



Homestead Poultry Keeping:

Good Practice Guide





Authors:

Letty Fajardo Vera¹, Jean Marc Pace Ricci¹, Reinier Veldman¹

Design and Layout:

Madiha AlJunaid¹

Acknowledgements:

We would like to thank Fasil Kebede² for valuable insights and feedback on the content of this manual. His contributions have made this document more practical and comprehensive.

Affiliations:

¹MetaMeta Research, Netherlands

²Wageningen University and Research, Netherlands

This manual provides information on how to keep poultry around the homestead in healthy, productive, and profitable way. It is targeted at rural women, youth, and smallholder farmers.

This manual is one of the many anticipated outputs of the Green Future Farming Program (GFF). The GFF is a 4 year program being funded by the IKEA Foundation. The program will focus on promoting and supporting regenerative agricultural practices, improved water management, and resilient circular rural economies. The project is being implemented by MetaMeta (Ethiopia), Aidenvironment (Uganda), and Justdiggitt (Kenya) together with numerous local partners.

Homestead Poultry Keeping:

Good Practice Guide

Table of Contents

Introduction	1
Chicken meat and eggs	2
Manual of good practice	5
<i>Selecting the best chicken breeds</i>	5
Feed	8
<i>Eggshells and Calcium</i>	9
<i>Drinking water</i>	11
<i>Additives to keep chicken healthy</i>	11
Chicks	14
Chicken housing	15
<i>Sleeping Coops</i>	16
<i>Predators</i>	17
Chicken habits	18
<i>Dust baths</i>	18
<i>Exercise</i>	18
<i>Moulting</i>	19
<i>Laying eggs</i>	19
<i>Incubation</i>	20
<i>Hatching pans & Broody Hens</i>	21
<i>Candling eggs</i>	22
Disease	24
<i>Isolation</i>	26

Introduction

This practical guide is for keeping poultry around the homestead. This is an important activity that contributes adequate nutrition for families and to the creation of a source of income, especially for women and for people with no access to land. This guide gives an overview of the practical steps in keeping poultry around the house. In addition to the best practices explained in this quick manual, it is also advised to follow the recommendations of local government expert veterinary services, for instance where it concerns vaccination and the prevention and control of diseases, biosecurity and keeping poultry in general.

The GFF project will work together with Bureau of Agriculture, development agents and other government extension staff and avian veterinary service, and poultry organizations.

As part of the GFF project homestead poultry activities will be introduced to communities in the Woredas through information days, together with awareness creation and encouragement of egg and poultry meat consumption at household level to improve the nutritional status.

Before starting any rural poultry development program, the first critical step is the encouragement of the selected people to change their attitude towards poultry keeping and animal welfare. Basic care is required which includes regular watering and feeding, supplementation with quality feeds, cleaning the bird's night shelter and taking care of the young chicks.

In GFF women and youth will have opportunities to register as an interested person. The homestead poultry project representative will organize a training day with the youth and women, taking a gender-sensitive training approach, considering, time, distance, and content. After the training the future poultry keepers should have the basic knowledge to be able to keep healthy chicken, overcoming the lack of knowledge about poultry production, limitation of feed resources, and prevalence of diseases will prevent the big risk of chicken mortality.

After the training and in the first stage, GFF together with the bureau of agriculture, will build a support team, for the new homestead poultry keepers. Monitoring part will be organized by women and youth. Ideally groups of trained people will in turn train others in the Woredas, scaling the impact of this training. All these are aspects of an integrated approach that spans nutrition, female empowerment, income generation, poultry care and management, disease control, and marketing capacity and access. Providing this sort of knowledge can help household manage their dietary diversity, minimizing the risk that highly nutritious eggs are all sold for less nutritious grains for example.

This sort of decision might make financial sense but makes less sense nutritionally. We will make use of a checklist, to be sure that basic requirements are reached, and this will also show the serious commitment of the people's interest in keeping poultry.



Here below is a basic homestead poultry check list with a basic 'to do' list for the aspiring new chicken owner:

- ✓ Get information on how to get your poultry vaccinated and other disease protection
- ✓ Before your chicken arrive make sure that you will have enough food to provide for all the meals for the first few weeks/months
- ✓ Provide a list of the food sources you will feed your chicken
- ✓ Prepare the water container
- ✓ Consider getting the hatching pan
- ✓ Make a chicken coop. Preferably using local material

Chicken Meat and eggs

Chicken meat and eggs provide a readily available, high-quality source of protein, vitamins and micronutrients. Eggs are an excellent source of iron, zinc and vitamin A, all of which are essential to health, growth and well-being. Chicken and eggs contribute to a nutritious, balanced diet, which is especially important for children, nursing mothers and people who are ill. This is very important given the still high levels of stunting in many rural areas. It is important to couple nutritional education with programs such as this that are promoting poultry keeping – eggs and other forms of animal protein can have immense benefits to a child's development if consumed in sufficient quantities within the first 5 years of the child's lifetime.

Village chickens also play a significant role in the rural community through its contribution to the cultural and social life of the people. The chicken dish doro wot is considered the national dish of Ethiopia and is prepared as a special meal for high status visitors or respected guests. As chicken husbandry is mostly carried out by women, children and the elderly, it contributes to family labour productivity and empowerment of the more disadvantaged groups of the community. For rural women, chicken production is a cash-in-hand livelihood



Figure 1. A young boy takes eggs to the market after a healthy and nutritional breakfast.

activity to help households to buy consumables (sugar, coffee, salt); to pay social obligations such as edir (burial associations), equb (informal savings and loan co-operatives), and other household utilities. It has been shown that agricultural interventions which target women are more likely to lead to positive nutritional outcomes. In poultry, women are often the prime movers. Experience in several countries lists the reasons why poultry is very suitable for poverty alleviation (Todd, 1998), in particular:



Poultry is mainly owned and managed by women and children



Poultry keeping is universal: there are few religious taboos related to poultry



Poultry is socio-culturally important



Low cost technology is available



Low investment is needed



Land is not needed; homestead chicken production is environmentally friendly and part of regenerative agriculture



Chicken also improve the quality of land with their scratching and droppings and their propensity to eat insects



10-15 chickens under improved conditions are enough to make a difference for one household



Poultry production can be self-evolving with young chicks shared with ever more families



Poultry production can serve to build up an entitlement base for poor women

We will make use of the GFF poultry keeping program opportunity to gather data and information about homestead chicken in the rural Ethiopia, so in this way we can record the experience of homestead chicken keeping and learn from the experiences coming out. This will make it possible to spread the lessons learnt far and wide.

*** Some of these questions can help us to have a better view**

1. What is the structure of homestead poultry farming in the rural areas?
2. What is the socioeconomic status of (aspiring) homestead poultry farmers?
3. What are the constraints experienced by aspiring poultry farmers?
4. What is the profitability of poultry farming in rural areas?
5. What strategies can improve the success of poultry in rural areas?

Manual of Good Practice

1. Selecting the best chicken breeds

In your chicken breed selection, you need to consider a breed that is resistant to disease, tolerant to cold and heat, able to escape from predators, grows quick and lays a good amount of eggs.

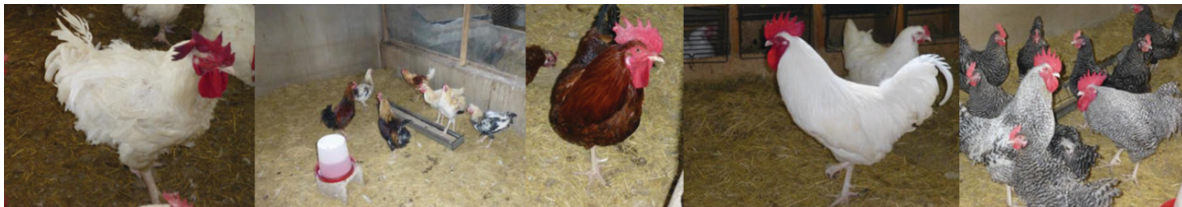


Figure 2. different chicken breeds, photo: Chicken Health for Development (CH4D))

Local indigenous chicken usually does well in resistance, but they grow slowly and produce not as much eggs as improved breeds. This may however be caused by the way they are being fed and kept – this is largely unknown. Ethiopia indigenous chicken varieties: Tilili, Horro, Jarso, Tepi, Gelila, Debre-Elias, Melo-Hamusit, Gassay/ Farta, Guangua and Mecha.

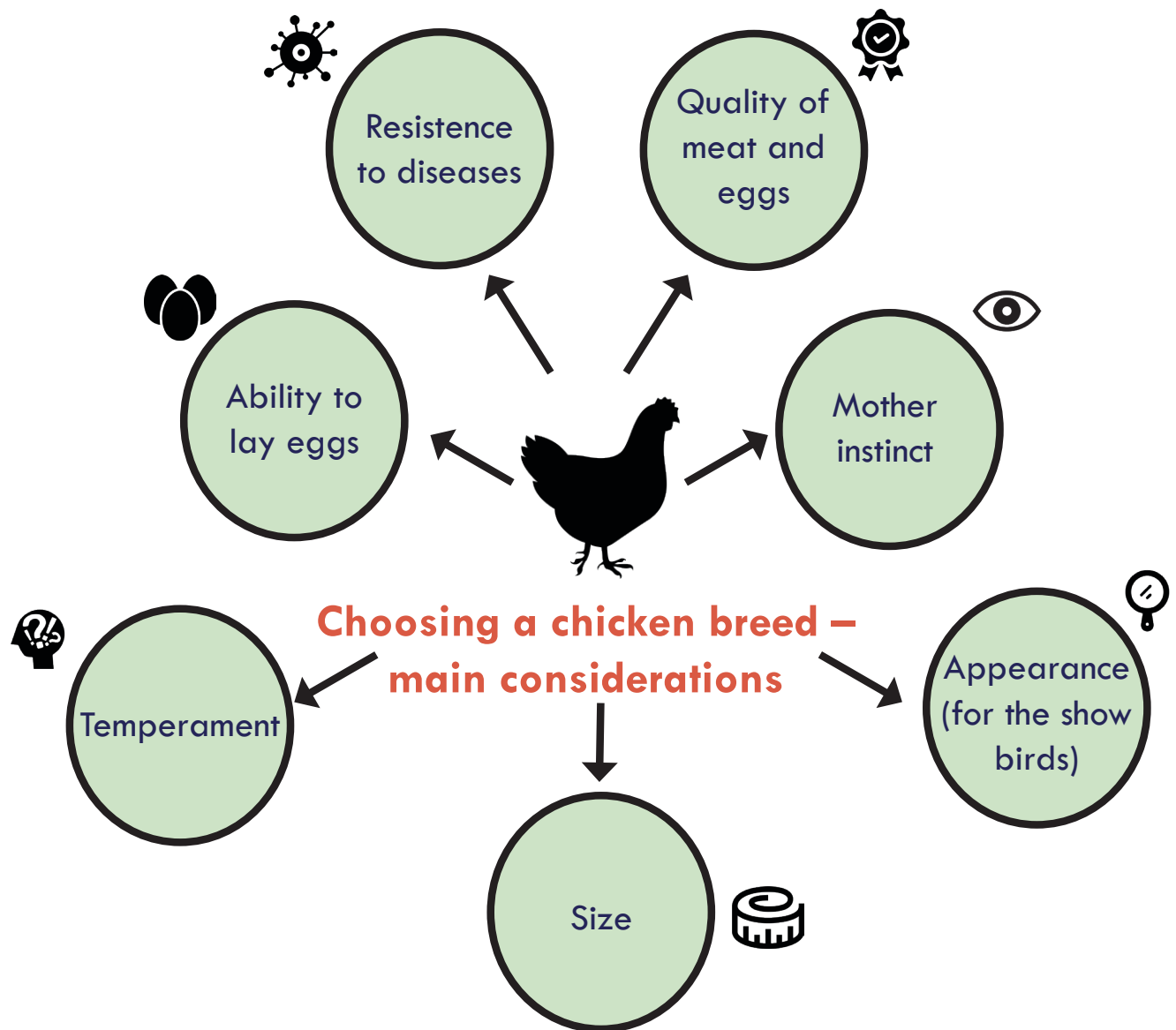
Replacement of indigenous chickens by exotic chicken is sometimes promoted but must not be done lightly, it can endanger the existence of indigenous breeds.

Exotic chicken like Hubbard JV and Koekoek are more susceptible to diseases and therefore have a higher demand for vaccination, but if these care conditions are reached, they can be very profitable for commercial purpose. The White Leghorn chickens are equally adaptable as the local indigenous chicken but with a lower survival rate.

Indigenous chicken meat and eggs are considered tastier and more nutritious (more protein) and fetch better prices, but indigenous chicken is not accustomed to confinement. There seems to be no economic justification for keeping local chickens under intensive management systems for the purpose of meat production due to their poor feed utilization efficiency and low survival rate in captivity. It is however profitable to keep local indigenous chicken in a homestead poultry system.

Beside the breed choice, all the future participants in homestead poultry need to get training on husbandry practices, and discuss with the expert what will be the best chicken breeds for their local conditions and personal goals. This is not

always a straight forward decision but is often a trade off between nutritional, economic, and conservation goals. Besides selecting the right breed, decisions also need to be taken about the size of the flock – many other factors come into play here such as how many birds can the poultry keeper support with their available space and resources.



Hybrid Hens

These are birds of mixed parents and grandparents which have been developed for production by selecting from the best strains. A strain is a family line which has a particularly desirable feature, as far as the breeder is concerned. This might be a good record of eggs laid, good shell quality or excellent feathering. Hybrids are generally the best choice for commercial production, and initially were developed for broiler conditions.

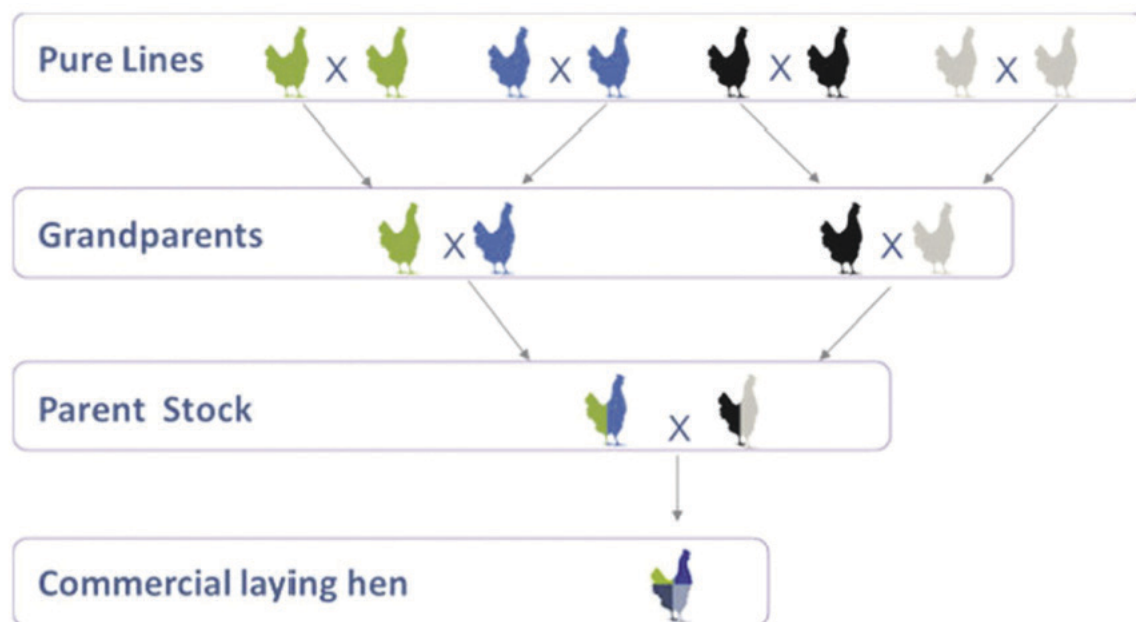


Figure 3. Hybrid poultry. Photo: Real Escuela de Avicultura.seleccionesavicolas.com

It is important to start with a flock of healthy chickens with favorable traits. The flock must then be closely managed to control which pairs are bred to populate the next generation of the flock. Only allowing the strongest and healthiest birds with the most favorable traits to breed will help the poultry keeper ensure that their flock's vitality does not degrade with time. As an alternative, there are multiple local SMEs, private and government operated breeding centres from which a poultry keeper can source chickens with improved germplasm. The poultry keeper should be aware of their options.

An important decision early on is if you want to keep chicks, pullets or laying hens. Chicken are usually divided into layers (for eggs), broilers (for meat), and dual-purpose breeds. It is important to have a clear strategy – to keep chicken for eggs, meat or both. Are you more interested in egg production for your own consumption or for sale? Or you are more interested in chicken meat for sale and own consumption? Make this plan before you get into poultry keeping as it has implications for which strain and lock size are best for the situation.

Another decision when keeping broilers is to choose the age of the chicks to be fattened. If you are a busy person it is better for you to keep pullets from 7 to 20 weeks old, they will need a little less care and live comfortably outside. Chicks from 0 to 6 weeks old need much more time and care and will not survive on their own; they need heat to keep warm and to be fed regularly. In general, the younger your chickens, the more care they require.

Feed

A diverse diet from various food sources is ideal. A chicken eats typically 50-60 gram of food a day. It is best to have grains, some protein, some calcium (old crushed eggshells) and a pinch of salt in the mix.

Chickens are omnivores: they can digest both animal and plant foods but be careful not to give raw meat, it will motivate them to become cannibalistic.

Homestead chicken can self-select from the different feeds and make their own diet. This way of feeding is excellent because it will reduce the costs of buying commercial feeds which many farmers can not afford. This is also the reason why farmers often use feed grains from their own farm left over. It is important to keep in mind that young chicks are much more sensitive and require a diet of easily digestible foods.

Is important to check what are the most accessible food sources that your chicken can find themselves while kept free range. Seasonal considerations are also important; what kind of food sources are available in the dry or wet seasons. This is important to keep a record of a balance diet. You will need to be aware that the food they find is very diverse and healthy, but maybe not enough in amount, so it's important that you are supplementing feeding 2-3 times a day. Feed the chicken in the morning with grain, it can be maize, rice, sorghum, millet, and other by products of the mill house. The rest of the day a combination of kitchen waste with some garden vegetables, forage leaves, flowers, and forage seed, these

are very rich in vitamins. Other unconventional feeds are earthworms, maggot larvae, termites, and grasshopper and cut worms, this feed sources are full of protein, and chicken can find them easy around the house.

Allowing chickens to roam around freely and select their own food is good exercise for the chicken and beneficial for gardens/farms. However, it is important to keep the area where the chickens are living clean from small bits of plastic or other pollutants that they might eat. Eating plastic or other unnatural substances can cause serious problem to your chicken such as digestive issues, choking, sickness and even death.

In case you keep your poultry in coops, food and water need to be lifted from the ground to avoid getting dirty, but low enough to be reached without any effort and you will need to feed them more often.

1. Eggshells and Calcium

Eggshells are a great source of essential nutrients like calcium that your chicken needs to keep strong bones and for good egg production. Laying hens need even more calcium to produce eggs, approximately 3-5 gram a day. You can provide calcium in the form of finely smashed eggshells or from finely crushed limestone. Limestone is preferred as it is easily digested and absorbed by the hens. Use the one that is affordable for you, mix it together with grain feed, give it in a separate bowl, do not give it to small chick 0-8 weeks, it will not be good for their kidneys at that young age.

Eggshells need to be completely dry before smashed, you can dry by the sun light or setting them close to a hot stove or oven, in this way you are sure that no bacteria will be alive and make the chicken sick.

Most kitchen wastes are fine but avoid giving chicken raw potato skins, avocado pits, and eggplants. These foods are highly toxic and might harm your birds if they feed on them.

The Homestead chicken feed resource includes:

			
Household kitchen waste	Grains and grain by-products	Roots and tubers meals	Oilseed cakes and meals
			
Leaves of trees, shrubs (including Leucaena, Calliandra and Sesbania) and fruits	Animal protein meals; blood, termites, maggots, earthworms, oysters, snails	Aquatic plants (Lemna, Azolla and Ipomoea aquatica)	

Helping Chicken Issues with Herbs

No Eggs or Egg Issues

- Marjoram
- Mint
- Lavender
- Fennel
- Parsley
- Borage

Respiratory

- Thyme
- Dill
- Basil
- Bee Balm

Injuries/Illness

- Comfrey
- Oregano
- Cilantro
- Bee Balm
- Nasturtium
- Calendula

Molting

- Dill
- Fennel
- Parsley
- Mint
- Rosemary

Internal Parasites

- Oregano
- Sage
- Garlic
- Pumpkin and seeds

External pests

- Mint
- Lavender
- Thyme
- Basil
- Catnip
- Marigold



Figure 4. Nutritional information for chickens. Source: Timber Creek Farm.

2. Drinking water

Chickens need clean water for survival, growth, activity, and egg production.

Five chickens will drink about 1 liter of water every day and they will need more than this when it is very hot. Water should always be available. Clean and disinfect well the waterers every day.



Figure 5. Chicken drinking water from a waterer

Waterers should be:



not too high, so that all age groups can drink without risk of drowning



not too large, to avoid contamination



cleaned daily



kept constantly in the same place that the chickens get used to (helpful in case of the need to add medication via the water)



placed where the chickens will be at least risk of attack by predators

3. Additives to keep chicken healthy

Garlic

Garlic can contribute in an important way to the health of the chicken. It will help build their immune system, helps guard against worms – and when you give chicks garlic water soon after hatch, they will grow healthy and they will accept drinking garlic easily as adults.

Garlic in particular:

- Protects against viruses, including Salmonellosis, Colibacillosis and Cholera.
- Kills 'bad' bacteria. Antibiotics in poultry feed is illegal in some countries and ill-advised in others, because of the increased resistance to them in humans. Garlic can effectively be used as a replacement.
- Re-balances the system. Because garlic seems to target 'bad', rather than 'good', bacteria, it can help a chicken recovering from illness to return to full health.
- Helps hens' egg production. It's known to help produce larger, better quality eggs with a lower level of 'bad' cholesterol.
- Helps underweight or non-eating chickens. Garlic stimulates the appetite and helps promote growth.

Garlic can be used in either a preventive or curative way, it is natural antibiotic. The easiest way to administer is to add raw garlic to the drinking water, simply crush 1 clove per litre (4 per gallon of 5 litre) and give it a minimum of twice a week. There is no problem in giving small amounts daily. Remember to refresh the water after 48 hours, leaving out the garlic. Garlic will lose the qualities after 24 hours in the water. Garlic can also be given with food: just crush or finely chop one clove and give it 3 times a week. For weak chicks or chickens, or those who need a boost to their immune system, continue with the garlic every day until symptoms have passed. If they are very sick and do not want to drink just squeeze a couple of drops of liquid into the beak. The chick will automatically open and drink, you can use a spoon. They will need to drink a few times a day for 3 to 4 days or until you see improvement.

Remember chickens are creatures of habit, and very easily stressed if their routine changes.



Figure 6. Different parts of a garlic bulb. Source: Raising-happy-chickens.com

If your chicken is not drinking, they might not like the taste, add less garlic and slowly build up the amount, until they get used to the garlic taste. Remember moderation is the key. Do not cook any garlic you're intending to feed to your flock, raw garlic is best.

Onions

THE BENEFITS OF CHICKEN EATING ONIONS:

- ✓ Proven antibacterial
- ✓ Antiviral
- ✓ Prevents parasites
- ✓ Anti-fungal
- ✓ Antihypertensive
- ✓ Anti-inflammatory
- ✓ Promotes antioxidant activity



Figure 7

Using onions

Onion is a natural anti-biotic for chicken. It helps to prevent several diseases, but also giving it in small portion it improves egg production, health of the hen, egg weight and quality, better food absorption and a decrease in cholesterol. Onions have vitamins, minerals, and amino and fatty acids that can increase chicken growth.

The onion needs to be chopped in fine pieces and mashed. This can be given directly or added to the water. If mixed with the water (together with the garlic) it will also prevent the development of bacteria in the water. Keep the amount of onion per chicken to about a tablespoon. This is enough to allow them to benefit from the good properties found in onions without causing digestive upset, so used with moderation.

Chicks

To prevent high mortality at 0-7 weeks, chicks must be kept in a safe, warm, and clean environment and must always have easy-to-digest feed.

Chicks can't control their body temperature; you have to keep them warm all the time. You can observe the behavior of the chicks if they are too hot, cold or there is some windy part of the box they will react. When they are cold, they come very close together, too hot they separate from each other, if there is wind from a side, they will go to the other side.

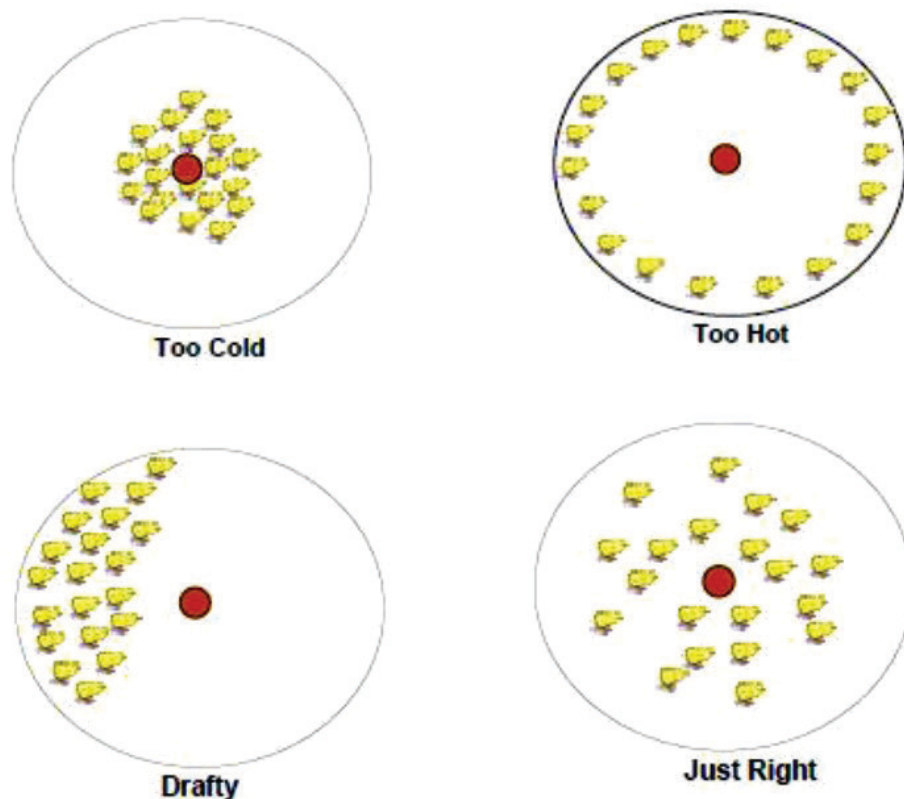


Figure 8. Chick's behaviour, photo: University of New Hampshire Corporate Extension

Keep small chicken in a round place not in a square because they will try to come very close together and some of them will get suffocated in the corners.

One of the greatest biosecurity problems for the day-old chicks is the exposure they get to the dirty environment where the adults, growers and other chicks that hatched earlier are already living and soiling the area with their faecal matter. Keep young chicks in a separate place as much as possible.



Figure 9. Chicks, photo: Granja el Motilon

Chicken housing

Chicken housing improvements can prevent the mortality of chicken. Some of the basic requirements are: a roof, 4 walls, and a doorway for entering and leaving, and to be able to lock it at night to protect them from predators. It is important that the chicken house is secure to protect the birds from thieves at night or day predators like rodents, mongoose, wild cats and birds.

In the case you want to keep pullets in broiler houses, this needs another requirement. The chicken house should be built in a way that protects the birds from strong winds and drafts but also allows good ventilation in the house. The best is to build the broiler house in a way that it will be easily cleaned and disinfected.

Rules for entering the broiler house: People entering the house should clean and disinfected shoes, clothes and hands, to prevent bringing infection and disease from outside.

It is important that your chicken get enough sunlight and have adequate drainage so that the poultry house remains dry.

The size of the house will depend on the number of birds to be kept.

By locking the chicken in a limited space, their natural instincts become destructive, they can even adopt cannibalistic behaviours. Ensure the broiler chicken will have enough space for scratching the earth, jumping, stretching their wings and fly short distances.

Normally housing should provide adequate space for birds in general 3-4 square feet per bird for layers and 1 square foot per bird for broilers (Ngugi, 1980).

1. Sleeping Coops

For health reason it is not recommended for people to sleep in the same room with the poultry, so you will need to build a separate house, using local material. Many materials can be used in different combinations to create coops that protect the chickens from the elements and from predation at low cost.

A successful design that is commonly used at the homestead level is a small, double-storied, well-ventilated pen on stilts (Figure 10, below). The basic frame can be constructed with wood and the walls can be made from wire or other available materials as long as there are some gaps big enough for air flow and light, and small enough to keep chickens in and predators out. The chicks can be kept separate from the hens at the top floor which keeps them safe from competing with the larger chickens. Appropriate flooring is necessary for the top level, the chicks may damage their feet and legs if wire fencing is used, and a solid floor that is easy to clean is preferable. A rainproof roof is also important to keep the young chicks warm and dry. Simple coops like this protect chicken from predators and from cold, dampness, and diseases.

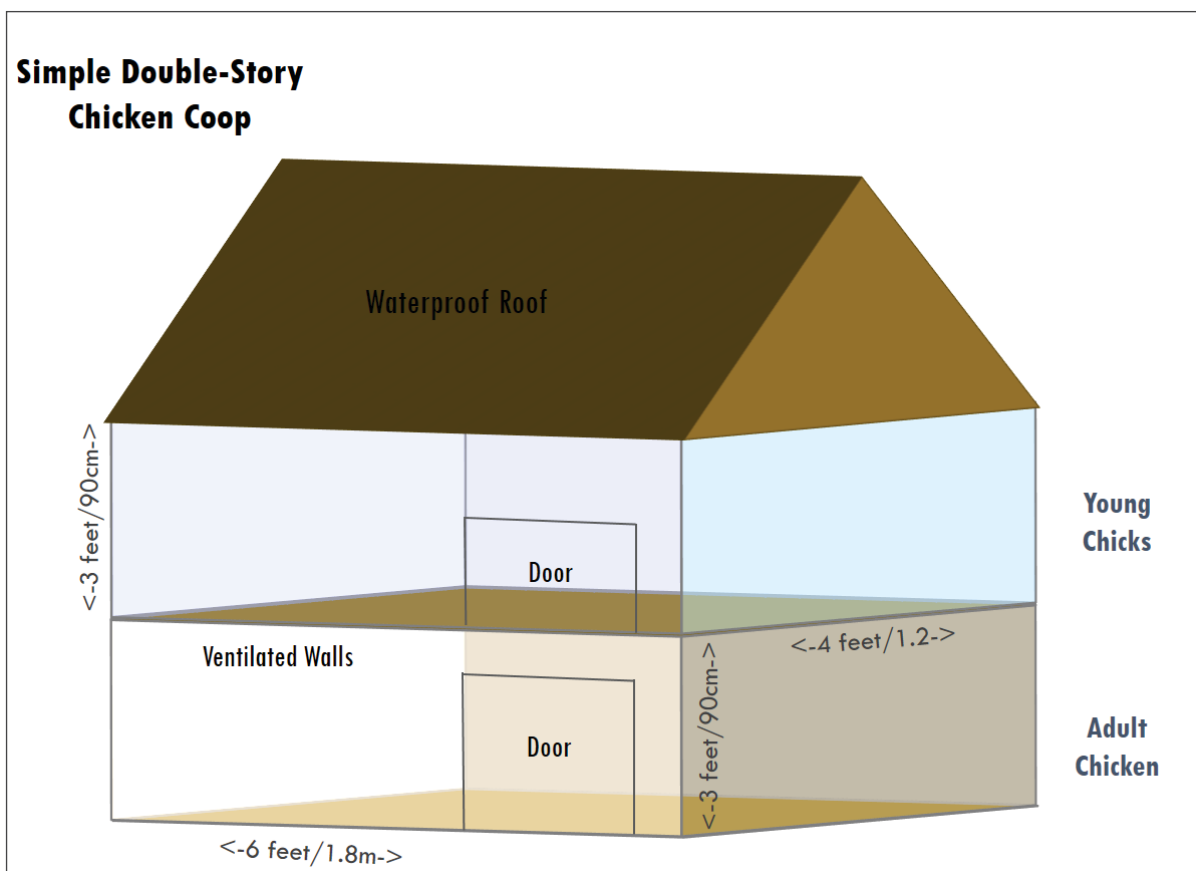


Figure 10. Simple double-storeyed chicken coop.

Another consideration is that in nature, flocks sleep on tree branches. All the flocks sleep in the same tree and go back there every night. Include in your chicken coop a hanger or perch where all your chickens can sleep. Use non-slippery material. Sleeping above the ground will keep them safe and dry. They must be at the same height otherwise they will fight with each other trying to reach the highest places. Ventilation and protection from cold and heat is important.



Figure 11. Alternative chicken coop designs. Photo: FAO Kenia

2. Predators

After diseases, one of the major constraints that cause chicken deaths is predation, especially in the homestead poultry system. Predators like snakes, rats, dogs, cats and foxes are animals that cause losses particularly in younger flocks. Wild birds of prey (eagles, hawks, etc.) during the dry season and wild cats (locally known as shelemetmat) during the rainy season are the most dangerous predators that attack older chickens.

Chicken habits

1. Dust baths

Chickens will naturally take a dust bath every day to every other day. It is the way they are able to clean oils and dirt from their feathers and get rid of external parasites and pests such as mites and lice. You can make a dust bath for your chicken with a combination of wood ash, sand, earth and mixing all together in a container. It can be a constructed wood box or a car tire. You should never use ash from treated wood or coal or if you have burned plastics or waste in the fire.

Common External Parasites

- Mites
- Flea
- Poultry lice



Figure 12. Chicken dust baths. Photos: Granja Orgánica el Motilon

2. Exercise

Exercise is as important to chickens as it is to humans. Just like us, they get weak and unhappy when they do not get enough physical activity that their bodies need. You can build a simple climber gym.



Figure 13. Chicken climbing corner, photo:
The Owner -Builder Network

3. Moulting

Moulting is the process of shedding and renewing feathers. Chickens molt in a predictable order beginning at the head and neck, proceeding down the back, breast, wings and tail. While moulting occurs at fairly regular intervals for each chicken, it can occur at any time due to lack of water, food, or normal lighting conditions. Broody hens tend to molt furiously after their eggs have hatched as they return to their normal eating and drinking routines.

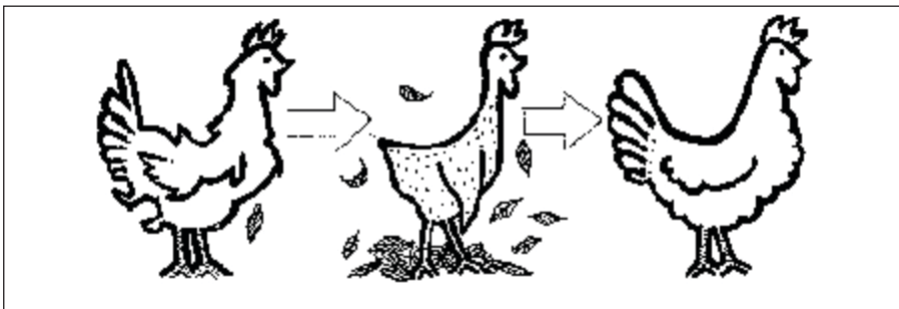


Figure 14. Chicken molting, photo: M R Ellis Poultry Branch

4. Laying eggs

A chicken does not need a rooster to lay eggs, just to fertilize them. The hen starts laying eggs when it reaches maturity. Not all hens mature at the same age; this varies by race and environmental factors. Local field hens usually start laying eggs at five or six months of age. The first few eggs they lay can be very small, irregular, or with a little blood on the surface, and they may go several days without laying again. All this is normal and is due to the natural process of growth.

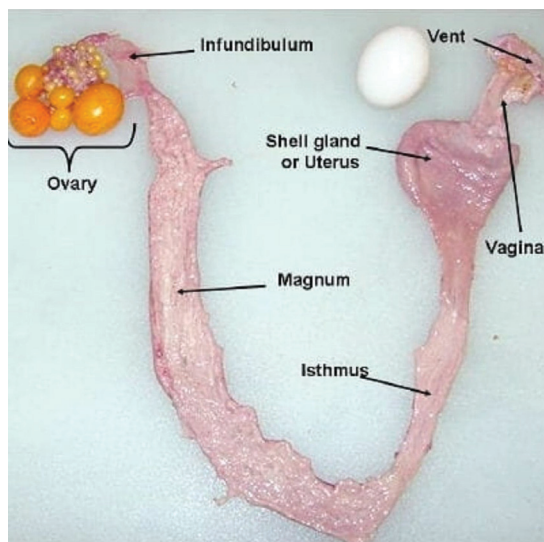


Figure 15. Reproductive tract of female chicken, photo: University of Kentucky College of Agriculture

Checking egg freshness

How to Test the Freshness of Eggs:

1. Place the egg in a bowl of water.
 2. If the egg lays on its side at the bottom, it is still quite fresh.
 3. If the egg stands upright on the bottom, it is still fine to eat, but should be eaten very soon, or hard-boiled.
 4. If the egg floats to the top, it's past its prime, and not good for eating.
- The science behind this method: Eggshells are very porous. Over time air passes through the shell into the egg, and its shelf life diminishes as more air enters the shell. Also, the more air that enters the shell, the more buoyant the egg becomes.

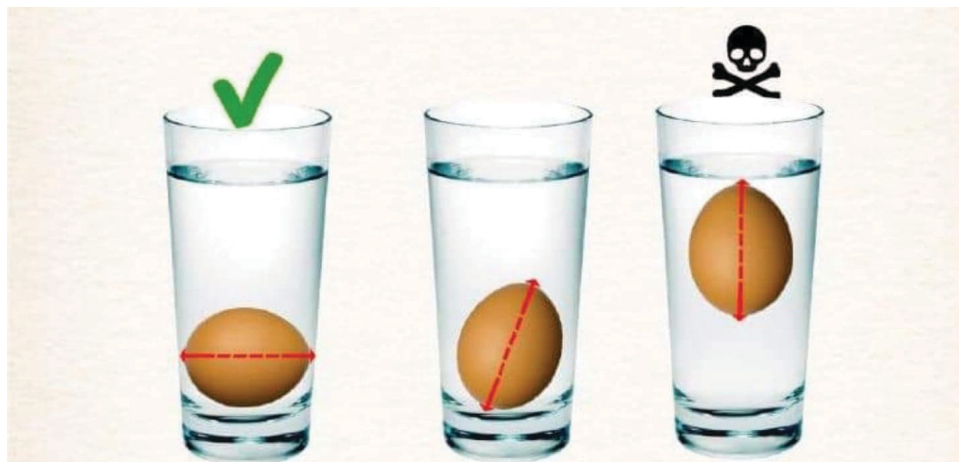


Figure 16. Checking the freshness of an egg.

5. Incubation

Without a rooster for fertilization, eggs will not hatch into chicks. A rooster will be needed if you want to incubate the egg. Hens in general are polygamous, they usually mate with the same rooster, which usually has in their care between 6 and 10 hens, which will prevent them from reproducing with other males, so if you have more than 10 hens it is advisable to have another rooster.

A pleasant and safe place is indispensable for your hens to lay eggs regularly. Your laying boxes must have enough space for the hen to turn around completely; she wants to feel safe but not locked up.

Once the hen lays the fertilized egg, it begins the incubation phase. The hen will take good care of her eggs and will not separate at all from them. The hen with her body will provide them with all the heat they need to form. It is during this period that the hen is said to be broody.

Hen will follow her instinct to hatch eggs, she lies down even if the nest is empty, or she is incubating unfertilized eggs, sometimes she will lie longer than the 21 days that it takes for a chick to be born. If this happen, you need to remove her from the hatching pan into another place, day after day until it is over.

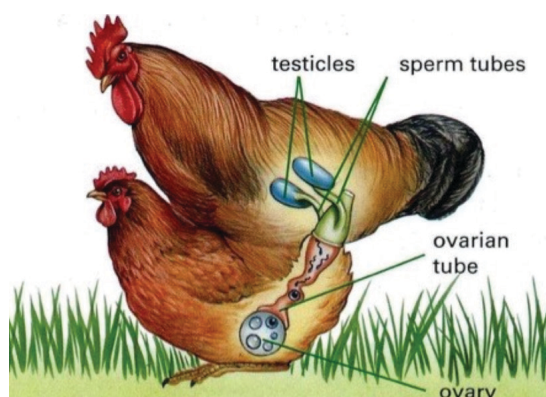


Figure 17. Chicken reproduction, photo: Bitching chicken

6. Hatching pans & Broody Hens

A broody Hen is a hen that is ready to lay eggs and sit on them and wants her eggs to hatch.

In villages, hens start to lay eggs when they are about 5–6 months of age. Malnutrition or poor health condition in growers will result in the birds starting to lay later and producing fewer eggs. It is estimated that, under scavenging conditions, the reproductive cycle of indigenous hens consists of 20-days of lying phase, 21-days of incubation phase and 56-days of brooding phase (Alemu and Tadelle, 1997).



Figure 18. Hatching pan, photo: The Water Channel

If your hen has nestled down far from the rest of the flock, she still needs to eat. Broody hens leave their nests at least once a day to relieve themselves and eat. Providing feed nearby will ensure that she does not need to leave to eat and will not lose weight. A hen who has nested can lose up to half of their weight if they don't have food close by. With a hatching pan you will combine a comfortable place for the chicken to hatch its eggs with two small containers—one for water and one for food. Thus, the hen always has food and water at hand. This keeps it from foraging around to satisfy its hunger and quench its thirst and neglect its eggs in the process. The hatching pan has been seen to double the number of eggs that are successfully hatched.

Just make sure it isn't in a place that will attract predators, or you may put your hen at risk once again. The best place is in a quiet place.

What is a hatching pan?

The hatching pan is a simple innovation that can take many forms as long as there is a safe nesting place for the chicken and 2 containers for food and water. The hatching pan can be produced from local materials such as mud, clay, recycled wood and/or plastic. The production of hatching pans is another potential livelihood option for poultry keepers. When building the pans, it is important that to consider the size and shape of the nesting area to be a comfortable fit for the chickens. The two containers should also be able to hold at least one day's worth of food and water. Chickens also appreciate a bit of bedding in the pan which can be prepared by mixing some ash, straw, and naphthalene (if available) – this will ensure the eggs are well insulating and the hen is comfortable.

7. Candling eggs

Chicken farmers use candling to learn which of their chicken's eggs are fertile and will hatch into baby chicks. Candling can also be used to tell if a fertilized egg has stopped developing. The candling process works by illuminating the interior of an egg, so you can see what is inside the shell. In a dark room with a lamp or a candle place hold the egg in front of the light with your hand, be careful not to burn your hand or the egg. You will notice the light passes through the egg and you will be able to see what is happening inside.

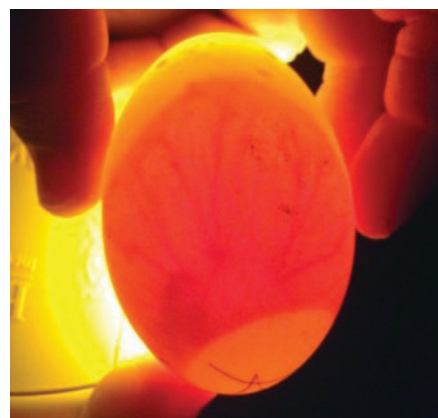


Figure 19. A candled egg.
Photo: Museums Dorf

Hatching egg are temperature sensitive, do not keep them away from the hen for longer than 20 minutes.

After day seven it will be easier to candle the eggs, because you should be able to see the developing embryo and distinguish between good and bad eggs. You can candle the egg one more time at around day 14, be careful not to rotate or shake the egg too much when doing this! After the 17 day, you should not move the egg anymore because those are the days close to hatching.

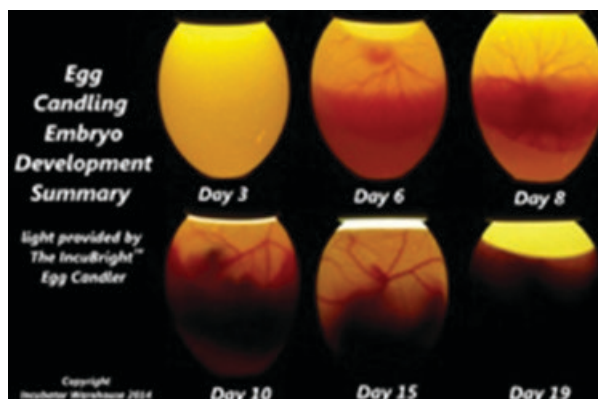


Figure 20. Stages of chicken embryo development. Photo: Incubator warehouse 2014

Distinguishing the three

Winner

is an egg with a successful developing of an embryo, with a candle you can see:

- Very visible network of blood vessel spreading.
- With a good candling you may see the dark top half of the egg where the embryo is developing.
- Sometimes you can see the embryo is moving.

Yolker

is an egg that is not fertile

- You will see very clear inside of the egg; it has not changed since the first day you checked it.

Quitters

are eggs that have stopped developing at some point during the incubation process

- You can see a blood ring, and it looks like a defined red circle which is visible on the inside of the shell.

When you have identified yolkers and quitters during the incubation process you need to remove them, they will rot and contaminate other eggs with bacteria and a will smell bad.

Disease

To keep your flock healthy is very important to feed them well with a balanced combination of vitamins, minerals and proteins and keeping good hygiene. Chicken will become more resistant to disease by introducing additional onion and garlic to their water and diets to help them to build a strong immune system. However, be aware about the areas you have your poultry and what are threats to them, and what kind of vaccination, medicine and diseases treatment they will need. If you are living in a place where there are different birds or farmland, you may need to use additional local vaccination for your poultry. The control of many viral, bacterial, and parasitic diseases is essential for efficient poultry production. The demand for vaccination and disease susceptibility depend largely on its origin. For example, indigenous chicken like Local Horro and Tepi “have better natural immunity against common poultry diseases,” while exotic chicken like Hubbard JV and Koekoek do not, and therefore have a higher demand for vaccination and susceptibility to disease (Dana). Commercial layer and broiler flock are routinely vaccinated against common diseases found in the country. However, most indigenous chickens are not vaccinated except in areas where special programmes have been run that show the farmers the value of protecting birds from disease and the ensuing increases in productivity. However, vaccine packaging in large (up to 1,000) multi-dose vials, are not cost-effective for small producers, and a lack of veterinary service or an organized village level delivery system are major barriers to implementing vaccination for economically important poultry diseases in village chickens. However vaccination is an essential element to maintaining flock health and advice should always be sought from local veterinarians or extension workers about the availability of vaccinations.

In Ethiopia there is not much data about Highly Pathogenic Avian Influenza (HPAI)

Type off illness	Disease/Infection name (English)	Prevalence	Prevention/ treatment
Viral	Newcastle disease (ND)	44%	Vaccine
	Infectious bursal disease (IBD)	41%	Vaccine
	Marek's disease (MD)	34%	Vaccine
	Infectious Bronchitis	94.5%	Vaccine
Parasitic	Avian coccidiosis	37%	Vaccine. Keep coop clean and dry
	Helminth infestation	62%	Keep coop clean.
	Ecto-parasite infestation	50%	Dust/spray treatment*
	Toxoplasmosis	19%	Control rodents. Keep coop clean.
Bacterial	Salmonella infestation	51%	Keep coop clean.
	Campylobacter infection	71%	Keep coop clean. Antibiotic treatment.
	Chronic Respiratory Disease	47%	Keep coop clean. Antibiotic treatment.
	Fowl Cholera	4%	Vaccine
	Avian tuberculosis	45.1%	Difficult to treat**
	Listeria infection	54.2%	Antibiotic treatment.
	Staphylococcus Infection	22.4%	Keep coop clean. Antibiotic treatment.
	Escherichia coli infections	/	Keep coop clean and dry. Antibiotic treatment.

*Diatomaceous earth kills soft-bodied parasites ex. Lice (do not let the bird breathe this irritant), dried turmeric and neem bark powder is also effective. Using essential oils and soap or oil applied to the birds' feet can also help.

**Consider disposing of entire flock to prevent spread/human transmission

1. Isolation

Isolation of premises and poultry from sources of infection. This would include such practices as keeping different bird species separately; preventing exposure of birds to potential sources of disease; preventing introduction of new birds from live bird markets or neighbours into an old flock; quarantining new birds for a period of time before letting them join an older flock; quarantines in the event of a disease outbreak in a farm.

1. In a case a chicken is sick you have to separate from the rest of the chicken to avoid making the other chicken sick. Place the sick chicken in a quarantine until she gets better,
2. Infectious diseases, such as Newcastle disease, salmonellosis, fowl cholera, coccidiosis and fowl pox, are the major causes of morbidity and mortality in village poultry in Ethiopia.

Sources:

- <https://thepoultrysite.com/articles/moulting-a-natural-process>
- <https://edepot.wur.nl/185048>
- <http://www.fao.org/livestock/AGAP/frg/conf96.htm/tadelle.htm>
- <https://aciar.gov.au/publication/books-and-manuals/improving-village-chicken-production-manual-field-workers-and-trainers>
- [http://cpdobbser.in/cpdobbser/\(S\(juz3xu0o3reqdoq0svp013ix\)\)/pdf/Poultry_management_guide.pdf](http://cpdobbser.in/cpdobbser/(S(juz3xu0o3reqdoq0svp013ix))/pdf/Poultry_management_guide.pdf)
- <https://extension.unh.edu/resource/brooding-and-caring-chicks>
- <https://bitchinchickens.com/2020/07/20/case-study-mareks-disease/>
- <https://www.lrrd.cipav.org.co/lrrd15/11/deme1511.htm>
- <https://the-chicken-chick.com>
- <http://www.fao.org/3/a-al838e.pdf>
- <https://en.engormix.com/poultry-industry/articles/status-of-indigenous-village-chicken-production-poultry-production-in-ethiopia-t35476.htm>
- <https://www.raising-happy-chickens.com>
- <http://ecochickspoultry.com/poultry-breeding-hatching-and-brooding/>
- <https://ch4d.wordpress.com/2015/05/26/chicken-health-and-production-constraints-in-ethiopia/>
- https://www.worldfoodprize.org/documents/filelibrary/images/youth_programs/2012_interns/LagozeLucy_185A1D3EC1E78.pdf
- <https://bnrc.springeropen.com/articles/10.1186/s42269-019-0061-6>
- <https://bnrc.springeropen.com/articles/10.1186/s42269-019-0061-6>
- <https://seleccionesavicolas.com/avicultura/2017/11/reproduccion-de-las-gallinas-ponedoras>
- <https://thewaterchannel.tv/thewaterblog/broody-the-essential-art-of-hatching/>
- http://www.ruralfinanceandinvestment.org/sites/default/files/1128086041346_Egg_marketing___a_guide_for_the_producti275682694.pdf
- <https://timbercreekfarmer.com/keeping-your-chicken-coop-smelling-fresh/>

Additional Reading

- Ahuja, V., Dhawan, M., Punjabi, M. and Maarse, L. 2008a. Chickening out of Poverty? Story of 'Kuroiler' from India. Presented at International Conference:
- Ahuja, V., Dhawan, M., Punjabi, M. and Maarse, L. 2008b. Poultry based livelihoods of rural poor: Case of Juroiler in West Bengal. Report from the South Asia Pro Poor Livestock Policy Programme. (Available online: http://www.drcsc.org/VET/library/Animal/Bk--Poultry_Based_Livelihoods.pdf)
- FAO. 2010a. Chicken genetic resources used in smallholder production systems and opportunities for their development, by P. Sørensen. FAO Smallholder Poultry Production Paper No. 5. Rome.
- Magothe, T.M., Okeno, T.O., Muhuyi, W.B. and Kahi, A.K., 2012. Indigenous chicken production in Kenya: I. Current status. *World's Poultry Science Journal*, 68(1), pp.119-132.
- MAGOTHE, T.M., MUHUYI, W.B. and KAHIL, A.K. (2010b) Genetic parameters for egg and body weights of indigenous chicken in Kenya. Proceedings of the Animal Production Society of Kenya annual symposium, 20-22 April 2010, Garissa, Kenya.
- Ndegwa, J.M., Mead, R.R., Norrish, P., Shepherd, D.D., Kimani, C.W. and Wachira, A.M., 2012. Growth characteristics of six reciprocal crosses of Kenyan indigenous chicken. *Journal of Agricultural Science*, 4(6), p.160.
- Safalaoh, A.C.L., 2001. Village chicken upgrading programme in Malawi. *World's Poultry Science Journal*, 57(2), pp.179-188.
- TADELLE, D., ALEMU, Y. and PETERS, K.J. (2000) Indigenous chickens in Ethiopia: genetic potential and attempts at improvement. *World's Poultry Science Journal* 56: 45-54.
- BETT, H.K., BETT, R.C., PETERS, K.J., KAHIL, A.K. & BOKELMANN, W. (2011a) Estimating farmers' preferences in selection of indigenous chicken genetic resources using non-market attributes. *Animal Genetic Resources*, 49: 51–63.
- Okeno, T.O., Kahi, A.K. and Peters, K.J., 2013. Evaluation of breeding objectives for purebred and crossbred selection schemes for adoption in indigenous chicken breeding programmes. *British poultry science*, 54(1), pp.62-75.
- Jensen, H.A. 2000. Structures for improving smallholder production in Bangladesh breeding strategy. In: In S. Galal, J. Boyazoglu & K. Hammond, eds. Workshop on developing breeding strategies for lower input animal production environments. ICAR Technical Series No.3. Rome, pp395-407. International Committee for Animal Recording. Available at agtr.ilri.cgiar.org/documents/Library/docs/tec_series_03_bella.pdf.
- Jensen, H.A. 2001. Replication of the Bangladesh Smallholder Poultry Model. Case from Malawi. Available at <http://www.poultry-development.dk/document/Replication%20Malawi.DOC>

- Jensen, H.A. and Dolberg, F. 2013. A Conceptual Framework for using Poultry as a Tool in Poverty Alleviation. The Bangladesh model and other experiences in family poultry development. International Network for Family Poultry Development (INFPD) Conference. FAO, Rome. Available at <http://www.fao.org/docrep/019/aq634e/aq634e.pdf>
- Saleque, A. 2000. Scaling-up: The BRAC Poultry Model in Bangladesh. In: F. Dolberg and P. H. Petersen (eds.) Poultry as a Tool in Poverty Eradication and Promotion of Gender Equality. Proceedings of a workshop, March 22-26, 1999, Tune Landboskole, Denmark. <http://www.husdyr.kvl.dk/htm/php/tune99/5-Saleque.htm>
- Ahmed, N. 2000. The smallholder poultry model in Bangladesh. In: G. Pedersen, A. Permin, and U. M. Minga (eds.) Possibilities for smallholder poultry projects in Eastern and Southern Africa. Network for Smallholder Poultry Development, Copenhagen. www.poultry.kvl.dk
- Sonaiya, E.B. 2003. Village poultry and its role in rural Africa, pp16-30. Paper presented at the 1st National 'Workshop on Indigenous Poultry Development, Nature and Development Group of Africa (NGO Registration No. 026-851-NPO).
- Sonaiya, E. B. and Swan, S. E. J. 2004. Small-Scale Poultry Production: technical guide. Food Agricultural Organization, Animal Production and Health Series No. 1, Rome.
- Wondmeneh, E., Dawud, I. and Adey, M. 2011. Comparative evaluation of fertility and hatchability of Horro, Fayoumi, Lohmann Silver and Potchfstroom Koekoek breeds of chicken. Asian Journal of Poultry Science 5(3): 124-129.
- Dolberg, F. 2001. A livestock development approach that contributes to poverty alleviation and widespread improvement of nutrition among the poor, Livestock Research for Rural Development, Vol 13, No 5 (Available at <http://www.cipav.org.co/lrrd/lrrd13/5/dolb135.htm>)
- Dolberg, F. 2003. The Review of Household Poultry Production as a Tool in Poverty Reduction with a Focus on Bangladesh and India [Online]. Italy [Rome]. FAO. Available at <http://www.fao.org/ag/againfo/projects/es/pplpi/docarc/wp6.pdf>
- Roothaert, R.L., Ssalongo, S. & Fulgensio, J. 2011. The Rakai chicken model: an approach that has improved fortunes for Ugandan farmers. International Journal of Agricultural Sustainability, 9: 222–231.
- Grobbelaar, J.A.N. 2008. Egg production potentials of four indigenous chicken breeds in South Africa. Pretoria, Tshwane University of Technology. (M.Tech.thesis).
- Grobbelaar, J.A.N., Sutherland. B., Molalagotla, N.M. 2010. Egg production potentials of certain indigenous breeds from South Africa. Animal Genetic Resources 46: 25-32

