for a number of questions, including:

- What will it be for? Education or an attractive centre-piece?
- What sort of pond shall we have? Formal, informal, fish or only wildlife? Raised or gradually sloping into the ground?
- Where will it go? You will obviously need to ask the Head and Governors, but also get permission from the



local authority and the site management team. New ponds must be visible from a classroom or school office

- How much will it cost? Carefully research exactly what you plan to have in your pond and which materials you are going to use
- How will it be funded? The answers to this could range from fundraising, applying for a grant, a donation from the PTFA, private donations or that it is planned as part of curriculum development
- Who is going to build it? A group of pupils, a couple of teachers, parent volunteers, a friendly local builder/gardener or contractors?
- What are you going to have in it? Apart from water! This will depend on the type of pond – for example, it could be ornamental fish, or natural populating wildlife
- Who will use the pond? It will be a cross- curricular resource for all.

Construction

A small pond can be dug by hand or only needs a small digger, rather than a full-blown JCB!

Small ponds can easily be lined with an artificial pond liner. There is a huge range of options available, from rigid ready-

moulded and shaped liners to flexible UPVC liners (see more below).

Make sure the pond is dug carefully and lined with fine sand to smooth over any rough parts.

Wildlife ponds generally need some parts to be 45cm deep; fish need at least 60cm. It is best to have more than one 'shelf' at differing depths. This will encourage marginal plants to grow in the shallower water, as well as others that require deeper water.

Liners

Rigid and moulded liners are the cheapest option, but shop round for a good one. The shape you choose will depend on the use of the pond, so if you plan to keep fish in it, for example, check that it will be deep enough to not freeze solid in winter and will give the fish enough swimming room. This will, of course, depend on the type of fish; you can research this question at an aquatic centre.

Flexible UPVC liners are more expensive but a good-quality liner should come with at least a ten-year guarantee. These liners can be bought from garden centres, large DIY outlets and specialist water garden retailers. Make sure you buy enough! This formula will help: Length of sheet = maximum pond length plus twice pond depth, plus an extra 60cm or

1m to be safe. Width of sheet = maximum pond width plus twice pond depth, plus an extra 60cm.

Concrete can also be used in pond construction, but should be always be primed with a sealer, to prevent toxic leachates affecting the fish and to improve durability.

Choosing plants and animals

The list here is almost endless and depends very much on the use, design, location and type of pond that has been chosen, and whether you only wish to grow native (indigenous) plants. You can get local advice from a garden or aquatic centre, or from members of local conservation or wildlife groups.

Other considerations

Health and Safety

Your pond must have a safety fence around it. Sympathetically designed and installed, it will keep the area safe and also help deter unwanted visitors such as cats and herons. You will also need a secure edge to allow safe access to the water for activities such as pond dipping and to prevent accidental slipping.

Hands must always be washed after work in the pond area as would be the case at the end of any outdoor activity.

Electricity

For lighting, fountains and pumps. Any electrical installation must be carried out by a qualified electrician and meet all the latest standards and specifications.



Simple horticultural activities and small animal care



Section 3

What this section covers

- Unheated protected cultivation
- Large ponds
- Easy exotics
- Rabbits and guinea pigs



Unfamiliar terms can be found in the **Glossary**. Further details on subjects such as health and safety can be found in **Useful Information**. The **Bibliography** shows where the most useful practical information can be found, and useful contact details for further information are provided in **Support and advice**.

The information in this section is based on the assumption that you already have the level of knowledge and skills covered in previous sections.

Where next?

- Sections 4 – 7 of this resource introduce more complex horticultural activities and animals for you to consider rearing in your school grounds.



If you have access to some land that could be cultivated, or on which to erect a temporary building, or the space to keep some small animals indoors, then read on and get growing!

Unheated protected cultivation

How can growing plants be an educational resource?

Growing plants is extremely useful:

- At all Key Stages in the areas of science related to plant growth and development
- Growing food crops relates to the 'School Food Plan'
- It improves the school environment
- Is a useful component in achieving Eco-Schools status
- Can be a fundraiser (your excess seedlings and produce can easily be sold)
- At secondary level, plant cultivation can be used as part of the teaching of BTEC

Horticulture, NVQ Horticulture, GCSE Food Technology and foundation level Skills for Working Life, amongst other qualifications

- Working in school gardens has proved a very effective tool in a school's inclusion policy, particularly with regard to disaffected boys
- The teamwork required in gardening within the school is an effective socialising activity
- There are many good experimental science activities that can be carried out through plant cultivation (see case studies)
- Most importantly, children love producing their own crops that they can take home and eat.

Designing your growing space

Even without heat, any form of protected cultivation allows you to extend the growing season – an important factor when you take into account the restrictions imposed by school holidays. It also gives you a chance to increase 'outdoor' activities when the weather is bad.

A small greenhouse is invaluable for getting plants off to an early start – essential if you want most of your crops to be ready before the summer holidays. Don't go for the cheapest option: health and safety considerations mean that if you are putting in a new greenhouse, it should be equipped with toughened glass or even polycarbonate. Existing greenhouses could have their traditional glass replaced or covered in a safety film.

Polytunnels are a cheaper option and, while being less efficient to heat, work well unheated. If you go for a large enough size, they have the advantage of providing additional teaching space for activities such as sowing and pricking out prior to the growing season. Make sure you have sufficient headroom for taller, secondary-aged children; ideally, your tunnel should also have straight sides. These give a greater working area than traditional curved sides and you don't have to bend over to get into the corners. Some companies supply polytunnels without doors, but always pay the bit extra and get the doors supplied.

When you're thinking about locations, try to orientate your greenhouse or polytunnel so that the longest side faces south. That way, you can take maximum advantage of available sunlight. Ideally, you would have a water supply within or near to the greenhouse/polytunnel. If a mains supply of water needs to be installed, current legislation requires outdoor taps to be fitted with non-return valves to prevent contamination of the water supply. If finances do not run to installing mains water, then one or several water butts can be used to collect rainwater. This is also useful when you consider issues such as resource conservation and recycling. Solar pumps and battery-operated

timers are now available to run from these to provide an automatic, environmentally-friendly, watering system.

A soil floor can be used within the greenhouse, but a paved floor makes maintenance and hygiene much easier. Weed blocking membrane can be used as a good floor cover - and allows drainage.

If you are likely to have a problem with vandalism, then try to locate the greenhouse away from paths from where thrown missiles can cause damage. A protective cover of chicken wire on a polytunnel can help and if run around the outside, can prevent damage from cats and foxes.

Cold frames and cloches act as a halfway house between a heated environment and the harsh outdoors. Much better crops will be produced if your plants are not checked (that is, have their growth halted) by a cold shock, such as being moved from the warmth of your classroom window-sill directly to the environment outside. A simple cold frame can be constructed from a wooden or plastic box with a sheet of polythene or clear plastic on top.

Removing the lid on warm days and covering up at night will toughen your plants up prior to planting in the garden.

Cloches are a temporary means of protecting crops whilst outside. As well as protecting your plants from the cold, they have a secondary advantage of keeping many pests off your crop without you having to use pesticides. As the cloches are at ground level, it's recommended that you use polythene or plastic ones rather than glass varieties, for obvious health and safety reasons. They are easy to make out of pop bottles.

Choosing plants

Seedlings, bedding plants and vegetables can get an early start in an unheated greenhouse.

Once the seedlings have been planted out, the greenhouse can be used to produce other crops such as tomatoes, cucumber, peppers, aubergines, melons and so on. If possible, make sure you start the crops off early enough to avoid having to do too much summer maintenance.

Exotic crops such as cucamelons and tomatillos can also be grown.

Once your summer crops have been removed, then autumn flowering chrysanthemums and salad leaves are both popular autumn crops. These can be followed by bulbs for early spring or Christmas flowering. In this way, with a little thought and planning, your greenhouse should be in use throughout the year.

Other considerations

If cost is a major consideration, small greenhouses can often be obtained cheaply or even free, if you are willing to take them down, through the small ads in the local papers. If you only have the frame, you can cover it with polytunnel plastic to create a growing space.

Large ponds

How can large ponds be an educational resource?

Where better than a pond to start off the lesson which asks "Why does life on Earth need water?" Apart from the fact that we need water to sustain life, it has been a vital resource since human life began and is needed today for washing, drinking, transport, recreation, relaxation and generating energy. It is also an environmental resource which needs to be managed in a way which is sustainable. In short,

your school pond can act as a stimulus for all sorts of learning opportunities.

More specifically, pond work can link into many parts of the curriculum. Science (ecology, capture/recapture, data logging, identification of organisms, classification) is an obvious one, but others include languages (naming animals, plants and areas of the pond), maths (calculating volume and taking measurements) and artwork.

Health and safety is likely to be an issue which causes concern. However, if the correct procedures are followed, then a school pond can be as relaxing, enjoyable and as educational as it should be.

Designing your space

Once the question of "Shall we have a pond in the school grounds?" has been aired, your pond group will need to discuss and find answers for a number of questions. These include:

- What will it be for? Education or an attractive centre piece?
- What sort of pond shall we have? Formal or informal?





Raised or graduated?
Populated with ornamental fish or naturally populating wildlife?

- Where will it go? You will obviously need to ask the Head and Governors, but also get permission from your local education authority, local authority, the site management team and so on. New ponds must be visible from a classroom or school office.
- How much will it cost? Carefully plan exactly what you intend to have in your pond and which materials you are going to use.
- How will it be funded? This could range from fundraising, applying for grant, a donation from the PTFA or planned as part of curriculum development.
- Who is going to build it?
- Who will use the pond? Will it be a cross-curricular resource for all?

- Who will maintain the pond? Once established, the pond will need ongoing maintenance to keep it healthy, attractive and useable. Pupils can, and should, be involved in all aspects.

Construction

A large pond is one which cannot be dug by hand unless you have a lot of time or hundreds of willing volunteers with spades! It's really more of a job for a tractor or a JCB.

Good design for a pond of this scale is vital, as the size of the area concerned is likely to have a large visual impact. The design is therefore going to need careful thought from people who have a real eye for this type of thing. After all, you are not just digging a hole, but landscaping a large area of school grounds.

Large ponds will generally not be able to be lined artificially because of the huge cost that would be

involved. Instead, ponds on this scale can be clay-based. Having designed and dug the hole, remove sharp objects. The first layer to line the hole is a dusting of soot – this is needed to deter worms whose burrowing would otherwise break up the soil, creating drainage holes in the clay. On top of the soot goes at least 15cm of clay – preferably several thin layers, which all have to be tightly compacted by foot or vibrating plate machines. On top of the clay, add 10cm of good topsoil.

Keep the clay wet during construction and fill the pond up gently from a hose placed in the deepest point. Clay ponds will give a more natural look, but trees and shrubs will need to be kept away from the edges to minimize root disturbance to the clay.

A clay-based pond could also be lined with Bentonite clay mats, but these would need specialist advice and are expensive.

Concrete or ferrocement can also be used.

Choosing plants and animals

A suitable list depends very much on the use, design, location and type of pond that has been chosen.

You will need to seek advice from an expert at a garden centre or a member of a local conservation or wildlife group. Bear in mind that a pond of this scale is likely to attract ducks, herons and migrating birds.

Good planting will help prevent algae and blanket weed issues.

Keep stocking densities low for messy fish like koi carp. A good filtration system is needed for large fish. Large fish and wildlife won't co-exist in balance!

Other considerations

Below are a few more points to consider. In addition, your local authority may have specific guidance linked to their insurance policies.

Health and Safety

Any pond must have a safety fence around it. Sympathetically-designed and installed, it will keep the area safe and also help prevent unwanted visitors such as cats and herons. A secure edge will also be needed to allow safe access to the water for activities such as pond dipping and also to prevent accidental slipping.

Hands must always be washed after work in the pond area, as should be the case at the end of any outdoor activity.

Electricity

For lighting, fountains, pumps and so on. Any electrical installation must be carried out by a qualified electrician and meet all the latest standards and specifications.

Cleaning and maintenance

Once the pond is built, it will need regular care. Again this will depend on the type of pond you have built, but maintenance is important if

your pond is to be sustained as an effective educational resource. Maintenance should be undertaken little and often to reduce disturbance to the ecosystem you are developing.

Easy exotics

The term 'easy exotics' is used to describe some of the more unusual small animals that can be kept in school and are relatively straightforward to care for.

A huge range of animals could, of course, come into this category, but for simplicity, only the following are included here:

- Stick insects
- Leopard geckos
- Chinchillas

How can 'easy exotics' be an educational resource?

All of the above would generate much interest from pupils. They can be used in science and land-based subjects, such as BTEC Animal Care.

Designing your animal care space

All the above need specialised cages. Stick insects are best kept in a mesh cage, available from

pet shops or biological suppliers. Chinchillas are best kept in metal cages (usually with a metal floor to keep their fur clean), also available from large pet shops. Leopard geckos will live well in a vivarium with a heat mat and thermostat. See bibliography for cage sizes and other references.

Choosing animals

As a first step, it may be worth checking with local animal homes to see if they have any of the above animals that need homing. Otherwise, source your animals carefully from reputable breeders or pet shops.

Research into your animals' care before getting them is crucial. The general principles are also covered in this resource's animal welfare information sheet.

Points to note, however, are that chinchillas have a very plain diet in the wild (they are indigenous to Chile) and so should not be fed much rich succulent food as this causes them digestive upset. They also have extremely dense fur and must have a dust bath to bathe in regularly. Stick insects can be fed on privet but do much better when fed on bramble (blackberry branches). Leopard geckos should be fed on mealworms and locusts (not crickets) and should not be kept on a sand substrate.

Chinchillas need to be handled regularly by someone competent and confident in order for them to be tame enough for pupils to handle. Stick insects are best handled by letting them walk on to your hand, and baby ones can be moved with fine paintbrushes. Handling leopard geckos should never be by the tail, they will become quite used to being scooped gently up on to your hand.

Pupils can and should take responsibility for caring for these animals, but it must always be under the supervision of



an adult. Don't forget to make arrangements for the animals to be looked after properly during the holidays.

Other considerations

Pupils should be advised to have an anti-tetanus jab if they may come into contact with animals at school. They should always wash their hands very carefully after handling them.

A licence is not required to keep these animals.

All animals may require veterinary treatment. Funds in school must be available – preferably 'ring-fenced' – for proper treatment when required.

Rabbits & guinea pigs

Rabbits and guinea pigs are excellent animals to keep in school. Although they do have different requirements, they have much in common. They should never be kept together, for various reasons. Both animals need company, female guinea pigs will live happily in pairs or small herds and male guinea pigs will usually get along in pairs, or even trios, as long as there are no females around. Rabbits do best in mixed gender, neutered pairs or groups. Unneutered animals will result in babies, and this is something which should be very carefully researched and managed and never left to chance.

How can keeping rabbits and guinea pigs be an educational resource?

Rabbits and guinea pigs demonstrate all the characteristics of mammals. They are excellent for teaching pupils how to care for an animal and are very good for use with special needs pupils. They can also be used in science and land-based subjects.



Designing your animal care space

A hutch for a lone rabbit or guinea pig is absolutely not suitable. Both animals do much better in runs with access to the inside of a shed or a large hutch. Rabbits burrow, which can make escaping a problem, but this can be overcome by burying 15cm of wire mesh (perhaps with turf) under the edges of the run, intruding inwards (rabbits don't learn to burrow that far from the fence). See the **Bibliography** for cage sizes and handling advice.

The bulk of a rabbit's food should be hay (many rabbits are overfed with pelleted rabbit food and consequently develop dental issues and become overweight). They should not be fed any fruit or vegetables, small pieces of veg can be used as training treats. Instead, give them grasses and leafy greens. Guinea pigs must have daily access to greens and fruit, as they cannot make their own vitamin C. Their differing dietary requirements is another good reason never to keep them together.

Choosing animals

Think about how you want to use the rabbits or guinea pigs. Breeds such as Dutch rabbits are more docile with children and not too big. Short-haired guinea

pigs will require less grooming. If you want to sell young stock, remember that pure-bred animals sell better than crossbreeds; do ensure, though, that you have a market for youngsters before commencing a breeding programme.

It is really important to be responsible about breeding animals and it is good practice for a school to 'vet' homes when selling livestock on. Some schools give their pupils a 'knowledge test' before buying rabbits, and a parent must be present if a pupil is aged under 16.

Other considerations

- The general rule that all pupils should wash their hands after handling animals applies.
- Veterinary funds should be reserved and available if the animals become ill.
- Teachers need to know the correct way to handle both rabbits and guinea pigs. Rabbits in particular can struggle and easily end up with a broken back.
- Remember that rabbits are often sold well before they can be reliably sexed (which is at about 3 months). This can mean the new owners end up with a male or female animal they did not want.



Growing in a heated greenhouse and rearing poultry



Section 4

What this section covers

- Growing in a heated greenhouse
- Using experimental plots
- Advanced exotics
- Poultry keeping
- Incubators



Unfamiliar terms can be found in the **Glossary**. Further details on subjects such as farm and livestock registration can be found in **Useful Information**. The **Bibliography** shows where the most useful practical information can be found, and useful contact details for further information are provided in **Support and advice**.

The information in this section is based on the assumption that you already have the level of knowledge and skills covered in previous sections.

Where next?

- Sections 5 – 7 of this resource introduce more complex horticultural activities and animals for you to consider rearing in your school grounds.



If you have access to some land that could be dedicated to growing plants or keeping small animals, and you have access to a building or greenhouse in which to store tools and other equipment, then read on and get your hands dirty! And while you're about it, why not consider rearing poultry – and even running your own incubator loan scheme?

Growing in a heated greenhouse

How can growing plants in a heated greenhouse be an educational resource?

Having heat in your greenhouse really does extend both the growing season available to you and the range of plants that you can grow. A greenhouse heated throughout the year gives you the opportunity to keep tender perennial plants, which are useful for sale, display or propagation, and can act as another outdoor classroom for use throughout the year.

Designing your space

If you are going to heat your greenhouse – a big advantage, given our relatively short growing season – then you need to think

carefully about running costs. It does not make economic sense to heat a whole greenhouse all winter and most schools will only need heat during early spring to get seedlings off to a flying start.

If you have gas on site, then a thermostatically-controlled gas heater is the most cost effective heat source but is expensive to purchase and install.

If electricity is the preferred option then tubular heaters are the most efficient, but again expensive to purchase and install. Portable greenhouse convector heaters are relatively inexpensive and easy to install if you have electricity in the greenhouse, but while convenient and easy to move, they only have a relatively short life span.

Under-bench or soil cable heaters are very efficient and put the heat where it is needed rather than heating the whole greenhouse.

An eco-friendly way to heat a greenhouse may be to use a hot bed, as favoured by Victorian growers. A deep bed of soil is prepared in the greenhouse or cold frame and filled with fresh manure. This is then covered with a layer of soil. The decaying manure creates enough heat from below to grow even such plants as exotics; this was the way melons were prepared for the Victorian table. You do, however, need a supply of fresh manure each year and plenty of willing labour. A simpler version is to build a compost bay within a polytunnel or greenhouse, and start trays of seedlings on top of it, enabling you to get growing earlier in the year.

Don't forget the usefulness of the classroom, a room that is kept frost-free throughout the year.

Add to that a simple electric propagator in the room, where pupils can see what is happening. Most classrooms are not light enough to prevent the seedlings

getting leggy (etiolating). An open fronted box lined with silver paper on three sides facing the window makes a cheap and effective way to grow seedlings without the need for expensive equipment.

The addition of an automatic watering system to your greenhouse will certainly ease the maintenance burden. There are two basic systems: the drip system, best suited to the whole greenhouse or areas of the greenhouse where you have plants in larger pots such as tomatoes or large houseplants, and the spray system, best suited to watering a whole bench where you have multiple plants or trays. Both systems can be automated with timer switches or be linked to sensors that trigger the system when the plants start to dry out. Sub-irrigation planters are another way of easing the work involved with watering.

Automatic ventilators are a relatively cheap addition to any greenhouse, and again reduce the labour time needed to maintain a healthy greenhouse.

Choosing plants

Selecting plants for the heated greenhouse is very much down to choice and individual need, as there is very little you cannot grow in these conditions.

Plants for display

Consider growing a wide range of plants that will be suitable for displays at events throughout the school calendar, from concerts to prize days. Many of these can be purchased as small plants from your local garden centre for less than £1 and grown into large specimen plants, worth up to £100.

Exotic plants

If you have sufficient heat and space, then there is the opportunity to grow exotic plants

from around the world such as coffee, ginger, citrus, banana and monkey nuts. Unusual seeds are much easier to purchase now. Try exploding cucumbers, shark's fin melon or foot long beans!

Mimosa pudica, the sensitive plant, whose leaves fold when touched, is a great favorite with children.

Propagation

There's a wide range of plants which you can use to demonstrate the range of propagation techniques: begonias and Streptocarpus for two methods of leaf cutting, spider plants and mother-of-thousands for runners, geraniums for stem cuttings and so on.

Other considerations

Health and Safety

Qualified professionals must carry out all electrical installations and everything must be protected with a residual current device (RCD).

Pest control

Pest control can be an issue with permanent plants in heated greenhouses, but pests in themselves provide useful educational opportunities.

Several companies provide biological control methods that are not only effective but also very educational.

Cultural control such as sticky traps will also reduce the need to resort to chemical methods.

Experimental plots

Growing plants in schools need not only be concerned with developing horticultural skills, useful though these are. As well as the cross-curricular links with most school subjects, there are a range of opportunities for experimental work.



Designing your growing space

If you are starting up a new school garden, consider making some of the plots organic and others inorganic for comparison. This allows pupils to grow the same crops in each type of plot and, after a few years, to see visible and quantifiable differences between the produce. There are also all kinds of experimental work that can be done on the resulting soils. You could carry out comparisons of drainage/water retention related to humus content, for example, or do comparisons of soil organisms, soil depth and so on.

Variety trials can be carried out at any Key Stage. Potatoes and tomatoes make particularly good subjects as they come in so many colours, shapes and sizes. This offers lots of good maths and science opportunities (you could link to selective breeding and hybrids, for example) and taste trials, too, which make for a really fun and enjoyable lesson.

Spacing trials will help you find the ideal spacing for a particular plant within a row. A semi-circular plot might be set aside for this purpose. Starting from the centre of the straight edge of the semicircle, strings should radiate out at ten-degree intervals like the lines on a protractor.

The same numbers of plants are then planted in semicircular rows moving out from the centre, so that the plants in each row have a little more space. Working out the average plant size in each row can also lead to some interesting work on competition between plants.

Plots can be set up to demonstrate the effect of soil type on plant growth. If a plot, typically 2m x 2m, has all the topsoil removed, this can then be replaced with soil of another type brought in from outside. A school that is on alkaline, silty loam soil might create a rich peaty soil using the contents of old grow bags. You can make clay soils and sandy soils using soils from friends' gardens.

Choosing plants

When choosing plants for experimental work there are a few things to be considered. Plants for variety trials need to show a wide variety within their own family. Good vegetables to use include potatoes and carrots, while tomatoes also come in a very wide range of colours, flavours and sizes. These also have F1 varieties that are a good way of introducing genetics. Where speed is required in your investigation, then radishes can give results in weeks rather than months.

For the spacing experiments, onions grown from sets give particularly good results. The sets are easy to place at the required distance and produce a good range of sizes. If using other vegetables such as cabbage, use young plants rather than starting from seed in your plot.

Some pupils may need to work with easy-to-handle seeds and tubers (potatoes, onion sets, peas and beans, for example), rather than small seeds such as lettuce.

Other considerations

As with most biological investigations, experimental plots are open to the difficulties of dealing with living things outside our control. The weather or pest damage can lead to problems with your results, but try to regard these as further learning opportunities, rather than disasters!

Advanced exotics

The term 'advanced exotics' is used here to describe animals that are not native to your country and are not commonly kept as pets, and require either specialised accommodation or a specialised diet. Some are commonly found in zoos, but do not require a licence to keep. We focus here on three examples:

- Snakes
- Tortoises
- Lizards



How can rearing 'advanced exotics' be an educational resource?

All reptiles generate a lot of interest. Snakes, in particular, really capture pupils' imagination. They can be used in science lessons, for example, in demonstrating adaptation and classification, and also in BTEC Animal Care. However, none of the creatures listed above are easy to keep and research needs to be carried out before the purchase of any advanced exotic.

Designing your animal care space

All the above require special accommodation that is well-described in books (see the **Bibliography**), but be aware that research into the husbandry of these animals is still ongoing and recommended best practice can change. Surprisingly, perhaps, it's tortoises that require the most attention. An example is the leopard tortoise, which used to be fed fruit and vegetables and put into hibernation, but should be fed mostly grasses and provided with UV light and heat year round, as it should not hibernate.

A wide variety of snakes can be purchased from reputable sources. The most important thing to ensure is that the snake is feeding well and that you can continue to provide the correct diet. A good keeper will provide you with feeding and shedding records, which you should continue to keep. Conditions in the vivarium are crucial to health; you should closely monitor the temperature and humidity.

The majority of snake species feed on whole prey, such as mice, rats or day old chicks. These should be purchased from a licenced seller already humanely dispatched. You will need a freezer to store feed. Live vertebrate prey should never be



fed. If your snake is not feeding well on defrosted prey items, it is more likely to be your husbandry that is the cause, seek expert advice. Thorough research is needed to ensure that you look after these animals properly.

Most lizards require ultra-violet light at all times. An exception to this rule is the leopard gecko, which is nocturnal. Many lizards require live food, such as mealworms or crickets – unless, of course, they are herbivores. Bearded dragons require a diet of both insects and plants.

Other considerations

- Schools need to make arrangements for animals to be looked after at weekends and holidays. All animals can become ill and a veterinary fund/budget should be set up before purchase
- It is illegal to feed a live mammal to a reptile
- Many reptiles are associated with salmonella. Pupils must wash their hands very carefully after handling or touching the inside of the vivarium
- Many reptiles are endangered in the wild (especially tortoises). Make sure an animal comes from a reputable source
- Do not purchase venomous snakes. Avoid reptiles requiring a Wild Animal Licence.



Poultry keeping

How can poultry keeping be an educational resource?

Poultry keeping appears to be one of the fastest-growing hobbies in Britain. Some schools have for many years encouraged pupils to keep poultry rather than guinea pigs or rabbits on the basis that they provide an economic return on food invested, as well as being friendly and enjoying human interaction.

Three to four hens will supply the needs of the average family for most of the year. Egg-laying is controlled by day length, so there is a natural drop-off in laying during the winter months, when hens can rest their systems, take time to moult and conserve energy during cold weather. Hens who stop laying for winter generally live longer and are healthier.

Choosing animals

Poultry come in different sizes; chickens are either bantam or large breed. Smaller breeds require less food, but also produce smaller eggs. There are over a hundred breeds of

poultry available in the UK. They are grouped as pure breeds or hybrids; laying, meat, exhibition or dual purpose. Supporting traditional and/or rare breeds is a very worthwhile thing to do.

The auto-sexing breeds – for example, Cream Legbars (which have blue eggs) and Gold Legbars (which have white eggs) – are quite prolific layers, and you will also be able to identify the males at hatching.

Re-homing ex-commercial layers is a noble thing to do, and makes a huge difference to these birds. They are at least a year old at the point of retirement and will be in poor health. They are all commercial hybrids, so have not been bred to have a long, healthy life. They will stop laying and go into recovery mode (well deserved) as soon as you have them, moulting and growing new plumage and putting on condition. Some will never lay again and losses are common. They are confident and can become very dominant members of your flock. They are not a beginner's bird, but it can be a rewarding experience to give them a chance. Remember that any breed of chicken kept for eggs is helping reduce the numbers of birds kept in intensive systems.

It will only be necessary to keep a male if you intend to breed your stock. Hens will lay and go broody without a male present. You can give her any eggs to hatch and she will adopt them as her own, fertile eggs are readily available.

Birds can be purchased at any stage of growth, from when they are merely days olds (when they will require heat) to mature birds that have commenced laying.

As egg laying drops off after two years, older birds will provide fewer (often larger) eggs. The most popular age for purchasing birds is as point of lay pullets, birds that should commence laying within a week or two of purchase. Point of lay is a stage of development, not an age, but the birds will usually be between 20 and 26 weeks old.

Designing your animal care space

There is a wide range of housing available, from fully enclosed to free range. The most popular method of keeping small numbers of poultry, however, is in a moveable ark, which can be kept on grass and moved once or twice a week. Alternatively, it can be kept on concrete, but will require regular moving for



Incubators

How can incubators be an educational resource?

Hatching eggs in school provides an excellent opportunity to introduce pupils to the wonders of creation and new life.

Hatching eggs are most easily obtained during the spring and summer terms – eggs are less fertile during the autumn. It is common to start incubation shortly after the February break until the end of June; remember that hens eggs take 21 days to hatch so a careful eye must be kept on term dates.

If incubating eggs with early years pupils, their natural impatience may be helped by setting eggs in the week preceding a half-term break so that they hatch almost immediately on the children's return (effectively losing a week's anxious wait!). Hatching eggs in a classroom probably provides the best opportunity in the animal realm to show the start of new life. After hatching, chicks can be kept for as long as facilities allow.

cleaning and must be filled with a substrate to enable the chickens to fulfill their natural desire to scratch around. Poultry arks are well within the scope of a design and technology project.

The chief requirement of any poultry house is security from predators and vermin, ventilation, a dry area for the food container, water, a roosting area and an egg-laying space – easily accessible and from the bird's point of view, preferably darkened.

Other considerations

Food

Pellets or mash feed are readily available and should be fed ad-lib to the hens. Poultry also require grit; this can be bought as mixed grit which contains granite chips for grinding food in the bird's gizzard, and sea shells as a source of calcium carbonate for the egg shells. Free ranging birds with access to a natural diet of insects and plant matter will require less feed and produce more nutritious eggs with a deeper yellow yolk.

Bird Health

Poultry are low-maintenance animals and, with the right husbandry, remain healthy. Red spider mite can be a problem

in their housing. Regular worm counts are a good idea. Vaccinated birds are available, but most hobby keepers do not vaccinate.

A consideration for all poultry keepers is what to do when a bird becomes ill. Chickens are livestock, and are legally classed as such, so different rules apply than would to a pet. More vets are knowledgeable on poultry now, but the cost of treatment is something you must plan for.

At present, only those keeping more than 50 birds need register with Defra, although all keepers are encouraged to do so, as this will give you notice of disease outbreaks, such as bird 'flu. Check the Defra website for the latest instructions.

Vermin

Rats can be a problem as poultry food is readily consumed by these vermin, so it is important to keep food in sealed metal containers. Choose housing that is raised off the ground so that they cannot hide beneath. Small gauge weld mesh for runs and suspended feeders can also help.

Designing your animal care space

To hatch eggs in school, you will need:

- A source of fertile eggs (that is, hens that have been running with a cockerel)
- An incubator – preferably a self-turning machine as eggs need to be moved regularly
- A box or crate in which to rear the chicks after hatching
- A heat lamp (for instance, an infra-red lamp) to keep the chicks warm
- Proprietary chick crumbs and a drinker.

The alternative to an incubator is a broody hen – though probably best not kept in a classroom!



The conditions necessary for successful incubation are:

- Fertile eggs (fertility can be as low as 50% or as high as 95%, depending on season)
- A temperature maintained at 39°C
- A relative humidity of 39%
- Turning three to four times per days (automatic turning is a continual process) (see below)
- To check fertility and progress, eggs can be candled (that is, have a light shone through them). Fertility can be checked as early as four days, but should be done around day ten, with pale eggs easier to do than brown eggs.

You may be able to hire an incubator – many of the schools in the Schools Farm Network and many community farms have incubators that can be loaned to schools, together with a number of fertile eggs. If you or a group of schools wish to invest in an incubator there is a range to chose from in various sizes from ten eggs upwards.

Try to invest in a self turning model otherwise, as indicated above, you will have to turn the eggs by hand three to four times per day – including weekends. These work very successfully and reliably, barring power cuts, and come with full instructions.

After hatching, chicks can be carefully handled for weighing and measuring. Remember that pupils should wash their hands after handling chicks.

The chicks can be left in the incubator for up to 24 hours after hatching – though they can be removed as soon as they are dry and fluffy. Avoid opening the incubator until all chicks are hatched and dry, the humidity inside is important in enabling them to hatch.

There is no immediate requirement for food as the remains of the yolk sac will have been absorbed. Once in the brooder, food and water should be available – make sure that there is no chance of the chicks drowning. If using an open dish

put a few washed pebbles in to avoid this risk. Chick crumbs (available from pet shops or farm stores) can be placed in a shallow dish or chick feeder. Show the chicks where their food and water is, just like a mother hen would.

A heat lamp should be placed over the chicks – remember that their incubation temperature was 39°C so they should not be subjected to sudden chilling.

Other considerations

Before beginning an incubation project, you should have decided what will happen to the chicks that it produces. You may wish to start your own flock, arrange to give them back to the farmer or chicken keeper who gave you the eggs, or sell them to raise funds for the school.

If you've been successful at incubation and if space is available and secure, then why not try growing the chicks until they too produce eggs? For most commercial and traditional breeds, this starts from 22-26 weeks.

You will have to cull any excess cockerels, they are difficult to re-home as they are noisy and you cannot keep too many together. Pure breed males are easier to re-home than hybrids.





Enterprise horticulture and more advanced animal care



Section 5

What this section covers

- Enterprise horticulture, including use of a commercial greenhouse or polytunnel
- Bees
- Calves
- Goats
- Piglets
- Sheep



Unfamiliar terms can be found in the **Glossary**. Further details on subjects such as farm and livestock registration can be found in **Useful Information**. The **Bibliography** shows where the most useful practical information can be found, and useful contact details for further information are provided in **Support and advice**.

Where next?

- Sections 6 – 7 of this resource introduce more complex horticultural activities and animals for you to consider rearing in your school grounds.

If you have access to some land and have experience of growing food plants or keeping small animals, then read on and get growing commercially – and while you're about it, you could also consider rearing goats or calves! At this level, you will need to have had significant prior experience or employ someone who has.

If you choose to rear sheep, goats, pigs or cattle, then the school will need to register the land on which the livestock will be reared with the Department for Environment, Food and Rural Affairs (DEFRA) as an agricultural holding, which is free to do.

Enterprise horticulture and use of a commercial greenhouse or polytunnel

How can enterprise horticulture be an educational resource?

- Offering pupils the opportunity to develop a horticultural enterprise meets the government's recent requirement that each pupil should receive some enterprise education. It does this in a hands-on, practical way
- If done properly, it can provide a valuable vocational education for students interested in a horticultural career
- It promotes team work and is highly motivating for students
- The income provided for the department can help fund further development
- It meets the requirement for work-based studies for BTEC Animal Management, as well as several other land-based qualifications.



Designing your growing space

While small horticultural enterprises can run on limited resources, anything on any larger scale is going to require reasonably sized heated greenhouses or polytunnels. While the costs of such infrastructure are high, the income that results may well justify the costs, even without the obvious educational value.

It is worth looking at the way commercial enterprises are organised to handle the throughput of large numbers of plants, and then model your practices as far as possible on their best practice.

You will need to obtain your pots, trays, seeds, plugs, compost and so on at wholesale rather than retail prices if you are going to be a viable enterprise, so find and speak to your local suppliers. You may be able to source some commercial equipment at auction or as a donation from a large supplier

Choosing plants

The selection of plants to sell in your enterprise will be determined by your facilities and own interests, along with those of your pupils and your potential market.

The following are therefore only suggestions for you to consider:

- **Hanging Baskets:** commercial businesses sell hanging baskets for up to £20 each, so they are potentially very lucrative and the skills involved in their production are useful for pupils to possess. If you can find a good source of plugs at a reasonable price, then this is a good way to start off. Look at what plants are being used commercially and copy those. In time you could develop your own recognisable school mixture. Retain some of your plugs and plant up single variety hanging baskets as stock plants to use as a source of cutting material for the future. Don't forget that in winter, lovely baskets can be made up with ivy, heather, winter pansies and bulbs to give you a second bite at the cherry. You might ask people to bring in their old baskets and refill these to save on initial outlay.
- **Bedding plants:** a typical 35p packet of seeds can produce four trays of bedding plants worth around £3.50 each. Alternatively, it is possible to grow these without heating the greenhouse in early spring if you buy in seedlings and pot these into trays yourself.

- **Vegetables:** tomato plants, brassicas, beans and so on all sell very well and are very easy to produce as single plants. Use poly bags or recycled pots to reduce your cost.
- **Perennials:** if you are lucky enough to have the space for herbaceous borders, then good maintenance requires regular thinning out of your plants. Division of plants provides a good source of material to sell, merely for the cost of the pots and compost to grow them in.
- **Conifers:** ornamental conifers are very expensive to buy, but very easy to propagate. A simple heel cutting put into sharp compost will root very easily, particularly if you can provide bottom heat and/or a mist bed. Once rooted, annual potting on will give you a stock of plants for sale at very little cost.
- **Bulbs:** good for Christmas, Mothers Day and for cut flowers – particularly in the autumn when your greenhouse is otherwise underused. All bulbs are potential markets for your enterprise.

Other considerations

Selling

Start small and target staff and parents, perhaps on a weekly basis, to find out what sells well and at what price. Once you have the capacity and experience, then move out into the wider community.

Marketing

Within your school this is obviously very easy, but it requires a little more thought if you are going to sell to the wider community. Most schools would not have the staff or the

stock to set up a shop, so look at selling your produce at events. Depending on your enterprises, perhaps once or twice a year you could spend a couple of days selling at well-advertised events. If you are selling good quality plants at a competitive price then you will soon build up a regular customer base. Always bear in mind you will be setting up in competition with local suppliers; you may encounter some resistance if you get too popular, so you may wish to discuss the enterprise with them in advance and perhaps obtain support or an extra outlet.

Bees

How can keeping bees be an educational resource?

The honey bee (*Apis mellifica*) is by far and away the most important insect in the British Isles. Not only does it give us honey and wax, it's the most important pollinator of crops and fruit.

Nevertheless, give careful consideration to the idea of keeping bees in your school. The main concern is that if a child has a severe allergic reaction to bee stings, then this may lead to anaphylactic shock.

Classes can make use of an observation hive, where a few combs are sited inside a classroom, with entry and exit to the hive via a tube to outside. Great use can be made of magnifying glasses or a low-powered microscope to look at the differences between the three hive occupants – the queen, the worker bee and the drone. Investigation can be carried out into the uses of honey, wax and pollen – though you might not stretch this as far as mead-making! For lots of ideas for pupils, teachers and parents, plus links to the National Curriculum visit www.bees4kids.org.uk

Due to the difficulties and expense of kitting up a class with veils and gloves, bee husbandry lends itself to a small informal group. However, whole classes can be involved in the extraction of honey and working with the wax.

Many children are, understandably, sceptical of all things that can bite and sting. However, bee-keeping affords an excellent opportunity to dismiss some of the myths. If you can stand round an open hive with potentially 50,000 stingers not harming you, confidence will grow.



Designing your animal care space

Unless your school grounds are extensive and an area can be set aside for bee-keeping, the site should be screened by a tall hedge that will also encourage entry to the hive(s) from a high trajectory.

The best site for a hive is on a flat roof, where the flight path and entry to the hive(s) is much higher than a pupil. Bee-keeping can add a great deal of interest to the school garden, which will provide both pollen and nectar sources for the bees (and other insects).

Several types of hive are available. The three most commonly adopted in this country are the National, the Smith and the attractive but rather inefficient WBC, which has both inner and outer boxes.

It is usual to take honey away in the summer and early autumn, but bees need to either be left enough honey to satisfy their needs through the winter or be fed syrup during the autumn before the onset of cold weather.



Choosing animals

As a rule of thumb, the better the forager the more aggressive the strain of bee, so schools are likely to want to sacrifice some yield in exchange for docility. Bees can be bought as a nucleus (a few frames of bees with a laying queen) or gathered as a swarm. While the latter are cheaper, there is no guarantee as to their docility.

Purchasing

Beekeepers are usually extremely helpful people and only too pleased to pass on their expertise, so the local beekeepers association is a good starting point for sourcing both equipment and bees. Having said that, equipment and bees are also available from commercial companies. Costs will vary depending on whether hives and equipment can be bought secondhand and what has to be purchased new. Costs of a typical hive and basic equipment vary from around £210 to £330.

An alternative to purchasing a hive would be to allow a local beekeeper to site a hive or two on school grounds in return for some of the harvest or talks to students.

Other considerations

Bees are usually very self sufficient, but like all animals, they can succumb to disease. One of the more recent is Varroa, a disease of bees that has now spread from Asia to most of Britain.

Health and safety

A critical risk assessment needs to be made as to the increased likelihood of a pupil getting stung if bees are kept onsite. There are, however, no diseases that can be transmitted to humans.

Keeping cattle (calves) in schools

How can keeping calves be an educational resource?

One of the most exciting activities for school children is to rear their own calf. One way forward would be to approach a local dairy farmer and borrow two or three calves aged between two weeks and six months (or even twelve months, depending on the housing or land you have available). Most farmers would be only too willing to offer advice, including tips on housing and feeding, and to keep an eye on things. Alternatively, of course, you could purchase a calf or two of your own.

Designing your animal care space

Housing

Calves need a well-ventilated airy shed with no draughts. They should be allowed to lie on a thick bed of straw on a solid floor that drains well.

If the calves are penned individually for a period, the pens should be a minimum of 1.25m by 1.50m and have three solid sides with an open front, so that the animals can see the world around them.

Calves should ideally be reared in small groups and with a minimum floor area of 2m² per calf. When the calf is around eight weeks old, it can be moved into a larger pen, which should offer access to hay, concentrate and clean water.

Fresh bedding can also be added each day so that a deep, well-drained, warm bed develops underneath the calf. This should be cleaned out when the calf is moved.



Feeding

An average calf fed twice a day will drink about four litres of milk, fed in two feeds. Calves will readily drink from a teat, but can be trained to drink from a bucket. A range of milk substitutes are marketed, each with their own instructions. Weaning can take place at around eight weeks, when the calf is eating about 1kg of concentrate each day, plus hay. Calves may be offered a bucket of clean water and a bucket containing a small amount of coarse calf mix from one week of age.

Choosing animals

Purchasing a calf

- **Age:** A calf should be at least two weeks old before it is brought to a school. It needs to have had the best start in life, including access to its mother's colostrum. Produced in the 48 hours after calving, colostrum contains four times as much protein as ordinary milk as well as antibodies produced by the mother, which give protection against diseases to which the mother has been exposed.
- **Breed/sex:** This may depend upon the breeds kept in

your area. Most dairy farms produce Holstein or Holstein-crossed calves. A heifer is easiest to begin with, although a bull calf castrated in its first week of life will become a quiet animal.

- **Where to buy:** Always go to a local farm and ask them to select one for you. Never purchase through a market or dealer, as the calves can carry disease and you need considerable experience to select a suitable calf. All calves have to have their own passport, which should travel with them.
- **What would the animal's future be?** A dairy heifer can be reared as a milk producer or sold back to its original owner. A cross-bred calf has two possible futures – either as a suckler animal or as a beef animal. Remember that they grow into large, heavy, powerful creatures.

Other considerations

Stock tasks

At around six weeks of age, your calf will be developing horn buds which will need to be removed to prevent accidents. This procedure must be carried out by your vet or

by a competent stockperson from your local farming community.

Bull calves can also be castrated at six weeks.

Handling

Calves can quickly grow into large animals. Once the calves are three to four weeks old, pupils can be encouraged to put halters on them and later to get them used to being led or tied up. Calves then learn to respect a halter before they discover their own strength. Always tie them loosely and use a quick release knot.

Prevent pupils from allowing a calf to suckle their fingers as this can bloat the animal's stomachs and spread disease.

Remember, too, that while it may be just a game to push a hand against a playful calf's head, this will teach bad habits for later life.

Planning for the future

Before you even think of keeping a calf, plan ahead with regard to its future. In the first instance, borrowing a calf for a short period that does not include the long summer holiday would be easiest.

Remember that keeping an animal is a commitment that will involve before and after school care, as well as weekends and holidays.

Legal considerations

You will need to register your school farm with DEFRA in advance.

If you borrow or purchase a two-week old calf it will already have had a metal or plastic ear identification tag placed in each ear. It will travel with a passport and its arrival should be reported to DEFRA and recorded in your movement book, which can now be done online at the British Cattle Movement Service website, www.bcms.gov.uk



Goats

How can keeping goats be an educational resource?

Unusually amongst farm animals, goats positively seek human contact and hence make excellent school animals. They have few vices and are very adaptable. They provide an excellent example of a small milk-producing ruminant. They can be halter-trained and taken for walks, and some can even be harness-trained to pull small goat carts.

Any animal brings a calming effect to the environment in which they are living. Pupils respect them and will naturally ask questions. Animals will generate interest at break and during lesson-time, which can be focused as a theme for discussion or a lesson. They can be part of a specific land-based curriculum, or an integral part of a cross-curricular link. Probably more people eat goat meat in the world than beef – and there are no cultural taboos around them such as might be experienced by keeping pigs.

Designing your animal care space

Goats do not like getting wet, so some form of shelter is necessary. This could take the form of a small shed, or a section of a larger building. Doe (female) goats don't smell – but bucks (uncastrated males) certainly do!

Goats are very intelligent, so pens need to be properly secured to avoid them escaping.

Choosing animals

Although pygmy goats make good pets and obviously take up less space and need slightly less feed, there is more education in keeping a full-sized breed. Anglo Nubians are interesting - they are very variable in colour and have a roman nose and long drooping ears. If possible, get stock that is tested for CAE (caprine arthritis-encephalitis syndrome).

Unless you know someone who keeps goats, the best contact for advice and buying would be your nearest goat club. A goat keeper might also let you have one or two animals on loan – and might even provide the food. Then you'd have the best of everything in terms of educational value and a place that will also look after the animals during the holidays.

As with everything, costs can vary depending on quality. Males have very little economic value (unless you want one for breeding) and you might pick up a wether for nothing. Pedigree stock is more expensive; a young doe, for example, may cost between £60-200. But having the potential to breed is much more fun and opens up many more educational opportunities. Keeping females also means there is the potential for selling kids (young goats) to offset costs.

Other considerations

The great advantage of goats over other larger farm animals is that pupils can easily handle them and, as mentioned above, they can be halter trained to a lead and taken for a walk.

Routines

As with the majority of animals, goats require attention seven days per week. In addition, they need regular foot trimming (a local farmer or vet can show you how this is done). Drenching may also be necessary to prevent worms. Goats enjoy being groomed, which also reduces the risk of lice and mange.

Goats have very few ailments and usually give birth (kid) without assistance. Does will remain in milk for up to two years – but equally, they can be dried off soon after weaning.

Unlike sheep, goats can be bred from at any time of year.

Goats are experts at removing scrub plants and weeds and can be used to clear ground very successfully.

Health and safety

Adult goats can be bought de-horned for pupil's safety. If breeding your own, this operation has to be carried out by a veterinary surgeon under full anaesthetic as soon as the horn bud can be felt (usually when the animal is three to four weeks old), a process known as dis-budding.

Legal considerations

You will need to register your school farm with DEFRA in advance. Goats must be tagged before they leave their birth site. Older animals may be tattooed.

Piglets (weaners)

How can keeping pigs be an educational resource?

Pupils will be captivated by the antics of pigs, but adult animals require considerable handling experience. Make a start by gaining experience with rearing a few weaners (six to eight week old weaned pigs).

Pigs provide many opportunities for taking measurements and carrying out analysis linked to Mathematics and Science. For example, the male to female (boar to gilt) growth rates can also be linked to hormone production for study in Biology lessons.

Designing your animal care space

Suitable accommodation must be in place before the arrival of your piglets. You could use an existing outbuilding or unused shed, or a new, purpose-built building. It must have access to an enclosed yard or decent-sized paddock.

The housing must allow the pig to be warm, dry and free from draughts, and the entire area must be pig-proof. One of the most effective barriers, especially for the paddock, is a mains-powered electric fence using a transformer. Walls are best made from brick and any wooden panels – gates, for example – must be metal-lined to avoid the pig smashing them up!

Access to fresh water and a feeding area is also required. Any indoor housing should have a concrete floor, as should the yard area – this will make cleaning much easier. If you have a paddock it must be free draining or with an area of hard standing that allows escape from muddy conditions in wet weather. Waste can be easily removed and placed on the dung heap (pig muck can often smell a bit strong and this



may need to be considered when sighting the accommodation).

Pigs can be moved from place to place with the use of a pig board. This could simply be a piece of wood approximately 1.2m by 1m. They are easily trained to walk with you and to come when called.

Choosing animals

There is a large range of pig breeds from which to choose. Your first decision needs to be whether you are going to keep pure-bred or cross-bred, and you will also need to consider whether it is important that pure bred stock is registered, pedigree or a rare breed. The breed you choose is best determined by first establishing your reason for keeping pigs – is it for fattening, showing, breeding, and/or pet? You may also wish to keep a local breed, for instance Tamworth pigs in the Tamworth area.

Pigs can be real characters and are certainly some of the most intelligent animals you are likely to keep. However, remember that they are extremely strong. A large weaner could easily knock an adult over; more so a child. Correct training must, therefore, be given before staff or students work with your pigs. They may also bite anything to see if it's

edible, so steel-toed boots are essential.

Local papers and agricultural magazines are a good place to try and find out where to buy your pigs, along with the Internet and the British Pig Association. You can also find specific pig breed associations with enthusiastic members who may be willing to advise. When buying, remember you will need the correct movement license, a recently cleaned vehicle and correctly marked pigs.

The costs of weaners can vary hugely, from £20 to £150 for organic stock. Talking to the seller is a good start to finding out what to feed them. Again, this ranges hugely from concentrate nuts to the waste from a local supermarket. However, you must ensure that you stick to the latest legislation and DEFRA guidelines, and that a diet is not changed suddenly.

Other considerations

General husbandry can be learnt from a range of books and videos, but the best source of information for all of the above is obtained from a friendly local farmer or vet – and from experienced colleagues in the School Farms Network.

All pigs will root through the earth as part of their natural behavior and should be allowed to do so. Smaller breeds with shorter noses (for example, the Kunekune) will do less damage to pasture than a Tamworth.

Legal considerations

You will need to register with Defra in advance. Pigs aged one year or over (or going to market) must be ear tagged, tattooed or slapmarked (tattooed on their shoulder) before being moved.

Sheep

How can keeping sheep be an educational resource?

Taking care of newborn lambs and their mothers is therapeutic and beneficial for children of all ages.

Sheep have had a close association with humans over a long period of time and are kept as pets as well as farmed commercially. They are generally docile creatures (depending on breed and the amount they are handled), clean and easily managed. They make very good subjects to observe.

Animals also bring vitality and reality into subjects perceived by some pupils as 'dead' or boring. There are many ways to make use of sheep in school. Here are just a few for use in Biology, Mathematics, Geography, Religious Education, Personal Skills Development etc:

- Sheep are ruminant mammals
- They produce lambs, which can be used for growth comparisons.
- Sheep are used in different cultures, allowing discussion around meat, milk and wool production, ethical issues and religious issues.
- They are excellent subjects for life cycle studies.
- They are good subjects for the care of animals, whether for health and safety or welfare issues.
- They can be handled and lambs can be bottle-fed.

Designing your animal care space

Sheep are not fussy animals and can survive outside with the barest of shelters. It is true that lambs born early in the year survive better if given the warmth of a shed, but this need

not be elaborate. An old garden shed where they can run in and out will be adequate. The grass does not have to be high quality nor have great length, as long as poor quality or a low quantity of grass is supplemented with other foods.

What do you need?

- Official figures suggest about ten sheep per hectare as a stocking rate, but smaller areas can be used if food is provided from other sources
- Fencing is needed to allow sheep to move between areas of grass (fresh pasture)
- You'll also need a shed or polytunnel for lambing, open on one side with good air circulation
- Handling facilities - a holding pen and a race with further pens
- Concrete floors in the shed and handling area make it more accessible to wheelchairs
- Electricity is necessary in the shed, as is a good water supply (fresh, clean and freely available) both inside and out
- Storage facilities for hay, straw and feed
- Lockable storage for equipment and medicines
- The most important part of your land is the boundary, whether posts and sheep netting, walls or solid hedges (beware that sheep will climb into hedges if grass is in short supply). If you want to keep on good terms with the neighbours, the local park keepers and the police then make sure you can keep your sheep on your own land! Money spent on secure fencing is a good investment. Ideally, the land should be free draining and not be too wet



- While moving sheep can be done on foot over short distances, a small cattle trailer is ideal for longer distances or along busy roads. Beware of restrictions on moving stock (movement licences and outbreaks of notifiable diseases).

Food

A healthy eating policy is to be encouraged and junk food is definitely out! Sheep like short grass to eat, supplemented by hay and silage in the winter. Only use concentrates specifically formulated for sheep as feed formulated for other stock could potentially kill them. Provide mineral supplements, plus turnips, beet and other fodder as available.

Choosing your animals

Take time to find out what breeds the local farmers are using on their own farms and why. Soil conditions will largely determine the breed of sheep most suited to your area. The National Farmers Union can put you in touch with local farmers, who can explain what breeds they use and why they may have changed breeds in the past.

As well as advice on breeds, local farmers will also be the best source of advice and help for obtaining suitable stock. For example, rams can often be borrowed for a few weeks; there is usually no need to buy one.

Probably the best way to begin is with a few lambs raised from when they are about two weeks old and taken through to the summer, when they can be sold to a friendly butcher or kept to breed from.

Other considerations

You will be dealing with live animals and that will mean you need to learn flexibility – but look



for the opportunities to give your pupils responsibility. Challenge them to care, observe, work together and solve problems and see them rise to this and surprise even themselves. Older pupils may be given a more permanent role where they tutor younger pupils as well as checking the sheep and helping with tasks.

Lambing time can mean 24 hour watch.

Handling

Sheep are strong animals, so be prepared to flex your muscles and indeed grow some where you had none before. Also, their wool is coated with lanolin, which is greasy, so do not be surprised if pupils complain about this, along with the smell. However, lanolin will make your hands incredibly soft, and you can explain how ancient Britons used this as a primitive soap.

Sheep are best handled in a group and in a small space. When moving them have plenty of help, or a well trained sheep

dog! Specialised handling facilities are best. These must be robust, although a race and pens can be made using hurdles or home made, secure barriers.

Routines

Check sheep twice daily to make sure they are present, healthy and well. Check food and water for sufficiency and quality. Make sure no sheep are lying on their backs; sheep try to scratch themselves can get stuck on their backs and then quickly die. Ensure they are not bothered by dogs. Look at their eyes, ears, wool, back end, udders and feet. Ensure that they are moving together as a group and check out anything that's unusual.

If animals are kept near classrooms, then pupils can be given the job of looking after them and checking on them even just from a nearby window. Get them to look out and take notice.

A big summer problem for sheep is blowfly maggots, which hatch in damp wool around the



bottom and tail, causing irritation and flesh wounds that can be fatal if not treated. Dipping or other fly protection (eg pour-on treatments) reduce the chance of maggots and other external parasites occurring – this can often be carried out at a nearby farm. Drenching can be used for protection against intestinal worm incidence.

Sheep need to be able to walk to graze, but their hooves get overgrown and sometimes get a bacterial infection called foot rot. If this happens, the overgrown hoof needs to be trimmed away and infection treated. Foot trimming is a job that will stretch your ability, but once you have learnt how to do it, you will feel really good – and so will the sheep! You will need the help of a friendly farmer or vet to begin with, but do not hold back: get involved and let the pupils have a go too. The use of a footbath may be beneficial if foot problems persist.

Shearing

Shearing is usually done in May/June, but varies in different parts of the country. Expert help must be sought. Your local young farmers club might be happy to assist for free! This can be an event for the whole school, and perhaps invite other schools to join in with the experience.

Lambing

Tupping (putting the ram in with the ewes) is generally done from August through to November, depending on when you plan for the lambs to be born.

There is always excitement when a sheep gives birth. However, this is not for the squeamish. You will need to have an experienced sheep breeder on hand to tell you when it is time to help any struggling ewe.

Check ewes in the weeks before lambing to make sure they have enough feed to sustain the pregnancy - extra concentrates

may be necessary. Prepare the shed and bring ewes in at night to improve lamb survival and to make it easier to check them. Have small individual pens ready to separate the ewe and newborn from the rest of the flock to enable bonding. Identify ewes and their lambs (eg with a coloured marking), and put antiseptic onto the navel. Tail docking and castration (if essential) should be done in the first week of birth.

After a few days, if the weather is dry and conditions not muddy, they can be let out onto pasture. Lambs can be put outside permanently after one week, weather permitting. Predators (foxes) need to be guarded against. Provide shelter and maybe creep feed (small concentrate nuts for lambs) to give extra strength and nutrition.

Health and Safety

Health and safety issues relate to lifting (feed bags, hay bales and turning over sheep for foot trimming) and zoonoses (diseases caught by humans from animals).

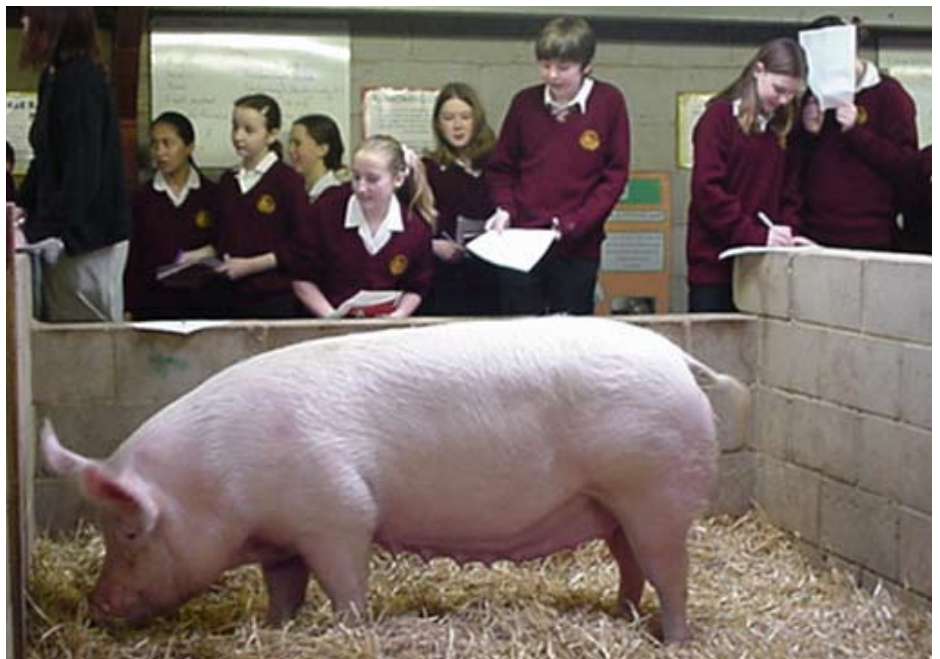
Zoonoses include Orf, a painful disease caught when lambs have pustules around their mouths and handlers have open wounds (remember to always wear gloves). Also when ewes are pregnant, women may be more liable to an enzootic abortion. So pupils and adults who are pregnant (or even if there is a risk that they may be pregnant) should not go near sheep. Risk assessments need not, however, be too onerous, as supervision and training are the two main issues – along with the provision of suitable protective clothing.

Legal considerations

You will need to register with DEFRA in advance. Sheep must be tagged in one ear before they leave their birth site (older animals may be tattooed).



Rearing alpaca, cattle and pigs



Section 6

What this section covers

- Adult Cattle
- Alpaca
- Pigs
- Growing animal feed



Unfamiliar terms can be found in the **Glossary**. Further details on subjects such as farm and livestock registration can be found in **Useful Information**. The **Bibliography** shows where the most useful practical information can be found, and useful contact details for further information are provided in **Support and advice**.

The information in this section is based on the assumption that you already have the level of knowledge and skills covered in previous sections.

Where next?

- Sections 7 of this resource introduces more complex horticultural activities and animals for you to consider rearing in your school grounds.



If you have access to some land and have experience of growing food plants or rearing sheep or similar, then read on and develop your farming skills! And while you're about it, why not consider breeding pigs, or rearing ponies?

At this level you will need to have had significant prior experience, and the land on which the livestock will be reared should be registered with DEFRA.

Adult cattle

The word 'cattle' refers to oxen, which belong to the genus *Bos*. Cattle have traditionally been bred to convert grass, forage and concentrates into meat or milk. They grow into large animals and need experienced stockpersons to look after them. The choice of breed needs care, while proper handling equipment and adequate housing are essential.

How can rearing adult cattle be an educational resource?

Cows are examples of ruminants, with a four-chamber stomach, and give rise to a number of products (leather, meat, milk, manure etc). Milking cows, although a big commitment, can be a wonderful educational resource, such as calculating milk production and

learning about dairy produce.

Designing animal care space

Housing and fencing

This does not need to be expensive, but bear in mind that a solid floor aids cleaning. Pens must be strongly built with adequate gates.

Cattle produce large quantities of manure (dung, urine and bedding materials), which will need to be disposed of by composting then either spreading it onto land or making it available for sale.

A good-standard stock fence topped with barbed wire is suitable for a perimeter fence, with perhaps electric fencing for internal grazing paddocks.

Feeding and grazing

Cattle need about 0.4 hectares (one acre) of grazing land per animal each year, plus additional land which can be conserved for hay or silage production for use in winter when the grass stops growing. If cattle stay outside in winter, they will simply grow a thicker coat, but you will run the risk of their churning up or poaching the wet ground with their heavy hooves, potentially turning it into unproductive mud

the following spring. Each adult animal needs ten tonnes of silage or 50 bales of hay, plus concentrates, to feed it through the winter months.

Choosing animals

The breed you choose may be determined by the availability of suitable stock from a local farmer willing to help and advise you, or by you selecting a rare breed via a specialist breeder. It is never advisable to purchase from a livestock market without considerable prior experience.

Many schools looking to keep adult cattle will prefer to keep beef-type animals that suckle their own calf for eight or nine months after calving.

Alternatively, dairy cows give birth to a calf each year which, after suckling to receive its mother's first milk or colostrum, is normally removed. If a dairy cow continues to be milked she will not only produce enough milk for her calf but much more besides. However, milking is a twice-a-



day commitment over a three-hundred-day period (lactation) after calving.

Breeding

Dairy cows need to give birth to a calf each year in order to maintain milk production. They will either need to be run with a bull, which can be complicated on a logistical and health and safety level, or you can use artificial insemination.

Cattle over twelve months of age come into oestrus (their breeding condition) every 21 days until they become pregnant. However, they should not normally calve until they are at least 26 months old.

You may have noticed cows riding or resting their front legs on the back of another, known as 'riding' a 'bulling' animal and a sign that the bulling cow is coming into oestrus. Another sign is the presence of a clear discharge hanging from the vulva or sticking to the tail of the ridden animal.

Other considerations

Legal considerations

Cattle are also subject to brucellosis and tuberculosis testing by DEFRA vets at regular intervals.

Land on which cattle are kept needs to be registered with DEFRA as an agricultural holding, and each animal must have its own passport and be fitted with a tag in each ear in its first week of life.

Movements of cattle on or off your registered site must be recorded in your movement book, which can now be done online at the British Cattle Movement Service website:

www.bcms.gov.uk



Alpaca

Alpaca are members of the camel family (Camelid) and, like the llama, come from Chile. During the nineteenth century, Bradford's textile mills processed alpaca wool.

Very few schools currently keep alpaca. Their popularity is increasing thanks to interest in the very fine fleece they produce, second only to silk for strength. An alpaca's average life expectancy is about 15-20 years.

How can rearing alpaca be an educational resource?

Alpaca are examples of:

- the camel (and llama) family
- a browser and grazer
- a fleece-producing animal

They are gentle animals that are very useful for work with pupils with special needs and with those studying land-based subjects.

Designing your animal care space

Housing

Paddocks with an open shelter are suitable for alpaca, but don't

let the space get too muddy. These are very hardy animals, but they'll appreciate not getting too wet. The field or paddock is best sheltered from wind by hedges.

Feeding

A mixture of grazing and browsing on hedges is ideal. Hay should be available throughout winter. Special camelid feed is available to buy and should be fed according to the animal's condition. Water should be available at all times.

Choosing animals

Alpaca can be expensive animals, but it is possible to buy geldings (castrated males) a lot cheaper. Older animals generally have a coarser, less valuable, fleece.

Alpaca should never be kept on their own – always keep at least two or three animals together.

Other considerations

Contrary to popular belief alpaca very rarely spit, especially when they are used to people. They can easily be herded and don't generally try to escape. Specialist shearers are usually required to remove their fleece. These shearers can usually also offer other services, such as nail clipping and worming injections.

Pigs

How can rearing pigs be an educational resource?

Pigs provide many opportunities for taking measurements and carrying out analysis linked to Mathematics and Science. The male to female (boar to gilt) growth rates can also be linked to hormone production for study in Biology lessons.

Designing your animal care space

Adult pigs require all the conditions described for weaners (see **Section 5**). In addition, if you plan to breed your pigs, you will also need specific accommodation for farrowing. Your farrowing house should ideally be separate from the pig's 'normal' accommodation and will come with insulated flooring, walls and a roof so as to avoid heat loss. Additional heating should be supplied by lamps.

The farrowing-house should also be draught-free and have natural ventilation.

Pupils will be captivated by the antics of pigs, but looking after the adult animals requires considerable experience. The best way to start is by gaining experience rearing a few weaners, six to eight week old weaned pigs (see **Section 5**).

Choosing animals

Professional advice is best sought if you are choosing breeding pigs for the first time. Buy from a reputable seller in order to help ensure that what you get will be fertile (although only time will tell) and that the animal is healthy.

Other considerations

Adult breeding pigs are larger and stronger than weaners. In particular, they will be very protective of each other when mating and farrowing, so pupils and support staff will need careful supervision.

Growing animal feed

Cereals are also sometimes grown as forage crops, but these are normally conserved rather than grazed.

Recent advances in plant breeding mean 'designed' grasses are now available to suit most needs. Early growth, precise dates when the grass flowers, a high sugar content, grass for grazing and grass for conserving are just a few of the traits breeders have addressed.

Most grasses are perennial, but there are examples of important annual agricultural grasses such as Italian Ryegrass.

Choosing plants

Forage

By far the most important forage crop in Britain is grass. Fibrous roots and a growing-point that is at ground level make grass unique in its ability to be grazed and cut without destroying the plant.

Other major forage crops are:

- Clover, a type of legume
- Other legumes such as lucerne (alfalfa), sainfoin or peas
- Brassicas, such as kale and turnips.

Grasses are usually grown as a mixture of cultivars (which give, for example, a long grazing period) and may be left to grow from one to five years (leys) or left down permanently (permanent pasture).

Grass may also have the addition of clovers in the seed mixture - either red or white varieties or both. Clovers are a very important source of nitrogen, a major plant nutrient. All legumes possess root nodules that contain bacteria able to utilise (fix) the nitrogen in the air and convert it into a usable form. They can then be used in a





crop rotation to replenish soil that has been depleted of nitrogen.

Fodder

Crop growth usually starts in March, though the actual date will depend on aspect, elevation and geographic position in the country. Growth then declines in the autumn and has usually ceased by the end of October (again depending on climatic factors and season). This means the farmer needs to conserve forage during the period of maximum growth, for feeding during the winter months. The generic term for these feeds is fodder.

A fodder system is an indoor method of sprouting grains for animal feed and is an excellent way of showing plant growth in just a few days, as well as comparing nutritional value of sprouted/ unsprouted grains. Fodder sprouts are highly nutritious, resulting in healthy animals, better animal products and lower feed costs. It's easy to design your own to provide a continual supply, even on a small

scale as a supplementary feed.

There are two main methods for conserving grass. The crop material can be dried out completely to make hay (the rice and pasta we use in the kitchen has undergone a similar process), or pickling it as silage.

Silage

There has been a tremendous movement towards silage-making during the past twenty years. The reasons are not too difficult to appreciate – it can be made in 36 hours, while hay needs four to five days of dry weather, sunshine and wind.

However, this change is not without cost to our ground-nesting farmland birds, and in particular to skylarks and lapwings. Whilst hay making traditionally takes place at the end of June and July, when chicks are fledged, silage making takes place in the later part of May and the beginning of June, just when eggs are being laid.

More recently, cereals and maize have been grown for making into

whole-crop silage, where the crop is cut before it is ripe and ensiled.

The process of silage-making is dependent on anaerobic (without oxygen) micro-organisms, which means air has to be excluded. Farmers either create a big heap of material (a clamp) which is compressed and covered with a plastic sheet to exclude air, or the crop is made into individual bales – either square or round – and wrapped with several layers of clingfilm, again to exclude air.

The above is only a brief introduction to forage and fodder. Consider carefully, before you contemplate keeping livestock, whether you plan to grow your own fodder or buy it in from nearby farms.



Small-scale farm enterprises



Section 7

What this section covers

- Equines
- Small-scale farm enterprises



Unfamiliar terms can be found in the **Glossary**. Further details on subjects such as farm and livestock registration can be found in **Useful Information**. The **Bibliography** shows where the most useful practical information can be found, and useful contact details for further information are provided in **Support and advice**.

The information in this section is based on the assumption that you already have the level of knowledge and skills covered in previous sections.



If you have access to a significant amount of land and have experience of growing food plants in a greenhouse or on a large scale, or rearing pigs or similar, then read on and develop your farming skills even further! Why not consider keeping horses, or even breeding farm livestock?

Of course, at this level you will need to have had significant prior experience. What's more, the land on which the livestock will be reared should be registered with DEFRA as an agricultural holding (See **Useful Info**).

Donkeys, ponies and horses

Keeping a horse in a school context is an option available to only a few schools. It will depend on your locality, the kind of land you have available and the commitment and support of your staff. Even then, careful consideration is needed before embarking on such a project.

A visit to schools or community farms who already rear horses would be a good starting-point. Cardinal Wiseman School in Coventry, for instance, keeps donkeys (and has kept Shetland ponies) in a relatively small area, whereas the Warriner School

in Bloxham, North Oxfordshire keeps heavy horses – gentle giants, but the facilities required for looking after them are much more extensive.

The life expectancy of a horse or pony is some 25 years.

How can keeping horses be an educational resource?

Horses have a very long association with humans and hence there is a well-established bond between us and these animals. Bear in mind, though, that keeping horses at school is extremely time-consuming – although this can be an advantage when hands-on experience for pupils is required. Nonetheless, it's very important that you don't neglect the issue of what happens to the animals in the holidays.

Horses and donkeys (especially donkeys!) are highly intelligent and require mental stimulation; rather like dogs they can be mischievous if bored.

Horses (including ponies) and donkeys can be kept for:

- an interesting and caring retirement for older animals
- riding or they can be driven.

Whichever approach is taken, the basic care that pupils can get involved with includes feeding, watering, grooming, hoof care and so on.

The use of donkeys and horses in different countries can provoke some very interesting discussions on culture and food.

Designing your animal care space

The needs of horses and donkeys are very different to each other.

A standard pony box is 3m x 3m. For a horse, it should be larger at 3.6m x 3.6m; heavy horses can be accommodated in a 'foaling box' of around 3.6m x 4.8m. If building a box from new, think carefully about adding a tack room and food store, along with a hay and straw bedding store. The volume of bedding required can be reduced by having thick rubber matting on the stable floor – but this doesn't come cheap. Wheat straw should be used for horses, barley straw for donkeys.

For donkeys, the key to their care is to remember that they are a desert species. They are used to travelling many miles every day in search of nutritionally poor rations of grasses. They need shelter all year and are trained and handled quite differently to horses.





Choosing animals

Once you've taken into account the physical resources required to keep equines, great consideration and care must be given to the selection of the individual animal. Do not be tempted by other people's cast-offs offered either very cheaply or 'free to a good home'. Always take an experienced person with you who understands what is required, and seek the advice of the equine centre at your local college. Insist on a loan period. Model loan agreements are available on the British Horse Society website: www.bhs.org.uk

If you take an animal on loan, check which bills are included – what about insurance, foot care and vet's bills, for instance?

The Donkey Sanctuary is a national charity that will work closely with you to select the donkeys to suit your particular set up and needs. They will provide training and ongoing support before and after you re-home donkeys from them.

A further consideration is the amount of support you will have at weekends and over holiday periods to care for the animals. Do not underestimate the time required for routine work, even if the horse is out to grass. Many

horses and ponies can remain outside throughout the year, although some may require rugs, which need to be regularly checked. Other horses require stabling during the colder months and donkeys will always require shelter/ stabling.

Other considerations

Health and safety

The keeping of equines requires very careful risk assessment, in all aspects of their care and in your access to them, both in and out of the stable. Remember that even little ponies like Shetlands have teeth and hooves. Equines can also be a trigger for both asthma and skin rashes in certain individuals.

Where young children are concerned, building up their confidence is an essential part of the exercise of learning to care for a horse, this can quickly be destroyed by an unpredictable animal. All equines are stronger than most humans – certainly, they will be stronger than your pupils – so your animal housing must be very secure indeed.

Although it is common practice to give equines rewards or titbits, the practice should be avoided because the animal can come to expect this as a matter of course.



This can lead to difficulties, including being nipped, for those approaching the animal with empty hands.

Legal considerations

All horses and donkeys now require a passport.

Additional costs

Another big consideration is how the enterprise is to be financed. Certainly, keeping horses can mean kudos for the school, but it won't pay the bills. Not only can the capital cost of buying a horse be quite substantial, but keeping horses means a range of extra costs, over and above the sort you'd incur if you were keeping other kinds of farmed animals. There will be farrier bills, for instance, even if the horse is not to be used on roads, and some harness will also be required. (retirement homes for horses may be useful here). Unfortunately, here there is no 'product' to sell to mitigate your expenses!

Farriers

Feet need the attention of a farrier every six weeks and shoes are necessary if much roadwork is envisaged. You might find a friendly farrier (who might carry out the task free or almost free).

Small-scale farm enterprise

A small-scale farm enterprise means the keeping of farm livestock in a manner that replicates a commercial farm – normally as a profit-making concern. This means you would require the services of a full-time stockperson, with supporting holiday cover, for what would be a 365 day a year operation.

However, although enterprise profitability is one consideration, the overall use of a small-scale farm as an educational resource must not be overlooked. For this reason, stocking levels and variety may be influenced by its educational use.

How can small-scale farm enterprise be an educational resource?

A small-scale farm can be a major resource for making a significant contribution to learning in most curricular areas. This is well-documented in Ofsted reports of inspections of schools which have farms. The School Farms Network and other specialist organisations can share a great deal of expertise in this area.

A small-scale farm enterprise is an ideal platform for Land Based Vocational courses as well as GCSE courses and the new Land Based Diplomas.

A small-scale farm enterprise can be used to demonstrate:

- Every child matters
- Healthy eating
- Sustainable agriculture
- Education outside the classroom
- Biodiversity
- Locally-sourced food
- Increased flexibility/inclusion
- Organic/inorganic production

- Vocational learning
- Enterprise
- Personalised learning
- Courses for very able students.

Some larger school farms have links to inner city schools via webcams and a dedicated classroom base for visiting groups. Others have farm trails or dedicated areas of woodland with a well-managed pond or stream for use by environmental groups.

A small-scale farm would keep farm accounts with monthly stock valuation sheets and a ledger which could go for an annual audit. These can be used by business studies and enterprise education.

Designing your space

Relevant information can be found in **Section 4** (Poultry), **Section 5** (Calves, goats, pigs and sheep) and **Section 6** (Alpaca, cattle and pigs).

Choosing plants and animals

A small-scale farm should ideally have one or more productive sections – for instance, a small flock of sheep, or an area for producing store or finished lambs, breeding sows, rearing weaner pigs for pork, or even a small suckler herd of cattle. Some farms produce and market free-range eggs or even oven-ready chickens. A few schools have their own milking cows for liquid milk sales or for turning into other dairy products.

A farm and garden with a reasonable-sized glasshouse or polytunnel can produce bedding or pot-plants, hanging baskets and vegetables for sale. Animal related crops for fodder can also be grown on a field scale.

Other considerations

Management

Most larger school farms have their own farm committee – sometimes as a sub-committee of the governing body. It's usually made up of school governors, the Head, parents, local farmers, local businessmen and women and, ideally, pupil representation. The person responsible for the overall management of the farm should present a report on the farm's activities – say once a term – to this group.

The group would be responsible for health and safety, risk assessment and the promotion of the farm as a resource to the main governing body and wider school community.

Wider access to your school farm

A larger school farm should not limit its ambitions to providing vocational opportunities to a small number of pupils. Such facilities can be offered to other local secondary schools, as well as work placements from colleges.

The farm and gardens should give the opportunity for curricular visits from early years groups, right through to Key Stages 2, 3 and 4.

A larger school farm can also offer opportunities to groups of potential (adult) smallholders and as the base for enrichment activities for high achievers.

Some school farms are also open to the local community at certain times.

Farm registration and movement of farm livestock

This information sheet gives information of registration of land as a farm holding and guidance on the keeping of farm livestock.

Prior to keeping cattle, pigs, sheep and goats (not poultry) in school, the premises need to be registered as an agricultural holding (CPH). No cost is involved.

Please note that if animals are kept as pets there is no requirement to register the land as a County Parish Holding (CPH).

Registering your land as an agricultural holding

Before moving livestock to your school land (holding) you need a County Parish Holding (CPH) number for the land where the livestock will be kept.

The CPH is a nine digit number; the first 2 digits relate to the county, the next 3 relate to the parish and the last 4 digits are a unique number to the keeper, e.g. 12/345/6789. To apply for a CPH you need to contact the Rural Payments Agency (RPA) on 03000 200 301.

Once you have your CPH you can move livestock to your holding under a general licence.

Department for Environment, Food and Rural Affairs (DEFRA)

DEFRA has a user-friendly website for all livestock related issues which can be accessed through the main DEFRA website: www.defra.gov.uk

Welfare codes do not lay down statutory requirements. However, livestock farmers and employers are required by law to ensure that all those attending to their livestock are familiar with, and have access to, the relevant codes.

Listed below are the basic relevant guides (welfare codes) for those animals which are most likely to be kept in schools – these can all be accessed through the DEFRA site. Our advice is to visit this website as part of your planning process. All guides are downloadable as PDF files (some can be requested as booklets) and should legally be kept for reference in the farm/school office for all types of animal you rear.

Some are under review and may be revised by industry bodies in the coming years.

Each code covers the key issues surrounding the health and welfare, identification and movement of farm animals.

Of particular interest to schools are:

- Cattle and dairy
- Pigs
- Poultry
- Sheep and goats
- Guidance on key notifiable and zoonotic diseases (those that can be transferred from animals to people).

Electronic Identification (EID) for sheep. UK sheep keepers now need to identify their sheep through the EID where each animal can be identified through an electronic reader.

Movement of your animal can be recorded online. If you use the Animal Reporting And Movement Service website to keep your register, it can automatically record your livestock movements to premises that also use ARAMS online (such as markets and abattoirs).

Poultry

Many schools keep poultry even if they are the first farm animal to be reared. Guidance provided by DEFRA which covers the legal requirements for poultry keeping includes:

- Poultry: An overview - Understanding and complying with rules and regulations for poultry farming.
- Poultry Health: How to maintain poultry health, deal with notifiable, endemic and zoonotic diseases and implement key bio-security measures, and guidance on how to maintain

poultry welfare in the farm environment.

Poultry registration

Species of poultry that must be registered on the Great Britain Poultry Register include chickens (including bantams), ducks, geese, partridge, quail, turkeys, as well as some less frequently kept species.

Who has to register?

You must register if you own - or are responsible for - a poultry premises with 50 or more birds in total. They do not have to all be of the same species. This applies even if your premises are only stocked for part of the year.

Premises with fewer than 50 birds do not need to register, but DEFRA and the School Farms Network (SFN) encourages keepers to do so voluntarily.

The advantage of registering is that if any further legislation or disease prevention measures (e.g. because of Bird Flu) are introduced they will be communicated direct to you.

To keep the register up to date, you must notify DEFRA of any significant changes to information you have already supplied. You should do this within one month of the changes happening.

You should call the GB Poultry Register Helpline on 0800 634 1112.

Subjects covered in the poultry code include:

- Poultry welfare on the farm
- Poultry welfare off the farm
- Disease
- Disease prevention
- Disease notification and restrictions
- Environmental protection and pollution control
- Withdrawal periods for poultry medicines, marketing rules,

and regulations for eggs and poultry.

Registering pigs, sheep and goats

Whether you keep a single animal (not usually recommended) or a commercial herd/flock you will need to be registered with DEFRA. If you already keep sheep, goats or pigs and have not registered you must do so immediately.

With your CPH number approved, contact your local DEFRA Animal Health Divisional Office (AHDO). You will be asked for your CPH as a reference and will be able to register your livestock over the phone. If your correspondence address is different from the herd/flock location, inform the AHDO and confirm that they have the correct details.

When your livestock are registered, a flock/herd mark will automatically be created. Herd marks for pigs are one or two letters followed by four digits, e.g. AB1234 or A1234. Flock/herd marks for sheep and goats are six digits, e.g. 123456.

The DEFRA herd mark provides a quick and effective means of identifying premises from which livestock have moved. It is unique, kept on a single database and available to inspectors for rapid tracing. The AHDO will send you a registration document which will contain your personal details, CPH and flock/herd mark.

If any of your details change, you must tell your AHDO within one month of the change.

Livestock movements

Pigs

Pig movements must be accompanied by a completed animal movement licence (AML) document. The movement must be reported by the recipient of the animals to their local authority within three days of the movement taking place using the appropriate AML form.

One or more pigs moving onto a premises will be subject to a 20 day standstill (they cannot be moved away from the farm) and will also trigger a 20 day standstill on other pigs on the premises. Cattle, sheep and goats moving onto premises will impose a six-day standstill on any pig on those premises. There are exceptions such as for slaughter.

Pet pigs may not be moved under the general licence for the movement of pigs, unless they are moving from one holding to another holding. Pet pigs that are returned immediately to the holding they were moved from should be moved under a PRIMO (Pig records, identification and movement order) walking licence issued by the Divisional Veterinary Manager (DVM).

Documents are available online at: www.gov.uk/bpex-online-pig-movement

Sheep and goats

Prior to any movement the owner/keeper must inspect sheep and goats to be moved for signs of foot and mouth disease. If any evidence of such disease is found it must be notified without delay to the Divisional Veterinary Manager (DVM) of the local DEFRA Animal Health Divisional Office.

All sheep and goat movements must be accompanied by a

completed animal movement licence (AML) movement document. Sheep and goat movements must be reported by the recipient of the animals to the local authority within three days of the movement taking place, using the appropriate AML form.

Cattle

Prior to any movement the owner/keeper must inspect the cattle to be moved for signs of foot and mouth disease. If any evidence of such disease is found it must be notified without delay to the Divisional Veterinary Manager (DVM) of the local DEFRA Animal Health Divisional Office. If any evidence of disease is found the licence shall be invalidated and no animals kept on the premises of departure may be moved.

All cattle movements must be notified to the British Cattle Movement Service (BCMS), electronically or by post, within three days of the movement. www.bcms.gov.uk

All cattle born in or imported into Great Britain must have a valid cattle passport. This applies whether the cattle are male, female, dairy or beef. All cattle must be accompanied by their passport when moved.

All applications for cattle passports must be made to the British Cattle Movement Service (BCMS) within seven days of tagging. This gives all keepers a maximum of 27 days in which to tag, register the birth and apply for a passport. It is very important that keepers of cattle ensure that passport applications are made within the time limits allowed. Late applications for passports will be refused unless there are exceptional circumstances to consider. Documents are available at:

www.gov.uk/guidance/animal-welfare

Horses

All horses must be accompanied by a valid passport if they are:

- sold or exported
- used for the purpose of competitions
- moved to the premises of a new keeper
- presented for slaughter for human consumption
- used for breeding purposes.

Horse owners who have not yet applied for a horse passport should do so immediately by contacting a relevant passport issuing organisation.

Other animals

If you choose to keep animals other than common farm livestock you may require extra licences under the Dangerous Wild Animals Act (e.g. ostriches, birds of prey). If you keep non-farm animals you may need to obtain a zoo licence from your local Animal Health Office.

If you intend to breed pets for sale you will also need a pet shop licence. However, if surplus pets (young or old) are sold privately (without advertising) or given to new owners in exchange for a donation then a licence is not required - but you should have a procedure in place to ensure they will receive good care.

At present no licence is required to keep Alpaca but Trading Standards may visit any school with animals. It is always good practice to notify all the authorities of your plans in advance; staff are usually very helpful and willing to offer advice that will either reassure you or at least prevent potential difficulties if you make a mistake.

Rules are changing all the time. Again, for the up to date position please consult: www.gov.uk/guidance/animal-welfare

Vehicles and drivers

Any vehicle used to transport livestock must be fit for the purpose and suitably insured - check your personal or school insurance policy to ensure that the vehicle is covered.

In addition, the Animal Welfare Transport Regulation 2006 applies to all those involved with the transport of live vertebrate animals in connection with an economic activity, including:

- livestock and equine hauliers
- farmers
- commercial pet breeders.

However, the Regulation does not apply to the transport of animals where:

- The transport is not in connection with an economic activity
- Transport is to or from veterinary practices or clinics under veterinary advice
- The animal is an individual animal accompanied by its owner (or other responsible person) and is fit for the journey
- Animals are pet animals accompanied by their owner on a private journey.

The regulation requires that:

- Vehicles have appropriate authorisation
- No animal shall be transported unless it is fit for the intended journey or is accompanied by a vet (pregnant and very young animals are not normally considered fit for transport)
- All animals are to be transported in conditions guaranteed not to cause them injury or unnecessary suffering.

Further information and relevant documents are available online at:
www.gov.uk/guidance/farm-animal-welfare-during-transportation

Other considerations

Movement of livestock to agricultural shows or to other schools will be subject to special conditions.

Regulations change from time to time, in particular if there is any danger of specific disease outbreaks.

The DEFRA website has both advice and the legislation that underlies the guidance, including updates to regulations.

www.defra.gov.uk

If you have a query that cannot be resolved by the guidance you can call the helpline.

Tel:08459 335 577

You could also contact your peers in the School Farms Network.

email: schoolfarms@farmgarden.org.uk

www.schoolfarms.org.uk

Glossary

Ark: Moveable housing for poultry with run attached.

Artificial insemination: When sperm is placed into a female's uterus (intrauterine), or cervix (intracervical) using artificial means rather than by natural copulation. Modern techniques for artificial insemination were first developed for the dairy cattle industry to allow many cows to be impregnated with the sperm of a bull with traits for improved milk production.

Aspect: Direction of your site/buildings in relation to the sun.

Bale wrap: Plastic wrapping used to protect hay after baling.

Bedding plants: Easy to grow plants that complete their lifecycle from seed germination to maturity in a single growing season and then die. Most bedding plants quickly produce a mass of colour, primarily in spring, summer or early autumn and are therefore ideally suited for transforming an otherwise dull border in a very short period of time.

Biological control: The control of plant or animal pests either by the introduction of natural predators or parasites, that are only harmful to the pest, or by interfering with the reproductive behaviour of the pest.

Brassicas: Any of various plants of the genus Brassica of the mustard family, including cabbage, broccoli, and turnip.

Broody: Poultry that are physiologically ready to incubate eggs and hatch them.

Capital funding: Money given to purchase fixed assets such as buildings and equipment (usually over £100), and start-up costs of a new enterprise including small equipment such as hand tools.

Caprine arthritis-encephalitis syndrome: A viral infection of goats which may lead to chronic disease of the joints and on rare occasions encephalitis in goat kids less than six months of age. Since not all goats that become infected with CAE virus progress to disease, it is important to routinely test goats for infection by means of a serology blood test which detects viral antibodies in the serum.

Castration: Also known as neutering, castration is the surgical procedure which removes an animal's testicles (or testes).

CITES: The Convention on International Trade in Endangered Species of Wild Fauna and Flora is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

Cold frame: A transparent-roofed enclosure, built low to the ground, used to protect plants from cold weather.

Colostrum: First milk produced by the mother containing important antibodies to protect the new born animal.

Combs: Structures of hexagonal, thin-walled cells constructed from beeswax by bees to hold honey and larvae.

Concentrates: Dried animal feed often compressed into pellet shapes due to their extrusion through round holes during their manufacture.

Contaminated land: Land on, or in which can be found, waste or chemicals that could be dangerous to the health of people working on the land or eating anything produced from it.

Cool composting: Slow decomposition of organic material, usually achieved by adding small amounts at a time which does not generate the heat that produces better quality compost in a shorter time.

Glossary

Culling: Removing surplus or unwanted animals and birds from the farm to slaughter.

Cultivar: Plants that are no longer a pure variety; they have been cross-pollinated and are often sterile.

De-horned: Often termed dis-budding: removal of the growing horn/antler to prevent further growth.

Defra: Department for Environment, Food and Rural Affairs: the government department responsible for agriculture, horticulture and animal welfare (England and Wales).

Dipping: The use of various preparations of liquid disinfectant to destroy parasites living on sheep and to clean their wool, especially before shearing.

Dis-budding: Sometimes termed de-horning: removal of the growing horn/antler to prevent further growth.

Drenching: To administer a large oral dose of liquid medicine to an animal.

Dried off: No longer yielding milk.

Drip system: An irrigation system which slowly delivers water directly to the roots of plants.

Dung: The faecal matter of animals, otherwise known as manure.

Ensiled: Enclosing grass or other green vegetation to exclude air and allow partial breakdown resulting in preserved animal food called silage.

Enzootic abortion: Infection with certain organisms can cause abortion in pregnant sheep, and if a pregnant woman becomes infected with these organisms they may harm her unborn child, resulting in abortion or stillbirth of the foetus.

Etiolating: Seedlings growing too tall and thin trying to reach adequate light, often termed 'leggy'.

F1 varieties: Seeds bred by crossing two purebred inbred strains of plants, to produce plants of great vigour and increased uniformity.

Family: A taxonomic group containing one or more genera.

Farrowing: To give birth to a litter of pigs.

Farrier: Person who makes and attaches metal shoes to the feet of horses.

Finished (animals): An animal that has reached a suitable marketable stage of development and is ready for taking to the abattoir.

Fodder: Dried plant food for animals, such as hay.

Forage: Plant food for animals that has not been dried such as turnips or swedes (fed by animals grazing the plants or harvesting and feeding away from the field).

Gilt: Young female pig that has not yet given birth.

Gizzard: A specialized stomach with a thick, muscular wall used for grinding up food. It is found in birds, reptiles, earthworms, some fish, insects, molluscs, and other creatures.

Grow bags: Commercially sold growing medium, usually used by slitting holes in one surface and sowing or planting directly into the medium; can be used anywhere and just requires watering.

Glossary

Halter: Harness suitable for the particular type of animal that allows it to be led by someone attaching a rope.

Harden off: The gradual process of preparing seedlings grown under glass in a greenhouse or poly tunnel to external weather conditions.

Hay: Dried grass; mature grass (green but flowering) is cut and dried in the sun.

Heavy soils: Soil that is difficult to dig, drains poorly and usually containing a high proportion of clay.

Heel cutting: A cutting made from a side shoot with part of the main stem attached.

Heifer: A young female cow that has not yet had her first calf.

Hot composting: A method of accelerating the decomposition of plant material by encouraging worms and regularly digging through, or turning, the decaying matter. Also known as active composting.

Humus: Organic matter in the soil; a source of nutrients for soil organisms and plants, and to maintain a good soil structure to improve drainage and encourage plant root growth.

Hurdles: A movable frame (fencing) used for enclosing land for holding sheep and cattle etc.

Lease: Contract with a landowner setting out what both parties agree to do, and not to do.

Leggy: The term for a seedling that has grown more stem than leaf. Usually caused by lack of light (see also Etiolating).

Legume: A plant of the pea family; 'fixes' nitrogen from the air and makes it available to the plant.

Licence (land): A temporary agreement granting permission to occupy premises to which the Landlord and Tenant Act does not apply.

Light soils: Sandy soil that dries out rapidly. Compared with heavy clay soil, it is lighter in weight and lighter in colour.

Loam: Soil with an ideal mixture of clay, sand and humus.

Mange: Chronic skin disease caused by parasitic mites and characterised by skin lesions, itching, and loss of hair.

Marginals: Plants that grow on the margins of ponds or other bodies of water, in constantly damp soil or even in shallow water.

Mist bed: A propagation system which sprays a fine mist of water over plant seedlings or cuttings once every few minutes.

Movements book: Animal Movement registers are a requirement under legislation which states that the births, deaths and movement of livestock must be recorded. For example, if you keep cattle you must keep individual details including date of birth, dam identification, ear tag number, movement onto the farm if not born on premises, movement off and date of death if they die on premises. (See **Useful Information**).

Mulch: Covering, over soil or around plants, to hold in moisture, exclude light or feed plants.

Newcastle Disease: A highly contagious disease affecting many domestic and wild avian (bird) species.

Glossary

Notifiable diseases: A notifiable disease is a disease named in section 88 of the Animal Health Act 1981 or an Order made under that Act. Section 15 (1) of the Act says that: "any person having in their possession or under their charge an animal affected or suspected of having one of these diseases must, with all practicable speed, notify that fact to a police constable." In practice, if you suspect signs of any of the notifiable diseases, you must immediately notify a DEFRA Divisional Veterinary Manager. (See also **Useful Info 1**).

Oestrus: Applies to nonhuman mammals: a state or period of heightened sexual arousal and activity.

Passport: Documents issued by vet or DEFRA officially authorising the movement from your farm of the animal it relates to.

Pathogens: A biological agent that causes disease or illness to its host.

Perennial: A plant which lives for more than two growing seasons. All trees and shrubs are perennials. It may be herbaceous and die back to underground structures such as corms, tubers, or bulbs.

Plug plants: A small but well-rooted seedling raised in a cellular tray or tube for ease of transplanting and speedy establishment; often used for bedding plant displays, new wildflower meadows or introducing a few plants into lawns.

Poaching: Damage caused to land when heavy animals are introduced onto wet land with poor drainage.

Pollinator: An insect that helps fertilise plants by carrying pollen from one flower to another.

Polycarbonate: A type of engineering thermoplastic that is strong, stiff, hard, tough and transparent; often used instead of glass.

Poly tunnel: A polythene covered frame that provides lots of space and light for growing plants whilst protecting them from the elements and extending the growing season.

Pricking out: The process of separating and transferring recently grown seedlings from where they were sown into larger pots, trays or an outdoor bed.

Propagation: The deliberate, directed reproduction of plants using seeds or other parts of the plant such as stem, leaf or root cuttings.

Pure-breed: Animals bred from parents of the same breed.

Race: Equipment, similar to hurdles or a sheep pen, for separating out individual animals from the flock or herd and containing them whilst they are given medical or other treatment.

Raised beds: A system of growing plants in small areas of land that have been raised above the ground and contained in some way, e.g. with railway sleepers or wooden boards. This system allows a gardener to grow very intensively in a limited area, and will reduce difficulties of bending to ground level if tall side walls are made.

Residual Current Device: Device that protects users of electrical equipment from electric shock by interrupting the electricity supply if a short circuit or current leakage occurs.

Rooting: To cause a plant cutting to put out roots and grow.

Glossary

Ruminant: Any of various hoofed, even-toed, usually horned mammals characteristically having a stomach divided into four compartments and chewing a cud consisting of regurgitated, partially digested food.

Run to seed: Term used to describe the stage of growth where plants stop flowering just prior to the development of seed; some plants are best harvested before this stage. It can occur prematurely if there is a water shortage at the crucial stage of development.

Sapling: A young tree.

Sets: Small onion bulbs used to grow onion crops in preference over sowing onion seed.

Setting eggs: Refers to placing of eggs in an incubator or under a broody hen.

Services: Power (gas or electricity), water or sewerage supply lines.

Shearers: Specialists who remove the fleece (shear) of sheep, goats and Alpacas.

Silage: Crops, commonly grass, harvested in a green state and preserved in a large container or clamp in a succulent condition for later use.

Spray system: An irrigation system for greenhouses or growing-areas that delivers a spray of water over the plants rather than water direct to the roots (see Drip system).

Stock plant: A plant used to obtain propagating material, whether seed or vegetative material.

Store (animals): Animals that are not at a marketable stage of growth and are kept over winter before completing their growth in the spring and summer (see Finished).

Suckler: An unweaned calf.

Tack: The harness for a horse, including saddle and bridle. Stored in a **Tackroom**.

Tagging: System for identifying individual animals, often with plastic tags in their ears.

Tanalised: Tanalising involves impregnation of wood with preservative under controlled conditions in a vacuum pressure chamber. When impregnated into the timber the chemicals become fixed into the timber and cannot be removed.

Tenure: The right to property, granted by custom and/or law, which may include land, trees and other plants, animals and water.

Thinning out: Once seeds begin to grow, if these have been originally sown close together it becomes necessary to remove the excess seedlings or young plants so the remaining plants can reach their maximum size.

Tree nursery: Growing area set aside for the propagation and nurturing of young trees.

Varroa: A serious Asian parasitic mite of honey bees.

Weaner: Piglets aged about 5-8 weeks which have just stopped feeding on milk.

Weaning: The act of substituting other food for the mother's milk in the diet of a young mammal.

Glossary

Wild Animal Licence: Under the Dangerous Wild Animals Act 1976, a licence is required for anybody wishing to keep a dangerous wild animal. The only time a licence is not required is if the animal is kept in a zoo, circus or pet shop. For further information and a list of those animals considered to be dangerous contact DEFRA.

Worming: Medical treatment given to animals to prevent or remove an infestation of the intestines or other parts of the body with worms or wormlike parasites.

Zoonoses: Diseases which are biologically adapted to and normally found in lower animals but which under some conditions also infect humans.

Support & advice

British Alpaca Society (BAS)

The BAS provides information, support and events for alpaca owners, breeders and those interested in alpacas.

Address: British Alpaca Society Ltd, c/o Grassroots Systems Ltd, PO Box 251, Exeter EX2 8WX

Tel: 0845 331 2468

email: info@bas-uk.com

website: www.bas-uk.com

British Bee Keepers Association (BBKA)

The BBKA provides information, support and events for bee keepers, breeders and those interested in bees.

Address: National Beekeeping Centre, National Agricultural Centre, Stoneleigh Park, Warwickshire CV8 2LG

Tel: 02476 696 679

email: bbka@bbka.org.uk

website: www.bbka.org.uk

British Horse Society (BHS)

The BHS provides information, advice, support and events for horse owners, breeders and those interested in horses.

Address: Stoneleigh Deer Park, Kenilworth, Warwickshire CV8 2XZ

Tel: 02476 840 508

email: education@bhs.org.uk

website: www.bhs.org.uk

Countryside Classroom

Partnership of food, farming and countryside organisations providing information and signposting to resources and providers.

Address: c/o FACE, Arthur Rank Centre, Stoneleigh Park, Warwickshire CV8 2LG

Tel: 0845 838 7192

email: info@countrysideclassroom.org.uk

website: www.countrysideclassroom.org.uk

Countryside Learning

Aims to inform and encourage debate about the countryside. Offers teaching materials for primary and secondary schools and in-service teacher training.

Address: PO Box 8, Hebden Bridge HX7 5YJ

Tel: 01422 885 566

email: info@countrysidelearning.org

website: www.countrysidelearning.org

Department for Environment, Food and Rural Affairs (DEFRA)

Government department responsible for legislation and advice on land issues and animal welfare.

Support & advice

Address: Noble House, 17 Smith Square, London SW19 3JR
Tel: 0845 933 5577
email: helpline@defra.gsi.gov.uk
website: www.defra.gov.uk

Farming and Countryside Education (FACE)

Aims to educate children and young people about food and farming in a sustainable countryside, and links schools to member organisations involved in food and farming.

Address: Farming and Countryside Education (FACE), Arthur Rank Centre, Stoneleigh Park, Warwickshire CV8 2LG
Tel: 02476 858 261
email: info@face-online.org.uk
website: www.face-online.org.uk

Federation of City Farms and Community Gardens (FCFCG)

Promotes, supports and represents city farms, community gardens and other community growing projects. Co-ordinates the School Farms Network.

Address: The GreenHouse, Hereford Street, Bristol BS3 4NA
Tel: 0117 9231 800
email: admin@farmgarden.org.uk
website: www.farmgarden.org.uk

Forest Schools Association

Provides learning resources about trees, forests, forest products and school related activities and qualifications for leaders.

Address: Institute for Outdoor Learning, Warwick Mill Business Centre, Warwick Bridge, Carlisle, Cumbria CA4 8RR
Tel: 01228 564 407
email: enquiries@forestschoollassociation.org
website: www.forestschoollassociation.org

Garden Organic

Promotes organic gardening and runs the Organic School Gardens Network of over 3,000 schools.

Address: Ryton Organic Gardens, Coventry, Warwickshire CV8 3LG
Tel: 02476 303 517
email: enquiry@gardenorganic.org.uk
website: www.gardenorganic.org.uk

Groundwork UK

Environmental regeneration charity with a network of local trusts working in partnership with local people.

Address: Lockside, 5 Scotland Street, Birmingham B1 2RR
Tel: 01212 368 565
email: info@groundwork.org.uk
website: www.groundwork.org.uk

Support & advice

Health and Safety Executive (HSE)

HSE's Infoline is their first point of contact. Contact details for regional offices are available from the HSE website or your local phone directory. Many publications are free of charge.

Address: Various offices depending on specific nature of the enquiry
Tel: 0845 345 0055
email: hse.infoline@natbrit.com
website: www.hse.gov.uk

LANDEX (Land Based Colleges Aspiring to Excellence)

Landex represents the land-based Further & Higher Education Colleges and Universities in the UK.

Address: Only via telephone, email or website
Tel: 01604 892 650
email: enquiries@landex.org.uk
website: www.landex.org.uk

Learning through Landscapes (LTL)

LTL undertakes research, develops programmes and provides training, resources and support to help schools and early years settings improve their grounds.

Address: Ground Floor, F Block, Clarendon House, Monarch Way, Winchester SO22 5PW
Tel: 01962 846 258
email: enquiries@ltl.org.uk
website: www.ltl.org.uk

National Association for Environmental Education (NAEE)

To promote and support environmental education throughout formal education and in the work of NGOs. and to encourage the promotion of environmental education in other sections of society in the UK and overseas.

Address: Only via phone, email or website
Tel: 07479 287 183
email: info@naee.org.uk
website: www.naee.org.uk

National Association of Field Study Officers (NAFSO)

NAFSO is the only organisation in the UK which represents professionals employed in teaching, promoting and developing field studies. It has over 300 individual members based at more than 150 Field Study and Environmental Education Centres throughout the UK.

Address: Warwick Mill Business Centre, Warwick Bridge, Carlisle, Cumbria CA4 8RR
Tel: 01228 564 580
website: www.outdoor-learning.org

Support & advice

National Farmers' Retail & Markets Association (FARMA)

FARMA is a co-operative of farmers, producers selling on a local scale, and farmers' markets organisers, and can provide advice on schools selling to or as part of a farmers market.

website: www.farma.org.uk

National Allotment Society (NSALG)

Promotion, protection and preservation of allotment gardening, and provides legal advice on statutory sites.

Address: O'Dell House, Hunters Road, Corby, Northants NN17 5JE

Tel: 01536 266576

email: natsoc@nsalg.org.uk

website: www.nsalg.org.uk

National Council for Volunteering Organisations (NCVO)

Works to promote volunteering as a powerful force for change, both for those who volunteer and for the wider community, and provides advice on all aspects of volunteering.

Address: Regents Wharf, 8 All Saints Street, London N1 9RL

Tel: 020 7713 6161

email: ncvo@ncvo.org.uk

website: www.ncvo.org.uk/ncvo-volunteering

National Sheep Association

Address: The Sheep Centre, Malvern, Worcestershire, WR13 6PH

Tel: 01684 892661

email: enquiries@nationalsheep.org.uk

website: www.nationalsheep.org.uk

Permaculture Association

Promotes an ecological approach to design of gardens and gardening activities.

Address: Hollybush Conservation Centre, Broad Lane, Kirkstall, Leeds LS5 3BP

Tel: 0845 458 1805

email: office@permaculture.org.uk

website: www.permaculture.org.uk

Rare Breeds Survival Trust (RBST)

RBST is the leading conservation charity working to restore Britain's native livestock breeds to their rightful place in our countryside.

Address: Stoneleigh Deer Park, Kenilworth, Warwickshire CV8 2LG

Tel: 0247 669 6551

email: enquiries@rbst.org.uk

website: www.rbst.org.uk

Support & advice

Royal Horticulture Society (RHS)

Provides advice and information, and encourages schools education of all aspects of good gardening.

Address: Campaign for School Gardening, The Pines, RHS Garden Wisley, Woking, Surrey GU23 6QB

Tel: 01483 226517

email: schoolgardening@rhs.org.uk

website: www.rhs.org.uk

Royal Society for Prevention of Cruelty to Animals (RSPCA)

The RSPCA as a charity will, by all lawful means, prevent cruelty, promote kindness to and alleviate suffering of animals.

Address: Wilberforce Way, Southwater, Horsham, West Sussex RH13 9RS

Tel: 0870 333 5999

website: www.rspca.org.uk

Rural Payments Agency

Contact for a new agricultural Holding Number (CPH).

Address: Customer Service Centre, PO Box 1058, Lancaster House, Hampshire Court, Newcastle Business Park, NE99 4YQ

Tel: 03000 200 301

email: csc@rpa.gsi.gov.uk

website: www.rpa.gov.uk

Soil Association

Campaigning and certification organisation for organic food and farming, and encourages educational work around organics.

Address: South Plaza, Marlborough Street, Bristol BS1 3NX

Tel: 0117 314 5000

email: info@soilassociation.org

website: www.soilassociation.org

The Conservation Volunteers (TCV)

Supporting conservation volunteering opportunities including school grounds.

Address: Sedum House, Mallard Way, Potteric Carr, Doncaster DN4 8DB

Tel: 01302 388 888

email: information@tcv.org.uk

website: www.tcv.org.uk

The Domestic Fowl Trust

Provides advice and sales relating to all breeds of domestic fowl.

Address: Bell Brook Farm, Pigeon Green, Snitterfield Lane, Snitterfield, Stratford Upon Avon CV37 0LP

Support & advice

Tel: 01789 850 046
email: dft@domesticfowltrust.co.uk
website: www.domesticfowltrust.co.uk

The Royal Society for the Protection of Birds (RSPB)

The RSPB was founded in 1889 and since then has grown into Europe's largest wildlife conservation charity with more than a million members.

Address: The Lodge, Potton Road, Sandy, Bedfordshire SG19 2DL
Tel: RSPCA: 0300 1234 999 (England and Wales), Scottish SPCA: 03000 999 999 (Scotland), USPCA: 028 3025 1000 (Northern Ireland)
website: www.rspb.org.uk

The Sensory Trust

Advice on inclusive design for public spaces. Projects, examples, publications, services and newsletter.

Address: c/o Eden Project, Bodelva, Cornwall PL24 2SG
Tel: 01726 222 900
email: enquiries@sensorytrust.org.uk
website: www.sensorytrust.org.uk

The Wildlife Trusts

The UK's leading conservation charity exclusively dedicated to wildlife; a local Trust can offer wildlife advice about your school site and may offer some volunteering.

Address: The Kiln, Waterside, Mather Road, Newark, Nottingham NG24 1WT
Tel: 01636 677 711
email: enquiry@wildlifetrusts.org
website: www.wildlifetrusts.org

The Woodland Trust

The Trust is embarking on a new education programme which includes the development of new resources for teachers, a schools website, events and activities for young people.

Address: Autumn Park, Dysart Road, Grantham, Lincolnshire NG31 6LL
Tel: 01476 581 111
email: enquiries@woodlandtrust.org.uk
website: www.woodlandtrust.org.uk

Thrive

National charity whose aim is to enable positive change in the lives of people with disabilities and disadvantaged people through the use of gardening and horticulture.

Address: The Geoffrey Udall Centre, Beech Hill, Reading RG7 2AT
Tel: 0118 988 5688
email: info@thrive.org.uk
website: www.thrive.org.uk

Exotics

'The Guide to Owning a Tortoise' by Jerry Walls (1996)
ISBN:0793820707

'Keeping and Breeding Amphibians' by Chris Mattison (1993)
ISBN: 0713723289

'Keeping African Grey Parrots' by David Alderton (1995)
ISBN: 0866229574

'Looking After Cage Birds' by David Alderton (1996)
ISBN: 0706365240

'Owners Guide to the Lizard' by Steve Orenard (1997)
ISBN: 0876054297

'Reptile Keeper's Guides - Leopard and Fat Tailed Geckos' by Richard and Patricia Barlett (1999) ISBN: 0764111191

'The Reptile Survival Manual' by David Alderton (1997)
ISBN: 186054052X

'Step by Step Book About Stick Insects' by David Alderton (1992)
ISBN: 0866223495

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ISBN: 1840134119

'The Ultimate Parrot' by Barrett Watson and Michael Hurley (2000)
ISBN: 1860541526

'Wild Mammals in Captivity' by Oevra Kleiman (1997)
ISBN: 0226440036

Goats

'Breeds of Goats', 'Goat Feeding' and 'Goat Keeping'
All published by The British Goat Society and available via their
website. www.britishgoatsociety.com

'Diseases of the Goat' by John Matthews (1999)
ISBN: 0632051671

'Goat Farming' by Alan Mowlem (2002)
ISBN: 0852362358

'Goat Husbandry' by David Mackenzie (1993)
ISBN: 0571165958

'Goat Husbandry and Health' (video) by Hilary Matthews (1996)
ISBN: 1903366534

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ISBN: 1903366917

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ISBN: 0643065253

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ISBN: 0706360842

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ISBN: 0878572392

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'Course Companion for BHS Stage One' by Maxine Cave (2002)
ISBN: 0851317650

'Farm Animals - Horses' by Rachael Bell (2001)
ISBN: 158810365X

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'Horse and Stable Management' by J Houghton Brown and V Powell-Smith (1994)
ISBN: 0632035943

'Horses - The Shetland Pony' by Anna Hodson (1997)
ISBN: 0851316670

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ISBN: 0003833305

'The Professional Handbook of the Donkey' by Elizaeth Svendsen
ISBN: 1873580371

'Shetland Ponies' by Anna Hodson (1990)
ISBN: 1852232889

Pigs

'Farm Animals - Pigs' by C Heather (2006)
ISBN: 1590364252

'The Pigman's Handbook' by G Brent (1982)
ISBN: 0852361262

'Pigs: Code of recommendations for the welfare of livestock'
Published by DEFRA (2003) Ref: PB7950

Poultry

'Chickens at Home' by M Roberts (1996)
ISBN: 0947870075

'Ducks and Geese at Home' by M Roberts (1991)
ISBN: 0947870091

'Ducks: Code of recommendations for the welfare of livestock'
Published by DEFRA (1999) Ref: PBDDIS

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ISBN: 1590364236

'Farm Animals - Turkeys' by Rachael Bell (2003)
ISBN: 1403440417

'Free-range Poultry' by K Thear (2002)
ISBN: 1873580592

'Home Poultry Keeping' by G Eley (1976)
ISBN: 0715804561

'Incubation: A guide to hatching and rearing' by K Thear (1997)
ISBN: 090613725X

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ISBN: 0906137381

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Published by DEFRA (2002) Ref: PB7274

'Meat Chickens and Breeding Chickens: Code of recommendations for the welfare of livestock' Published by DEFRA (2002) Ref: PB7275

'Turkeys: Code of recommendations for the welfare of livestock'

Published by DEFRA (1999) Ref: PBOO77

Rabbits

'Rabbits: Code of recommendations for the welfare of livestock'

Published by DEFRA (1999)

Ref: PBOO80

'Right Way to Keep Rabbits' by R Robinson (1999)

ISBN: 0716Q2117X

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'Farm Animals - Sheep' by C Heather (2006)

ISBN: 1590364287

'From Lamb to Sheep (How do they Grow?)' by Jillian Powell (2001)

ISBN: 0739844253

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ISBN: 085236332X

'Practical Sheep Dairying' by O Mills (1982)

ISBN: 0722507313

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ISBN: 0207147507

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