

**Sustainable Livelihoods
for Rural Youth Project**



Improved kokorako keeping

**Breeding and keeping kokorako for
food and market in the Solomon Islands**

**Russ Grayson
Fiona Campbell**



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market in the Solomon Islands**

**Russ Grayson + Fiona Campbell, editors, 2004.
Based on the training manual,
Kai Kokorako, by Russell Parker.**

Improved kokorako keeping

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Author

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Graphics

Illustrator Stephen Bill Amasi,
Kastom Gaden Association,
Solomon Islands

Photography Russ Grayson

Design

Fiona Campbell TerraCircle Association Inc

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Contributors...

Russell Parker, Tenterfield, NSW, Australia.

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Improved kokorako Keeping follows the content of the training manual and includes other material.

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Information about Kastom Gaden Association:
www.terracircle.org.au

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PREFACE

Improved Kokorako Keeping is a handbook for trainees in the Kastom Gaden Association Sustainable Livelihoods for Rural Youth Project.

The project was funded by AusAID between 2002 and 2004 to assist rural youth in the Solomon Islands establish income-earning projects as part of post-conflict reconstruction.

Improved Kokorako Keeping is a training module in the project. Other modules and handbooks include *Agroforestry* and *Pig Farming*.

Introduction...

KOKORAKO IN SOLOMON ISLAND VILLAGES

Most villages in the Solomon Islands have kokorako but the birds do not produce many eggs. Sometimes, the eggs are hard to find because the kokorako do not have a special place for laying them in a kokorako house.

Village kokorako do not produce much meat because they are not fed a balanced diet and are not cross-bred with imported kokorako.

Traditional village kokorako:

- are free range — they are not kept in a house, so predators can kill them
- are not given special food — they have to find their own food which may not be enough
- they spend most of their time raising chickens rather than laying eggs.

Improved kokorako keeping

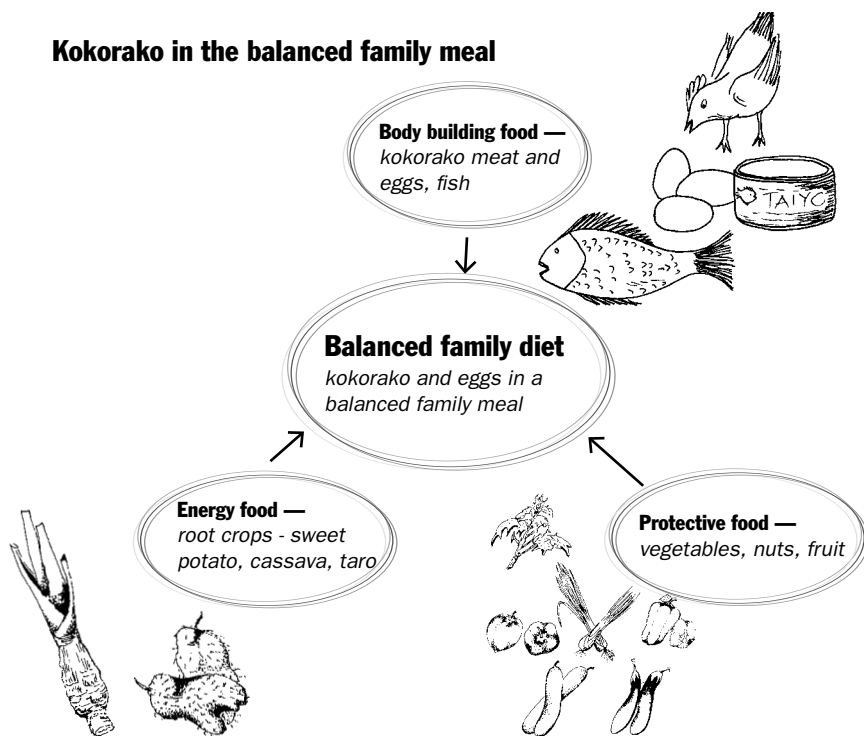
When we improve how we keep kokorako in the village:

- we can produce more eggs and kokorako meat; this will improve the family diet by providing us with body building (protein) foods; body building foods are eaten with:
 - energy food (carbohydrate) and
 - protective food (vitamins and minerals)
- a small business can be started by selling surplus eggs and kokorako.

We can produce more eggs, kokorako meat and young kokorako if we:

- cross-breed our village kokorako with imported types
- give our kokorako a balanced diet
- make a special house for the kokorako where they can shelter and lay eggs
- check our kokorako regularly to make sure they are healthy
- provide all that our kokorako need to live healthy lives.

Kokorako in the balanced family meal



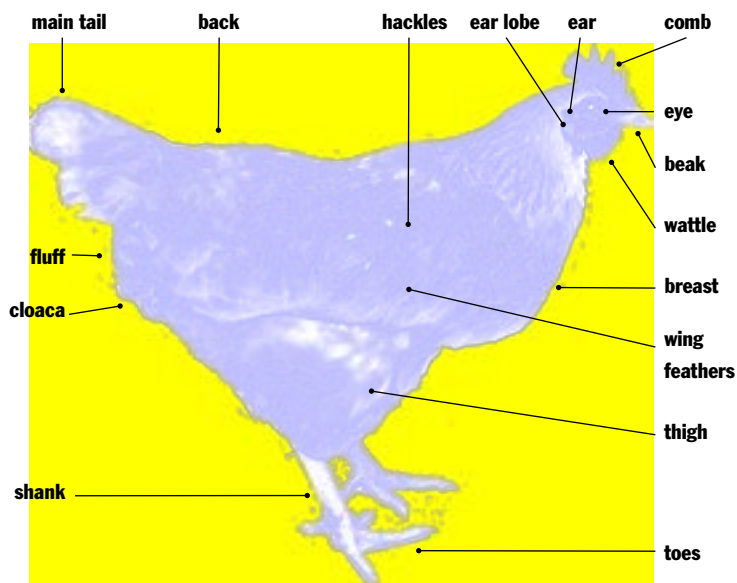
Kokorako meat and eggs provide body building food (protein) and, with energy food (carbohydrate) and protective food (vitamins and minerals), provides a balanced diet and nutritional health to the family.

Extra kokorako can be raised to produce surplus eggs and meat for sale at market.

THE HEN AND ROOSTER... their parts

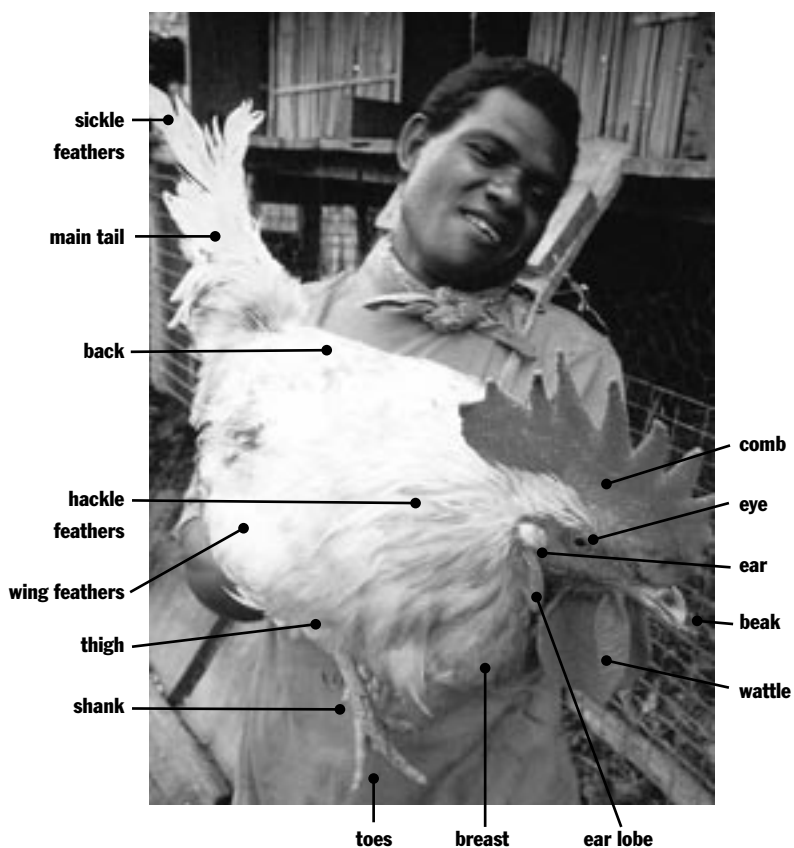
The hen... parts of the hen

The hen is the female kokorako.



The rooster... parts of the rooster

The rooster is the male kokorako.



CHICKEN—KEEPING TERMS

This list of terms was produced by Russell Parker.

Bantam	Usually refers to miniature fowls. Many village fowls are almost bantam size
Birds	Another term for chickens or poultry
Broiler	Young chickens specially fed and housed for meat production
Brooding	Raising of chickens from hatching until they have their own feathers, either under a mother hen or artificially with a lantern or electric light bulb for warmth at night
Broody	Hen is ready to sit on eggs to hatch them
Camouflage	Difficult to see or find by blending into the colours or patterns of the background
Chicken	American term for fowl or hen. English/Australian term for young fowl from hatching until approximately 8-10 weeks of age, when the sex of the chicken are known and they are referred to as cockerel or pullet.
Cloaca	The large opening at the end of the intestines where the droppings or manure comes from
Clucky	A hen that is ready to sit on a nest of eggs to hatch them
Clutch	A group of eggs laid by a hen
Cockerel	Young male fowl to 12 months of age
Cock	Male fowl over 12 months of age
Compost	Stored vegetable, leaf, and tree matter specially gathered to mix together while rotting to place on gardens to improve soil. Called 'sapa' in some parts of the Solomon Islands
Culling	Selecting unwanted animals from a group to kill for meat or sale
Droppings	Manure or waste from the chicken's body
Feral	Any domesticated bird or animal that has escaped or allowed to run wild
Flock	A group of birds or poultry
Forage	The hen searches for insects, grit and greenfood
Free choice	Different foods are supplied separately so that fowls can choose what they need
Free range	Poultry are allowed to wander

Greenfood	Green vegetable, leaf and grass are important parts of poultry diet
Grower	A person who grows chickens
Hen	Female fowl from 12 months of age
House	A shelter especially made for poultry
Husbandry	The care and management of animals
Hybrid	The crossbreeding of plants, birds or animals for a particular purpose. eg. kokorako specially bred for meat or egg laying
Incubation	The hatching of eggs either under a hen or artificially
Jungle fowl	The original wild species of fowl called Santa Cruz fowl in the Solomon Islands where it still lives freely
Kai	Solomon Islands Pidgin for 'to eat; or 'food'
Kokorako	Solomon Islands Pidgin for 'chicken' or 'fowl'
Manure	The waste or droppings from a chicken
Pen	See house or cage
Perch	Horizontally placed sticks in a poultry house that allow the birds to roost off the ground as they would if they lived in the wild
Poultry	Chickens, fowls, geese, ducks, turkeys etc are all poultry
Predator	Any bird or animal, which preys on another
Pullet	Hen to 12 months of age
Roost	The natural instinct of fowls to sleep up in branches of trees. This is artificially provided in pens and is also called a perch
Rooster	Male fowl over 12 months of age
Set	Natural process of a hen sitting on eggs until they hatch (see also Clucky)
Setting	Can mean a collection of eggs ready to be hatched or actually sitting on the eggs
Sitting	As above
Stock	Collection of animals such as poultry
Strain	Various breed varieties or different breeding backgrounds
Unit	Group or collection
Vent	Hole at the back of the kokorako where the waste comes out, eggs are laid and where the sex organs are located
Waterfowl	Poultry such as ducks and geese, which prefer to live on or near water
Yard	Fenced areas to hold animals

BREEDING KOKORAKO

Breeding our own chickens:

- saves money because we do not have to buy young chickens from other breeders
- lets us quickly build up the numbers and quality of our local poultry through selective breeding, correct feeding and captivity.

Local village kokorako

Village hens have become smaller over the years because they have been allowed to wander freely and to breed with little care. They are a smaller, more compact breed so they do not eat as much as larger imported fowls but still produce lots of eggs.

The local kokorako is an active forager and shows great interest in any food scraps thrown to it. It will adapt well to the free choice feeding system described later in this handbook.

A frizzle - a local breed of small size and upright feathers



Because of their tight feathering and more active nature, village kokorako may be more successful breeders than imported chickens and may continue to breed to a greater age.

Good feeding and management of village kokorako will produce better meat and eggs.

Number of chickens for a family

Depending upon the size of the family you can start with five to ten hens and one rooster. A mix of village and imported kokorako will suit a large extended family.

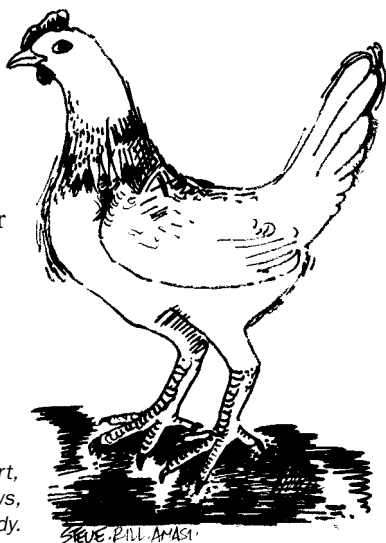
Keep both village and imported hens together:

- females of the village kokorako will provide broody hens throughout the year
- the imported hens will lay more eggs.

Imported breeds have been available for years. It is not necessary to import more. If the local village kokorako are given better feeding and management they can produce good results almost immediately.

For best results:

- keep the kokorako in pens for most of the day
- feed them properly
- breed correctly.



The ideal Pacific Island hen is alert, has strong beak, legs and claws, tight feathering and a compact body.

SELECTING HENS FOR BREEDING

Cross-breed local and imported varieties

The small local kokorako can be cross-bred with imported kokorako to make a hardy, productive breed. The resulting kokorako will be hardy like the village chicken but will produce more eggs and meat.

Imported kokorako have bigger bodies and lay more eggs. These good points are passed on to your cross-bred kokorako.

- local or village kokorako are adapted to the climate and foods of the Solomon Islands; that are a hardy breed
- imported kokorako are bred to produce a lot of eggs and meat.

Choosing kokorako for breeding

The main features we look for in breeding kokorako include:

- chickens that are active and search for their own food
- strong and healthy young fowls
- good egg layers
- good broody hens.

In selecting local village chickens for breeding you should look for:

- alert eyes and strong beak
- strong legs and claws for foraging for food
- tight feathering; tight feathers are better in the hot weather of the Pacific islands than the fluffy imported chickens which feel the heat and need to drink more water
- compact body; needs less food and can fly easier to escape danger.

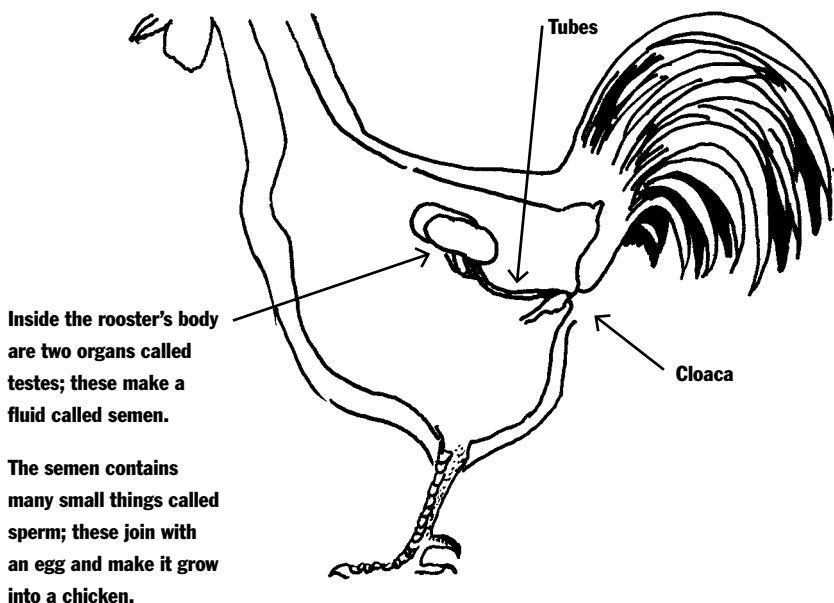
DIFFERENCES BETWEEN ROOSTERS AND HENS

The breeding rooster

The male kokorako is called a rooster or cock and the female kokorako is called a hen. You must always have a healthy rooster with your hens to make sure you get good quality fertilised eggs for breeding.

The rooster, which is kept with the breeding hens, should be young and healthy so he does a good job of guarding the hens and fertilising their eggs with his sperm.

The rooster: male organs



The difference between roosters and hens

It is difficult to tell the sex of baby chickens because their sex organs are very small and located inside their body.

You have to look closely at growing chickens to be able to tell the males from the females.

Roosters:

- young roosters (cockerels) grow faster than young hens
- cockerels might show brighter colours in their feathers
- roosters are larger and may have more elaborate feathering and colouring than hens.

Hens:

- young hens (pullets) are much slower to develop their combs
- young pullets might grow plain-coloured feathers.

Young hens



EGGS: their parts and egg laying

Kokorako eggs and meat are very good sources of protein that help our bodies grow.

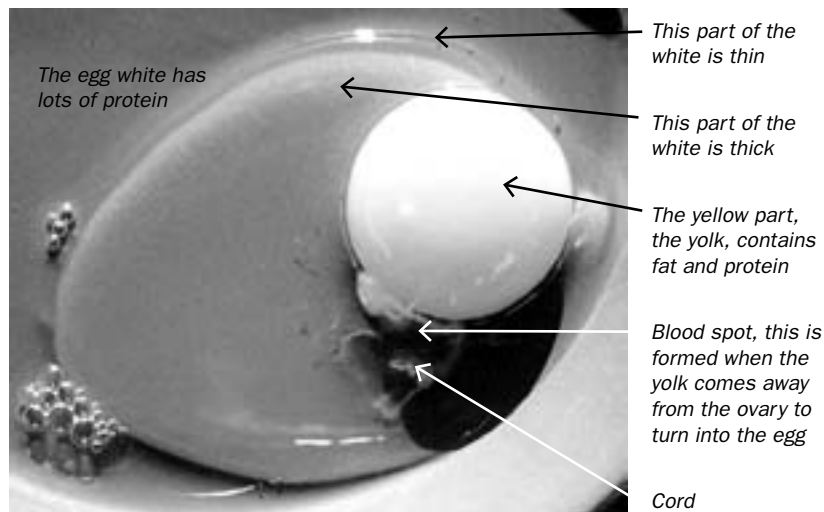
You do not need a rooster with your hens to get eggs.

To lay eggs, hens need to be healthy.

Feed kokorako to get good eggs

- green food and corn fed to kokorako helps to make the egg yolk a bright yellow colour
- shellfish and bone should be fed to help the egg shell grow.

Parts of an egg



This end is pointed



This end is rounded and is laid first. It is where the air bubble is

When do kokorako start to lay eggs?

- imported chickens may not lay until they are five or six months old
- female chickens which have not started to lay are called pullets until they reach 12 months of age — village pullets may take seven or eight months to lay their first egg — they have not been bred specially to lay eggs like the imported kokorako
- pullets eggs may be small when they start to lay; their eggs grow in size as they grow older.

Oviduct: the cords are added to the yolk here and the egg is fertilised if there are sperm

The egg white is formed; it spends 3 hours here

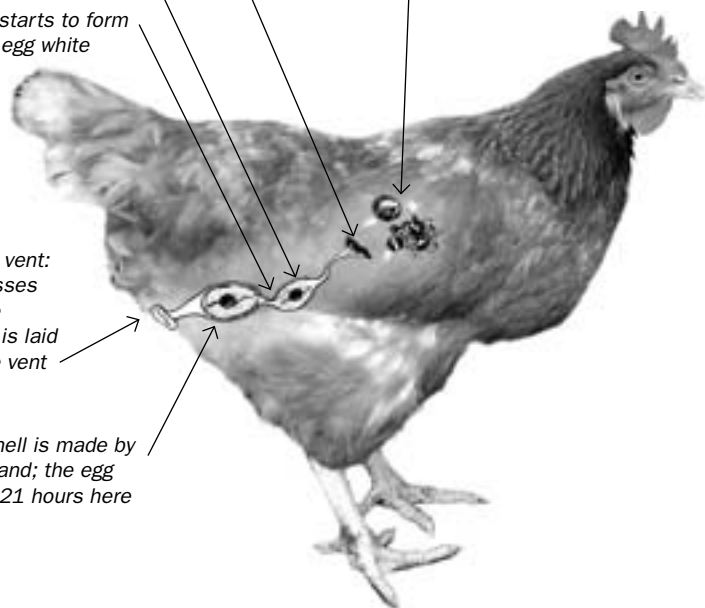
A thin skin starts to form around the egg white

Cloaca and vent: the egg passes through the cloaca and is laid through the vent

The hard shell is made by the shell gland; the egg spends 20-21 hours here

Forming and laying eggs

Ovary, here the eggs start forming (takes 7-10 days); as each egg grows it drops down a funnel into the oviduct



Making eggs

Most eggs are laid in the morning.

Each egg in a clutch is laid later than the previous day's egg until the last egg in a clutch is laid by 3pm. The hen may then have a day or so without laying.

How eggs are laid:

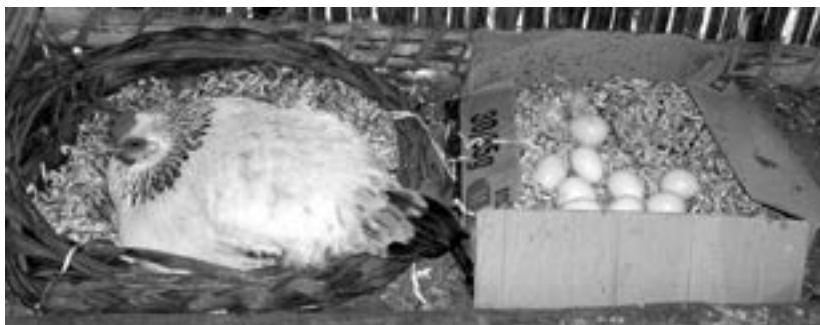
- eggs start leaving the ovary, where they are formed, with the rising of the sun
- in most hens it takes 26 hours for an egg to be made in the ovary; this explains why the hen eventually has a day off laying.

Broody hens

Village hens may decide to try to hatch eggs that are left in the nest. When they do this they are said to be 'broody'.

They may stay broody for 21 days.

They may stop laying while they are broody.



Hen (a Light Sussex) on a nest in a laying box.

The laying box next to the hen has had eggs laid in it by other kokorako.

Cut grass or similar material is put in the box so the hen is comfortable when it lays and to stop the eggs being broken.

KEEPING KOKORAKO HEALTHY

Healthy kokorako produce plenty of eggs. If we let our kokorako become unhealthy, disease could spread through the flock.

We check the health of kokorako each morning when we visit the kokorako house to collect eggs, feed the kokorako and give them clean water.

If we become familiar with the sounds and calls made by our chickens we will know if something is wrong. Listen to the sounds and think about what they mean.

Make sure that kokorako have enough space in their house. Avoid overcrowding because this can contribute to the spread of disease and destructive behaviour.

Things we can do to keep our kokorako healthy

Activity	Reason for activity
Provide medicines for kokorako	<ul style="list-style-type: none">• disease control using imported medications and vaccines costs too much for most villagers• to keep your kokorako healthy, give them proper care and food• to improve kokorako health investigate natural bush medicines used by people in villages; as kokorako breeding is developed over wider areas the investigation of bush medicines will become important to improving village kokorako health.
Control disease	<ul style="list-style-type: none">• try not to bring into your flock new kokorako that might carry disease or be too weak to resist the diseases your kokorako are used to• you can breed all your new chickens from your own flock• as imported medicines are difficult and expensive to obtain you need to make sure your kokorako are kept healthy with good food and housing

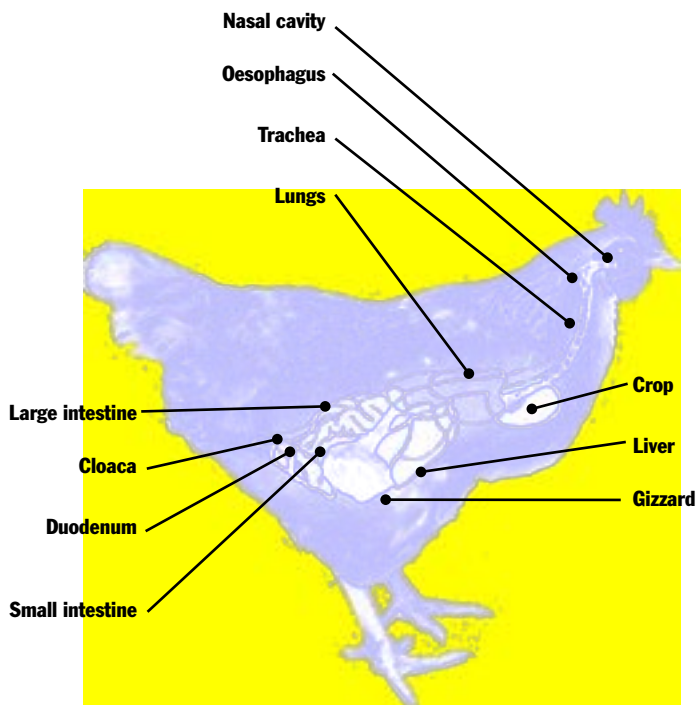
Feeding	<p>It is very important to give your kokorako the right food to maintain their health.</p> <p>They need:</p> <ul style="list-style-type: none"> • body building food (protein such as coconut meal, fish meal, leucaena meal, meat meal, soybean meal and sunflower) • energy food (carbohydrate, such as cassava, coconut — fresh, copra, corn/ maize, sago, sorghum, sweet potato and unpolished rice) • protective food (vitamins and minerals, such as leafy greens). <p>This provides kokorako with a balanced diet for good health.</p>
Kokorako house	<p>Make sure:</p> <ul style="list-style-type: none"> • the ground around the kokorako house and yard does not become stale and unhealthy • the floor of the kokorako house is cleaned regularly and the manure and other material is placed on the compost heap to use later on the garden • the floor of the kokorako house is made from gravel material to help with drainage and keep the kokorako house dry • the kokorako house is not overcrowded as this can cause illness and cannibalism.
Kokorako yard - drainage	<ul style="list-style-type: none"> • make sure water can drain away from the kokorako yard; good drainage will help prevent disease. • many island villages are located close to lagoons or beaches, so water will drain through the sandy soil • dig drains around the kokorako house to stop flooding.
Free range	<p>Allow the kokorako to free range after midday; they will forage for food that helps keep them healthy.</p>
Taming your kokorako	<p>The more the kokorako see you the quieter they will become, especially if at each visit you offer the chickens small pieces of food or vegetable scraps, soaked grain, kitchen scraps, fish scraps or garden leftovers.</p>

UNDERSTANDING KOKORAKO

Understanding the parts of a kokorako will help you care for them. It will help us know if they have any problems.

Become familiar with the sounds and calls made by your kokorako. Think about what the different sounds mean.

Inside a kokorako



What do the organs do?

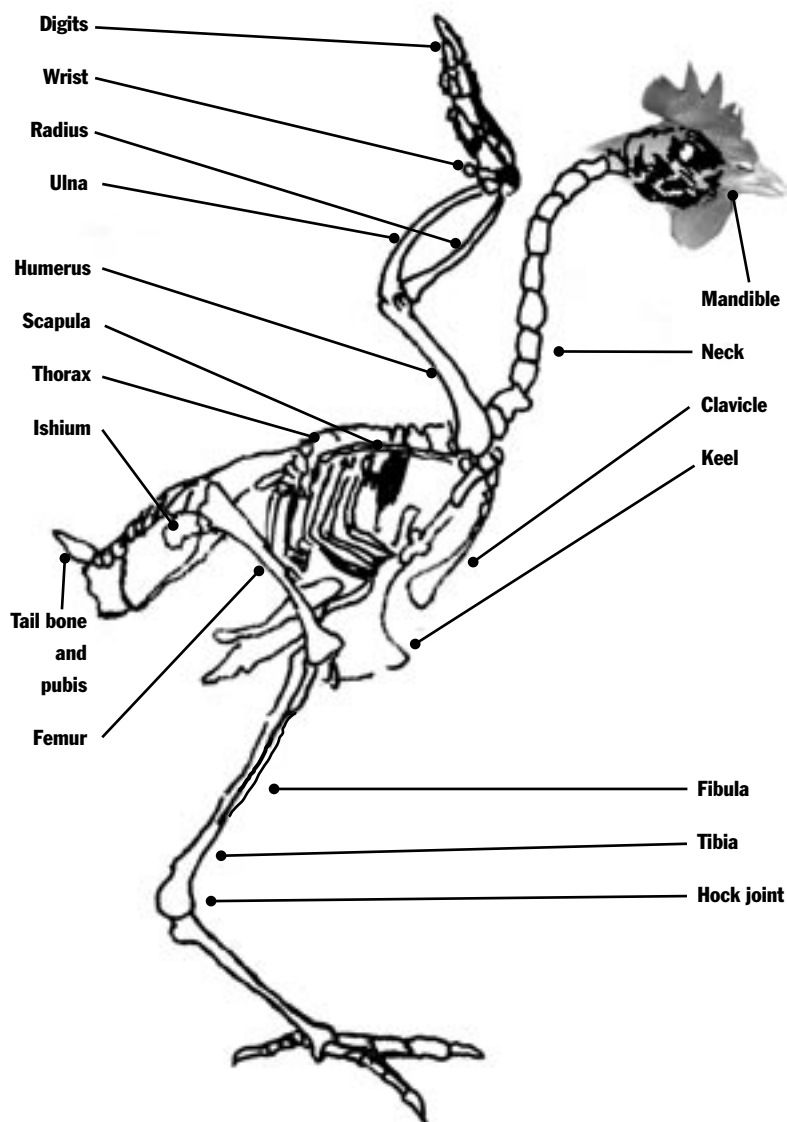
Kokorako do not have teeth. Food goes down the throat through the:

- oesophagus — tube for transporting food to the...
- crop — where food is stored and moistened and then carried through the oesophagus to the...
- gizzard — a strong muscular stomach with a rough lining; the kokorako eats grit to help break food into small pieces to then pass through the...
- duodenum — the first part of the small intestine where food is processed then passes to the...
- small intestine — the small pieces of food act with fluids from glands in its wall and bile from the...
- liver — which removes waste then the large pieces of food move to the...
- large intestine — some of the food is taken into the blood then parts of the food not digested are passed through the...
- cloaca — waste (undigested food) is passed here; urine is also passed after it has been carried from the kidneys.

Kokorako breath through their nose and the air passes through the:

- nasal cavity — behind the throat down the...
- trachea — then down to the...
- lungs — the air sacs; kokorako do not have sweat glands, so when they get too hot they let out excess heat by opening their mouth and panting.

The skeleton

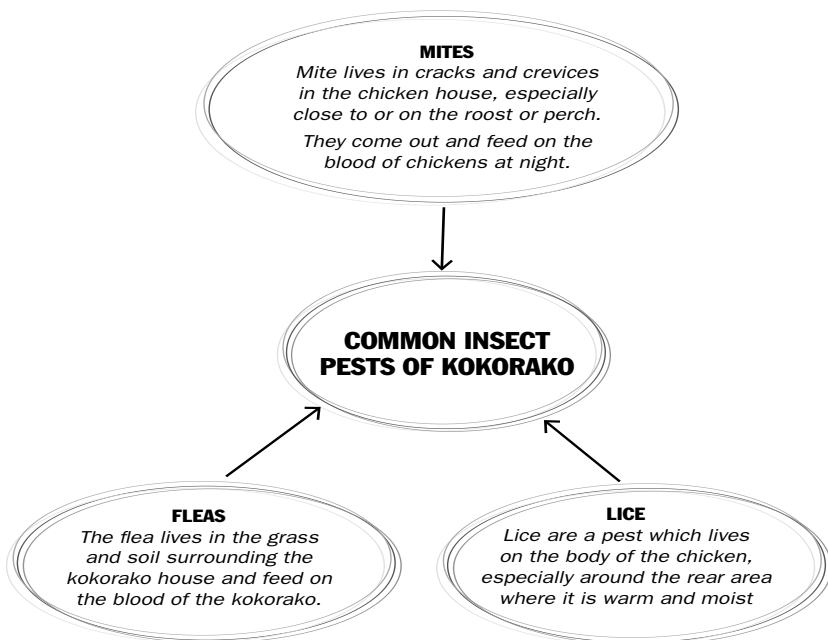


COMMON INSECTS PESTS AND PREDATORS

Protect kokorako from insect pests and predators:

1. Keep the kokorako house clean and dry to reduce lice and mites.
2. Kokorako need a place to dust bath to keep mites and lice away.
3. Allow kokorako to free range after midday to keep the birds healthy.
4. Remove uneaten food, rubbish and bush from around kokorako house to keep rats away.
5. Make sure there is someone to look after the kokorako when people go to work in their gardens. They will keep away predators like snakes and hawks and feed and water the kokorako.

Common insect pests of kokorako



How to look for signs of lice and mites

Check:

- the area around the vent; this is the most likely place to find lice and their eggs
- for mites, in the cracks of the chicken house, especially around the perches or roosts.

Solutions to reduce pest problems

- medicated powders and sprays (expensive)
- provide area for dust bath
- old engine oil or kerosene on perches
- bush medicine.

Treatment

Sometimes it is necessary to use medicated powder or sprays to get rid of the insect pests. These are imported medicines and very expensive.



Old engine oil or kerosene can be used on perches and timber. Do not put engine oil or kerosene on the kokorako's body.

Perhaps you can think of a bush medicine that can do this job better.

Check the area around the vent for lice and their eggs



*Make sure your kokorako have dry soil where they can dust bath.
Dust bathing removes lice and mites.*



Predators

Rats

Rats eat eggs and small chickens and spread pests and disease. Rat control will be a problem because of the lush undergrowth in most island areas.

Solutions include:

- the removal of all rubbish and bush near the chicken pens
- the use of poultry-friendly dogs and cats to catch the rats
- avoid over-feeding the poultry
- remove uneaten food at the end of the day to discourage rats at night
- remove all eggs from the nests in the evening unless you are waiting for the eggs to hatch.

Other predators

Hawks and snakes eat young chickens and eggs.

People will usually know these predators are around because of the noise made by the kokorako.

Villagers should make sure there is always someone left in charge of the kokorako when the people are away working in their gardens or elsewhere.

CATCHING AND CARRYING KOKORAKO

Catching kokorako

It is sometimes necessary to catch and handle your chickens to examine them or move them from house to house.

Using a net on a pole is the easiest way to catch the chicken out in the open.

If they are sleeping in the trees near your village you have to wait until it is dark to catch them.



Carrying kokorako the correct way

Carrying kokorako

Incorrect way

If carried by their feet, the chicken might flap its wings and struggle. It might hurt itself.

Correct way

A better way to carry a chicken is under your arm. This allows you to hold the legs and keep the wings from flapping. Make sure you face the rear of the chicken away from you so that it does not drop manure on you.



If carried by the feet the kokorako might flap its wings and struggle. It could hurt itself

FEATHERS AND WING CUTTING

Kokorako feathers

Chickens have four main types of feathers:

- flight feathers — the smaller feathers that fold over the front of the wing as it is extended are called ‘coverts’; the end feathers of the wing are known as the ‘primary’ feathers; the main feathers of the wing are called the ‘secondary’
- body feathers — just like our clothes, these keep the chicken’s body covered to protect the bird from the weather and from damage as they move around
- down feathers — these are the smaller, softer feathers underneath the body feathers; they help keep the body insulated from heat, cold and wet
- pin feathers — these are the start of new feathers and can be seen at any time on the chicken’s body; as feathers fall out, pin feathers start to replace them with new feathers.

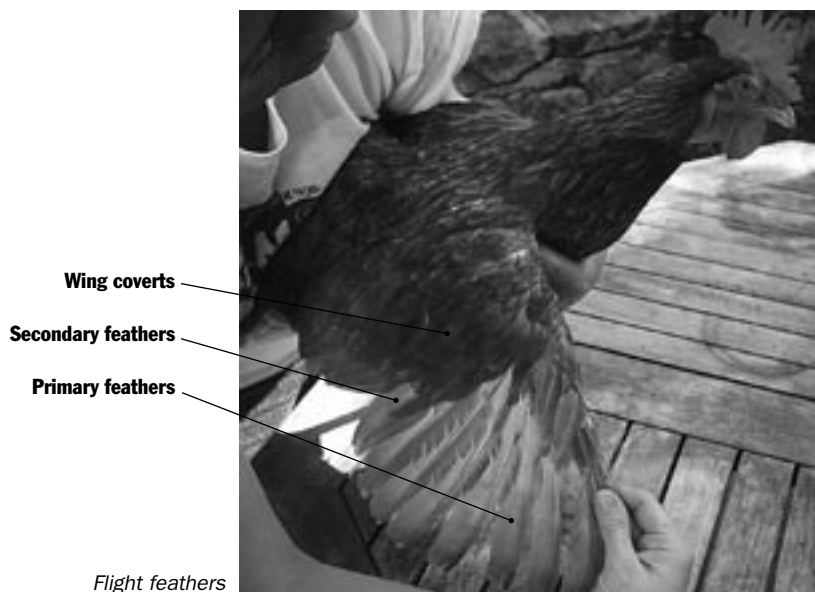


Photo courtesy E. McPeake

Wing cutting

Why cut kokorako's wing?

Wing feathers helps the kokorako to fly. Wing cutting may be necessary to stop your chickens flying outside their house or yard.

Cutting the flight feathers from one wing only will throw the kokorako off balance if it tries to fly.

Cutting the wings

- hold the chicken steady
- stretch out one wing — be careful to stretch out the wing before you cut it so you do not damage the bones of the wing
- using a pair of scissors, cut across the flight feathers on the rear section of the wing; cut off the ends of both the primary and secondary feathers on one wing.



Photo: E. McPeake

Cutting one wing — use a pair of scissors to cut across the flight feather on the rear section of the wing

MARKING BREEDING KOKORAKO

Marking kokorako when they are young makes it easy to identify any specially bred kokorako as they grow.

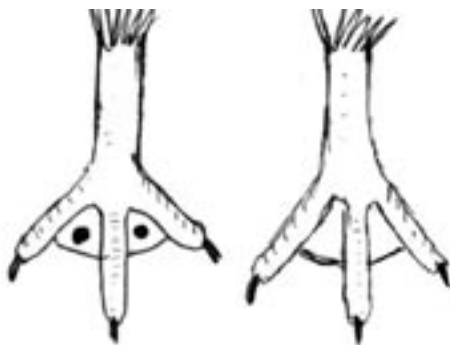
You can mark the baby chickens as they hatch.

Marking kokorako

Mark a kokorako:

- punch a hole in the webbing of the kokorako's foot
OR
- cut through the web of the foot with a knife or pair of sharp scissors.

The wound will bleed a little but the cut will soon heal.



Method 1: toe marking by punching hole in the webbing of the kokorako's foot



Method 2: cutting through the web of the foot with a knife or pair of sharp scissors

EVERYDAY ACTIVITIES

Carry out regular activities to look after kokorako to:

- reduce pests and diseases
- reduce predators — clean kokorako house
- keep kokorako healthy — provide a balance diet
- collect eggs.

Early morning

- make sure all kokorako have fresh drinking water
- check kokorako nests for eggs
- make sure the nests have plenty of soft material like rotted wood, dry grass and sand for the hens to lay in.

Mid-afternoon

- collect all the eggs and allow the kokorako to run free in their grassed yard
- provide fresh greenfood to those kokorako which cannot be let run free in yards.

Evening

- supply drinking water
- shut all kokorako in their houses for the night
- collect any late eggs from the nests so rats do not steal them during the night
- make sure there is no food left in the houses which will encourage rats to come at night
- watch for any broody hens that want to sleep on their nest instead of on the perch or roost.

Night

- this is the best time to catch any kokorako you want to move to another house or if you want to move a broody hen to her nest of eggs that you have ready.

Daily activities

- you should check through the day that your chickens are healthy and happy
- make sure they are not sick or fighting
- it will help to tame them if you offer small amounts of special food, like weeds from your garden or a sprinkling of seeds, each time you visit them
- make sure that drinking water is not spilt or made too dirty to drink by scratching fowls.



Let kokorako out of their house after midday to forage for food.

Give them small amounts of food and the kokorako will become tame.

A BALANCE DIET FOR KOKORAKO

Correct feeding of village poultry will not only improve their production of eggs and meat but also keep the chickens healthy — well fed chickens will produce good food for you.

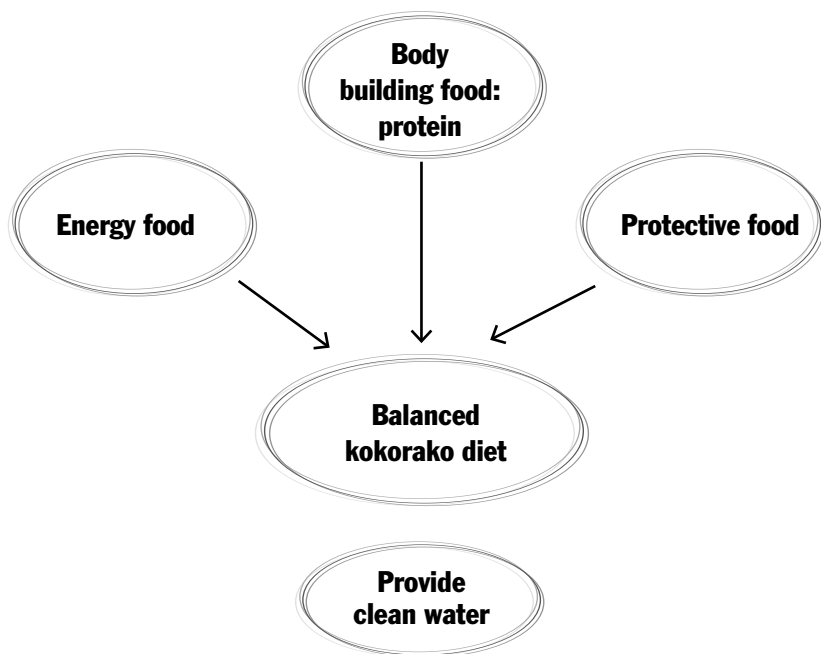
Kokorako need a mixed diet to stay healthy, just as people do.

Imported processed commercial feeds are too costly for most villagers. Locally grown grain of any sort is not really available in many island villages.

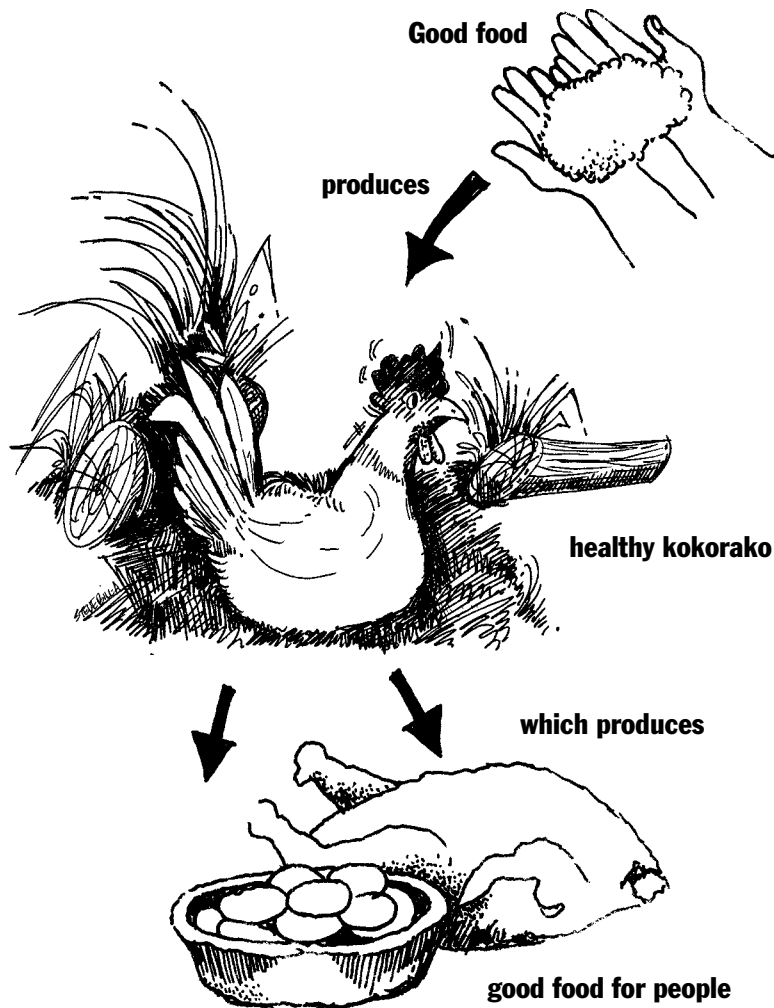
The diet for kokorako can be based on common, locally available produce.

A balanced diet for your kokorako

Just like people, kokorako need a balanced diet made up of three types of food:



Good food for kokorako

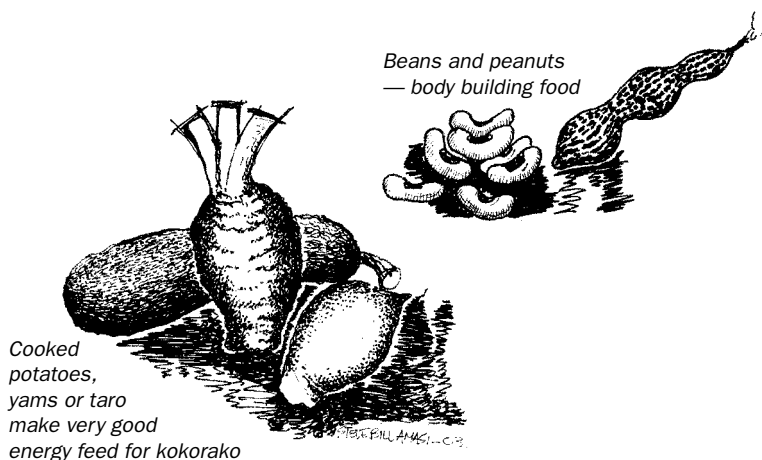


"...a scavenging hen ... lays only 30 to 50 eggs a year or up to 90 eggs a year with improved feeding and husbandry..."

Source: Spotlight FAO, UN (www.fao.org/ag/magazine/o203sp1.htm)

The three food types for kokorako

Body building	Energy	Protective
<ul style="list-style-type: none"> • cooked fishing waste; fishmeal in bags from canneries is an ideal protein source for larger poultry projects • animal offal • earthworms • insects including white ants • bean and peanut meal — make sure it is good quality otherwise it could poison your kokorako — left over copra cake from oil extraction for soap is suitable 	<ul style="list-style-type: none"> • root crops — cooked potatoes, yams or taro make very good energy feed for kokorako; root crops should be boiled to make better use of the starch • animal fat can also be fed for energy in the hot climate • sugarcane • sorghum • corn • sunflower • rice and other grain 	<ul style="list-style-type: none"> • vitamins are obtained from the fresh green leaves of plants • greenfood — green leafy vegetables, cut grass; provide access to grass yards in the afternoon • paw paw • chilli • Japanese cabbage • amaranthus



Other important foods

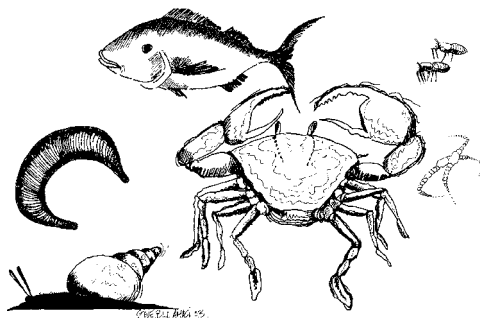
Kokorako need grit to help them digest the food they eat:

- seashell — this can be burned and crushed to provide calcium and grit for the poultry
- crushed animal bones provide calcium and phosphorous in the form of grit
- small gravel and charcoal
- salt is available from seaside pools or from seaweed.

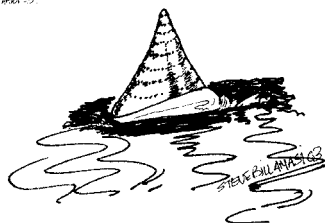
Water

Make sure your kokorako are given plenty of fresh, clean water every day.

- a water container can be placed in the kokorako yard so they have something to drink when they are released from their house
- place water containers where they will not get soil scratched into them and the water become dirty.



Live protein — body building food



Crushed animal bones and sea shells are good calcium and grit for kokorako

FREE CHOICE FEEDING

Feed from the three food groups:

- body building food
- energy food
- protective food

should be provided separately every day so the kokorako can choose their own needs. This is called free choice feeding.



Solomon Islanders using three different buckets to collect and separate food groups.

Free choice feeding can be carried out in the early morning when its cooler and the birds feel like eating.

Separate the feed

If one of the food groups is eaten quickly then you know that you should give more of that food that day.

In overseas countries where commercially mixed feed is used, the kokorako do not get a choice of what they eat. This can be very wasteful and unnecessary.

If you want to introduce new or different types of feed to the kokorako they will have to be trained to eat it first. The best time to introduce new types of feed is at the evening feed time or when you are trying to tame your kokorako.

Use local materials to make feeders

Use feed and water containers made from commonly-available materials such as carved wooden bowls, half-coconuts and split bamboo.

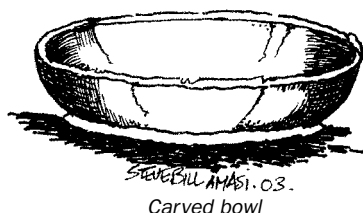
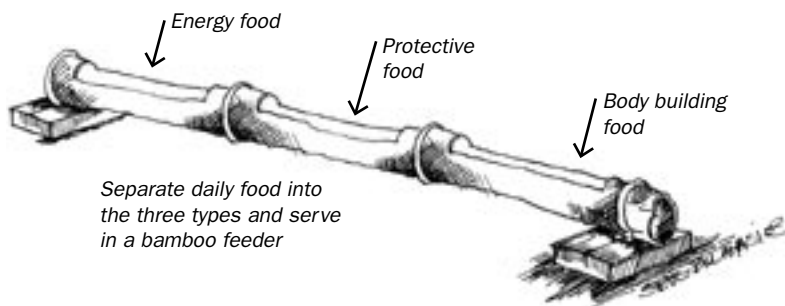
Use recycled waste materials to make feeders and help keep the village environment clean and healthy.

Place body building, energy and protective feed into separate containers.

Remove left over food from the pens every night so that rats will not become a problem.

Left over food can be placed on the compost heaps for use in the garden. If there is a lot of food leftover at the end of the day adjust the amount you give the kokorako the next day.

Feed containers made of local materials

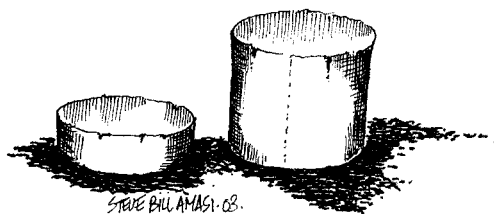


Half-coconut

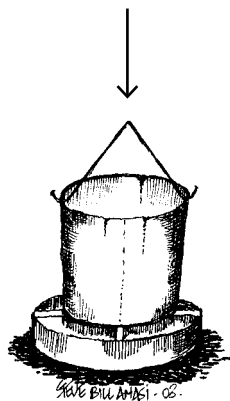
Use waste materials to make feeders

Feed and water containers can be made from waste materials such as drums, large tins, plastic containers etc.

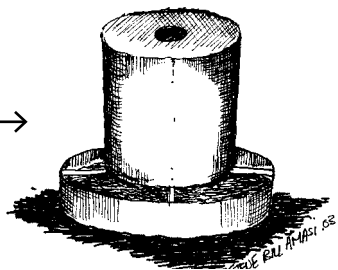
Recycling waste materials in this way helps keep the village environment clean and healthy.



Cut two tins of different diameter



Join them at the right height



Completed feeder

HOW MUCH TO FEED KOKORAKO

The diet for kokorako can come from locally grown food. The amount of food you give your kokorako depends on their age, sex and whether the kokorako is grown for eggs or meat.

Coconut, both fresh and dried (copra), will be the main food that is available on most islands. Up to 50% of feed for meat chickens can be good quality copra. Copra should make up only 30% of total daily feed to growing birds and 20% to layers.

Copra needs to be good quality otherwise it could poison your kokorako if it has started to go bad. Left over copra cake from oil extraction for soap makes a suitable energy food for poultry.

Energy food

Here is a table showing the maximum amount of energy food you can give your kokorako each day as part of their balanced diet:

Energy food	Amount of protein found in the food	Maximum daily amount to use as part of a the diet
Cassava	1%	1/2 or 50%
Coconut — fresh	8%	1/3 or 30%
Copra	7%	1/3 or 30%
Corn/ maize	9%	1/2 or 50%
Sago	1%	2/3 or 60%
Sorghum	9%	2/3 or 60%
Sweet potato	4%	1/3 or 30%
Unpolished rice	11%	1/2 or 50%

Body building food

Here is a table showing you the maximum amount of body building food you can give your kokorako each day as part of their balanced diet:

Body building food	Amount of protein found in the food	Maximum daily amount to use as part of the diet
Coconut meal	20%	1/3 or 30%
Fish meal	55%	1/10 or 10%
Leucaena meal	25%	1/10 or 10%
Meat meal	45%	1/7 or 14.3%
Soybean meal	30%	1/3 or 20%
Sunflower	25%	1/3 or 30%

Amount of food for different types of kokorako

Here is a table showing you amounts of body building and energy food you can give your different types of kokorako each day:

Age/ type	% of body building food to use in the diet each day	% of energy food to use in the diet each day	Protective food is needed by kokorako every day
Baby kokorako to six weeks	50%	50%	Make a mixture of pawpaw, greens such as cabbage, chilli, crushed shell.
Growing pullets	10%	90%	
Meat kokorako	30%	70%	
Layers and breeding kokorako	20%	80%	

Examples of the amount of body building and energy food given to meat chickens each day:

NOTE: 10% can equal one handful OR half a coconut shell full of feed, 20% can be equal to two handfuls OR two half coconut shells full of feed.

Food	Example 1	Example 2
Energy food: 70%	copra: 30%	fresh coconut: 30%
	cassava (only use 20% not 50%) 40%	sweet potato: 30%
		Unpolished rice (only use 10% not 50%): 10%
Body building food: 30%	sunflower: 30%	soybean meal: 20%
		fish meal: 10%
TOTAL:	100%	100%

TYPES OF KOKORAKO HOUSES

Kokorako houses should be well made to keep kokorako safe and healthy. They should shelter kokorako from the weather and protect them from pigs and dogs.

Kokorako houses can be built above the ground or on the ground.

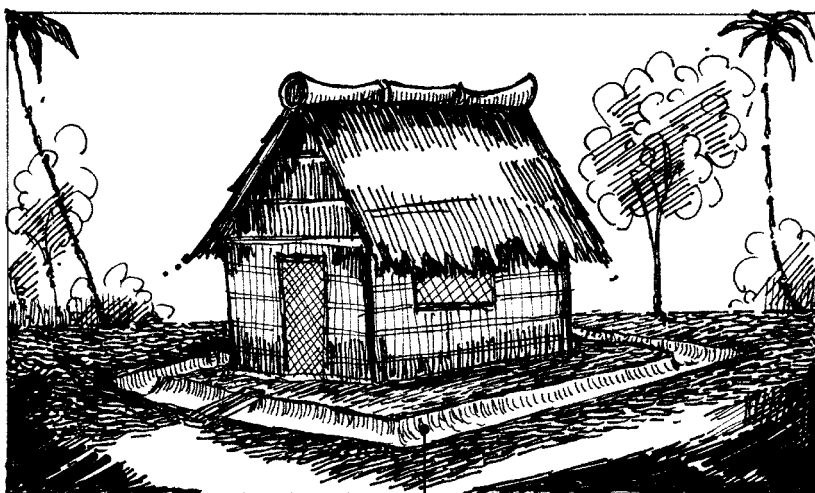
Small kokorako houses can be used to move kokorako around the garden to prepare the soil for planting.

The ground around kokorako houses should be well drained to stop the kokorako house flooding.

Kokorako house on the ground

Kokorako houses built on the ground need:

- a raised floor to lift them above floodwater
- logs around the outside to stop pigs and dogs digging under
- strong walls to stop pigs and dogs getting in.



Kokorako house on the ground

drainage ditch stops kokorako house flooding

House above the ground

Kokorako houses are built off the ground to:

- allow air to circulate underneath
- stop dogs and pigs digging into the house
- avoid floodwater.



Kokorako house above the ground

Mobile kokorako house

A mobile kokorako house is a small house that is moved around the garden and holds up to four kokorako.

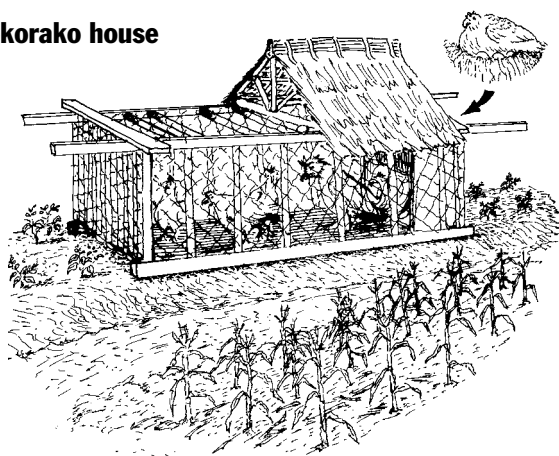
A mobile kokorako house can be constructed:

- to move kokorako around to fresh ground each day and move the shade shelter with them
- of strong, heavier material with strong bars to discourage dogs and pigs digging under the pen
- with woven sides to ensure that the chickens stay inside with their mothers and remain safe from predators.

The benefits of this type of house might be to:

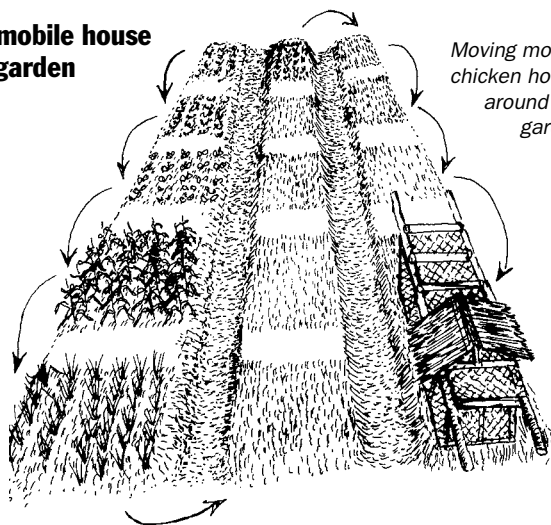
- improve the garden bed by preparing it for planting:
 - kokorako remove weeds
 - kokorako provide manure that improves the soil
 - kokorako turn and loosen soil for planting seeds and seedlings.

Mobile kokorako house



Mobile chicken house showing nesting box where eggs are laid

Moving the mobile house around the garden



Moving mobile chicken house around the garden

PREPARING TO BUILD THE HOUSE

When planning to build a new kokorako house you should ask:

- is land available to build the kokorako house close to the food garden?
- will the kokorako be safe?
- are there houses close by to guard the kokorako from thieves?
- is the land dry enough to build on?

Checklist for building a good kokorako house

The kokorako house should be:

- predator proof—the bottom half of the walls of the kokorako house should be made from strong sticks or boards to stop dogs, cats and pigs breaking in; the top half of each wall should be made from closely woven sticks or bamboo to stop the kokorako escaping and to stop cats from climbing into the house
- well ventilated
- shaded
- well drained, so the birds remain healthy and safe
- provide shelter them from sun, rain and strong wind
- built from local materials
- made with separate rooms into which kokorako of different ages can be divided
- made with windows to ventilate the kokorako house to keep the kokorako healthy and to stop smells.

Building special kokorako houses

You might have special houses for:

- young kokorako
- fattening kokorako for eating
- sick kokorako.

Houses for young growing kokorako

If possible, separate houses should be constructed on fresh ground for each batch of growing chickens. Make sure the permanent floor is cleaned to stop disease from spreading.



Special house for young kokorako... the mother hen and her chickens are separated from the flock in this small kokorako house so they get enough to food and water

Houses for kokorako kept for fattening

Any young male birds kept to fatten for eating can be kept in smaller pens so they do not have too much room to move around in and lose weight. Too much activity will reduce the condition of these meat chickens.

DESIGNING THE KOKORAKO HOUSE

Kokorako houses should be well made to keep kokorako safe and healthy.

They should shelter kokorako from the weather and protect them from pigs and dogs.

Space needed for the different age groups in a chicken house

To keep your poultry healthy and happy you need to allow plenty of space for them in their pens and houses.

When the kokorako are small, less area is needed. As they grow older and bigger, more area is needed.

Four square metres is needed for each adult bird. Measure each square metre as one man-size step by one man-size step.

Age:	Space needed:
0-5 weeks	.5 square metre
5-10 weeks	1 square metre
10-20 weeks	2.5 square metres
Adult	4 square metres

Separate your kokorako by age and size

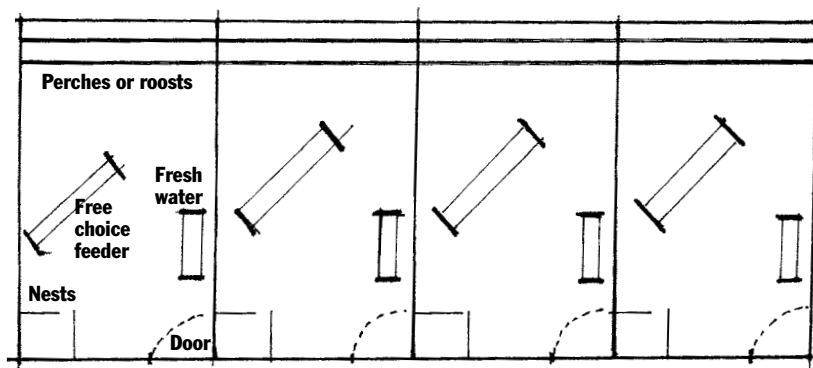
You need separate rooms for your:

- breeding kokorako
- young kokorako
- mother hen and baby chickens.

Separating kokorako into separate rooms by their age and size will make sure the younger, smaller birds get enough food and water.

Floor layout

Each house should be big enough to have five good-sized rooms to accommodate kokorako divided into breeding and growing groups. Each room has only kokorako of the same size. Otherwise, you need to build four or five separate houses.

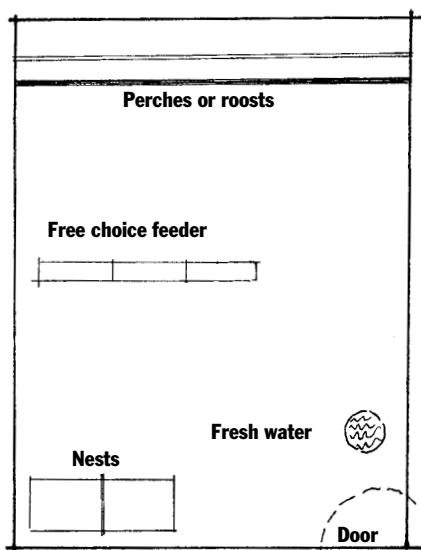


Floor layout of rooms in a kokorako house

Room layout

The room layout should be copied in each room of the kokorako house:

- perches, the free choice feeder and water container are placed close together
- the nests for laying are placed in a darker corner close to the door.



Floor plan for a kokorako room

MATERIALS FOR A KOKORAKO HOUSE

Materials for the construction of a kokorako house can be:

- bush materials — houses made from bush materials are more suited to the tropical climate than permanent materials
- permanent materials — like sawn timber and wire netting if you have the money.

Houses made of timber and corrugated iron become too hot during the day.



Kokorako house in Honiara.

The house is divided into three rooms. Each room has roosts, feeders and nests where kokorako lay eggs.

The floor is crushed coral. The sides are bamboo. The roof is made of leaf.

The house will hold up to 30 kokorako. Each afternoon, the farmers release the kokorako to find insects and vegetable food in the garden. The kokorako are allowed only a short time in the garden so they do not eat the vegetables.



A two-level kokorako house at Kastom Gaden Association, Burns Creek, Honiara, Solomon Islands. Kokorako live in the house and in the space below.

The area below is enclosed with wire mesh. The house is divided into three rooms each with roost, nests for laying eggs and free choice feeders.

Walls and roof



The walls of this kokorako house are made of split bamboo. The roof is made of palm leaf. The garden around the kokorako house produces kokorako food. The ditch around the house drains water away.

Doors



The doors are made of wire mesh on a timber frame.

Windows



Large windows are provided for ventilation to keep the kokorako healthy and give them fresh air. Smells escape through the windows.

The window openings are covered in split bamboo to keep the kokorako inside and to keep out dogs and other animals. The overhanging roof protects the windows from rain.

Perches



Roosting: chickens perch as high up as possible, out of the way of predators. Build the perch at the back of the kokorako house, as close to the roof as possible while leaving enough room for the chickens to stand. Allow for a 30cm length of perch per kokorako.

Nesting box and floor material



Nests for layers and sitting mother hens can be constructed of bush materials. They are disposed of after use by burning or in the compost.

Put grass or leaf on floor: replace the grass weekly. This helps keep the kokorako free of disease. The used grass can be put on the compost.



A kokorako house at Sasamuqa village, Choiseul Province, Solomon Islands. The house is made of timber slats that make it strong enough to protect the kokorako against dogs. The roof is palm leaf.



Inside the slatted house showing the roost to the side of the room and nesting box at the back. Grass has been placed on the floor. The rooms are well ventilated and shelter the kokorako from the sun and rain.

INCUBATION AND HATCHING

Broody hens

Kokorako go broody when they are ready to hatch chicks from eggs. A broody kokorako will sit on eggs for three weeks.

A broody kokorako wants to sit on the nest all day and night and she will complain when you take her eggs. Taking eggs away from the hen each day slows her going broody.

You should work towards raising a small flock consisting of a few hens that are good mothers to their chickens.

The hens should also be tame and easy to handle through the entire egg-hatching and chicken-raising times.

Helping broody hens hatch chickens

The way to hatch a lot of chickens quickly is to organise your broody hens so that two or three or more sit at the same time. The chickens will then all hatch around the same time. Prepare your broody hens so that eggs will hatch around the same time:

- provide a small room for each nest
- place eggs under hens at the same time.

Care for a mother hen and her chicks after hatching

- if your broody hens are tame, remove the chicks from under all hens on the first or second day after hatching and place them under a single hen
- the other hens can be given another clutch of eggs to start again; this can be done two or three times without harming your hens
- for the first six to eight weeks the mother hen and her chickens can be fed and protected in a moveable pen

- at eight weeks old the mother can be taken from the chicks and returned to the breeding pen — move the chicks to a larger growing pen
- at 12 to 15 weeks separate the chicks into male and female so they can be given particular feed requirements depending on whether they are to be layers or kept for fattening.

Hatching a lot of chickens

A way to hatch a lot of chickens quickly is to organise your broody hens so that two or three or more sit at the same time. The chickens will then all hatch around the same time.

- a broody hen does not have to hatch its own eggs
- you can collect eggs from different hens and mix them under one broody hen
- the hen will accept any chickens she hatches as her own
- it makes no difference that the chickens might be of different colours.

Grass and leaves are used to shade chickens

Handles for carrying moveable chicken house

Wire mesh reinforced with timber to keep away dogs



For the first six to eight weeks the mother hen and her chicks can be fed and protected in a moveable pen

Hessian bag used to shelter mother and her chicks

Preparing eggs to hatch

Quiet hens are important to the success of this method.

When you have two or three broody hens ready to sit on eggs, make sure they have a small room of their own for each nest.

Place eggs under the hens at the same time. It is best to do this at night so you do not disturb the hens too much. All the broody hens should hatch their eggs around the same time.

After hatching

If your broody hens are tame or not too wild, you can remove the chickens from under all hens on the first or second day after hatching. They can all be placed under a single hen.

The other hens can be given another clutch of eggs to start again. Make sure you do this at night so they do not get too upset.

When all the eggs have hatched, provide each chicken with a new set of eggs and repeat the process.

This can be done two or three times without harming your hens. You will be surprised just how many chickens a hen can care for.

Looking after new chicks

The mother hen and her chickens can be fed and protected in a moveable pen for the first six to eight weeks to make sure the chicks survive.

The chickens should be partly feathered by this age and should be fairly self-reliant.

Move and separate chicks

When the chicks are eight weeks old the mother can then be taken from the chicks and returned to the breeding pen.

Move the chicks to a larger growing pen. They will still need to be protected from the weather and from predators.

The chicks can be separated into male and female at 12 to 15 weeks so they can be given particular feed requirements depending on whether they are to be laying birds or fattened roosters for eating.

Problems with hatching young village chickens

When kokorako are kept in the traditional way in the Solomon Islands, without a kokorako house and special care, a village hen may be lucky enough to hide a clutch of eggs for the full 21 days required to hatch them.

Afterwards, when she emerges from her hiding place with her chicks to search for feed, they may:

- be killed by predators such as cats, dogs or hawks
- die from disease
- die from lack of food.

It is mainly the shortage of suitable chicken feed which causes the chickens to die of starvation.

Keep chickens safe

Keeping kokorako in a kokorako house for most of the day and feeding them properly will encourage them to lay their eggs in the house where they are safe.

The eggs can be easily collected.

Two simple changes

Two simple changes are all that is needed to ensure a better result:

- keep the poultry inside predator-proof fences or yards or on a small island away from predatory animals
- each day after the chickens hatch, provide fresh drinking water and grated coconut, greens or pawpaw and cooked egg in shallow bowls.

To make sure you increase the number of chickens, try and manage the hens which are incubating eggs.

If your poultry is kept in yards and special poultry houses you can control their:

- mating
- collection of eggs
- feeding.

Chicken houses and yards protect them from the weather and from predators.

Hatching

When chicks hatch from their egg:

- do not help chickens break out of their egg; just remove the left over broken shell a few times through the day so they do not cover the eggs still in hatching
- as the chickens dry out after hatching, leave them with the mother kokorako or place them in the brooder under the lamp (see section: *Artificial brooding of chickens*) with a shallow dish or water to drink; the chickens should be able to easily reach the water; the dish should not be very deep otherwise the chickens could drown.
- the chickens do not need feed on their first day, there is still food in their bodies from inside the egg.

MAKING NESTS

In improved kokorako keeping we make nests inside the kokorako house. Eggs laid in the nests will be:

- safe from predators that would eat them
- easy to find to collect.

What makes a good nest?

A good nest:

- is placed in a dark and private place for the hens to lay eggs
- should be made so that other hens cannot watch the hen lay; the other hens might break and eat the eggs
- nests should have soft materials like cut grass, rotted wood and sand for the hens to lay in.



Nest boxes have been made one above the other.

The boxes are lined with soft material such as cut grass.

They offer a safe and secluded place for the hen to lay eggs.

How many nests do you need?

You will need only one or two nests for every ten hens.

Material used to build a nest

A nest made of bush materials feels natural to the village hen.

Imported hens like this type of nest too. The nest should have a top on it and should not be open boxes like some people believe imported hens use.



A wood box has been placed in the corner for the kokorako to lay eggs in.

STORING EGGS

Store eggs in a container in a safe place.

You need to turn eggs a least twice a day if they are to be hatched.

Where to store eggs

Eggs can be stored:

- in your own house
- in a cool part of your house away from where they can be stolen or eaten by rats.

Containers for storing eggs

An egg container can be woven from leaf material or carved from sago wood.

Turn eggs that are going to be used for hatching so that the air sac inside the egg does not stick to the inside of the shell and stop the chicken from hatching.



Eggs stored in a sago wood container



Eggs stored in a bowl

The eggs should be turned end to end twice a day in their storage container



The air sac inside the egg does not stick to the inside of the shell and stop the chicken from hatching if you turn it.



HATCHING EGGS ARTIFICIALLY

The incubator

Eggs can be hatched without a hen.

They are hatched in an incubator which copies how the hen incubates the eggs — the hen sits on the eggs to keep them warm until they hatch; the incubator is made to keep the eggs warm.

An incubator can be used to hatch many eggs at a time.

We turn the eggs and keep the incubator clean so we will hatch more chicks.

You need a reliable electricity supply to keep the eggs warm for three weeks before hatching.

How to manage the eggs in the incubator

The hen keeps turning the eggs over and moves them around in the nest so they are kept at the right temperature; we turn and move the eggs in the incubator to make sure they hatch properly.

The hen turns and moves the eggs about every 20 minutes but we need not do the same; we turn the eggs at least four times a day; turning of eggs is not necessary after 18 days in incubation.



The eggs in this incubator are marked on one side so it will show which side has been turned

Stop moving the eggs three days before the eggs are due to hatch. Good eggs should now be left undisturbed in the incubator until they hatch on the twenty-first day.

Keep the incubator clean

Keeping our incubator clean keeps out chicks healthy.

- remove egg chips and dusty down produced by the hatching chickens
- cleaning helps to prevent disease which could kill the chickens growing inside the egg.



mark on top

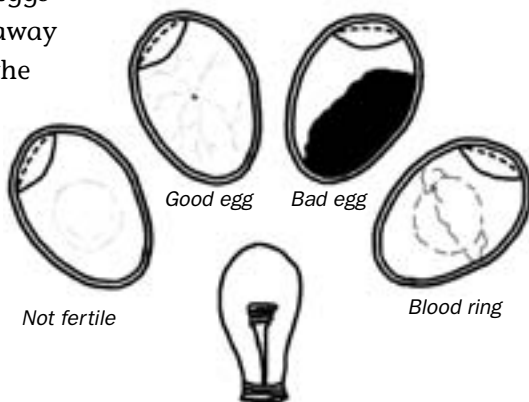
turn egg until the mark is...

...on the bottom - next time you turn, the mark will be on the top

Turn and move the eggs in the incubator to make sure they hatch properly - do not allow the eggs to cool too much while turning

Check eggs for growth

- pass the egg over a bright light at night — the light will show the inside of the egg
- all 'clear' or bad eggs should be thrown away to leave space for the good eggs to hatch.



Check eggs after a week of incubation

ARTIFICIAL BROODING OF CHICKENS

Once eggs have hatched we can use a machine instead of a broody hen to keep chicks warm. A brooder ensures the survival of chicks during their first three weeks of life.

Brooders

You can make a brooder:

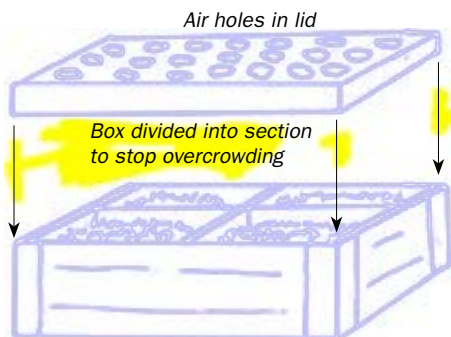
- a kerosene or other lamp can be used to artificially brood chickens for their first three weeks — the lamp is used through the night when it is cooler
- for cold brooding, a clean box with grass inside can be used or, if you have electricity, a normal light can be used — the box is divided into sections with only a few chickens in each section for the first two weeks.
- chicks can be moved out of the brooder after three or four weeks, the chickens should have enough feathers to keep them warm if they are kept in a weatherproof house and allowed into the sunshine during the day.

Artificial brooder



A kerosene lantern can be used to artificially brood the chickens for the first three weeks of their life. This is used through the night time when it is cooler. Chicks can be kept in the sun during the day.

Cold brooder



MAKING USE OF KOKORAKO

People require protein for a healthy diet. Many wild animals are used to provide this protein. Unfortunately, the rare and valuable wildlife of some Pacific islands is threatened.

Wildlife needs to be preserved. This is can sometimes be done by eating chicken instead of the wildlife.

Preserve wild jungle fowl for breeding

On islands where wild populations of the original jungle fowl remain there are mixtures of this self-sufficient wild fowl with the village kokorako. Every effort should be made to obtain breeding roosters from areas where there is the possibility of jungle fowl existing in the rooster's breeding background.

The wild jungle fowl is now a protected species under the Solomon Island Wildlife Act. Catching and killing this fowl should now be discouraged.

What is the main wildlife used by your village?

Answer this questionnaire

1. Ask older people in the village what type of wildlife they found in earlier times:

2. Ask these older people if there is more wildlife today than in earlier times.

3. What wildlife is still taken from the:

bush:

sea:

river:

4. Is any of this wildlife scarce?

5. Can scarce wildlife be replaced by chickens as food?

6. How could you introduce the use of village chickens as food instead of wildlife into your community?

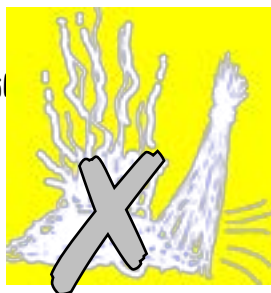
Make use of waste from kokorako house

We can use waste from the kokorako house as mulch to help improve the soil in our gardens and grow healthy plants.

- waste leaves and plant material can be thrown into the kokorako yard instead of burning it; when weeding the garden, put all the weeds into the kokorako yard first
- the chickens will take insects from the leaves and might eat some of the leaves
- when the kokorako house and yard are cleaned, the waste materials can be placed on the garden as a fertiliser (mulch); this can be done on those islands where using manure is not tambu (tabu; taboo).

The benefits of mulching the soil

- helps plant to grow strong
- protects the soil
- keeps water in the soil
- stops erosion.



Burning leaves causes pollution in the air and wastes the fertiliser value of the leaves and sticks that are swept up



A mulched garden grows healthy crops

Soil without mulch:

- dries out — no water for the plants
- gets hot — roots can be damaged
- has too little food for soil organisms — worms
- leave few nutrients for the plants.

STARTING A SMALL KOKORAKO BUSINESS

A kokorako small business can bring cash income to the family.

To start a small business you can expand the family kokorako system by breeding more kokorako, building more kokorako houses and making the yard around the kokorako house bigger, where the kokorako scratch in the soil.

You can do this slowly when materials and money are found.

A kokorako small business takes time and effort

Keeping kokorako as a small business is different to keeping kokorako for food for the family:

- it will take more of your time
- it needs more effort than keeping kokorako only for family food
- you will have to care for the kokorako more
- you will have to care for the kokorako through the year.

If you produce good quality kokorako products — eggs, meat, young kokorako to sell at market — people will come back to buy from you again.

To build the kokorako business, provide for the needs of kokorako

We must provide all the things that kokorako need if we are to raise kokorako as a small business.

Before we decide to start a kokorako farming business we should think about how we will provide for the needs of the kokorako.

If we provide all the needs of the kokorako they will grow strong and healthy.

The needs, uses and products of kokorako

Provide the needs of kokorako	Make use of the things kokorako do	Make use of what kokorako produce
<p>Food: a balanced diet of body building, energy and protective foods</p> <p>Clean water: each day</p> <p>Shelter: from sun, rain, strong wind: build a strong house</p> <p>Protection from predators: such as wild dogs and pigs - strong fence around pen; strong house</p> <p>Space: to move about and sleep - house and roost</p> <p>Place to lay eggs: laying box</p> <p>Care: check for health each day.</p>	<p>Scratch in soil: some farmers use kokorako to scratch a place for a new sup sup garden</p> <p>Kokorako waste: clean out house and pen and use wastes to fertilise sup sup garden</p> <p>Eating insects: some farmers let kokorako into sup sup garden for short time every day</p> <p>Eating kitchen and garden wastes: feed food wastes from kitchen and gardening wastes like old plants to kokorako.</p>	<p>Eggs: eaten by family or sold at market</p> <p>Meat: eaten by family or sold at market</p> <p>Baby kokorako - chickens: grow to sell at market</p> <p>Income: cash from selling eggs and kokorako at market; if you keep more kokorako than the family needs for eggs and meat you can start a kokorako small business and sell at market.</p>

Building the kokorako business

Needs — building your small business	What you need to do
More kokorako	<p>To produce enough eggs and kokorako to sell at market: you will need more kokorako than you have for eggs and meat just for the family.</p> <p>Breed village kokorako with imported breeds to produce more eggs, meat and young kokorako to sell. Breed young kokorako through the year.</p>
Continuous production: of eggs, meat and young kokorako for market	Produce eggs, meat and young kokorako to sell at market through the year. Breed baby kokorako throughout the year.
Improved shelter	Protect your kokorako flock: from sun, rain and strong wind. Provide enough space for your kokorako. Build larger kokorako house or make more kokorako houses if you need to.
More food	Grow enough food to keep your kokorako healthy. Make a larger garden to grow more food if you need to. Providing a balance diet helps grow your kokorako quickly for market.
Enough water	Provide clean water every day to keep kokorako healthy. Place water containers in each room in kokorako house and in kokorako yard.
Improved health care	<p>Check your kokorako regularly to keep them healthy and to stop disease spreading:</p> <ul style="list-style-type: none"> • check kokorako each day for signs of disease • separate sick kokorako in separate cage until healed • get help with healing sick kokorako • provide balanced diet and clean water.
Maintain good quality products: eggs, meat, young kokorako for sale	Be a reliable producer of good quality kokorako products who people like to buy from.

A kokorako small business can use poor soils

Because only a small area is needed for keeping kokorako, a kokorako project is suited to overcrowded or small islands.

Poor quality sandy or rocky soils can be used on which to build the kokorako house and yard.

Kokorako manure can be mixed with poor soils to make a garden so you can grow more kokorako food as well as food for the family.

Improving health and earning cash

The way kokorako are usually kept in the village is less productive.

If we improve the way we keep kokorako we can enjoy better nutritional health and start a small business by selling eggs and kokorako at market.





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