

CHAPTER 4

Family Food Production

Planning for a Garden

You can grow a successful garden.

Some people have grown gardens for many years and are very good at it. However, others who do not have as much experience often think that growing a garden is too difficult. Do not let fear keep you from growing a garden. Almost everyone who tries to grow a garden for the first time makes a few mistakes. But by making mistakes we learn how to do things better the next time. Your garden will be a success if you and your family are committed to spending the time and doing the work that will be needed. If you are willing to make the effort, you can have a successful garden.

The information in this chapter applies to gardens in most parts of the world. But you should also use the resources in your community. Local people and organizations can tell you specific things that make gardening successful in your area.

Plan to grow foods that meet the particular needs of your family.

You must decide what kind of garden will be right for you. You will want to consider such things as the size of your family, the amount of land available to you, the cost of seeds, the amount of time you have to work in your garden, and how much experience you have. Every family has different needs, so you should make sure that the garden you grow is right for your family.

It is very important to choose foods to grow that will improve nutrition for your family. We all need food from three different groups (see pages 29–30).

You will need different amounts of land to grow foods in each of these groups. Energy foods need a lot of space. Growth or protein foods need medium amounts of space, and protection foods need little space. To grow enough food from all three food groups to completely feed a family of six requires half a hectare of good land (about one acre). This is true if the climate is tropical and two crops are harvested each year.

If you have enough land, you can grow a garden that will provide the majority of the food your family needs. If you have only a small amount of space, you may want to grow foods from the protection group. In a small area, you can grow some dark green, leafy vegetables that contain good amounts of vitamin A. Tomatoes and peppers contain good amounts of vitamin C and can be grown in small planters, pots, or plastic bags.

When you are deciding what foods to plant, be sure to think about the foods your family likes. It is important to grow foods that will provide good nutrition for your family. But it does not matter how nutritious the food is if your family will not eat it.



People often make the mistake of trying to grow a garden that is too large and has too many different kinds of food in it. Unless you have a lot of experience in growing gardens, it is usually better to start out small. Begin with only three or four kinds of crops. Choose those that will provide good nutrition and that the family likes. Choose crops that grow well in your area and do not require a great deal of work. Get information from local universities, ministries, bureaus, and neighbors.

Choose the best possible place and design for your garden.

Even if you have no plot of ground for a garden, the supplementary material following this section tells how you can still grow vegetables in containers. Otherwise, when you are choosing a place for your garden, consider the following things:

Soil. Choose a place where the soil is loose and does not have many rocks. The soil must be free from tree roots, grasses, and weeds. Soil that grows a lot of weeds will usually also grow good vegetables if the weeds are removed first.

Slope. Try to find a place where the ground has very little slope. The ground should be flat enough that the plants and fertilizer will not wash away. However, it should have some slope so that the water will drain and not stand around the plants. In some areas, the ground may slope so much that you will have to build terraces to hold the plants and fertilizer.

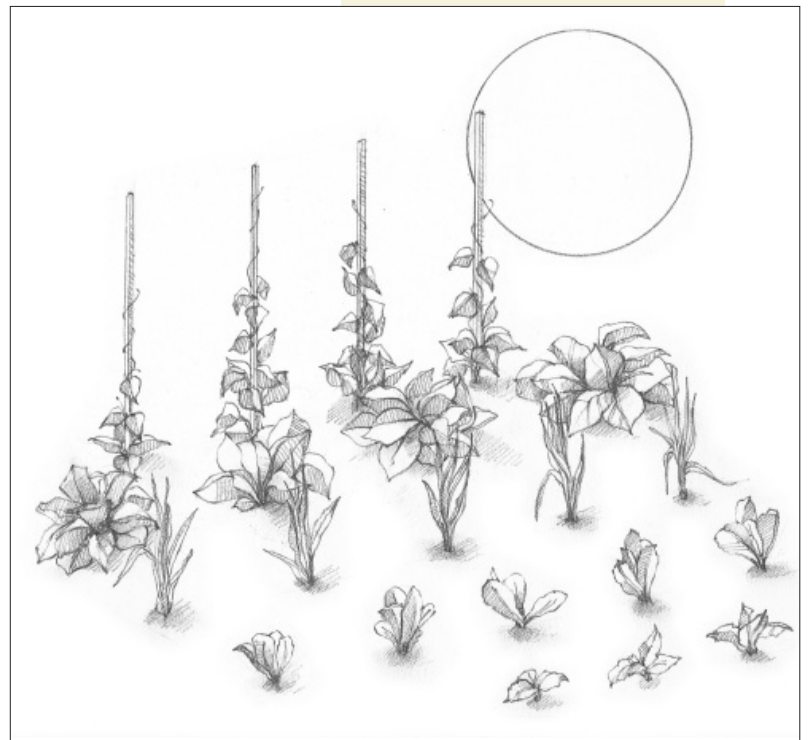
Water. Choose a place for your garden that is close to a source of water. You must have water to use in your garden. Even if you plan to use rainfall for water, you will need some water to use while planting and transplanting, after weeding, and during dry periods.

Sun. Find a place for your garden where the plants will get lots of sun. Energy and growth foods need full sun to be able to grow well. Protection foods need sun too, although some will grow when they are partly shaded.

After you have chosen the place for your garden, you should decide where to plant the different crops in the garden. To do this, make a drawing of your garden before you plant it.

Plan to plant the different crops in your garden so that they will get enough sun. Fruit trees, vines on poles, or tall vegetables should not be planted where they will keep the sun from getting to other plants. Smaller vegetables should be planted in rows that run from north to south to help them get the most sun.

It is a good idea to keep the drawing of your garden in a place where you can find it next year. Some plants leave the soil with more nutrients than were in it before. Other crops, such as corn, take nutrients out of the soil very quickly. You will need to grow these plants in different places in your garden each year. Having a drawing of the garden will help you do this.



Supplementary Material: Container or Patio Gardening

You do not need a plot of ground to grow fresh vegetables. Many vegetables do well in containers, especially bush or dwarf varieties. Vegetables that take up little space, such as carrots, radishes, and lettuce, or crops that bear fruit over a long period of time, such as tomatoes or peppers, are perfect for container vegetable gardens. All they need is a sunny place to grow (six hours of direct sunlight each day), soil, water, and some fertilizer.

For example, tomato, cucumber, and parsley or chives might all be together in a large (0.6–0.8 m or 24–30") summer salad container. They all have the same water and sun requirements. By late summer they may not look very pretty, but they'll keep producing into the fall.

Containers and Pots for Vegetable Gardens

Containers can be almost anything: flower pots, buckets, baskets, wooden boxes, wash tubs, plastic bags, etc. However, they should have holes at the base or in the bottom for excess water to drain out. If they are a dark color, they may need to be painted a light color so they won't absorb heat and damage plant roots. For larger vegetables like tomatoes and eggplants, you should use a five-gallon (20-liter) container. Containers half that size require more attention and water.

Soil and Fertilizer

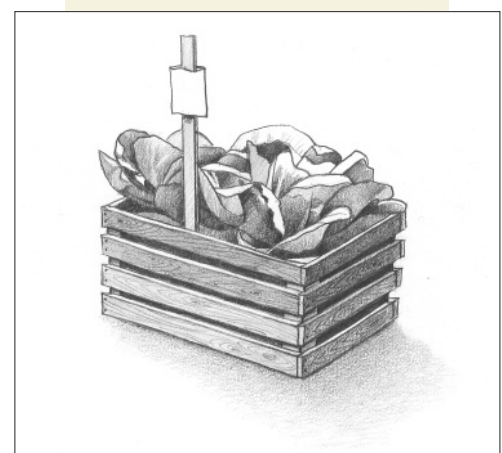
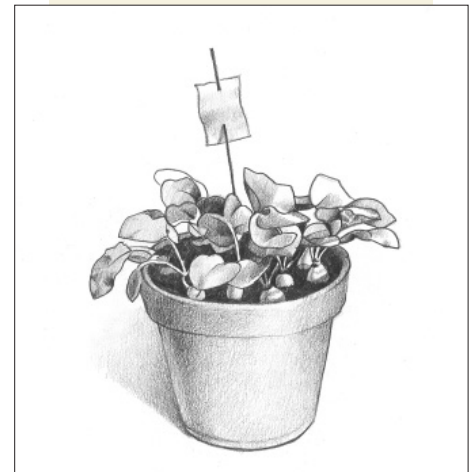
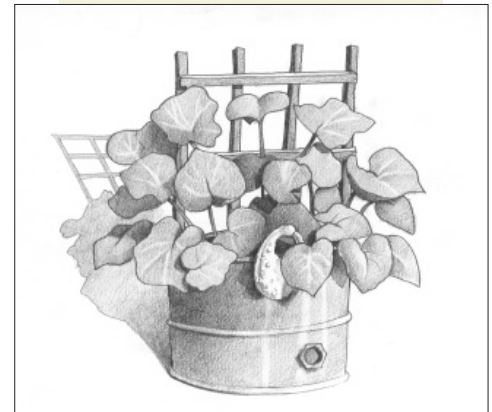
Soil can be used in the container, but synthetic mixes are better. Peat-based mixes (peat moss plus vermiculite) are relatively sterile and have the right acidity; they also allow plants to get enough air and water. You can mix one part compost to two parts planting mix to improve fertility. Use a slow-release or complete organic fertilizer to keep vegetables fed for the whole growing season.

Watering

Plants in containers always need more water than plants in the ground. And as they grow, they need even more water. Don't wait until the plants begin to wilt to give them water. Check them daily.

Seed and Fertilizer Availability

Seed and fertilizer are available at local garden supply stores. More information about growing food is available at LDS.org and other Internet sites.



Fertilizer and Compost

Fertilizer adds nutrients that plants need to grow well.

Plants, like people, need specific foods or nutrients to grow well. The soil in many parts of the world does not have all of the nutrients that plants need. To have a garden with strong, healthy plants that do not get diseases, you must add the missing nutrients to the soil. This is called fertilizing the soil.

Garden plants need three nutrients: nitrogen, phosphorus, and potassium. Plants use these nutrients quickly and need to have more of them put into the soil. You can add fertilizer that contains these nutrients to your soil. This is especially important to do in a tropical country with frequent heavy rains, since the rains wash the nutrients out of the soil. In these areas, gardens may need to be fertilized every three or four weeks.

Soil is different from one place to another. Some soil may have a lot of all three nutrients. Other soil may need more nitrogen, more phosphorus, or more potassium to grow healthy plants. Sometimes you can take a sample of your soil to a university or an agricultural agency to be analyzed. Then you can find out which nutrients your soil needs.

You can choose a fertilizer that has the nutrients your crops need.

Different fertilizers have different amounts of the three nutrients. You must know how to read the labels on the fertilizers so you will know which fertilizers to get for your garden. The amounts of the nutrients are usually listed in this order: nitrogen, phosphorus, and potassium. The numbers on the label show what percentage of the fertilizer is made up of each nutrient.

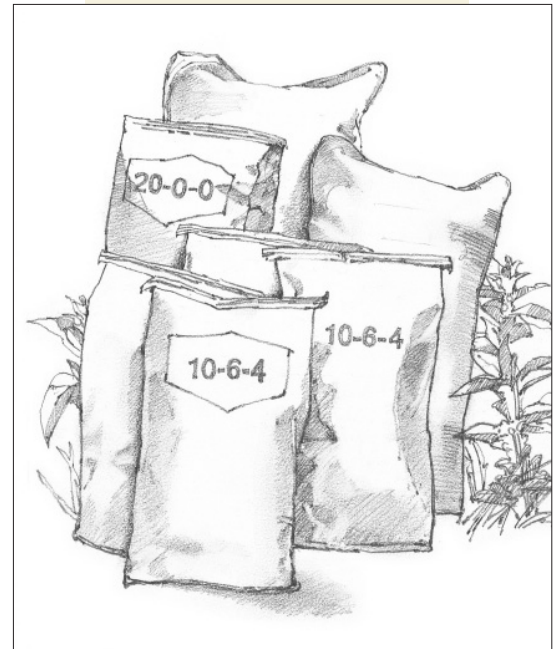
A container of fertilizer with the numbers 14-14-14 on the label contains 14 percent nitrogen, 14 percent phosphorus, and 14 percent potassium. This fertilizer would be good for fertilizing corn, sweet potatoes, and rice.

Another example is a fertilizer with the numbers 45-0-0 on the label. This type of fertilizer contains 45 percent nitrogen and no phosphorus or potassium. In most countries this type of fertilizer would be good for fertilizing leafy, dark green plants such as spinach, kale, and kangkong.

In addition to nutrients for plants, fertilizer also contains filler. Filler is sawdust, sand, or some other inexpensive material. The plants use the nutrients and not the filler. For this reason, you should be careful to buy the fertilizer with the most nutrients, not the most filler.

A sack of fertilizer labeled 10-10-10 contains a total of 30 percent nutrients; the other 70 percent is filler. A sack labeled 5-5-5 contains a total of 15 percent nutrients and 85 percent filler. The second sack has half the nutrients of the first sack and should cost only half as much. You should look for the fertilizer that has the most nutrients and the least filler.

Fertilizer may seem expensive, but it is worth the money it costs. It can make the seeds you plant produce much more food. The value of the extra food is usually much more than the cost of the fertilizer. It is usually less expensive to buy large amounts of fertilizer, such as bags of 50 or 100 pounds. Two or three families may want to buy a bag together and divide it.



You can improve the soil in your garden by adding composted mulch.

Another way to improve the soil in your garden is by adding mulch. Mulch can be made very simply. You pile natural waste between layers of soil and layers of a chemical fertilizer and allow it to decompose. This is called composting.

To make mulch in a compost pile, follow these steps:

1. Build a container one meter square and one meter high out of boards or blocks to contain the compost. Or choose an area one meter square for a compost pile. Or dig a hole one meter square and one meter deep for a compost pile in the ground.
2. In the area you have chosen, make a layer 10 centimeters high of old plants, kitchen garbage, and manure. For the plant material, you can use such things as mature plants, rice hulls, seed husks, and leaves. Do not use tree limbs, boards, bones from kitchen garbage, or other material such as grease or fat that will not decompose quickly. Do not put human feces or dog feces in the compost or use them in any way near the garden.
3. Cover the first pile with 5 centimeters of soil.
4. Spread 200 grams of ammonium sulfate (21-0-0) or 100 grams of urea (45-0-0) on top of the soil.
5. Repeat these three layers about five more times.
6. Cover the top with 5 centimeters of soil. If you have made your compost pile above ground without a container, cover the sides of the pile with 10 centimeters of soil so that no waste shows.
7. After two months, thoroughly mix the compost and cover it with 10 centimeters of new soil.

The compost will be ready to use as mulch in four months from the time it was started. Mulch can be made in less time if the pile is covered with plastic and the compost is turned once a week.

Mulch has many valuable uses in the garden. You can put it on the soil around plants to keep weeds from growing and to keep water in the soil. It can also be mixed with soil before the garden is planted.

Mulch does the following things:

- Keeps water in the soil.
- Helps the soil to drain well.
- Keeps nutrients and fertilizer in the soil.
- Helps the plant roots to get oxygen.
- Helps good bacteria to grow in the soil.

Making mulch by composting will also help you keep the area around your home free of trash. Sometimes leaves and garden trash contain weed seeds and insect eggs. Composting can destroy these seeds and eggs.

Seeds and Transplants

Make sure that you get good seeds for your garden.

Buying good seeds and plants is the best way to have a good garden without spending a lot of money. Sometimes it may seem easier to use seeds from past years or to get seeds from friends and neighbors. However, such seeds may not grow well. You will have better harvests if you get new, high quality seeds each year.

Good seeds have a high germination rate. This means that almost all of the seeds planted will grow.

You can tell which seeds are good by the way they are packaged for sale. Watch for these things:

- The package should state that the seeds are certified by the seller. This means that there are no weed seeds in the package and that all of the plants will be good.
- The package should state the germination rate. This should usually be over 90 percent.
- The package will include a date showing that the seeds have been packaged for this year.
- There will be instructions for planting on the package.

Start some kinds of seeds in a seedbed rather than planting them in the garden.

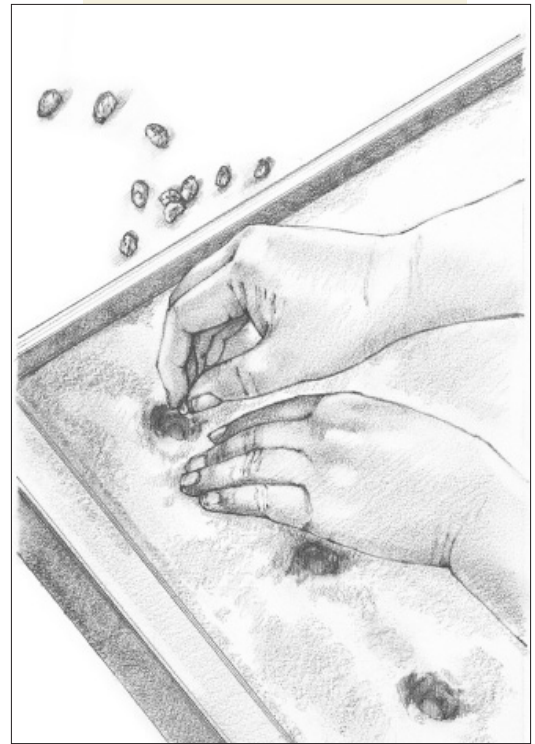
Some plants may die or be easily damaged if they are planted as seeds in the garden. You can protect these plants by planting the seeds in a special seedbed. Let them grow into young plants before transplanting them to the garden. Some plants that grow well when started in seedbeds include tomatoes, peppers, eggplants, cucumbers, squashes, and onions. You can make a seedbed in one corner of your garden, in a planter box, or even in a flowerpot. You can border the seedbed with adobe or rocks and cover it with clear plastic to protect the young plants. You should prepare special soil for the seedbed. Mix one part sand, one part good garden soil, and one part compost.

Start some kinds of plants from cuttings taken from mature plants.

Some plants cannot be started from seeds. To grow sweet potatoes or kangkong, you must put cuttings from the vine in water or in a seed bed. The water should cover a joint where a leaf emerges from the vine. When roots begin to grow on the vine, you can plant the cuttings in the garden.

To grow cassava and cane, you must have the cuttings from the woody stem of a mature plant. Let these cuttings dry for about three weeks in the shade, and then plant them directly in the garden.

Taro and potatoes can be started by planting pieces of the taro or potatoes directly in the garden.



Preparing the Soil and Planting the Garden

Prepare the soil carefully before planting.

Before you plant, clean up your garden site and the area around it. Remove any tree roots, rocks, cans, bottles, boards, or other trash. You can kill grasses and weeds with herbicides, but these are expensive and must be used exactly as the directions say. Most families will need to pull out weeds and grasses by hand.

Your soil must be loose and easy to work with. Then water will drain through it well and not stand around the crops' roots. If the soil sticks together too tightly, you should add plant or animal material such as leaves, rice hulls, cottonseed hulls, or compost. Mix these things well with the soil. Then make the area as level as possible, and break up the soil so that it is fine enough for planting.

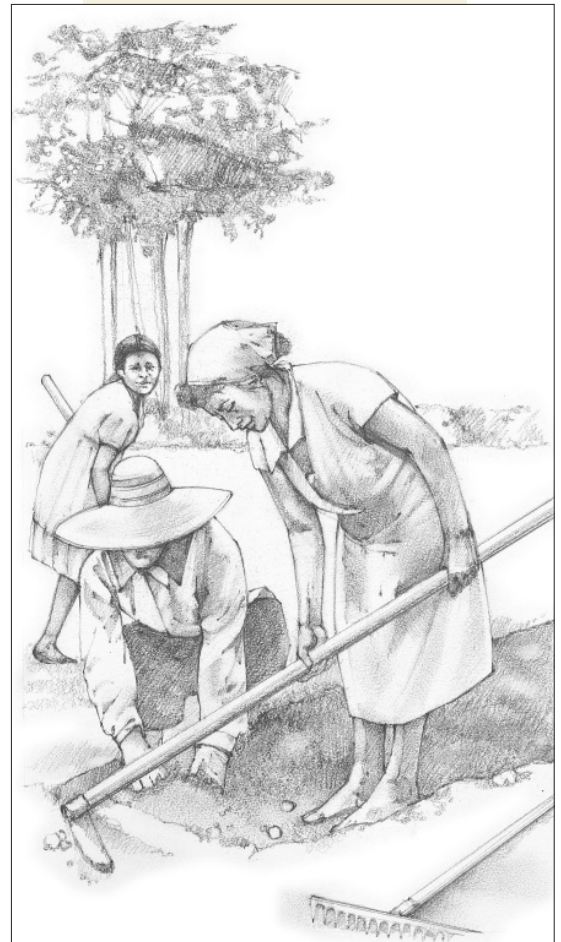
Plant your seeds at the right distance under the soil and away from each other.

Every kind of seed must be planted at a different depth and distance from other seeds. Most good seeds will have planting instructions on the package. However, a general rule is to plant seeds at a depth that is three to four times the width of the seed. Small seeds such as carrot, lettuce, and tomato seeds are planted about 6 millimeters deep. Larger seeds such as mung bean seeds are planted about 10 millimeters deep. Very large seeds such as dried beans and peas are planted about 2 to 4 centimeters deep.

It is also important to plant the seeds far enough apart so that they will have room to grow. In general, most plants must be more than 10 centimeters apart in rows that are about 20 centimeters from each other. Carrots, lettuce, and onions are this kind of plant. Some larger plants such as tomato, eggplant, and cabbage must be planted 30 centimeters apart in rows that are about 100 centimeters from each other. Plants that are too close together will shade each other and take too many nutrients out of the soil.

Carefully transplant plants from seedbeds.

When you transplant plants from seedbeds, you must be careful not to damage the roots. First dig holes large enough for the roots in the soil that you have prepared. Dig the plants from the seedbed one at a time. Try to keep a ball of soil around the roots of the plant as you remove it. Plant it immediately in the hole that has been prepared. Set the plant a little deeper in the soil than it was in the seedbed. Then water it with about one-fourth liter of water.



Maintaining the Garden

Keep your garden free of insects, snails, and slugs.

To have a good crop, you must control pests in your garden. In most tropical countries, there are many insects that reduce the crop or destroy the garden. Slugs and snails must also be kept out of the garden.

You can do the following things to keep pests out of your garden:

1. Get rid of places in and around the garden where pests can live. Insects can live in weeds around the garden. Trash, weeds, or dead leaves from garden plants are food for snails and slugs. Remove these things.
2. You may wish to spray your garden regularly with an insecticide. Most insecticides are in liquid form. Dilute the insecticide by carefully following the instructions on the bottle. Spray it with a hand sprayer onto the plants in the garden. Follow instructions carefully.
3. If there are plants around the garden, spray them at the same time you spray your garden. If you do not, the insects will move from these plants back into your garden.
4. Do not use insecticides around children, and keep all insecticide containers out of the reach of children. Throw away empty containers (but not in streams, lakes, or ponds), and do not use them for other things.
5. Do not immediately pick and use vegetables that have been sprayed or dusted with an insecticide. Carefully follow the instructions on the container for waiting a certain time before picking the crops.
6. Insecticides will not kill slugs and snails. You may be able to control them by picking them off plants by hand. You may also use bait that you leave on the ground for the slugs and snails to eat. Talk to local specialists to find out which bait is best for your area. You will need to put out more bait after a certain length of time. This bait is dangerous to humans and animals.
7. Some tropical soils contain pests called nematodes or wire-worms. These pests attack the roots of crops and either reduce yield or destroy the crops. Talk to local specialists to find out if nematodes are a problem and how you should treat them.

Keep your garden free of weeds.

You must do all you can to keep weeds out of your garden. Weeds use nutrients and water that the crops need. They steal fertilizer and keep sun from getting on the vegetables. Remove weeds from your garden as soon as they start to grow. You can do this by hand or with a simple tool. However you do it, keep weeds out of your garden at all times. You may need to weed each week. You should also remove the weeds from around the garden to keep them from dropping seeds into the garden area.



Make sure your garden gets enough water.

Plants need water to grow. When they do not receive rain regularly, they begin to wilt in the hottest part of the day. This means that they grow slower and produce less. They are weaker, so insects and bacteria can hurt them more easily. If you see your plants start to wilt, water them very well. The water should reach below the plant roots. You can make a sprinkling can by punching holes in the bottom of a clean can. If necessary, carry water from a nearby river or pond. Use compost or mulch to help the soil hold water.

Fertilize your garden regularly.

The amount of fertilizer you should put on your garden depends on the kinds of plants, the type of soil, and the climate. In general, however, you should use about 150 grams of fertilizer for each meter of a row.

Do not place fertilizer next to seeds when planting. Put it beside the row after the plants come up (usually two or three weeks after planting). The fertilizer should not touch the plants. It should be at least 5 centimeters from the plant but not more than 10 centimeters away. Work dry fertilizer into the soil with a sharpened stick or hoe. If you do not, the rain may wash the fertilizer away.

You can also use liquid fertilizer. To do this, dissolve 3 tablespoons of fertilizer in 4 liters of water. This will fertilize 30 centimeters of a row or the stems of three large plants such as corn, sweet potato, or tomato. Liquid fertilizer should also be used with plants in seedbeds about two weeks after planting.

In most tropical countries, you should put fertilizer on your garden every three weeks until the plant flowers.

Harvest food regularly.

The plants in the garden will be ready to pick at different times. Someone with experience can help you know when to pick your crops. Generally, plants like lettuce need to grow about 30 days, plants like tomatoes need three months, plants like sweet potatoes need five months, and plants like taro and cassava may need a year to produce their starchy roots.

You should regularly harvest crops such as cucumbers, beans, and summer squash so they will produce more.

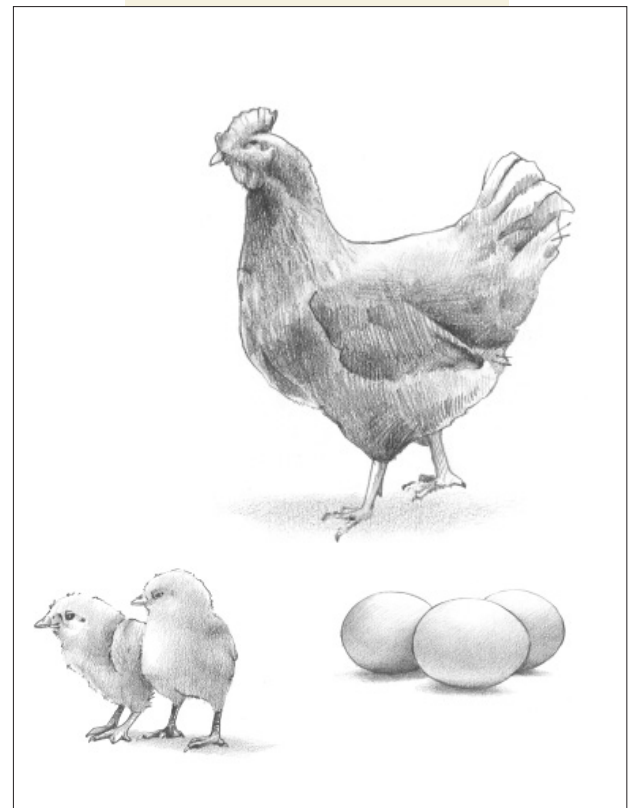
When you pick crops and remove old plants, you will have room to plant more crops.

Small-Animal Production

Small-animal production can provide a family with a good protein source and some income.

Animals best suited to small-scale production include chickens, rabbits, guinea pigs, and goats for the following reasons:

- Small-animal production is less likely to upset the food production balance that may be used for meeting other basic family needs.
- Small animals cost less individually for families whose focus is not on producing food to sell.

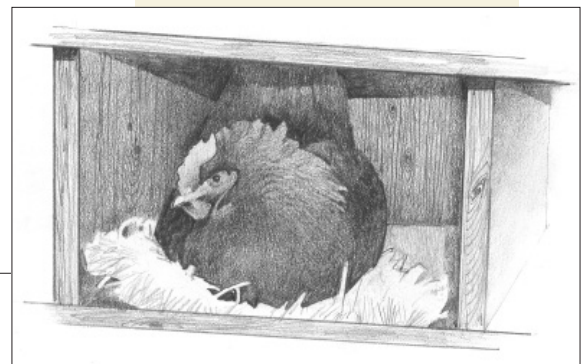


- The short time to get small animals into production reduces the risk of loss and the time needed to receive benefits.
- The minimal feed requirements for small animals fit well into the limited resources of families.
- Small animals individually yield smaller quantities of animal products. The yields of eggs, milk, or meat more closely match the daily needs of a family and do not require refrigeration.
- Children and adults with special needs can be involved in the management and care of small animals.

Because chickens can live and are eaten in nearly every country and culture in the world, some basic principles of home production of chickens are given below.

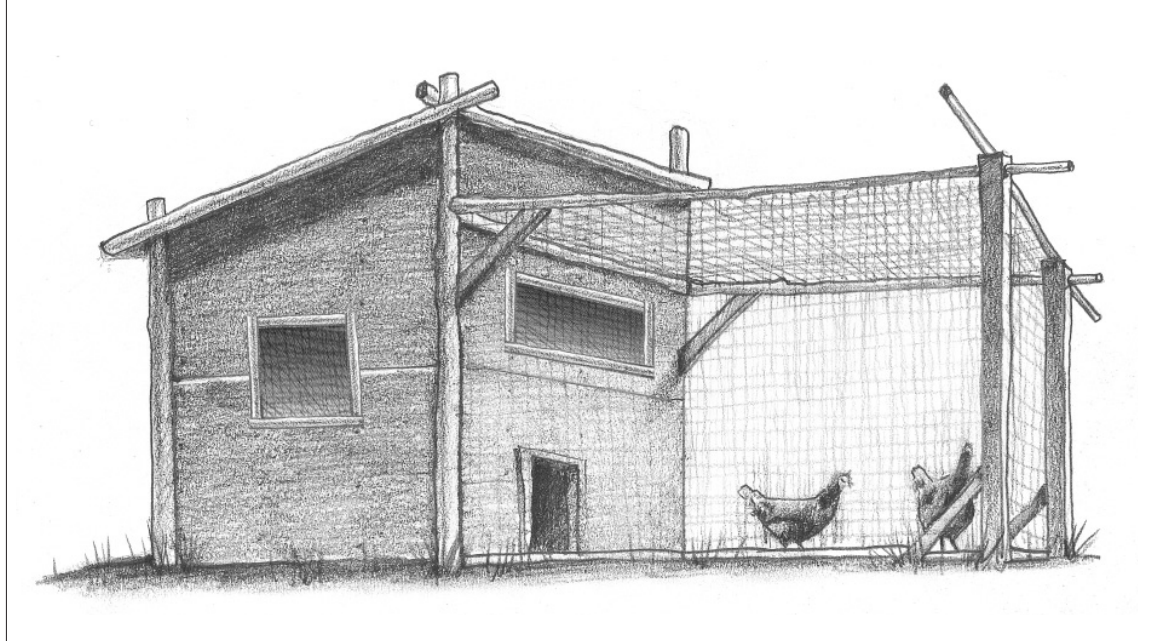
Chickens can be raised at home all over the world.

Chickens are a good source of eggs and meat. They are the most simple food animal to raise at home. After hatching, healthy baby chicks will begin laying eggs at 20 weeks. Chickens in good health will lay eggs three days out of four for 18 months. They are easy to care for and have four basic needs: clean feed, clean water, a clean coop, and a safe roaming area.



Clean Feed

Chickens will eat many things, including plants, seeds, insects, and scraps from the home, such as meat, fruits, and vegetables. They do best when they have a good source of grains, such as corn, on a constant basis. Almost all areas of the world have agricultural supply businesses that sell chicken feed that has high grain content and is usually supplemented with critical nutrients (proteins, minerals, and vitamins). Chickens also need grit (small crushed rocks) to help them grind and digest food. Chickens that have a roaming area can usually find the grit they need.



Clean Water

Chickens need a constant source of clean water that is easily available. Their water source should never be allowed to dry up. Hens that are laying eggs need a constant supply of water.

A Clean Coop

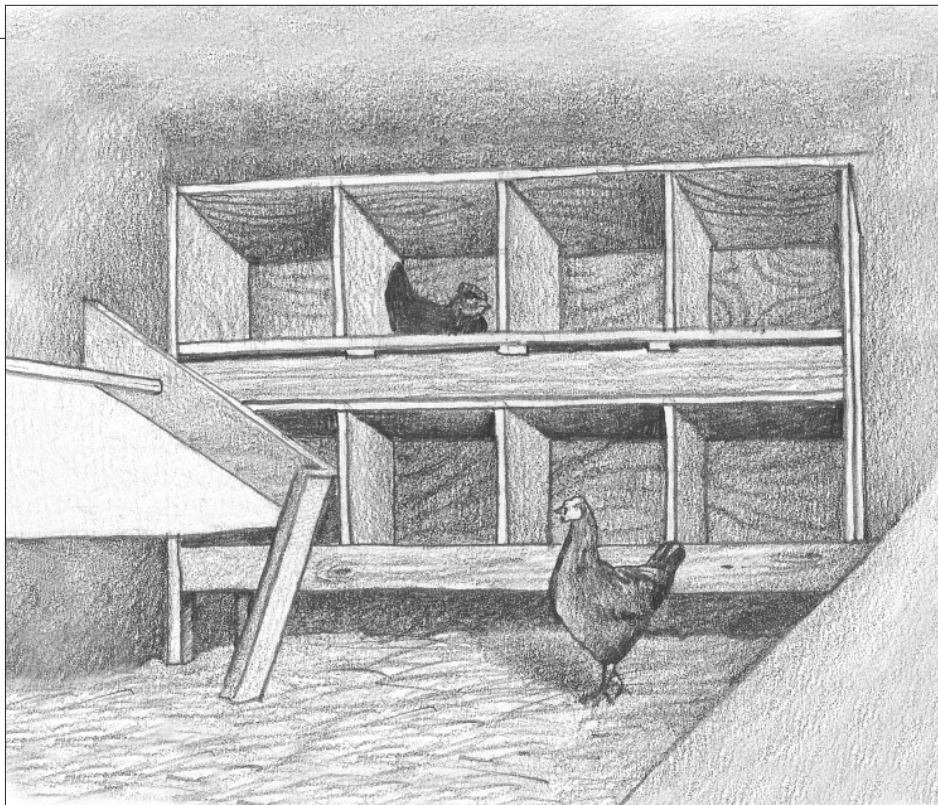
Chickens need a safe and relatively clean place to lay eggs and roost (rest and sleep). The coop needs to be secure so animals can't get in to kill the birds or disturb their food and water. A small shedlike structure can provide protection from bad weather, a supply of fresh air, ventilation, and easy access for you to work in while feeding and watering the chickens and collecting their eggs. There needs to be at least two to three square feet (0.2 to 0.3 square meters) for each bird in the coop.

Inside the coop the chickens need nesting boxes with straw or other similar material where they can rest and lay their eggs on a soft, clean surface. Chickens also require roosts where they can sit and sleep. There should be at least one nesting box for every two hens, and there should be two linear feet (0.6 meters) of roost for each bird in the coop.

Safe Roaming Area

Chickens need room to get out of the coop for fresh air and sunshine and to scratch for food in the soil. The roaming area can be made by attaching a wire run to the coop so the birds can get out of the house but not have free range. Chickens need at least three to four square feet (0.3 to 0.4 square meters) of space for each bird in the run.

Another option is to let the chickens have free range outside of the coop during the day without being restricted by a run. Birds quickly learn to go inside the coop in the evening for protection, but the coop must be secured nightly or animals will get inside and kill the birds.



How to care for baby chicks during the first 60 days.

Baby chicks have special needs but grow fast. With a little attention they can provide the beginnings of an ongoing supply of the high quality growth foods meat and eggs (see pages 29–30).

When caring for baby chicks, consider the following:

- A young chick brooder (housing) can be as simple as a sturdy cardboard box or a small animal cage.
- The flooring (bedding) can be wood shavings, straw, or grass.
- The temperature needs to be controlled between 90 and 100 degrees Fahrenheit (32–38 degrees Celsius) for the first week and then should be decreased 5 degrees Fahrenheit (3 degrees Celsius) per week until normal room temperature is reached. A 100-watt bulb or heat lamp in the center of the brooder allows chicks to gather in a comfort zone. If the chicks crowd under the lamp, the brooder is too cold. If they have moved away and are panting, they are too hot.
- Food and water needs are met simply by chick starter feed from the local agricultural store and a small chick waterer.
- Outside time can be provided by creating a safe area near the home where the chicks can explore and scratch. Make sure you can catch them when it's time to come in.
- Vaccination will help prevent the chicks from getting sick. Chicks should be vaccinated for Newcastle disease at 6–8 days of age and against fowl pox at 8–12 weeks.

Hens need 14 hours of light per day to lay eggs each day.

When daylight hours are short, use a 25-watt lightbulb in the coop to maintain laying. Don't leave the light on all night or use a bulb that is too bright, or birds will start to peck each other. If you choose not to use a bulb to maintain light, the chickens will be fine, but they will not lay eggs every day and they may begin to molt. Molting is a time when chickens lose their old feathers and start to grow new ones. They will stop laying eggs during this time.

